J&D SPRINKLER COMPANY, INC.

315 WEST MAIN STREET, CLAYTON, NC 27520

WWW.JDSPRINKLER.COM

OFFICE: 919.553.2356 FAX: 919.359.0622

EMERGENCY AFTER HOURS: 919.631.6088

05/10/2023

RE: The Springs Of Ballentine

40 Rawls Club Road
Fuquay-Varina, NC
Mr. Taylor,

The following is a response letter for the above referenced projects review comments of May 09, 2023.

Comment 1: Point of compass is re uired per NFPA 13, Chapter 23, section 23.1.3 #3.
Response 1: Point of compass has been added to Site Plan on FP-1.

Comment 2: Provide full height cross section, or schematic diagram, including structural member information per NFPA 13, Chapter, Section 23.1.3 #4.
Response 2: Full height cross section now included on page FP-2.

Comment 3: Are there any small enclosures in which no sprinklers are to be installed (near Apothecary 176 & Servery 159).
Response 3: No.

Comment 4: City main in street and whether dead end or circulating if dead end, direction and distance to nearest circulating main and city main test results and system elevation relative to test hydrant per NFPA 13, Chapter 23, Section 23.1.3 #10.
Response 4: City main circulates with Hwy 401 UG Main & Rawls Church Rd UG Main. Lengths to circulating mains are now noted on Site Plan on FP-1 as well as elevations relative to Sea Level. Labels noting the Test & Flow Hydrants utilized during J&D Sprinklers water test have been added.

Comment 5: Provide total area protected by each system on each floor per NFPA 13, Chapter 23, Section 23.1.3 #14.
Response 5: Total area protected by Sprinkler System is now noted under the "Sprinkler Design Data" section on FP-1.

J&D SPRINKLER COMPANY, INC.

315 WEST MAIN STREET, CLAYTON, NC 27520

WWW.JDSPRINKLER.COM

OFFICE: 919.553.2356 FAX: 919.359.0622

EMERGENCY AFTER HOURS: 919.631.6088

Comment 6. The head count for the Victaulic V3506 appears to not match the plans (too low). This may also impact Viking head VK3021.
Response 6. Sprinkler head legend has been updated to accurately reflect the head count.

Comment 7. The sprinkler head outside rear entry near Electrical Room 169 appears to not be the correct symbol for the intended head.
Response 7. Sprinkler head symbol has been corrected to reflect a Dry Flex Pendent Sprinkler (V3506).

Comment 8. The symbol for heads provided in Activity 162 & Lobby 110 are not listed in the Sprinkler head legend.
Response 8. Sprinkler head legend has been corrected & now reflects VK3021 Semi-Recessed Pendents.

Comment 9. Provide cut sheets for inspectors test connections per NFPA 13, Chapter 23, Section 23.1.3 #23.
Response 9. Spec sheets for inspectors test included in Submittal Documents.

Comment 10. Show location of the inspectors test valve on the plan view.
Response 10. Location of Inspectors test valve now shown in Mech Room 168 (Riser Room).

Comment 11. Provide cut sheets & location for alarm bells per NFPA 13, Chapter 23, section 23.1.3 #26.
Response. Spec sheets are now included in submittal package. Alarm bell now reflected on page FP-1 in Riser Detail & outside Mech Room 168 (Riser Room).

Comment 12. Provide material & weights with regard to to point of connection to city main, types and locations of valves, valve indicators, regulators, meters & valve pits & the depth that the top of pipe is laid below grade per NFPA 13, Chapter 23, Section 23.1.3 #39.
Response 12. Gate valves are now noted on Underground piping. Underground piping elevations are now noted relative to Sea Level.

J&D SPRINKLER COMPANY, INC.

315 WEST MAIN STREET, CLAYTON, NC 27520

WWW.JDSPRINKLER.COM

OFFICE: 919.553.2356 FAX: 919.359.0622

EMERGENCY AFTER HOURS: 919.631.6088

Comment 13. Provide provisions for flushing the underground private main per NFPA 13, Chapter 23, Section 23.1.3 #28.
Response 13.Proposed Fire hydrant downstream of Backflow preventer.

Comment 14. Provide calculations of loads of loads for sizing and details of any sway bracing per NFPA 13, Chapter 23, Section 23.1.3 #41.
Response 14. Seismic Design Category = B. No Seismic Design required for this project.

Comment 15. Provide cut sheets for the wet & dry system pressure gauges.
Response 15. Specs for Wet system gauges included in Submittal Package. There is no proposed dry system for this project.

Comment 16. Provide cut sheets for Backflow Preventer per NFPA 13, Chapter 23, Section 23.1.3 #39.
Response 16. Specification sheets included in Submittal Package.

Comment 17. Provide size & location of fire hydrants, showing size & number of outlets. Static & Residual hydrants were used shall be shown that were used in water flow test per NFPA 13, Chapter 23, Section 23.1.3 # 43.
Response. Hydrant size, location, number of outlets & role in water test is now noted on page FP-1 under Site Plan.

Comment 18.Provide cut sheets to include size, location & piping arrangement of the remote fire department connection (FDC) per NFPA 13, Chapter 23, Section 23.3.1 #44.
Response Specification sheet for Storz Fire Department Connection included in Submittal Package. Piping arrangement & Location is noted on page FP-1 under Site Plan & Riser Details.

J&D SPRINKLER COMPANY, INC.

315 WEST MAIN STREET, CLAYTON, NC 27520

WWW.JDSPRINKLER.COM

OFFICE: 919.553.2356 FAX: 919.359.0622

EMERGENCY AFTER HOURS: 919.631.6088

Note: J&D Sprinkler Company begins our installation at 1'-0 AFF. Any design or installation of underground piping, fittings or valves are outside of the scope of work of the Fire Sprinkler contractor for this project.

If you should have any questions or further comments please feel free to contact us.

Thank you,

Travis Curry
Design Department
J&D Sprinkler
919-553-2356

J&D SPRINKLER CO., INC.
Fire Protection - Est. 1986

315 W Main St,
Clayton, NC 27520

(919) 553-2356

WWW.JDSPRINKLER.COM

THE SPRINGS OF BALLENTINE

FUQUAY-VARINA

NORTH CAROLINA

SUBMITTAL DATA

HYDRAULIC CALCULATIONS

Hydraulic Overview

Job Number: F23007
Report Description: Light Hazard (A)

Job

Job Number: F23007	Designer: TWC
Job Name: THE SPRINGS OF BALLENTINE	Phone: 919-553-2356 FAX:
Address 1: 40 RAWLS CLUB RD	State Certification/License Number: 16269FS
Address 2: FUQUAY-VARINA, NC 27526	AHJ:
Address 3:	Job Site/Building:

System

Density: 0.10 gpm/ft²	Area of Application: 1500 ft² (Actual 1343 ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 100.00
Coverage Per Sprinkler: 88 ft²	Number Of Sprinklers Calculated: 18 0
System Pressure Demand: 60.001	System Flow Demand: 302.08
Total Demand: 402.08 @ 60.001	Pressure Result: +35.564 (37.2%)

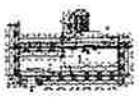
Supplies

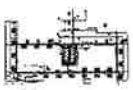
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

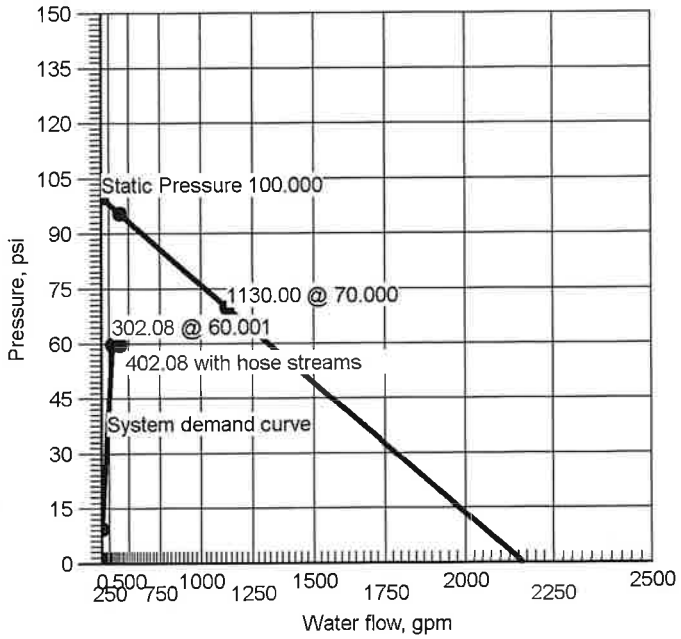
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR (15)	45.506	44.78	302.08

SPRINGS BALLENTINE FP





Water Supply at Node 19 (1130.00, 0.00, 100.000, 70.000)



Hydraulic Calculations

for

Project Name: THE SPRINGS OF BALLENTINE
Location: 40 RAWLS CLUB RD, FUQUAY-VARINA, NC 27526,
Drawing Name: SPRINGS BALLENTINE FP

Calculation Date: 5/15/2023

Design

Remote Area Number:	A
Occupancy Classification:	Light Hazard
Density	0.10 gpm/ft²
Area of Application:	1500 ft² (Actual 1343 ft²)
Coverage per Sprinkler:	88 ft²
Type of sprinklers calculated:	Upright
No. of sprinklers calculated:	18
No. of nozzles calculated:	0

In-rack Demand:	N/A gpm	at Node:	N/A		
Hose Streams:	100.00	at Node:	19	Type:	Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 19: 402.08 @ 60.001 (Safety Margin = 35.564)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherA N/A

Name of Contractor:
Address:
Phone Number:
Name of designer: TWC
Authority Having Jurisdiction:

Notes:

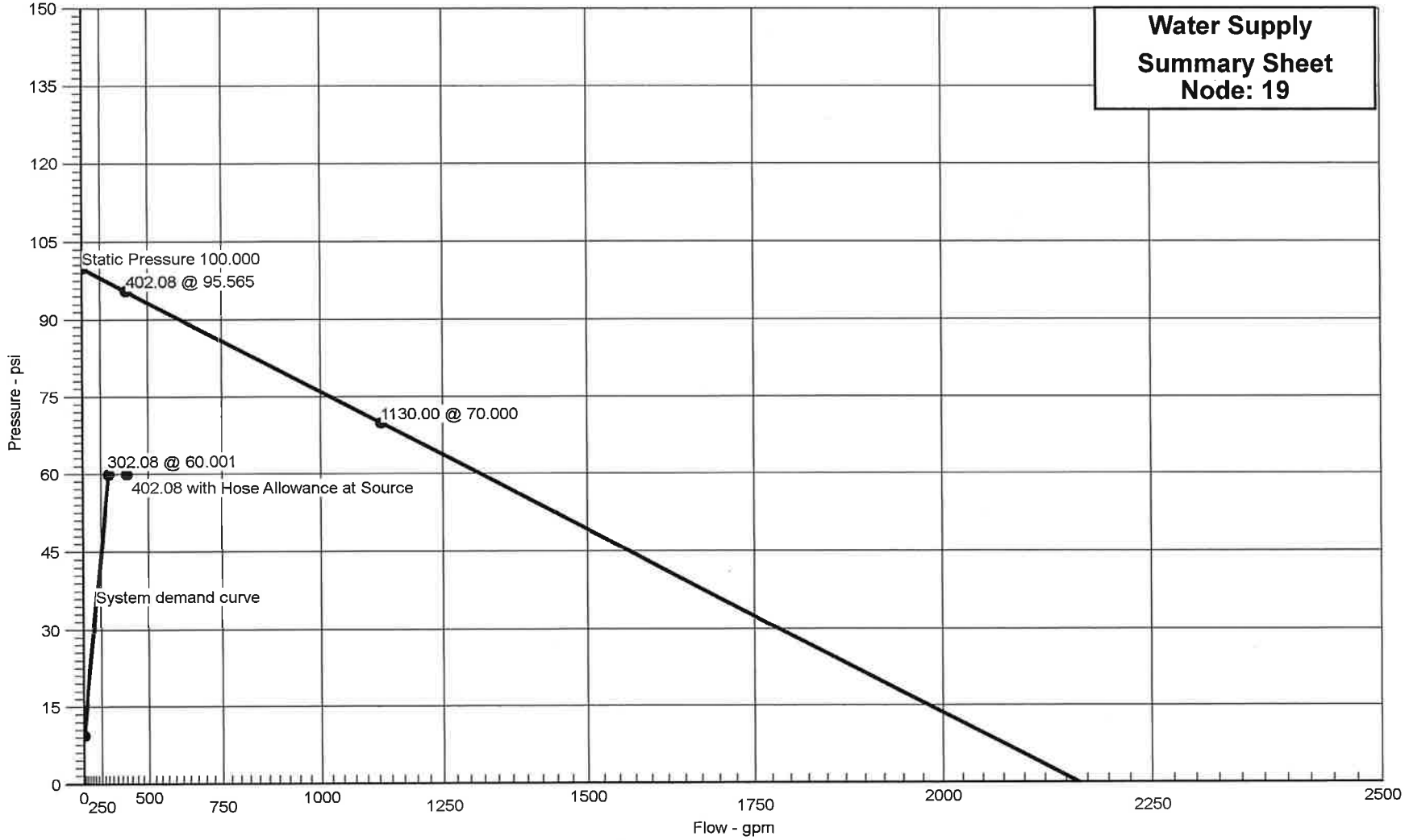
Automatic peaking results Left: 60.001 Right: 60.001

Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: A

$N^{1.85}$

Date: 5/15/2023

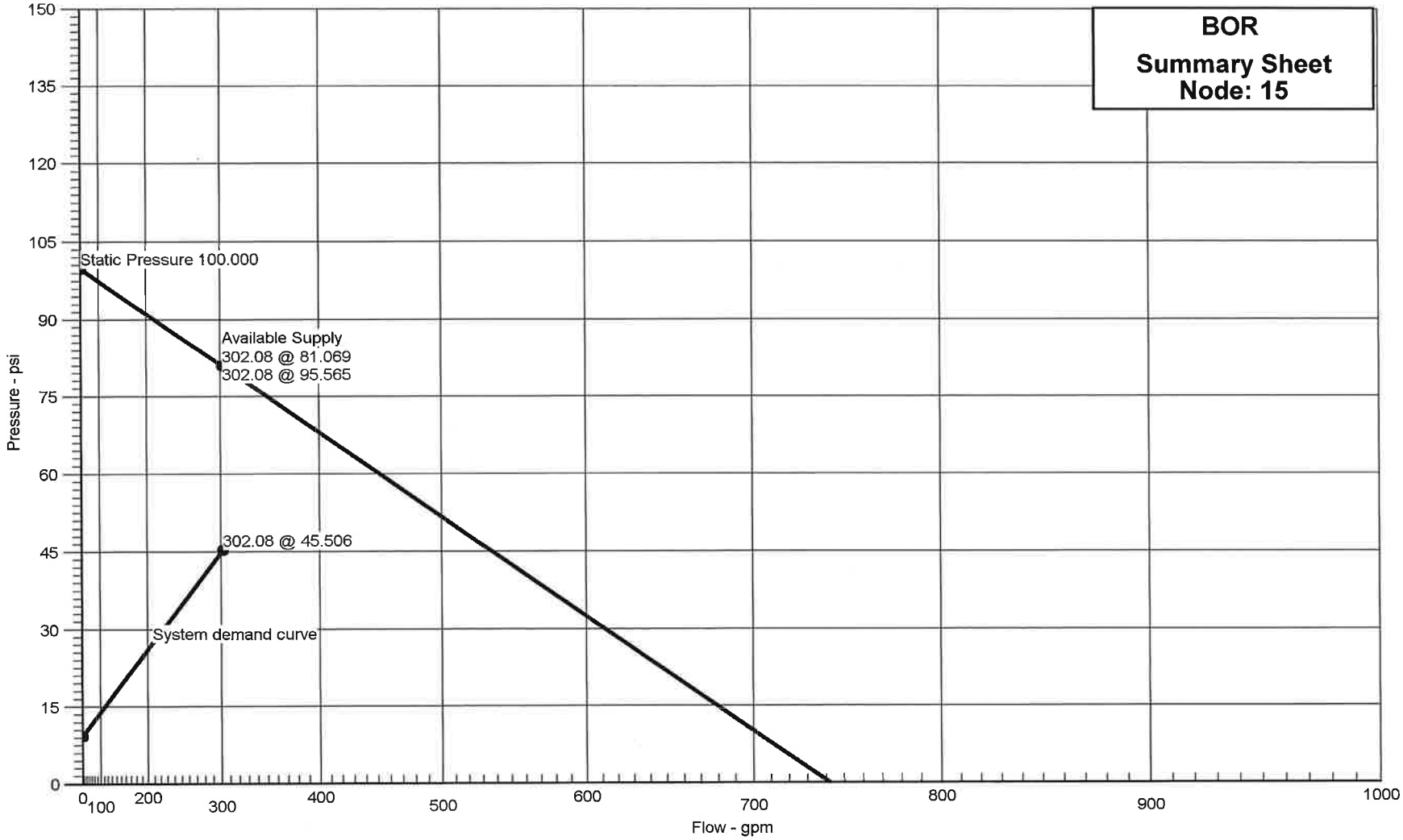


Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: A

$N^{1.85}$

Date: 5/15/2023



Summary Of Outflowing Devices

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
⇨ **Sprinkler**	**101**	**14.82**	**8.80**	**5.6**	**7.000**			
Sprinkler	102	14.93	8.80	5.6	7.106			
Sprinkler	103	15.31	8.80	5.6	7.477			
Sprinkler	104	15.77	8.80	5.6	7.928			
Sprinkler	105	16.88	8.80	5.6	9.087			
Sprinkler	106	16.89	8.80	5.6	9.095			
Sprinkler	107	16.90	8.80	5.6	9.111			
Sprinkler	108	16.91	8.80	5.6	9.115			
Sprinkler	109	16.98	8.80	5.6	9.193			
Sprinkler	110	17.07	8.80	5.6	9.286			
Sprinkler	111	17.07	8.80	5.6	9.294			
Sprinkler	112	17.13	8.80	5.6	9.361			
Sprinkler	113	17.24	8.80	5.6	9.473			
Sprinkler	114	17.26	8.80	5.6	9.502			
Sprinkler	115	17.51	8.80	5.6	9.771			
Sprinkler	116	17.53	8.80	5.6	9.800			
Sprinkler	117	17.90	8.80	5.6	10.219			
Sprinkler	118	17.99	8.80	5.6	10.322			

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
19	Water Supply	100.000	70.000	1130.00	95.565	402.08	60.001

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	1'-0	Supply	60.001	302.08	
101	22'-11½	Sprinkler	7.000	14.82	
102	22'-11½	Sprinkler	7.106	14.93	
103	21'-9½	Sprinkler	7.477	15.31	
104	21'-9½	Sprinkler	7.928	15.77	
105	18'-1½	Sprinkler	9.087	16.88	
106	18'-4	Sprinkler	9.095	16.89	
107	18'-1½	Sprinkler	9.111	16.90	
108	18'-4	Sprinkler	9.115	16.91	
109	18'-1½	Sprinkler	9.193	16.98	
110	18'-4	Sprinkler	9.286	17.07	
111	18'-1½	Sprinkler	9.294	17.07	
112	18'-1½	Sprinkler	9.361	17.13	
113	18'-1½	Sprinkler	9.473	17.24	
114	18'-4½	Sprinkler	9.502	17.26	
115	18'-1½	Sprinkler	9.771	17.51	
116	18'-4½	Sprinkler	9.800	17.53	
117	18'-1½	Sprinkler	10.219	17.90	
118	18'-4½	Sprinkler	10.322	17.99	

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	17'-8		10.465		
2	17'-8		10.587		
3	17'-8		10.735		
4	17'-8		10.988		
5	17'-8		11.860		
6	17'-8		15.148		
8	10'-0		26.629		
9	10'-0		27.315		
10	10'-0		28.703		
11	10'-0		30.099		
12	20'-0		25.996		
13	20'-0		26.564		
14	10'-0		40.476		
15	1'-0	Gauge	45.506		
16	-3'-0		47.279		
17	1'-0		46.694		
18	1'-0		59.854		
20	17'-8		10.424		
21	17'-8		10.320		
22	17'-8		10.347		
23	17'-8		10.438		
24	17'-8		10.623		
25	17'-8		10.760		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
26	17'-8		10.493		
27	17'-8		10.549		
28	17'-8		10.747		
29	17'-8		11.077		
30	17'-8		11.571		
31	17'-8		11.874		
32	17'-8		10.320		
33	17'-8		10.415		
34	10'-0		30.478		
35	10'-0		30.826		
36	10'-0		30.839		
37	10'-0		30.841		
38	10'-0		30.841		
39	10'-0		31.181		
40	10'-0		31.469		
41	10'-0		31.524		
42	10'-0		31.755		
43	10'-0		31.788		
44	10'-0		32.133		
45	10'-0		30.814		
46	10'-0		30.887		
48	10'-0		30.449		
49	10'-0		30.513		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
50	10'-0		30.700		
51	10'-0		30.746		
52	10'-0		30.459		
53	20'-0		26.170		
54	20'-0		26.521		
55	10'-0		30.460		
56	10'-0		30.472		
57	10'-0		30.477		
58	10'-0		30.866		
59	10'-0		30.867		
60	10'-0		30.867		
61	10'-0		30.874		
62	10'-0		30.873		
64	10'-0		30.196		
65	17'-8		10.419		
66	10'-0		30.158		
67	10'-0		30.888		
68	10'-0		30.901		
69	10'-0		30.905		
70	10'-0		30.869		
71	10'-0		31.025		
72	10'-0		28.863		
76	10'-0		30.838		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
81	10'-0		30.830		
83	10'-0		30.825		
85	10'-0		30.114		
86	10'-0		30.127		
87	10'-0		30.130		
88	20'-0		27.704		
90	10'-0		34.694		
91	10'-0		34.700		
96	10'-0		30.410		
100	10'-0		30.413		
119	10'-0		30.112		
123	10'-0		30.425		
124	10'-0		30.482		
125	10'-0		30.063		
126	10'-0		30.065		
127	10'-0		30.067		
128	10'-0		30.082		
129	10'-0		30.086		
130	10'-0		30.098		
131	10'-0		30.098		
132	10'-0		30.099		
133	10'-0		30.063		
134	10'-0		30.063		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
135	10'-0		30.063		
136	10'-0		30.098		
747	10'-0		30.410		
1119	10'-0		30.129		

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
101	22'-11½	5.6	14.82	1	(See Notes)	6'-9½	120	7.000	• • • • • Route 1 • • • • •
1	17'-8		14.82	1.0490		9'-0 15'-9½	0.074703	2.287 1.178	Sprinkler, 2E(2'-0), PO(5'-0)
1	17'-8		27.04	2		8'-0	120	10.465	Flow (q) from Route 3
2	17'-8		41.86	2.1570		8'-0	0.015245	0.122	
2	17'-8		14.93	2		5'-6	120	10.587	Flow (q) from Route 2
3	17'-8		56.79	2.1570		5'-6	0.026802	0.147	
3	17'-8		15.77	2		6'-0	120	10.735	Flow (q) from Route 4
4	17'-8		72.56	2.1570		6'-0	0.042173	0.253	
4	17'-8		17.53	2	(See Notes)	1'-6½ 12'-3½	120 0.062939	10.988	Flow (q) from Route 16 T(12'-3½)
5	17'-8		90.09	2.1570		13'-10½		0.872	
5	17'-8		86.93	2	(See Notes)	2'-8 12'-3½	120 0.219595	11.860	Flow (q) from Route 5 T(12'-3½)
6	17'-8		177.02	2.1570		14'-11½		3.288	
6	17'-8		125.07	2	(See Notes)	7'-8 6'-2	120 0.590244	15.148 3.324	Flow (q) from Route 6 E(6'-2)
8	10'-0		302.08	2.1570		13'-10		8.157	
8	10'-0			3		8'-8	120	26.629	
9	10'-0		302.08	3.2600		8'-8	0.078979	0.686	
9	10'-0			3	(See Notes)	8'-3½ 20'-2	120 0.048809	27.315	T(20'-2)
10	10'-0		232.89	3.2600		28'-5½		1.388	
10	10'-0			3		100'-0½	120	28.703	
132	10'-0		118.32	3.2600		100'-0½	0.013946	1.395	
132	10'-0		3.54	3		0'-0	120	30.099	Flow (q) from Route 31
11	10'-0		121.86	3.2600		0'-0	0.014728	0.000	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
11	10'-0			3		2'-0	120	30.099	
119	10'-0		79.36	3.2600		2'-0	0.006661	0.013	
119	10'-0			2	(See Notes)	10'-0	120	30.112	PO(12'-3½)
12	20'-0		32.91	2.1570		12'-3½ 22'-3½	0.009769	-4.333 0.218	
12	20'-0			2	(See Notes)	60'-10½	120	25.996	T(12'-3½)
13	20'-0		25.76	2.1570		30'-9 91'-7½	0.006212	-0.002 0.569	E(6'-2), T(12'-3½)
13	20'-0		7.40	2	(See Notes)	90'-5½	120	26.564	T(12'-3½), Flow (q) from Route 20
88	20'-0		33.17	2.1570		24'-7½ 115'-1	0.009912	1.140	T(12'-3½)
88	20'-0		29.33	2	(See Notes)	58'-4	120	27.704	Flow (q) from Route 24
90	10'-0		62.50	2.1570		24'-7½ 82'-11	0.032004	4.335 2.654	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	34.694	
91	10'-0		62.50	3.2600		1'-4½	0.004282	0.006	
91	10'-0		239.58	3	(See Notes)	44'-11	120	34.700	Flow (q) from Route 19
14	10'-0		302.08	3.2600		28'-2½ 73'-1½	0.078979	5.776	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	40.476	
15	1'-0		302.08	4.2600		44'-9 52'-7	0.021461	3.902 1.128	f, sCV(28'-11½), BV(15'-9½), BOR
15	1'-0			6	(See Notes)	4'-0	120	45.506	
16	-3'-0		302.08	6.3570		8'-9½ 12'-9½	0.003055	1.734 0.039	EE(8'-9½)
16	-3'-0			6	(See Notes)	358'-0½	140	47.279	
17	1'-0		302.08	6.2800		113'-5½ 471'-6½	0.002438	-1.734 1.149	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	1'-0			6	(See Notes)	12'-0	120	46.694	
18	1'-0		302.08	6.3570		40'-3 52'-3	0.003055	13.160	2LtE(11'-4), BFP(-13.000), E(17'-7)

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
18	1'-0			6	(See Notes)	13'-2	140	59.854	
						47'-3½	0.002438		
19	1'-0		302.08	6.2800		60'-5		0.147	S, T(47'-3½)
			100.00					60.001	Hose Allowance At Source
19			402.08						Total(Pt) Route 1
102	22'-11½	5.6	14.93	1	(See Notes)	6'-9½	120	7.106	• • • • • **Route 2** • • • • •
						9'-0	0.075745	2.287	Sprinkler,
2	17'-8		14.93	1.0490		15'-9½		1.195	2E(2'-0), PO(5'-0)
								10.587	Total(Pt) Route 2
103	21'-9½	5.6	15.31	1	(See Notes)	5'-7½	120	7.477	• • • • • **Route 3** • • • • •
						9'-0	0.079399	1.786	Sprinkler,
20	17'-8		15.31	1.0490		14'-7½		1.161	2E(2'-0), PO(5'-0)
20	17'-8		11.73	2		6'-1	120	10.424	Flow (q) from Route 10
							0.006794		
1	17'-8		27.04	2.1570		6'-1		0.041	
								10.465	Total(Pt) Route 3
104	21'-9½	5.6	15.77	1	(See Notes)	5'-1½	120	7.928	• • • • • **Route 4** • • • • •
						7'-0	0.083824	1.790	Sprinkler,
3	17'-8		15.77	1.0490		12'-1½		1.017	E(2'-0), PO(5'-0)
								10.735	Total(Pt) Route 4
105	18'-1½	5.6	16.88	1	(See Notes)	1'-11½	120	9.087	• • • • • **Route 5** • • • • •
						9'-0	0.095094	0.193	Sprinkler,
21	17'-8		16.88	1.0490		10'-11½		1.041	2E(2'-0), PO(5'-0)
21	17'-8		1.77	2		8'-0	120	10.320	Flow (q) from Route 8
							0.003416		
22	17'-8		18.65	2.1570		8'-0		0.027	
22	17'-8		16.90	2		8'-0	120	10.347	Flow (q) from Route 7
							0.011271		
23	17'-8		35.55	2.1570		8'-0		0.090	
23	17'-8		16.98	2		8'-0	120	10.438	Flow (q) from Route 9
							0.023206		
24	17'-8		52.53	2.1570		8'-0		0.186	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
24	17'-8		17.13	2		3'-6	120	10.623	Flow (q) from Route 12
25	17'-8		69.67	2.1570		3'-6	0.039120	0.137	
25	17'-8		17.26	2	(See Notes)	12'-6	120	10.760	Flow (q) from Route 14
5	17'-8		86.93	2.1570		6'-2 18'-8	0.058920	1.100	E(6'-2)
								11.860	Total(Pt) Route 5
106	18'-4	5.6	16.89	1	(See Notes)	4'-8	120	9.095	• • • • • **Route 6** • • • • • Sprinkler,
26	17'-8		16.89	1.0490		7'-0 11'-8	0.095172	0.288 1.110	E(2'-0), PO(5'-0)
26	17'-8		20.47	2		4'-7	120	10.493	Flow (q) from Route 35
27	17'-8		37.36	2.1570		4'-7	0.012352	0.056	
27	17'-8		17.07	2		8'-0	120	10.549	Flow (q) from Route 11
28	17'-8		54.43	2.1570		8'-0	0.024781	0.198	
28	17'-8		17.24	2		8'-0	120	10.747	Flow (q) from Route 13
29	17'-8		71.67	2.1570		8'-0	0.041224	0.330	
29	17'-8		17.51	2		8'-0	120	11.077	Flow (q) from Route 15
30	17'-8		89.17	2.1570		8'-0	0.061764	0.494	
30	17'-8		17.90	2		3'-6	120	11.571	Flow (q) from Route 17
31	17'-8		107.07	2.1570		3'-6	0.086640	0.303	
31	17'-8		17.99	2	(See Notes)	9'-10½	120	11.874	Flow (q) from Route 18
6	17'-8		125.07	2.1570		18'-5½ 28'-4	0.115480	3.274	E(6'-2), T(12'-3½)
								15.148	Total(Pt) Route 6
107	18'-1½	5.6	16.90	1	(See Notes)	1'-11½	120	9.111	• • • • • **Route 7** • • • • • Sprinkler,
22	17'-8		16.90	1.0490		9'-0 10'-11½	0.095333	0.193 1.043	2E(2'-0), PO(5'-0)
								10.347	Total(Pt) Route 7

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
108	18'-4	5.6	16.91	1	(See Notes)	2'-7½	120	9.115	• • • • • **Route 8** • • • • • Sprinkler,
32	17'-8		16.91	1.0490		7'-0	0.095362	0.288	E(2'-0), PO(5'-0)
						9'-7½		0.918	
32	17'-8			2		4'-7	120	10.320	
21	17'-8		1.77	2.1570		4'-7	0.000044	0.000	
								10.320	Total(Pt) Route 8
109	18'-1½	5.6	16.98	1	(See Notes)	1'-11½	120	9.193	• • • • • **Route 9** • • • • • Sprinkler,
23	17'-8		16.98	1.0490		9'-0	0.096122	0.193	2E(2'-0), PO(5'-0)
						10'-11½		1.052	
								10.438	Total(Pt) Route 9
110	18'-4	5.6	17.07	1	(See Notes)	1'-8	120	9.286	• • • • • **Route 10** • • • • • Sprinkler,
33	17'-8		17.07	1.0490		7'-0	0.097023	0.288	E(2'-0), PO(5'-0)
						8'-8		0.841	
33	17'-8			2		6'-6	120	10.415	
20	17'-8		11.73	2.1570		6'-6	0.001449	0.009	
								10.424	Total(Pt) Route 10
111	18'-1½	5.6	17.07	1	(See Notes)	1'-11½	120	9.294	• • • • • **Route 11** • • • • • Sprinkler,
27	17'-8		17.07	1.0490		9'-0	0.097096	0.193	2E(2'-0), PO(5'-0)
						10'-11½		1.063	
								10.549	Total(Pt) Route 11
112	18'-1½	5.6	17.13	1	(See Notes)	1'-11½	120	9.361	• • • • • **Route 12** • • • • • Sprinkler,
24	17'-8		17.13	1.0490		9'-0	0.097745	0.193	2E(2'-0), PO(5'-0)
						10'-11½		1.070	
								10.623	Total(Pt) Route 12
113	18'-1½	5.6	17.24	1	(See Notes)	1'-11½	120	9.473	• • • • • **Route 13** • • • • • Sprinkler,
28	17'-8		17.24	1.0490		9'-0	0.098828	0.193	2E(2'-0), PO(5'-0)
						10'-11½		1.082	
								10.747	Total(Pt) Route 13
114	18'-4½	5.6	17.26	1	(See Notes)	2'-8	120	9.502	• • • • • **Route 14** • • • • • Sprinkler,
25	17'-8		17.26	1.0490		7'-0	0.099111	0.301	E(2'-0), PO(5'-0)
						9'-8		0.957	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting / Total	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
								10.760	Total(Pt) Route 14
115	18'-1½	5.6	17.51	1	(See Notes)	1'-11½	120	9.771	• • • • • Route 15 • • • • • Sprinkler,
29	17'-8		17.51	1.0490		9'-0 / 10'-11½	0.101703	0.193 / 1.113	2E(2'-0), PO(5'-0)
								11.077	Total(Pt) Route 15
116	18'-4½	5.6	17.53	1	(See Notes)	1'-8½	120	9.800	• • • • • Route 16 • • • • • Sprinkler,
4	17'-8		17.53	1.0490		7'-0 / 8'-8½	0.101979	0.301 / 0.887	E(2'-0), PO(5'-0)
								10.988	Total(Pt) Route 16
117	18'-1½	5.6	17.90	1	(See Notes)	1'-11½	120	10.219	• • • • • Route 17 • • • • • Sprinkler,
30	17'-8		17.90	1.0490		9'-0 / 10'-11½	0.106000	0.193 / 1.160	2E(2'-0), PO(5'-0)
								11.571	Total(Pt) Route 17
118	18'-4½	5.6	17.99	1	(See Notes)	4'-8½	120	10.322	• • • • • Route 18 • • • • • Sprinkler,
31	17'-8		17.99	1.0490		7'-0 / 11'-8½	0.106995	0.301 / 1.251	E(2'-0), PO(5'-0)
								11.874	Total(Pt) Route 18
45	10'-0		129.35	3	(See Notes)	89'-0½	120	30.814	• • • • • Route 19 • • • • • Flow (q) from Route 21
40	10'-0		75.01	3.2600		20'-2 / 109'-2½	0.006001	/ 0.655	T(20'-2)
40	10'-0		75.62	3		2'-6½	120	31.469	Flow (q) from Route 23
41	10'-0		150.63	3.2600		/ 2'-6½	0.021797	-0.000 / 0.055	
41	10'-0		12.95 + 11.68	3		8'-0	120	31.524	Flow (q) from Route 54 and 59
42	10'-0		175.25	3.2600		/ 8'-0	0.028844	/ 0.231	
42	10'-0		13.71	3		1'-0	120	31.755	Flow (q) from Route 60
43	10'-0		188.96	3.2600		/ 1'-0	0.033158	/ 0.033	
43	10'-0		15.50	3		9'-0	120	31.788	Flow (q) from Route 45
44	10'-0		204.47	3.2600		/ 9'-0	0.038365	/ 0.345	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
44	10'-0		16.63 + 18.49	3	(See Notes)	29'-9	120	32.133	Flow (q) from Route 33 and 46
						20'-2	0.051436		T(20'-2)
91	10'-0		239.58	3.2600		49'-10½		2.566	
								34.700	Total(Pt) Route 19
45	10'-0		129.35	3		1'-11	120	30.814	• • • • • **Route 20** • • • • •
						20'-2	0.003306	-0.000	T(20'-2), Flow (q) from Route 21
46	10'-0		54.34	3.2600		22'-1		0.073	
46	10'-0			2	(See Notes)	7'-6	120	30.887	PO(12'-3½)
						12'-3½	0.000618	-4.335	
13	20'-0		7.40	2.1570		19'-9½		0.012	
								26.564	Total(Pt) Route 20
86	10'-0			3		2'-8½	120	30.127	• • • • • **Route 21** • • • • •
							0.000821		
1119	10'-0		25.59	3.2600		2'-8½		0.002	
1119	10'-0			3		5'-3½	120	30.129	
							0.000146		
87	10'-0		10.08	3.2600		5'-3½		0.001	
87	10'-0			1½	(See Notes)	56'-4½	120	30.130	PO(9'-11)
						19'-9½	0.003675		
96	10'-0		10.08	1.6820		76'-2		0.280	PO(9'-11)
96	10'-0			3		5'-3½	120	30.410	
							0.000146	0.000	
747	10'-0		10.08	3.2600		5'-3½		0.001	
747	10'-0		15.51	3		2'-8½	120	30.410	Flow (q) from Route 22
							0.000821	-0.000	
100	10'-0		25.59	3.2600		2'-8½		0.002	
100	10'-0		10.20	3		8'-0	120	30.413	Flow (q) from Route 43
							0.001527		
123	10'-0		35.79	3.2600		8'-0		0.012	
123	10'-0		10.66	3	(See Notes)	3'-0½	120	30.425	Flow (q) from Route 55
						20'-2	0.002473	0.000	
124	10'-0		46.45	3.2600		23'-2½		0.057	T(20'-2)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
124	10'-0		82.90	3	(See Notes)	0'-0	120	30.482	Flow (q) from Route 29
						20'-2	0.016446		T(20'-2)
45	10'-0		129.35	3.2600		20'-2		0.332	
								30.814	Total(Pt) Route 21
1119	10'-0			2	(See Notes)	66'-6½	120	30.129	• • • • • **Route 22** • • • • •
						49'-2½	0.002430	0.000	PO(12'-3½)
747	10'-0		15.51	2.1570		115'-9½		0.281	2T(12'-3½), PO(12'-3½)
								30.410	Total(Pt) Route 22
35	10'-0		7.54 + 17.42	3		5'-2½	120	30.826	• • • • • **Route 23** • • • • •
							0.000784		Flow (q) from Route 25 and 26
81	10'-0		24.96	3.2600		5'-2½		0.004	
81	10'-0			3		6'-0	120	30.830	
							0.001308		
76	10'-0		32.92	3.2600		6'-0		0.008	
76	10'-0			3		0'-6½	120	30.838	
							0.002018		
36	10'-0		41.61	3.2600		0'-6½		0.001	
36	10'-0			3		2'-1½	120	30.839	
							0.001351		
37	10'-0		33.50	3.2600		2'-1½		0.003	
37	10'-0		56.79	3		0'-0	120	30.841	Flow (q) from Route 28
							0.008456		
38	10'-0		90.28	3.2600		0'-0		0.000	
38	10'-0			3		88'-10½	120	30.841	
							0.003820		
39	10'-0		58.76	3.2600		88'-10½		0.340	
39	10'-0		16.86	3	(See Notes)	27'-1½	120	31.181	Flow (q) from Route 52
						20'-2	0.006092		T(20'-2)
40	10'-0		75.62	3.2600		47'-3½		0.288	
								31.469	Total(Pt) Route 23
10	10'-0		118.32	3		103'-5½	120	28.703	• • • • • **Route 24** • • • • •
							0.013138		Flow (q) from Route 1
133	10'-0		114.57	3.2600		103'-5½		1.359	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
133	10'-0			3	(See Notes)	1'-7	120	30.063	
48	10'-0		111.03	3.2600		29'-7 31'-1½	0.012397	0.386	E(9'-5), T(20'-2)
48	10'-0			3		2'-1½	120	30.449	
52	10'-0		66.17	3.2600		2'-1½	0.004759	0.010	
52	10'-0			2	(See Notes)	10'-0	120	30.459	PO(12'-3½)
53	20'-0		14.07	2.1570		12'-3½ 22'-3½	0.002028	-4.334 0.045	
53	20'-0		7.15	2	(See Notes)	56'-4½	120	26.170	T(12'-3½), Flow (q) from Route 37
54	20'-0		21.21	2.1570		24'-7½ 80'-11½	0.004336	-0.000 0.351	T(12'-3½)
54	20'-0		8.12	2	(See Notes)	119'-3	120	26.521	T(12'-3½), Flow (q) from Route 27
88	20'-0		29.33	2.1570		30'-9 150'-0	0.007896	-0.001 1.184	E(6'-2), T(12'-3½)
								27.704	Total(Pt) Route 24
52	10'-0		14.07	3		0'-6½	120	30.459	• • • • • **Route 25** • • • • • Flow (q) from Route 24
55	10'-0		52.10	3.2600		0'-6½	0.003058	0.002	
55	10'-0			3		6'-0	120	30.460	
56	10'-0		40.26	3.2600		6'-0	0.001898	0.011	
56	10'-0			3		5'-2½	120	30.472	
57	10'-0		28.74	3.2600		5'-2½	0.001017	0.005	
57	10'-0			3		6'-9½	120	30.477	
34	10'-0		11.32	3.2600		6'-9½	0.000181	0.001	
34	10'-0			1½	(See Notes)	56'-4½	120	30.478	PO(9'-11)
83	10'-0		11.32	1.6820		19'-9½ 76'-2	0.004554	0.000 0.347	PO(9'-11)
83	10'-0			3		6'-9½	120	30.825	
35	10'-0		7.54	3.2600		6'-9½	0.000086	0.001	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								30.826	Total(Pt) Route 25
57	10'-0			2	(See Notes)	66'-6½	120	30.477	• • • • • Route 26 • • • • • PO(12'-3½)
35	10'-0		17.42	2.1570		49'-2½	0.003011	0.000	
						115'-9½		0.349	2T(12'-3½), PO(12'-3½)
								30.826	Total(Pt) Route 26
36	10'-0			2	(See Notes)	10'-0	120	30.839	• • • • • Route 27 • • • • • PO(12'-3½)
54	20'-0		8.12	2.1570		12'-3½	0.000733	-4.334	
						22'-3½		0.016	
								26.521	Total(Pt) Route 27
49	10'-0		28.79 + 44.85	3		32'-2	120	30.513	• • • • • Route 28 • • • • • Flow (q) from Route 30 and 44
50	10'-0		73.65	3.2600			0.005802	-0.000	
						32'-2		0.187	
50	10'-0			3		10'-0	120	30.700	
51	10'-0		65.07	3.2600			0.004614		
						10'-0		0.046	
51	10'-0			3	(See Notes)	6'-5½	120	30.746	
37	10'-0		56.79	3.2600		20'-2	0.003586	0.000	
						26'-7½		0.096	T(20'-2)
								30.841	Total(Pt) Route 28
9	10'-0			1½	(See Notes)	22'-5	120	27.315	• • • • • Route 29 • • • • • PO(9'-11)
72	10'-0		40.40	1.6820		9'-11	0.047936		
						32'-3½		1.549	
72	10'-0			1½	(See Notes)	78'-2½	120	28.863	
66	10'-0		21.32	1.6820		9'-11	0.014696		
						88'-1½		1.295	PO(9'-11)
66	10'-0		42.50	3		8'-5	120	30.158	Flow (q) from Route 42
64	10'-0		63.83	3.2600			0.004452		
						8'-5		0.037	
64	10'-0		19.08	3		39'-8	120	30.196	Flow (q) from Route 53
124	10'-0		82.90	3.2600			0.007222	0.000	
						39'-8		0.286	
								30.482	Total(Pt) Route 29

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
9	10'-0			1½	(See Notes)	105'-0½	120	27.315	• • • • • **Route 30** • • • • •
						19'-9½	0.025622	0.000	PO(9'-11)
49	10'-0		28.79	1.6820		124'-10		3.198	PO(9'-11)
								30.513	Total(Pt) Route 30
128	10'-0		3.54	1½	(See Notes)	8'-0	120	30.082	• • • • • **Route 31** • • • • •
						9'-11	0.000226		Flow (q) from Route 32
129	10'-0		2.23	1.6820		17'-11		0.004	T(9'-11)
129	10'-0			1½	(See Notes)	171'-3½	120	30.086	
						9'-11	0.000066		
130	10'-0		1.15	1.6820		181'-2½		0.012	PO(9'-11)
130	10'-0		1.08	3		8'-0	120	30.098	Flow (q) from Route 48
							0.000009		
131	10'-0		2.23	3.2600		8'-0		0.000	
131	10'-0		1.31	3	(See Notes)	2'-8½	120	30.098	Flow (q) from Route 49
						20'-2	0.000021		T(20'-2)
132	10'-0		3.54	3.2600		22'-10½		0.000	
								30.099	Total(Pt) Route 31
126	10'-0		0.83 + 0.86	1½	(See Notes)	8'-0	120	30.065	• • • • • **Route 32** • • • • •
						9'-11	0.000135		Flow (q) from Route 39 and 56
127	10'-0		1.69	1.6820		17'-11		0.002	T(9'-11)
127	10'-0		1.85	1½	(See Notes)	18'-6	120	30.067	Flow (q) from Route 51
						9'-11	0.000530		
128	10'-0		3.54	1.6820		28'-4½		0.015	T(9'-11)
								30.082	Total(Pt) Route 32
56	10'-0			1½	(See Notes)	56'-4½	120	30.472	• • • • • **Route 33** • • • • •
						19'-9½	0.004702	0.000	PO(9'-11)
81	10'-0		11.52	1.6820		76'-2		0.358	PO(9'-11)
81	10'-0			1½	(See Notes)	49'-1½	120	30.830	
						19'-9½	0.000535	-0.000	PO(9'-11)
59	10'-0		3.56	1.6820		68'-11		0.037	PO(9'-11)
59	10'-0		3.78	3		6'-0	120	30.867	Flow (q) from Route 38
							0.000081		
60	10'-0		7.33	3.2600		6'-0		0.000	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
60	10'-0		3.15	3	(See Notes)	31'-9½	120	30.867	Flow (q) from Route 34
61	10'-0		10.49	3.2600		9'-5	0.000158		E(9'-5)
						41'-2½		0.006	
61	10'-0		6.14	1½	(See Notes)	116'-0	120	30.874	PO(9'-11), Flow (q) from Route 47
44	10'-0		16.63	1.6820		19'-9½	0.009275		PO(9'-11)
						135'-10		1.260	
								32.133	Total(Pt) Route 33
55	10'-0			1½	(See Notes)	56'-4½	120	30.460	• • • • • **Route 34** • • • • • PO(9'-11)
76	10'-0		11.85	1.6820		19'-9½	0.004954	0.000	
						76'-2		0.377	PO(9'-11)
76	10'-0			1½	(See Notes)	49'-1½	120	30.838	PO(9'-11)
60	10'-0		3.15	1.6820		19'-9½	0.000428	-0.000	
						68'-11		0.029	PO(9'-11)
								30.867	Total(Pt) Route 34
33	17'-8		11.73	2	(See Notes)	0'-11½	120	10.415	• • • • • **Route 35** • • • • • Flow (q) from Route 10
65	17'-8		5.33	2.1570		12'-3½	0.000337		T(12'-3½)
						13'-3½		0.004	
65	17'-8		15.14	2	(See Notes)	11'-11½	120	10.419	Flow (q) from Route 36
26	17'-8		20.47	2.1570		6'-2	0.004059		E(6'-2)
						18'-1½		0.074	
								10.493	Total(Pt) Route 35
32	17'-8		1.77	2	(See Notes)	11'-11	120	10.320	• • • • • **Route 36** • • • • • Flow (q) from Route 8
65	17'-8		15.14	2.1570		30'-9	0.002322		E(6'-2), 2T(12'-3½)
						42'-8½		0.099	
								10.419	Total(Pt) Route 36
12	20'-0			2	(See Notes)	214'-6½	120	25.996	• • • • • **Route 37** • • • • • T(12'-3½)
53	20'-0		7.15	2.1570		86'-2	0.000579	-0.001	
						300'-8		0.174	2E(6'-2), 5T(12'-3½)
								26.170	Total(Pt) Route 37
83	10'-0			1½	(See Notes)	49'-1½	120	30.825	• • • • • **Route 38** • • • • • PO(9'-11)
58	10'-0		3.78	1.6820		19'-9½	0.000598	-0.000	
						68'-11		0.041	PO(9'-11)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
58	10'-0			3		12'-0	120	30.866	
59	10'-0		3.78	3.2600		12'-0	0.000024	0.000	
								30.867	Total(Pt) Route 38
125	10'-0		0.83	1½	(See Notes)	20'-9	120	30.063	• • • • • **Route 39** • • • • •
126	10'-0		0.83	1.6820		14'-10 35'-7	0.000036	0.001	PO(9'-11), Flow (q) from Route 40 E(4'-11½)
								30.065	Total(Pt) Route 39
134	10'-0		1.69	3		7'-0	120	30.063	• • • • • **Route 40** • • • • •
125	10'-0		0.83	3.2600		7'-0	0.000001	0.000	Flow (q) from Route 41
								30.063	Total(Pt) Route 40
133	10'-0			3	(See Notes)	2'-8½	120	30.063	• • • • • **Route 41** • • • • •
135	10'-0		3.54	3.2600		20'-2 22'-10½	0.000021	0.000	T(20'-2)
135	10'-0			3		8'-0	120	30.063	
134	10'-0		1.69	3.2600		8'-0	0.000005	0.000	
								30.063	Total(Pt) Route 41
11	10'-0			3	(See Notes)	8'-3½	120	30.099	• • • • • **Route 42** • • • • •
66	10'-0		42.50	3.2600		20'-2 28'-5½	0.002098	0.060	T(20'-2)
								30.158	Total(Pt) Route 42
119	10'-0		32.91	3		1'-0½	120	30.112	• • • • • **Route 43** • • • • •
85	10'-0		46.45	3.2600		1'-0½	0.002473	0.003	Flow (q) from Route 1
85	10'-0			3		8'-0	120	30.114	
86	10'-0		35.79	3.2600		8'-0	0.001527	0.012	
86	10'-0			1½	(See Notes)	56'-4½	120	30.127	PO(9'-11)
100	10'-0		10.20	1.6820		19'-9½ 76'-2	0.003754	0.286	PO(9'-11)
								30.413	Total(Pt) Route 43

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
48	10'-0			3	(See Notes)	7'-8½	120	30.449	• • • • • Route 44 • • • • •
						20'-2	0.002318	0.000	T(20'-2)
49	10'-0		44.85	3.2600		27'-10½		0.065	
								30.513	Total(Pt) Route 44
46	10'-0		7.40	3		0'-7	120	30.887	• • • • • Route 45 • • • • •
							0.002521		Flow (q) from Route 20
67	10'-0		46.94	3.2600		0'-7		0.001	
67	10'-0			3		9'-0	120	30.888	
							0.001388		
68	10'-0		33.99	3.2600		9'-0		0.012	
68	10'-0			1½	(See Notes)	89'-0½	120	30.901	PO(9'-11)
						19'-9½	0.008151		
43	10'-0		15.50	1.6820		108'-10½		0.887	PO(9'-11)
								31.788	Total(Pt) Route 45
68	10'-0		15.50	3		9'-0	120	30.901	• • • • • Route 46 • • • • •
							0.000450		Flow (q) from Route 45
69	10'-0		18.49	3.2600		9'-0		0.004	
69	10'-0			1½	(See Notes)	89'-0½	120	30.905	PO(9'-11)
						19'-9½	0.011286		
44	10'-0		18.49	1.6820		108'-10½		1.229	PO(9'-11)
								32.133	Total(Pt) Route 46
38	10'-0			3	(See Notes)	2'-6½	120	30.841	• • • • • Route 47 • • • • •
						20'-2	0.001207	-0.000	T(20'-2)
70	10'-0		31.53	3.2600		22'-8		0.027	
70	10'-0			3		8'-0	120	30.869	
							0.000513		
62	10'-0		19.85	3.2600		8'-0		0.004	
62	10'-0			3		10'-0	120	30.873	
							0.000059		
61	10'-0		6.14	3.2600		10'-0		0.001	
								30.874	Total(Pt) Route 47

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
136	10'-0		1.08	3		7'-0	120	30.098	• • • • • Route 48 • • • • •
130	10'-0		1.08	3.2600		7'-0	0.000002	0.000	Flow (q) from Route 50
								30.098	Total(Pt) Route 48
128	10'-0		3.54	1½	(See Notes)	171'-3½	120	30.082	• • • • • Route 49 • • • • •
131	10'-0		1.31	1.6820		19'-9½ 191'-1	0.000084	0.016	T(9'-11), Flow (q) from Route 32 PO(9'-11)
								30.098	Total(Pt) Route 49
129	10'-0			1½	(See Notes)	178'-3½	120	30.086	• • • • • Route 50 • • • • •
136	10'-0		1.08	1.6820		24'-9 203'-0½	0.000059	0.012	T(9'-11) E(4'-11½), PO(9'-11)
								30.098	Total(Pt) Route 50
135	10'-0			1½	(See Notes)	13'-9	120	30.063	• • • • • Route 51 • • • • •
127	10'-0		1.85	1.6820		9'-11 23'-7½	0.000159	0.004	PO(9'-11)
								30.067	Total(Pt) Route 51
71	10'-0		8.58 + 8.28	1½	(See Notes)	6'-5½	120	31.025	• • • • • Route 52 • • • • •
39	10'-0		16.86	1.6820		9'-11 16'-4½	0.009520	0.000 0.156	Flow (q) from Route 57 and 58 PO(9'-11)
								31.181	Total(Pt) Route 52
72	10'-0			1½	(See Notes)	86'-7½	120	28.863	• • • • • Route 53 • • • • •
64	10'-0		19.08	1.6820		24'-9 111'-4½	0.011962	1.332	T(9'-11) E(4'-11½), PO(9'-11)
								30.196	Total(Pt) Route 53
67	10'-0			1½	(See Notes)	89'-0½	120	30.888	• • • • • Route 54 • • • • •
41	10'-0		12.95	1.6820		19'-9½ 108'-10½	0.005842	0.636	PO(9'-11) PO(9'-11)
								31.524	Total(Pt) Route 54
85	10'-0			1½	(See Notes)	56'-4½	120	30.114	• • • • • Route 55 • • • • •
123	10'-0		10.66	1.6820		19'-9½ 76'-2	0.004074	0.310	PO(9'-11) PO(9'-11)
								30.425	Total(Pt) Route 55

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor / Total Flow (Q)	Flow added this step (q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value
134	10'-0		1.69	1½	(See Notes)	13'-9	120	30.063	• • • • • **Route 56** • • • • •
						19'-9½	0.000039		PO(9'-11), Flow (q) from Route 41
126	10'-0		0.86	1.6820		33'-6½		0.001	T(9'-11)
								30.065	Total(Pt) Route 56
50	10'-0			1½	(See Notes)	99'-5½	120	30.700	• • • • • **Route 57** • • • • •
						19'-9½	0.002728		PO(9'-11)
71	10'-0		8.58	1.6820		119'-3		0.325	T(9'-11)
								31.025	Total(Pt) Route 57
51	10'-0			1½	(See Notes)	89'-5½	120	30.746	• • • • • **Route 58** • • • • •
						19'-9½	0.002555		PO(9'-11)
71	10'-0		8.28	1.6820		109'-3		0.279	T(9'-11)
								31.025	Total(Pt) Route 58
70	10'-0			1½	(See Notes)	116'-0	120	30.869	• • • • • **Route 59** • • • • •
						19'-9½	0.004824		PO(9'-11)
41	10'-0		11.68	1.6820		135'-10		0.655	PO(9'-11)
								31.524	Total(Pt) Route 59
62	10'-0			1½	(See Notes)	116'-0	120	30.873	• • • • • **Route 60** • • • • •
						19'-9½	0.006493		PO(9'-11)
42	10'-0		13.71	1.6820		135'-10		0.882	PO(9'-11)
								31.755	Total(Pt) Route 60

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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
BalV	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 Connecti	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				

Hydraulic Overview

Job Number: F23007
Report Description: Light Hazard (B)

Job

Job Number: F23007	Designer: TWC
Job Name: THE SPRINGS OF BALLENTINE	Phone: 919-553-2356 FAX:
Address 1: 40 RAWLS CLUB RD	State Certification/License Number: 16269FS
Address 2: FUQUAY-VARINA, NC 27526	AHJ:
Address 3:	Job Site/Building:

System

Density: 0.10 gpm/ft²	Area of Application: 1500 ft² (Actual 216 ft²)
Most Demanding Sprinkler Data: 8 K-Factor 38.03 at 22.600	Hose Streams: 100.00
Coverage Per Sprinkler: 180 ft²	Number Of Sprinklers Calculated: 6 0
System Pressure Demand: 59.401	System Flow Demand: 229.88
Total Demand: 329.88 @ 59.401	Pressure Result: +37.523 (38.7%)

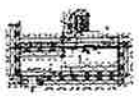
Supplies

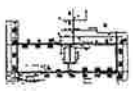
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

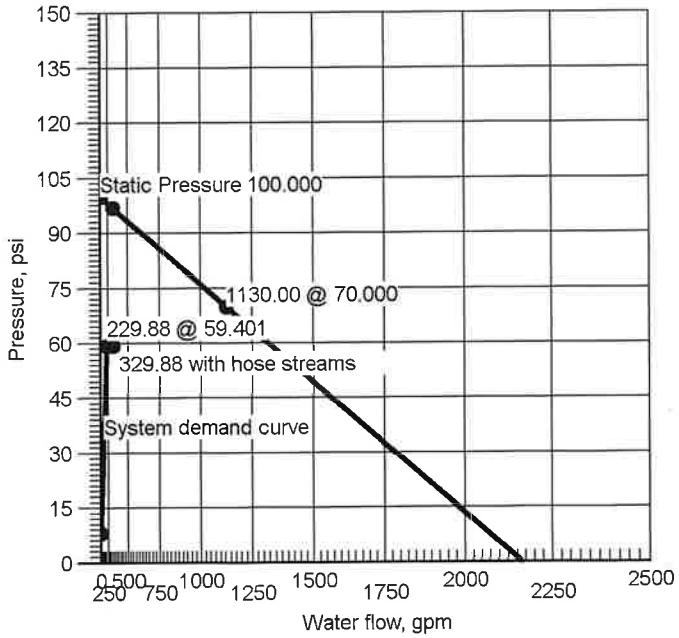
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR (15)	45.499	34.08	229.88

SPRINGS BALLENTINE FP





Water Supply at Node 19 (1130.00, 0.00, 100.000, 70.000)



Hydraulic Calculations

for

Project Name: THE SPRINGS OF BALLENTINE
Location: 40 RAWLS CLUB RD, FUQUAY-VARINA, NC 27526,
Drawing Name: SPRINGS BALLENTINE FP

Calculation Date: 5/15/2023

Design

Remote Area Number:	B
Occupancy Classification:	Light Hazard
Density	0.10 gpm/ft²
Area of Application:	1500 ft² (Actual 216 ft²)
Coverage per Sprinkler:	180 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: 19 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 19: 329.88 @ 59.401 (Safety Margin = 37.523)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherA N/A

Name of Contractor:
Address: ,
Phone Number:
Name of designer: TWC
Authority Having Jurisdiction:

Notes:

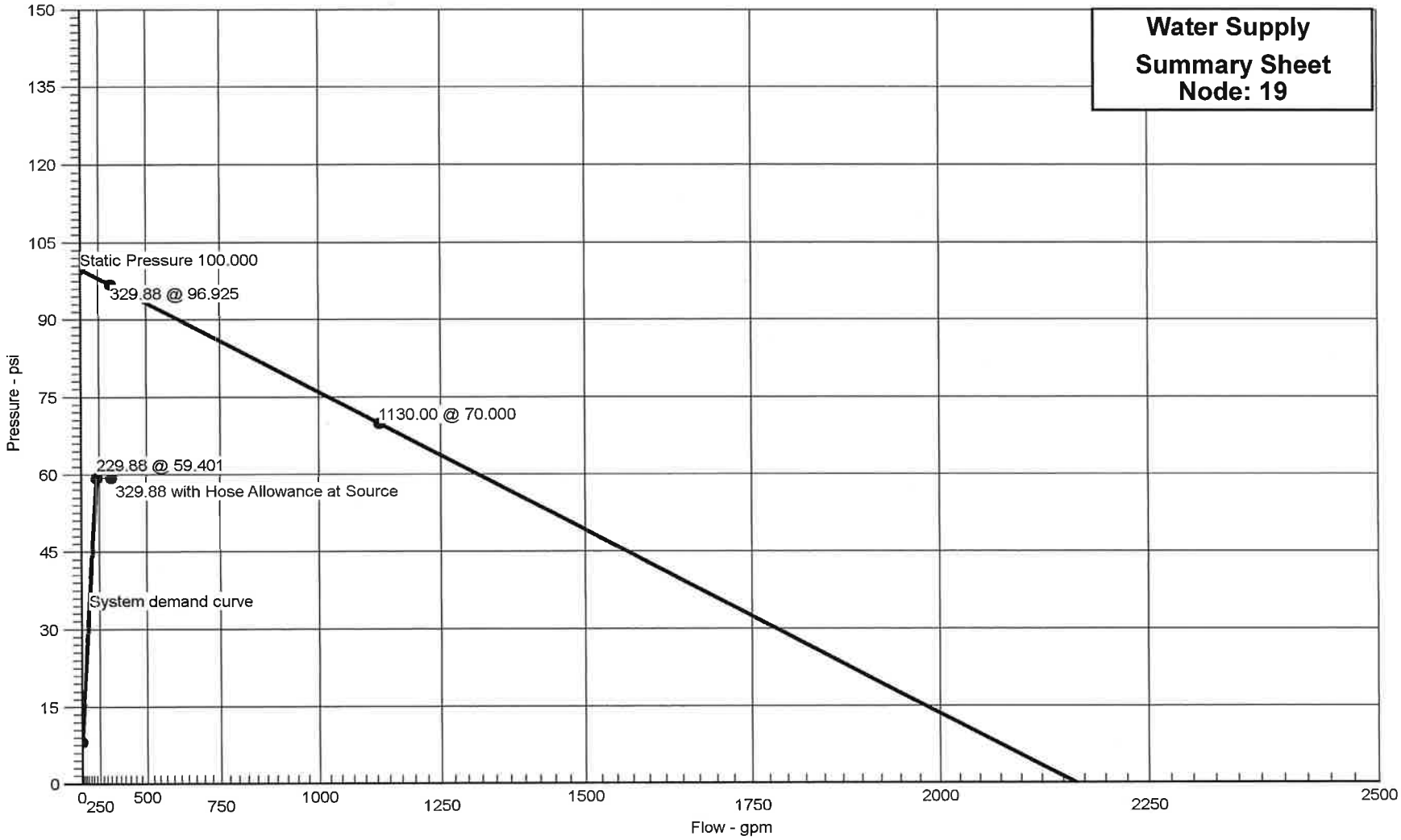
Automatic peaking results Left: 60.041 Right: N/A

Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: B

$N^{1.85}$

Date: 5/15/2023

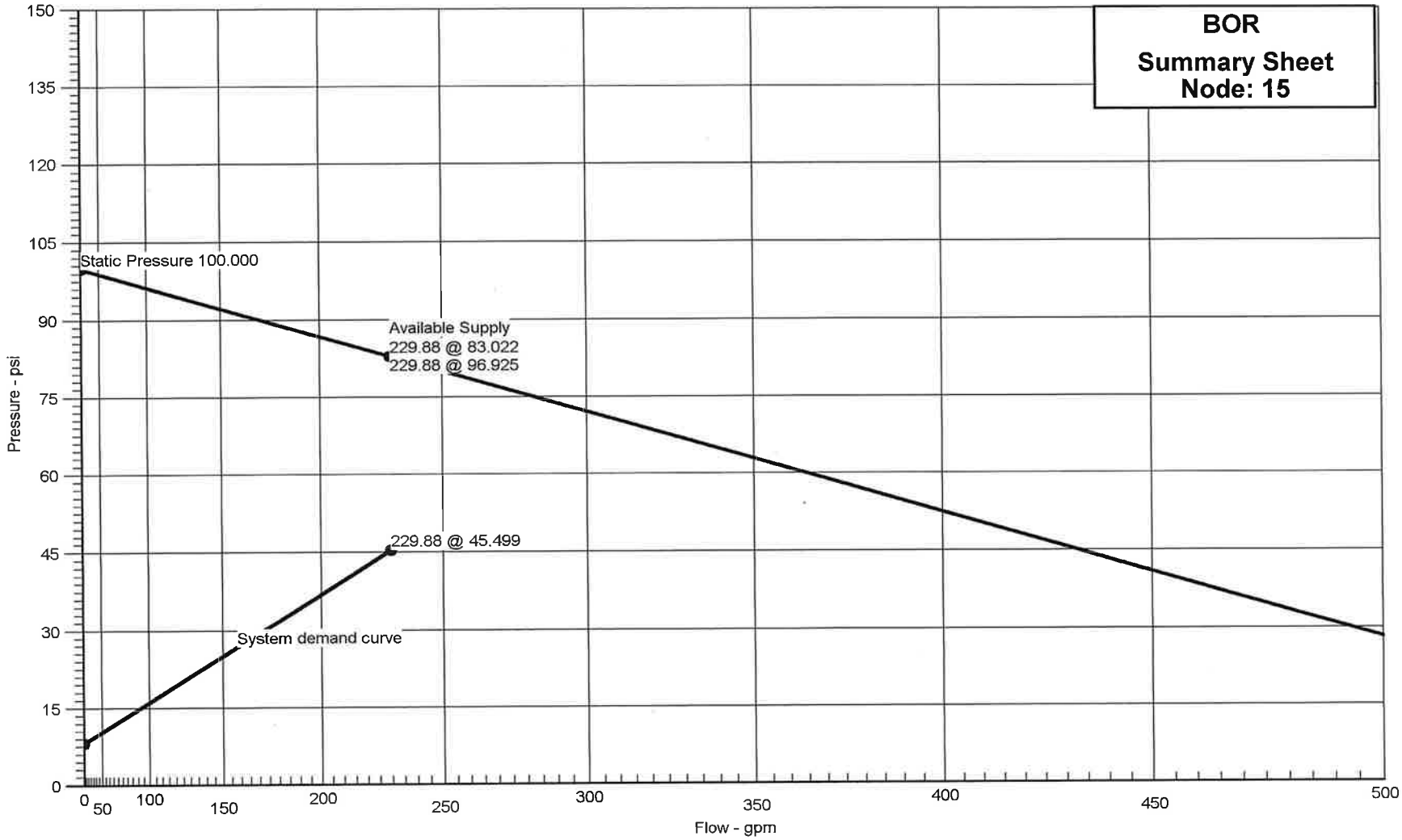


Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: B

$N^{1.85}$

Date: 5/15/2023



Summary Of Outflowing Devices

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
⇨ **Sprinkler**	**201**	**38.03**	**38.03**	**8**	**22.600**			
Sprinkler	202	38.04	38.03	8	22.608			
Sprinkler	203	38.14	38.03	8	22.734			
Sprinkler	204	38.44	38.03	8	23.094			
Sprinkler	205	39.03	38.03	8	23.798			
Sprinkler	206	38.20	38.03	8	22.800			

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
19	Water Supply	100.000	70.000	1130.00	96.925	329.88	59.401

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	1'-0	Supply	59.401	229.88	
201	20'-0	Sprinkler	22.600	38.03	
202	20'-0	Sprinkler	22.608	38.04	
203	20'-0	Sprinkler	22.734	38.14	
204	20'-0	Sprinkler	23.094	38.44	
205	20'-0	Sprinkler	23.798	39.03	
206	20'-0	Sprinkler	22.800	38.20	
9	10'-0		34.940		
10	10'-0		34.940		
11	10'-0		34.841		
12	20'-0		28.321		
13	20'-0		30.597		
14	10'-0		40.917		
15	1'-0	Gauge	45.499		
16	-3'-0		47.257		
17	1'-0		46.216		
18	1'-0		59.312		
34	10'-0		35.041		
35	10'-0		35.179		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
36	10'-0		35.184		
37	10'-0		35.186		
38	10'-0		35.186		
39	10'-0		35.358		
40	10'-0		35.502		
41	10'-0		35.534		
42	10'-0		35.671		
43	10'-0		35.690		
44	10'-0		35.896		
45	10'-0		35.056		
46	10'-0		35.060		
48	10'-0		35.036		
49	10'-0		35.051		
50	10'-0		35.129		
51	10'-0		35.148		
52	10'-0		35.033		
53	20'-0		30.385		
54	20'-0		30.845		
55	10'-0		35.034		
56	10'-0		35.038		
57	10'-0		35.040		
58	10'-0		35.199		
59	10'-0		35.200		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
60	10'-0		35.200		
61	10'-0		35.203		
62	10'-0		35.203		
64	10'-0		34.875		
66	10'-0		34.859		
67	10'-0		35.061		
68	10'-0		35.070		
69	10'-0		35.073		
70	10'-0		35.201		
71	10'-0		35.283		
72	10'-0		34.900		
76	10'-0		35.183		
81	10'-0		35.180		
83	10'-0		35.179		
85	10'-0		34.711		
86	10'-0		34.718		
87	10'-0		34.720		
88	20'-0		31.439		
90	10'-0		37.428		
91	10'-0		37.432		
96	10'-0		34.895		
100	10'-0		34.897		
119	10'-0		34.709		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
123	10'-0		34.904		
124	10'-0		34.940		
125	10'-0		35.019		
126	10'-0		35.013		
127	10'-0		35.000		
128	10'-0		34.936		
129	10'-0		34.919		
130	10'-0		34.869		
131	10'-0		34.868		
132	10'-0		34.866		
133	10'-0		35.021		
134	10'-0		35.019		
135	10'-0		35.019		
136	10'-0		34.869		
747	10'-0		34.895		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
201	20'-0	8	38.03	2	(See Notes)	6'-0	120	22.600	• • • • • Route 1 • • • • •
202	20'-0		11.58	2.1570		6'-0	0.001416	0.008	Sprinkler
202	20'-0	8	38.04	2	(See Notes)	6'-0	120	22.608	Sprinkler
203	20'-0		49.62	2.1570		6'-0	0.020884	0.125	
203	20'-0	8	38.14	2	(See Notes)	6'-0	120	22.734	Sprinkler
204	20'-0		87.77	2.1570		6'-0	0.059974	0.360	
204	20'-0	8	38.44	2	(See Notes)	6'-0	120	23.094	Sprinkler
205	20'-0		126.21	2.1570		6'-0	0.117445	0.705	
205	20'-0	8	39.03	2	(See Notes)	4'-11	120	23.798	Sprinkler,
12	20'-0		165.24	2.1570		18'-5½ 23'-4½	0.193334	0.001 4.521	E(6'-2), T(12'-3½)
12	20'-0			2	(See Notes)	60'-10½	120	28.321	T(12'-3½)
13	20'-0		54.53	2.1570		30'-9 91'-7½	0.024863	-0.002 2.278	E(6'-2), T(12'-3½)
13	20'-0			2	(See Notes)	90'-5½	120	30.597	T(12'-3½)
88	20'-0		28.16	2.1570		24'-7½ 115'-1	0.007322	0.842	T(12'-3½)
88	20'-0		20.23	2	(See Notes)	58'-4	120	31.439	Flow (q) from Route 13
90	10'-0		48.39	2.1570		24'-7½ 82'-11	0.019935	4.335 1.653	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	37.428	
91	10'-0		48.39	3.2600		1'-4½	0.002667	0.004	
91	10'-0		181.49	3	(See Notes)	44'-11	120	37.432	Flow (q) from Route 2
14	10'-0		229.88	3.2600		28'-2½ 73'-1½	0.047652	3.485	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	40.917	
15	1'-0		229.88	4.2600		44'-9 52'-7	0.012949	3.902 0.681	f, sCV(28'-11½), BV(15'-9½), BOR

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
15	1'-0			6	(See Notes)	4'-0	120	45.499	
16	-3'-0		229.88	6.3570		8'-9½ 12'-9½	0.001843	1.734 0.024	EE(8'-9½)
16	-3'-0			6	(See Notes)	358'-0½	140	47.257	
17	1'-0		229.88	6.2800		113'-5½ 471'-6½	0.001471	-1.734 0.693	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	1'-0			6	(See Notes)	12'-0	120	46.216	
18	1'-0		229.88	6.3570		40'-3 52'-3	0.001843	13.096	2LtE(11'-4), BFP(-13.000), E(17'-7)
18	1'-0			6	(See Notes)	13'-2	140	59.312	
19	1'-0		229.88	6.2800		47'-3½ 60'-5	0.001471	0.089	S, T(47'-3½)
			100.00					59.401	Hose Allowance At Source
19			329.88						Total(Pt) Route 1
201	20'-0	8	38.03	2	(See Notes)	6'-0	120	22.600	• • • • • Route 2 • • • • • Sprinkler,
206	20'-0		26.45	2.1570		24'-7½ 30'-7½	0.006519	0.200	2T(12'-3½)
206	20'-0	8	38.20	2	(See Notes)	179'-7	120	22.800	Sprinkler,
53	20'-0		64.65	2.1570		43'-1 222'-8	0.034065	-0.000 7.585	3T(12'-3½), E(6'-2)
53	20'-0			2	(See Notes)	10'-0	120	30.385	
52	10'-0		40.10	2.1570		12'-3½ 22'-3½	0.014083	4.334 0.314	PO(12'-3½)
52	10'-0			3		0'-6½	120	35.033	
55	10'-0		31.62	3.2600		0'-6½	0.001214	0.001	
55	10'-0			3		6'-0	120	35.034	
56	10'-0		24.44	3.2600		6'-0	0.000754	0.005	
56	10'-0			3		5'-2½	120	35.038	
57	10'-0		17.45	3.2600		5'-2½	0.000404	0.002	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
57	10'-0			3		6'-9½	120	35.040	
34	10'-0		6.87	3.2600		6'-9½	0.000072	0.000	
34	10'-0			1½	(See Notes)	56'-4½	120	35.041	PO(9'-11)
83	10'-0		6.87	1.6820		19'-9½ 76'-2	0.001809	0.000 0.138	PO(9'-11)
83	10'-0			3		6'-9½	120	35.179	
35	10'-0		4.27	3.2600		6'-9½	0.000030	0.000	
35	10'-0		10.58	3		5'-2½	120	35.179	Flow (q) from Route 6
81	10'-0		14.84	3.2600		5'-2½	0.000300	0.002	
81	10'-0			3		6'-0	120	35.180	
76	10'-0		19.34	3.2600		6'-0	0.000489	0.003	
76	10'-0			3		0'-6½	120	35.183	
36	10'-0		24.23	3.2600		0'-6½	0.000742	0.000	
36	10'-0		4.31	3		2'-1½	120	35.184	Flow (q) from Route 7
37	10'-0		28.55	3.2600		2'-1½	0.001005	0.002	
37	10'-0		34.61	3		0'-0	120	35.186	Flow (q) from Route 8
38	10'-0		63.15	3.2600		0'-0	0.004365	0.000	
38	10'-0			3		88'-10½	120	35.186	
39	10'-0		40.66	3.2600		88'-10½	0.001933	0.172	
39	10'-0		11.33	3	(See Notes)	27'-1½	120	35.358	Flow (q) from Route 27
40	10'-0		51.99	3.2600		20'-2 47'-3½	0.003047	0.144	T(20'-2)
40	10'-0		60.93	3		2'-6½	120	35.502	Flow (q) from Route 4
41	10'-0		112.92	3.2600		2'-6½	0.012791	-0.000 0.032	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q / Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
41	10'-0		11.03 + 8.11	3		8'-0	120	35.534	Flow (q) from Route 30 and 35
42	10'-0		132.06	3.2600		8'-0	0.017088	0.137	
42	10'-0		9.73	3		1'-0	120	35.671	Flow (q) from Route 36
43	10'-0		141.79	3.2600		1'-0	0.019491	0.019	
43	10'-0		12.78	3		9'-0	120	35.690	Flow (q) from Route 3
44	10'-0		154.57	3.2600		9'-0	0.022864	0.206	
44	10'-0		12.04 + 14.89	3	(See Notes)	29'-9	120	35.896	Flow (q) from Route 11 and 19
91	10'-0		181.49	3.2600	(See Notes)	20'-2 49'-10½	0.030774	1.535	T(20'-2)
								37.432	Total(Pt) Route 2
13	20'-0		28.16	2	(See Notes)	7'-6	120	30.597	• • • • • **Route 3** • • • • • Flow (q) from Route 1
46	10'-0		26.37	2.1570	(See Notes)	12'-3½ 19'-9½	0.006483	4.335 0.128	PO(12'-3½)
46	10'-0		12.33	3		0'-7	120	35.060	Flow (q) from Route 20
67	10'-0		38.70	3.2600		0'-7	0.001764	0.001	
67	10'-0			3		9'-0	120	35.061	
68	10'-0		27.67	3.2600		9'-0	0.000948	0.009	
68	10'-0			1½	(See Notes)	89'-0½	120	35.070	PO(9'-11)
43	10'-0		12.78	1.6820	(See Notes)	19'-9½ 108'-10½	0.005699	0.620	PO(9'-11)
								35.690	Total(Pt) Route 3
12	20'-0		54.53	2	(See Notes)	10'-0	120	28.321	• • • • • **Route 4** • • • • • Flow (q) from Route 1
119	10'-0		110.71	2.1570	(See Notes)	12'-3½ 22'-3½	0.092161	4.333 2.055	PO(12'-3½)
119	10'-0			3		1'-0½	120	34.709	
85	10'-0		35.96	3.2600		1'-0½	0.001540	0.002	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
85	10'-0			3		8'-0	120	34.711	
86	10'-0		27.71	3.2600		8'-0	0.000951	0.008	
86	10'-0			3		2'-8½	120	34.718	
1119	10'-0		19.82	3.2600		2'-8½	0.000511	0.001	
1119	10'-0			3		5'-3½	120	34.720	
87	10'-0		7.80	3.2600		5'-3½	0.000091	0.000	
87	10'-0			1½	(See Notes)	56'-4½	120	34.720	PO(9'-11)
96	10'-0		7.80	1.6820		19'-9½ 76'-2	0.002289	0.174	PO(9'-11)
96	10'-0			3		5'-3½	120	34.895	
747	10'-0		7.80	3.2600		5'-3½	0.000091	0.000 0.000	
747	10'-0		12.01	3		2'-8½	120	34.895	Flow (q) from Route 5
100	10'-0		19.82	3.2600		2'-8½	0.000511	-0.000 0.001	
100	10'-0		7.89	3		8'-0	120	34.897	Flow (q) from Route 31
123	10'-0		27.71	3.2600		8'-0	0.000951	0.008	
123	10'-0		8.25	3	(See Notes)	3'-0½	120	34.904	Flow (q) from Route 32
124	10'-0		35.96	3.2600		20'-2 23'-2½	0.001540	0.000 0.036	T(20'-2)
124	10'-0		37.29	3	(See Notes)	0'-0	120	34.940	Flow (q) from Route 17
45	10'-0		73.26	3.2600		20'-2 20'-2	0.005744	0.116	T(20'-2)
45	10'-0			3	(See Notes)	89'-0½	120	35.056	
40	10'-0		60.93	3.2600		20'-2 109'-2½	0.004085	0.446	T(20'-2)
								35.502	Total(Pt) Route 4
1119	10'-0			2	(See Notes)	66'-6½	120	34.720	• • • • • **Route 5** • • • • • PO(12'-3½)
747	10'-0		12.01	2.1570		49'-2½ 115'-9½	0.001514	0.000 0.175	2T(12'-3½), PO(12'-3½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								34.895	Total(Pt) Route 5
57	10'-0			2	(See Notes)	66'-6½	120	35.040	• • • • • **Route 6** • • • • • PO(12'-3½)
35	10'-0		10.58	2.1570		49'-2½ / 115'-9½	0.001196	0.000 / 0.138	2T(12'-3½), PO(12'-3½)
								35.179	Total(Pt) Route 6
54	20'-0		24.54	2	(See Notes)	10'-0	120	30.845	• • • • • **Route 7** • • • • • Flow (q) from Route 14
36	10'-0		4.31	2.1570		12'-3½ / 22'-3½	0.000227	4.334 / 0.005	PO(12'-3½)
								35.184	Total(Pt) Route 7
119	10'-0		35.96	3	(See Notes)	2'-0	120	34.709	• • • • • **Route 8** • • • • • Flow (q) from Route 4
11	10'-0		74.75	3.2600		20'-2 / 22'-2	0.005963	0.132	T(20'-2)
11	10'-0			3	(See Notes)	0'-0	120	34.841	T(20'-2)
132	10'-0		31.89	3.2600		20'-2 / 20'-2	0.001233	0.025	
132	10'-0			3	(See Notes)	2'-8½	120	34.866	T(20'-2)
131	10'-0		7.76	3.2600		20'-2 / 22'-10½	0.000090	0.002	
131	10'-0			3		8'-0	120	34.868	
130	10'-0		4.84	3.2600		8'-0	0.000038	0.000	
130	10'-0			3		7'-0	120	34.869	
136	10'-0		2.41	3.2600		7'-0	0.000010	0.000	
136	10'-0			1½	(See Notes)	178'-3½	120	34.869	PO(9'-11)
129	10'-0		2.41	1.6820		14'-10 / 193'-2	0.000261	0.050	E(4'-11½)
129	10'-0		2.43	1½	(See Notes)	8'-0	120	34.919	Flow (q) from Route 26
128	10'-0		4.84	1.6820		9'-11 / 17'-11	0.000945	0.017	T(9'-11)
128	10'-0		2.93	1½	(See Notes)	18'-6	120	34.936	Flow (q) from Route 23
127	10'-0		7.76	1.6820		9'-11 / 28'-4½	0.002268	0.064	T(9'-11)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step / Total Flow (q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting / Total	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
127	10'-0			1½	(See Notes)	13'-9	120	35.000	T(9'-11)
135	10'-0		3.66	1.6820		19'-9½ / 33'-6½	0.000564	0.019	PO(9'-11)
135	10'-0		4.11	3	(See Notes)	2'-8½	120	35.019	Flow (q) from Route 16
133	10'-0		7.76	3.2600		20'-2 / 22'-10½	0.000090	0.002	T(20'-2)
133	10'-0		25.01	3	(See Notes)	1'-7	120	35.021	Flow (q) from Route 9
48	10'-0		32.77	3.2600		9'-5 / 10'-11½	0.001297	0.014	E(9'-5)
48	10'-0		8.48	3		7'-8½	120	35.036	Flow (q) from Route 22
49	10'-0		41.26	3.2600		7'-8½	0.001986	0.000 / 0.015	
49	10'-0		4.68	3		32'-2	120	35.051	Flow (q) from Route 10
50	10'-0		45.94	3.2600		32'-2	0.002423	-0.000 / 0.078	
50	10'-0			3		10'-0	120	35.129	
51	10'-0		40.21	3.2600		10'-0	0.001893	0.019	
51	10'-0			3	(See Notes)	6'-5½	120	35.148	
37	10'-0		34.61	3.2600		20'-2 / 26'-7½	0.001435	0.000 / 0.038	T(20'-2)
								35.186	Total(Pt) Route 8
72	10'-0		3.31 + 2.26	1½	(See Notes)	22'-5	120	34.900	• • • • • **Route 9** • • • • • Flow (q) from Route 28 and 29
9	10'-0		5.57	1.6820		9'-11 / 32'-3½	0.001225	0.040	PO(9'-11)
9	10'-0			3	(See Notes)	8'-3½	120	34.940	
10	10'-0		0.89	3.2600		20'-2 / 28'-5½	0.000002	0.000	T(20'-2)
10	10'-0		24.12	3		103'-5½	120	34.940	Flow (q) from Route 18
133	10'-0		25.01	3.2600		103'-5½	0.000787	0.081	
								35.021	Total(Pt) Route 9

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor / Total Flow (Q)	Flow added this step (q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value
9	10'-0			1½	(See Notes)	105'-0½	120	34.940	• • • • • **Route 10** • • • • •
						19'-9½	0.000889	0.000	PO(9'-11)
49	10'-0		4.68	1.6820		124'-10		0.111	PO(9'-11)
								35.051	Total(Pt) Route 10
56	10'-0			1½	(See Notes)	56'-4½	120	35.038	• • • • • **Route 11** • • • • •
						19'-9½	0.001867	0.000	PO(9'-11)
81	10'-0		6.99	1.6820		76'-2		0.142	PO(9'-11)
81	10'-0			1½	(See Notes)	49'-1½	120	35.180	PO(9'-11)
						19'-9½	0.000277	-0.000	
59	10'-0		2.49	1.6820		68'-11		0.019	PO(9'-11)
59	10'-0		2.60	3		6'-0	120	35.200	Flow (q) from Route 15
							0.000041		
60	10'-0		5.09	3.2600		6'-0		0.000	
60	10'-0		2.29	3	(See Notes)	31'-9½	120	35.200	Flow (q) from Route 12
						9'-5	0.000082		
61	10'-0		7.39	3.2600		41'-2½		0.003	E(9'-5)
61	10'-0		4.65	1½	(See Notes)	116'-0	120	35.203	PO(9'-11), Flow (q) from Route 21
						19'-9½	0.005102		
44	10'-0		12.04	1.6820		135'-10		0.693	PO(9'-11)
								35.896	Total(Pt) Route 11
55	10'-0			1½	(See Notes)	56'-4½	120	35.034	• • • • • **Route 12** • • • • •
						19'-9½	0.001965	0.000	PO(9'-11)
76	10'-0		7.18	1.6820		76'-2		0.150	PO(9'-11)
76	10'-0			1½	(See Notes)	49'-1½	120	35.183	PO(9'-11)
						19'-9½	0.000238	-0.000	
60	10'-0		2.29	1.6820		68'-11		0.016	PO(9'-11)
								35.200	Total(Pt) Route 12
54	20'-0		24.54	2	(See Notes)	119'-3	120	30.845	• • • • • **Route 13** • • • • •
						30'-9	0.003971	-0.001	T(12'-3½), Flow (q) from Route 14
88	20'-0		20.23	2.1570		150'-0		0.596	E(6'-2), T(12'-3½)
								31.439	Total(Pt) Route 13

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
53	20'-0			2	(See Notes)	56'-4½	120	30.385	• • • • • **Route 14** • • • • •
						24'-7½	0.005677	-0.000	T(12'-3½)
54	20'-0		24.54	2.1570		80'-11½		0.460	T(12'-3½)
								30.845	Total(Pt) Route 14
83	10'-0			1½	(See Notes)	49'-1½	120	35.179	• • • • • **Route 15** • • • • •
						19'-9½	0.000300	-0.000	PO(9'-11)
58	10'-0		2.60	1.6820		68'-11		0.021	PO(9'-11)
58	10'-0			3		12'-0	120	35.199	
							0.000012		
59	10'-0		2.60	3.2600		12'-0		0.000	
								35.200	Total(Pt) Route 15
125	10'-0		1.69	3		7'-0	120	35.019	• • • • • **Route 16** • • • • •
							0.000005		Flow (q) from Route 25
134	10'-0		1.69	3.2600		7'-0		0.000	
134	10'-0		2.42	3		8'-0	120	35.019	Flow (q) from Route 24
							0.000028		
135	10'-0		4.11	3.2600		8'-0		0.000	
								35.019	Total(Pt) Route 16
11	10'-0		31.89	3		8'-3½	120	34.841	• • • • • **Route 17** • • • • •
							0.002131		Flow (q) from Route 8
66	10'-0		42.86	3.2600		8'-3½		0.018	
66	10'-0			3		8'-5	120	34.859	
							0.001837		
64	10'-0		39.55	3.2600		8'-5		0.015	
64	10'-0			3		39'-8	120	34.875	
							0.001647	0.000	
124	10'-0		37.29	3.2600		39'-8		0.065	
								34.940	Total(Pt) Route 17
132	10'-0		7.76	3		100'-0½	120	34.866	• • • • • **Route 18** • • • • •
							0.000736		Flow (q) from Route 8
10	10'-0		24.12	3.2600		100'-0½		0.074	
								34.940	Total(Pt) Route 18

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value
68	10'-0		12.78	3		9'-0	120	35.070	• • • • • **Route 19** • • • • •
69	10'-0		14.89	3.2600		9'-0	0.000301	0.003	Flow (q) from Route 3
69	10'-0			1½	(See Notes)	89'-0½	120	35.073	PO(9'-11)
44	10'-0		14.89	1.6820		19'-9½ 108'-10½	0.007564	0.823	PO(9'-11)
								35.896	Total(Pt) Route 19
45	10'-0			3	(See Notes)	1'-11	120	35.056	• • • • • **Route 20** • • • • •
46	10'-0		12.33	3.2600		20'-2 22'-1	0.000213	-0.000 0.005	T(20'-2)
								35.060	Total(Pt) Route 20
38	10'-0			3	(See Notes)	2'-6½	120	35.186	• • • • • **Route 21** • • • • •
70	10'-0		22.49	3.2600		20'-2 22'-8	0.000646	-0.000 0.015	T(20'-2)
70	10'-0			3		8'-0	120	35.201	
62	10'-0		14.38	3.2600		8'-0	0.000283	0.002	
62	10'-0			3		10'-0	120	35.203	
61	10'-0		4.65	3.2600		10'-0	0.000035	0.000	
								35.203	Total(Pt) Route 21
52	10'-0		31.62	3	(See Notes)	2'-1½	120	35.033	• • • • • **Route 22** • • • • •
48	10'-0		8.48	3.2600		20'-2 22'-3	0.000106	0.002	Flow (q) from Route 2 T(20'-2)
								35.036	Total(Pt) Route 22
131	10'-0			1½	(See Notes)	171'-3½	120	34.868	• • • • • **Route 23** • • • • •
128	10'-0		2.93	1.6820		9'-11 181'-2½	0.000373	0.068	PO(9'-11)
								34.936	Total(Pt) Route 23
127	10'-0		3.66	1½	(See Notes)	8'-0	120	35.000	• • • • • **Route 24** • • • • •
126	10'-0		4.11	1.6820		9'-11 17'-11	0.000698	0.012	Flow (q) from Route 8 T(9'-11)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
126	10'-0			1½	(See Notes)	13'-9	120	35.013	
						9'-11	0.000262		PO(9'-11)
134	10'-0		2.42	1.6820		23'-7½		0.006	
								35.019	Total(Pt) Route 24
126	10'-0			1½	(See Notes)	20'-9	120	35.013	• • • • • **Route 25** • • • • •
						24'-9	0.000135		T(9'-11)
125	10'-0		1.69	1.6820		45'-6		0.006	E(4'-11½), PO(9'-11)
								35.019	Total(Pt) Route 25
130	10'-0			1½	(See Notes)	171'-3½	120	34.869	• • • • • **Route 26** • • • • •
						19'-9½	0.000264		PO(9'-11)
129	10'-0		2.43	1.6820		191'-1		0.050	T(9'-11)
								34.919	Total(Pt) Route 26
71	10'-0		5.73 + 5.60	1½	(See Notes)	6'-5½	120	35.283	• • • • • **Route 27** • • • • •
						9'-11	0.004564	0.000	Flow (q) from Route 33 and 34
39	10'-0		11.33	1.6820		16'-4½		0.075	PO(9'-11)
								35.358	Total(Pt) Route 27
66	10'-0			1½	(See Notes)	78'-2½	120	34.859	• • • • • **Route 28** • • • • •
						9'-11	0.000468		PO(9'-11)
72	10'-0		3.31	1.6820		88'-1½		0.041	
								34.900	Total(Pt) Route 28
64	10'-0			1½	(See Notes)	86'-7½	120	34.875	• • • • • **Route 29** • • • • •
						24'-9	0.000231		PO(9'-11)
72	10'-0		2.26	1.6820		111'-4½		0.026	E(4'-11½), T(9'-11)
								34.900	Total(Pt) Route 29
67	10'-0			1½	(See Notes)	89'-0½	120	35.061	• • • • • **Route 30** • • • • •
						19'-9½	0.004342		PO(9'-11)
41	10'-0		11.03	1.6820		108'-10½		0.473	PO(9'-11)
								35.534	Total(Pt) Route 30
86	10'-0			1½	(See Notes)	56'-4½	120	34.718	• • • • • **Route 31** • • • • •
						19'-9½	0.002338		PO(9'-11)
100	10'-0		7.89	1.6820		76'-2		0.178	PO(9'-11)
								34.897	Total(Pt) Route 31

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
85	10'-0			1½	(See Notes)	56'-4½	120	34.711	• • • • • **Route 32** • • • • • PO(9'-11)
						19'-9½	0.002538		
123	10'-0		8.25	1.6820		76'-2		0.193	PO(9'-11)
								34.904	Total(Pt) Route 32
50	10'-0			1½	(See Notes)	99'-5½	120	35.129	• • • • • **Route 33** • • • • • PO(9'-11)
						19'-9½	0.001294		
71	10'-0		5.73	1.6820		119'-3		0.154	T(9'-11)
								35.283	Total(Pt) Route 33
51	10'-0			1½	(See Notes)	89'-5½	120	35.148	• • • • • **Route 34** • • • • • PO(9'-11)
						19'-9½	0.001239		
71	10'-0		5.60	1.6820		109'-3		0.135	T(9'-11)
								35.283	Total(Pt) Route 34
70	10'-0			1½	(See Notes)	116'-0	120	35.201	• • • • • **Route 35** • • • • • PO(9'-11)
						19'-9½	0.002456		
41	10'-0		8.11	1.6820		135'-10		0.334	PO(9'-11)
								35.534	Total(Pt) Route 35
62	10'-0			1½	(See Notes)	116'-0	120	35.203	• • • • • **Route 36** • • • • • PO(9'-11)
						19'-9½	0.003446		
42	10'-0		9.73	1.6820		135'-10		0.468	PO(9'-11)
								35.671	Total(Pt) Route 36

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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
BalV	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				

Hydraulic Overview

Job Number: F23007
Report Description: Light Hazard (C)

Job

Job Number: F23007	Designer: TWC
Job Name: THE SPRINGS OF BALLENTINE	Phone: 919-553-2356 / FAX:
Address 1: 40 RAWLS CLUB RD	State Certification/License Number: 16269FS
Address 2: FUQUAY-VARINA, NC 27526	AHJ:
Address 3:	Job Site/Building:

System

Density: 0.10 gpm/ft²	Area of Application: 1500 ft² (Actual 1998 ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 100.00
Coverage Per Sprinkler: 118 ft²	Number Of Sprinklers Calculated: 28 0
System Pressure Demand: 65.533	System Flow Demand: 506.77
Total Demand: 606.77 @ 65.533	Pressure Result: +24.972 (27.6%)

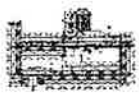
Supplies

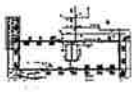
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

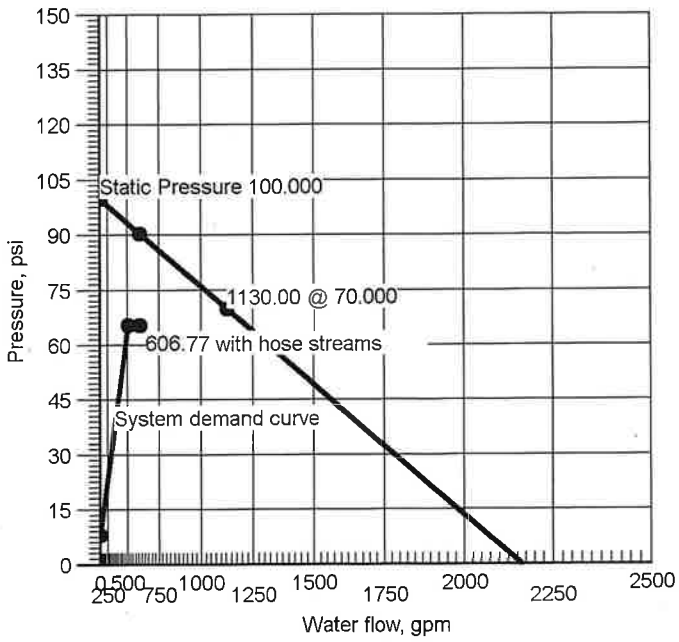
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR (15)	48.638	72.66	506.77

SPRINGS BALLENTINE FP





Water Supply at Node 19 (1130.00, 0.00, 100.000, 70.000)



Hydraulic Calculations

for

Project Name: THE SPRINGS OF BALLENTINE
Location: 40 RAWLS CLUB RD, FUQUAY-VARINA, NC 27526,
Drawing Name: SPRINGS BALLENTINE FP

Calculation Date: 5/15/2023

Design

Remote Area Number:	C
Occupancy Classification:	Light Hazard
Density	0.10 gpm/ft²
Area of Application:	1500 ft² (Actual 1998 ft²)
Coverage per Sprinkler:	118 ft²
Type of sprinklers calculated:	Upright
No. of sprinklers calculated:	28
No. of nozzles calculated:	0

In-rack Demand:	N/A gpm	at Node:	N/A		
Hose Streams:	100.00	at Node:	19	Type:	Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 19: 606.77 @ 65.533 (Safety Margin = 24.972)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherA N/A

Name of Contractor:
Address:
Phone Number:
Name of designer: TWC
Authority Having Jurisdiction:

Notes:

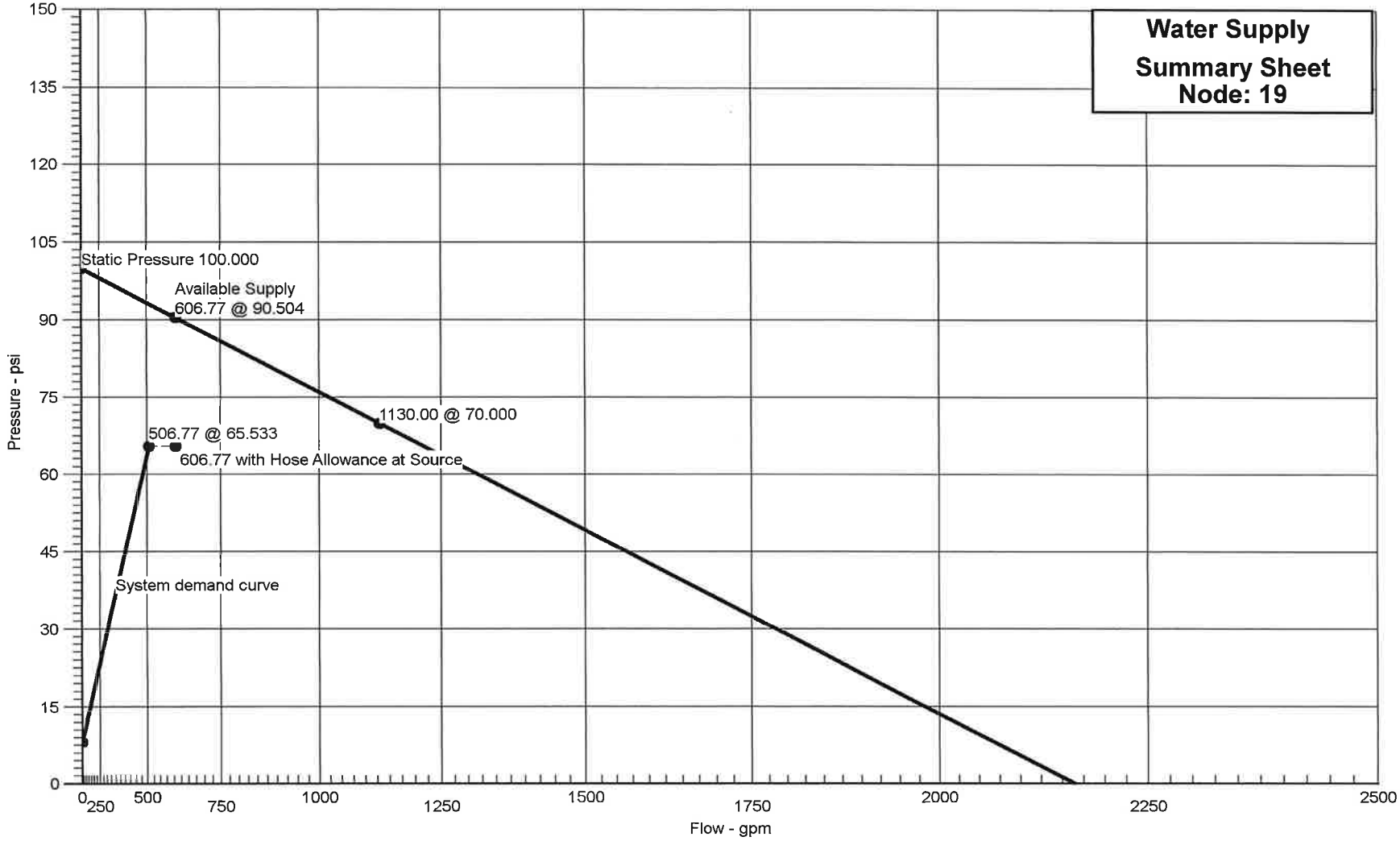
Automatic peaking results Left: N/A Right: 64.635

Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: C

$N^{1.85}$

Date: 5/15/2023

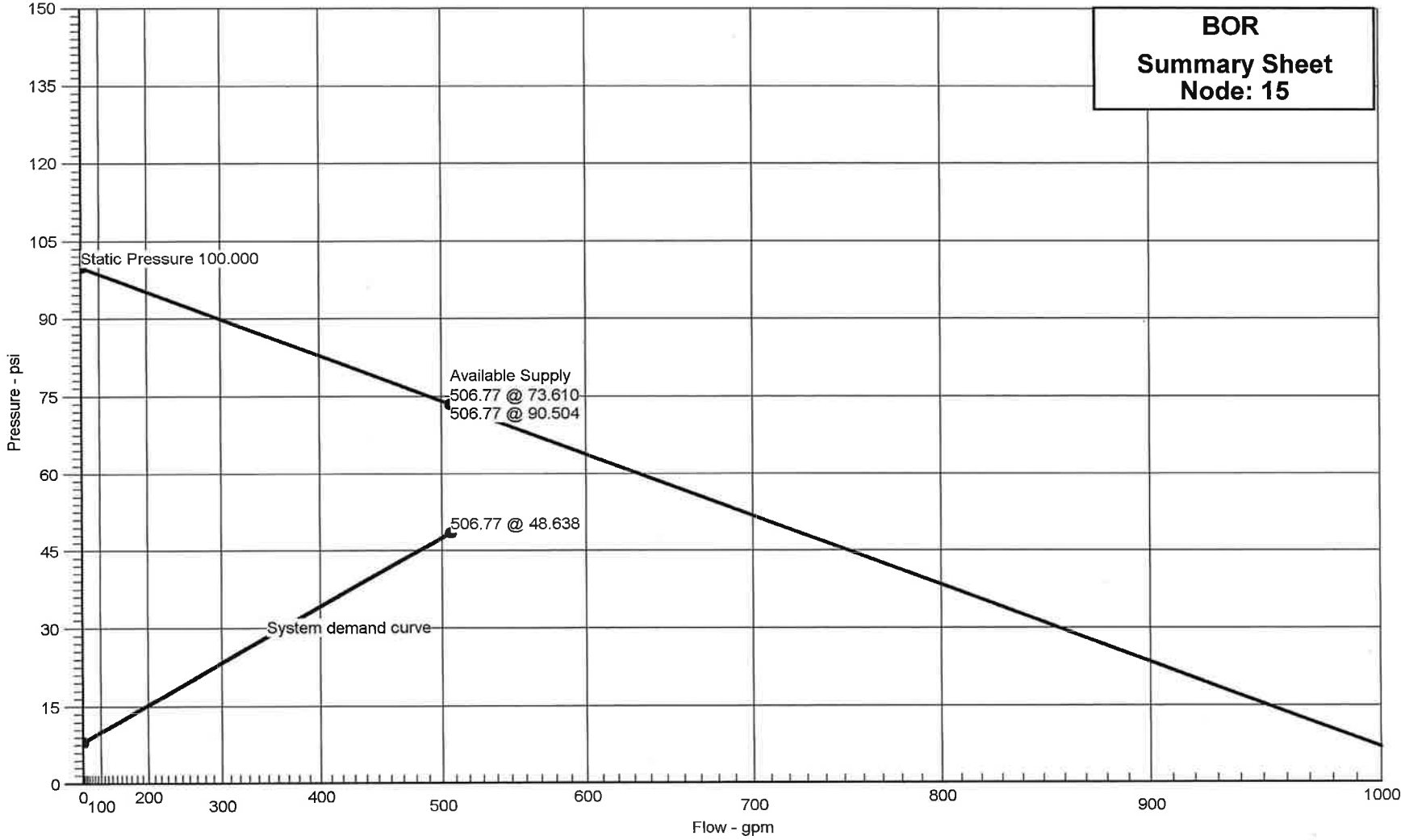


Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: C

$N^{1.85}$

Date: 5/15/2023



Summary Of Outflowing Devices

Job Number: F23007
Report Description: Light Hazard (C)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
⇨ **Sprinkler**	**207**	**14.82**	**11.75**	**5.6**	**7.000**			
Sprinkler	208	16.93	11.75	5.6	9.137			
Sprinkler	209	17.48	11.75	5.6	9.742			
Sprinkler	210	17.50	11.75	5.6	9.764			
Sprinkler	211	17.58	11.75	5.6	9.852			
Sprinkler	212	17.74	11.75	5.6	10.038			
Sprinkler	213	18.02	11.75	5.6	10.356			
Sprinkler	214	17.24	11.75	5.6	9.475			
Sprinkler	215	17.25	11.75	5.6	9.493			
Sprinkler	216	17.33	11.75	5.6	9.573			
Sprinkler	217	17.49	11.75	5.6	9.753			
Sprinkler	218	17.76	11.75	5.6	10.063			
Sprinkler	219	18.18	11.75	5.6	10.536			
Sprinkler	220	18.07	11.75	5.6	10.412			
Sprinkler	221	18.09	11.75	5.6	10.431			
Sprinkler	222	18.16	11.75	5.6	10.518			
Sprinkler	223	18.33	11.75	5.6	10.716			
Sprinkler	224	18.62	11.75	5.6	11.054			
Sprinkler	225	18.94	11.75	5.6	11.441			
Sprinkler	226	18.34	11.75	5.6	10.728			
Sprinkler	227	18.34	11.75	5.6	10.728			
Sprinkler	228	18.47	11.75	5.6	10.874			
Sprinkler	229	18.86	11.75	5.6	11.341			
Sprinkler	230	18.91	11.75	5.6	11.401			
Sprinkler	231	20.04	11.75	5.6	12.808			
Sprinkler	232	19.12	11.75	5.6	11.654			
Sprinkler	233	19.10	11.75	5.6	11.627			
Sprinkler	234	20.08	11.75	5.6	12.861			

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
19	Water Supply	100.000	70.000	1130.00	90.504	606.77	65.533

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	1'-0	Supply	65.533	506.77	
207	18'-10	Sprinkler	7.000	14.82	
208	13'-4½	Sprinkler	9.137	16.93	
209	15'-1	Sprinkler	9.742	17.48	
210	15'-1	Sprinkler	9.764	17.50	
211	15'-1	Sprinkler	9.852	17.58	
212	15'-1	Sprinkler	10.038	17.74	
213	15'-1	Sprinkler	10.356	18.02	
214	10'-11	Sprinkler	9.475	17.24	
215	10'-11	Sprinkler	9.493	17.25	
216	10'-11	Sprinkler	9.573	17.33	
217	10'-11	Sprinkler	9.753	17.49	
218	10'-11	Sprinkler	10.063	17.76	
219	10'-11	Sprinkler	10.536	18.18	
220	10'-11	Sprinkler	10.412	18.07	
221	10'-11	Sprinkler	10.431	18.09	
222	10'-11	Sprinkler	10.518	18.16	
223	10'-11	Sprinkler	10.716	18.33	
224	10'-11	Sprinkler	11.054	18.62	

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
225	10'-11	Sprinkler	11.441	18.94	
226	20'-0	Sprinkler	10.728	18.34	
227	20'-0	Sprinkler	10.728	18.34	
228	10'-5½	Sprinkler	10.874	18.47	
229	15'-1	Sprinkler	11.341	18.86	
230	15'-1	Sprinkler	11.401	18.91	
231	10'-5½	Sprinkler	12.808	20.04	
232	10'-11	Sprinkler	11.654	19.12	
233	10'-11	Sprinkler	11.627	19.10	
234	10'-5½	Sprinkler	12.861	20.08	
9	10'-0		16.371		
10	10'-0		16.370		
11	10'-0		17.388		
12	20'-0		13.097		
13	20'-0		13.585		
14	10'-0		41.799		
15	1'-0	Gauge	48.638		
16	-3'-0		50.474		
17	1'-0		51.734		
18	1'-0		65.149		
34	10'-0		15.093		
35	10'-0		14.361		
36	10'-0		14.811		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
37	10'-0		14.932		
38	10'-0		14.932		
39	10'-0		16.872		
40	10'-0		18.380		
41	10'-0		18.518		
42	10'-0		19.103		
43	10'-0		19.191		
44	10'-0		20.079		
45	10'-0		17.833		
46	10'-0		17.845		
48	10'-0		15.321		
49	10'-0		15.308		
50	10'-0		15.202		
51	10'-0		15.149		
52	10'-0		15.167		
53	20'-0		10.870		
54	20'-0		10.799		
55	10'-0		15.163		
56	10'-0		15.121		
57	10'-0		15.096		
58	10'-0		14.548		
59	10'-0		14.582		
60	10'-0		14.618		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
61	10'-0		14.911		
62	10'-0		14.936		
64	10'-0		17.488		
66	10'-0		17.431		
67	10'-0		17.847		
68	10'-0		17.868		
69	10'-0		17.875		
70	10'-0		14.938		
71	10'-0		16.294		
72	10'-0		17.028		
73	10'-11		11.623		
75	10'-0		14.676		
76	10'-0		14.771		
77	10'-0		11.952		
78	10'-0		14.555		
79	10'-0		14.605		
80	15'-1		11.320		
81	10'-0		14.541		
82	10'-11		11.870		
83	10'-0		14.272		
84	10'-0		14.546		
85	10'-0		17.439		
86	10'-0		17.452		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
87	10'-0		17.456		
88	20'-0		15.468		
90	10'-0		26.741		
91	10'-0		26.756		
96	10'-0		17.755		
100	10'-0		17.758		
119	10'-0		17.436		
123	10'-0		17.771		
124	10'-0		17.833		
125	10'-0		15.502		
126	10'-0		15.561		
127	10'-0		15.672		
128	10'-0		16.365		
129	10'-0		16.551		
130	10'-0		17.103		
131	10'-0		17.106		
132	10'-0		17.129		
133	10'-0		15.477		
134	10'-0		15.501		
135	10'-0		15.499		
136	10'-0		17.102		
734	10'-0		14.208		
747	10'-0		17.756		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1119	10'-0		17.455		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
207	18'-10	5.6	14.82	1	(See Notes)	8'-11	120	7.000	• • • • • Route 1 • • • • • Sprinkler, E(2'-0), PO(5'-0)
73	10'-11		14.82	1.0490		7'-0 15'-11	0.074703	3.435 1.189	
73	10'-11		110.21	2	(See Notes)	4'-6	120	11.623	Flow (q) from Route 5 E(6'-2), PO(12'-3½)
75	10'-0		125.03	2.1570		18'-5½ 22'-11½	0.115411	0.401 2.651	
75	10'-0		173.74	3		1'-3	120	14.676	Flow (q) from Route 3
76	10'-0		298.76	3.2600		1'-3	0.077382	0.095	
76	10'-0			3		0'-6½	120	14.771	
36	10'-0		294.36	3.2600		0'-6½	0.075287	0.040	
36	10'-0			3		2'-1½	120	14.811	
37	10'-0		253.70	3.2600		2'-1½	0.057185	0.121	
37	10'-0			3		0'-0	120	14.932	
38	10'-0		165.24	3.2600		0'-0	0.025869	0.000	
38	10'-0			3		88'-10½	120	14.932	
39	10'-0		150.77	3.2600		88'-10½	0.021834	1.941	
39	10'-0		34.27	3	(See Notes)	27'-1½	120	16.872	Flow (q) from Route 34 T(20'-2)
40	10'-0		185.03	3.2600		20'-2 47'-3½	0.031892	1.508	
40	10'-0		62.12	3		2'-6½	120	18.380	Flow (q) from Route 13
41	10'-0		247.15	3.2600		2'-6½	0.054482	-0.000 0.137	
41	10'-0		29.24 + 13.33	3		8'-0	120	18.518	Flow (q) from Route 2 and 43
42	10'-0		289.71	3.2600		8'-0	0.073101	0.585	
42	10'-0		31.74	3		1'-0	120	19.103	Flow (q) from Route 47
43	10'-0		321.45	3.2600		1'-0	0.088604	0.089	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
43	10'-0		19.24	3		9'-0	120	19.191	Flow (q) from Route 35
44	10'-0		340.70	3.2600		9'-0	0.098666	0.888	
44	10'-0		25.35 + 35.66	3	(See Notes)	29'-9	120	20.079	Flow (q) from Route 36 and 48
91	10'-0		401.71	3.2600	(See Notes)	20'-2 49'-10½	0.133821	6.677	T(20'-2)
91	10'-0		105.06	3	(See Notes)	44'-11	120	26.756	Flow (q) from Route 6
14	10'-0		506.77	3.2600	(See Notes)	28'-2½ 73'-1½	0.205679	15.042	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	41.799	
15	1'-0		506.77	4.2600	(See Notes)	44'-9 52'-7	0.055890	3.902 2.938	f, sCV(28'-11½), BV(15'-9½), BOR
15	1'-0			6	(See Notes)	4'-0	120	48.638	
16	-3'-0		506.77	6.3570	(See Notes)	8'-9½ 12'-9½	0.007956	1.734 0.102	EE(8'-9½)
16	-3'-0			6	(See Notes)	358'-0½	140	50.474	
17	1'-0		506.77	6.2800	(See Notes)	113'-5½ 471'-6½	0.006348	-1.734 2.993	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	1'-0			6	(See Notes)	12'-0	120	51.734	
18	1'-0		506.77	6.3570	(See Notes)	40'-3 52'-3	0.007956	13.416	2LtE(11'-4), BFP(-13.000), E(17'-7)
18	1'-0			6	(See Notes)	13'-2	140	65.149	
19	1'-0		506.77	6.2800	(See Notes)	47'-3½ 60'-5	0.006348	0.384	S, T(47'-3½)
			100.00					65.533	Hose Allowance At Source
19			606.77					Total(Pt)	Route 1
208	13'-4½	5.6	16.93	1	(See Notes)	10'-1½	120	9.137	• • • • • **Route 2** • • • • • Sprinkler,
77	10'-0		16.93	1.0490	(See Notes)	4'-0 14'-1½	0.095583	1.464 1.350	2E(2'-0)
77	10'-0		18.47	1	(See Notes)	1'-11½	120	11.952	Flow (q) from Route 8
78	10'-0		35.39	1.0490	(See Notes)	5'-0 6'-11½	0.374113	-0.000 2.604	PO(5'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
78	10'-0		30.60	3		5'-6½	120	14.555	Flow (q) from Route 11
59	10'-0		66.00	3.2600		5'-6½	0.004736	0.026	
59	10'-0		3.77	3		4'-5½	120	14.582	Flow (q) from Route 25
79	10'-0		69.77	3.2600		4'-5½	0.005249	0.023	
79	10'-0		20.08	3		1'-6½	120	14.605	Flow (q) from Route 12
60	10'-0		89.85	3.2600		1'-6½	0.008381	0.013	
60	10'-0			3	(See Notes)	31'-9½	120	14.618	
61	10'-0		82.17	3.2600		9'-5 41'-2½	0.007104	0.293	E(9'-5)
61	10'-0			3		10'-0	120	14.911	
62	10'-0		46.51	3.2600		10'-0	0.002479	0.025	
62	10'-0			3		8'-0	120	14.936	
70	10'-0		14.77	3.2600		8'-0	0.000297	0.002	
70	10'-0		14.47	1½	(See Notes)	116'-0	120	14.938	PO(9'-11), Flow (q) from Route 37
41	10'-0		29.24	1.6820		19'-9½ 135'-10	0.026358	3.580	PO(9'-11)
								18.518	Total(Pt) Route 2
214	10'-11	5.6	17.24	2	(See Notes)	6'-0	120	9.475	• • • • • **Route 3** • • • • • Sprinkler
215	10'-11		17.24	2.1570		6'-0	0.002953	-0.000 0.018	
215	10'-11	5.6	17.25	2	(See Notes)	7'-6	120	9.493	Sprinkler
216	10'-11		34.49	2.1570		7'-6	0.010656	-0.000 0.080	
216	10'-11	5.6	17.33	2	(See Notes)	8'-0	120	9.573	Sprinkler
217	10'-11		51.82	2.1570		8'-0	0.022625	-0.000 0.181	
217	10'-11	5.6	17.49	2	(See Notes)	8'-0	120	9.753	Sprinkler
218	10'-11		69.31	2.1570		8'-0	0.038747	-0.000 0.310	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
218	10'-11	5.6	17.76	2	(See Notes)	8'-0	120	10.063	Sprinkler
219	10'-11		87.07	2.1570		8'-0	0.059098	-0.000 0.473	
219	10'-11	5.6	18.18	2	(See Notes)	3'-7	120	10.536	Sprinkler,
82	10'-11		105.25	2.1570		12'-3½ 15'-10½	0.083927	-0.000 1.334	T(12'-3½)
82	10'-11		38.21	2	(See Notes)	0'-8½	120	11.870	Flow (q) from Route 10
734	10'-0		143.46	2.1570		12'-3½ 13'-0	0.148855	0.402 1.936	PO(12'-3½)
734	10'-0			3		3'-2½	120	14.208	
83	10'-0		143.46	3.2600		3'-2½	0.019918	0.064	
83	10'-0			3		6'-9½	120	14.272	
35	10'-0		114.87	3.2600		6'-9½	0.013203	0.089	
35	10'-0		77.59	3		5'-2½	120	14.361	Flow (q) from Route 4
81	10'-0		192.46	3.2600		5'-2½	0.034301	0.179	
81	10'-0			3		4'-9	120	14.541	
75	10'-0		173.74	3.2600		4'-9	0.028385	0.135	
								14.676	Total(Pt) Route 3
209	15'-1	5.6	17.48	2	(See Notes)	7'-6	120	9.742	• • • • • **Route 4** • • • • • Sprinkler
210	15'-1		17.48	2.1570		7'-6	0.003030	0.023	
210	15'-1	5.6	17.50	2	(See Notes)	8'-0	120	9.764	Sprinkler
211	15'-1		34.98	2.1570		8'-0	0.010935	0.087	
211	15'-1	5.6	17.58	2	(See Notes)	8'-0	120	9.852	Sprinkler
212	15'-1		52.55	2.1570		8'-0	0.023223	0.186	
212	15'-1	5.6	17.74	2	(See Notes)	8'-0	120	10.038	Sprinkler
213	15'-1		70.30	2.1570		8'-0	0.039776	0.318	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value
213	15'-1	5.6	18.02	2	(See Notes)	3'-7	120	10.356	Sprinkler,
						12'-3½	0.060672		T(12'-3½)
80	15'-1		88.32	2.1570		15'-10½		0.964	
80	15'-1			2	(See Notes)	5'-1	120	11.320	
						12'-3½	0.047742	2.210	PO(12'-3½)
35	10'-0		77.59	2.1570		17'-5		0.831	
								14.361	Total(Pt) Route 4
220	10'-11	5.6	18.07	2	(See Notes)	6'-0	120	10.412	• • • • • **Route 5** • • • • • Sprinkler
							0.003222		
221	10'-11		18.07	2.1570		6'-0		0.019	
221	10'-11	5.6	18.09	2	(See Notes)	7'-6	120	10.431	Sprinkler
							0.011626		
222	10'-11		36.16	2.1570		7'-6		0.087	
222	10'-11	5.6	18.16	2	(See Notes)	8'-0	120	10.518	Sprinkler
							0.024685		
223	10'-11		54.32	2.1570		8'-0		0.197	
223	10'-11	5.6	18.33	2	(See Notes)	8'-0	120	10.716	Sprinkler
							0.042274		
224	10'-11		72.65	2.1570		8'-0		0.338	
224	10'-11	5.6	18.62	2	(See Notes)	6'-0	120	11.054	Sprinkler
							0.064474		
225	10'-11		91.27	2.1570		6'-0		0.387	
225	10'-11	5.6	18.94	2	(See Notes)	2'-0	120	11.441	Sprinkler
							0.091391		
73	10'-11		110.21	2.1570		2'-0		0.183	
								11.623	Total(Pt) Route 5
226	20'-0	5.6	18.34	2	(See Notes)	44'-5½	120	10.728	• • • • • **Route 6** • • • • • Sprinkler,
						12'-3½	0.002505	0.000	T(12'-3½)
53	20'-0		15.77	2.1570		56'-9		0.142	
53	20'-0		12.56	2	(See Notes)	214'-6½	120	10.870	T(12'-3½), Flow (q) from Route 9 2E(6'-2), 5T(12'-3½)
						86'-2	0.007406	0.001	
12	20'-0		28.33	2.1570		300'-8		2.227	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes (Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.)
12	20'-0			2	(See Notes)	60'-10½	120	13.097	T(12'-3½)
13	20'-0		23.75	2.1570		30'-9 91'-7½	0.005342	-0.002 0.489	E(6'-2), T(12'-3½)
13	20'-0		19.74	2	(See Notes)	90'-5½	120	13.585	T(12'-3½), Flow (q) from Route 14
88	20'-0		43.49	2.1570		24'-7½ 115'-1	0.016361	 1.883	T(12'-3½)
88	20'-0		61.57	2	(See Notes)	58'-4	120	15.468	Flow (q) from Route 7
90	10'-0		105.06	2.1570		24'-7½ 82'-11	0.083653	4.335 6.938	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	26.741	
91	10'-0		105.06	3.2600		 1'-4½	0.011193	 0.016	
								26.756	Total(Pt) Route 6
226	20'-0	5.6	18.34	2	(See Notes)	7'-6	120	10.728	• • • • • **Route 7** • • • • • Sprinkler
227	20'-0		2.57	2.1570		 7'-6	0.000087	-0.000 0.001	
227	20'-0	5.6	18.34	2	(See Notes)	4'-5	120	10.728	Sprinkler,
54	20'-0		20.91	2.1570		12'-3½ 16'-8½	0.004222	-0.000 0.071	T(12'-3½)
54	20'-0		40.66	2	(See Notes)	119'-3	120	10.799	T(12'-3½), Flow (q) from Route 17
88	20'-0		61.57	2.1570		30'-9 150'-0	0.031130	-0.001 4.670	E(6'-2), T(12'-3½)
								15.468	Total(Pt) Route 7
228	10'-5½	5.6	18.47	1	(See Notes)	0'-9½	120	10.874	• • • • • **Route 8** • • • • • Sprinkler,
77	10'-0		18.47	1.0490		7'-0 7'-9½	0.112278	0.202 0.876	E(2'-0), T(5'-0)
								11.952	Total(Pt) Route 8
229	15'-1	5.6	18.86	2	(See Notes)	7'-6	120	11.341	• • • • • **Route 9** • • • • • Sprinkler
230	15'-1		29.59	2.1570		 7'-6	0.008025	 0.060	
230	15'-1	5.6	18.91	2	(See Notes)	49'-6½	120	11.401	Sprinkler,
57	10'-0		48.50	2.1570		24'-7½ 74'-2	0.020017	2.210 1.484	T(12'-3½), PO(12'-3½)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
57	10'-0		18.03	3		5'-2½	120	15.096	Flow (q) from Route 23
56	10'-0		66.53	3.2600		5'-2½	0.004807	0.025	
56	10'-0		14.95	3		6'-0	120	15.121	Flow (q) from Route 26
55	10'-0		81.47	3.2600		6'-0	0.006993	0.042	
55	10'-0		12.08	3		0'-6½	120	15.163	Flow (q) from Route 27
52	10'-0		93.56	3.2600		0'-6½	0.009032	0.005	
52	10'-0			2	(See Notes)	10'-0	120	15.167	PO(12'-3½)
53	20'-0		12.56	2.1570	(See Notes)	12'-3½ 22'-3½	0.001645	-4.334 0.037	
								10.870	Total(Pt) Route 9
233	10'-11	5.6	19.10	2	(See Notes)	7'-6	120	11.627	• • • • • **Route 10** • • • • • Sprinkler
232	10'-11		19.10	2.1570	(See Notes)	7'-6	0.003569	0.027	
232	10'-11	5.6	19.12	2	(See Notes)	4'-5	120	11.654	Sprinkler,
82	10'-11		38.21	2.1570	(See Notes)	12'-3½ 16'-8½	0.012879	0.000 0.215	T(12'-3½)
								11.870	Total(Pt) Route 10
231	10'-5½	5.6	20.04	1	(See Notes)	2'-9	120	12.808	• • • • • **Route 11** • • • • • Sprinkler,
84	10'-0		20.04	1.0490	(See Notes)	9'-0 11'-9	0.130633	0.202 1.536	2E(2'-0), PO(5'-0)
84	10'-0			3		3'-6½	120	14.546	
58	10'-0		20.04	3.2600		3'-6½	0.000522	0.002	
58	10'-0		10.56	3		6'-5½	120	14.548	Flow (q) from Route 29
78	10'-0		30.60	3.2600		6'-5½	0.001143	0.007	
								14.555	Total(Pt) Route 11
234	10'-5½	5.6	20.08	1	(See Notes)	2'-9	120	12.861	• • • • • **Route 12** • • • • • Sprinkler,
79	10'-0		20.08	1.0490	(See Notes)	9'-0 11'-9	0.131133	0.202 1.542	2E(2'-0), PO(5'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								14.605	Total(Pt) Route 12
45	10'-0		139.78	3	(See Notes)	89'-0½	120	17.833	• • • • • Route 13 • • • • •
						40'-4			T(20'-2), Flow (q) from Route 15
40	10'-0		62.12	3.2600		129'-4½	0.004233	0.548	T(20'-2)
								18.380	Total(Pt) Route 13
45	10'-0		139.78	3		1'-11	120	17.833	• • • • • Route 14 • • • • •
								-0.000	Flow (q) from Route 15
46	10'-0		77.67	3.2600		1'-11	0.006400	0.012	
46	10'-0			2	(See Notes)	7'-6	120	17.845	PO(12'-3½)
						12'-3½		-4.335	
13	20'-0		19.74	2.1570		19'-9½	0.003795	0.075	
								13.585	Total(Pt) Route 14
12	20'-0		23.75	2	(See Notes)	10'-0	120	13.097	• • • • • Route 15 • • • • •
						12'-3½		4.333	Flow (q) from Route 6
119	10'-0		4.59	2.1570		22'-3½	0.000255	0.006	PO(12'-3½)
119	10'-0		43.60	3		1'-0½	120	17.436	Flow (q) from Route 18
85	10'-0		48.19	3.2600		1'-0½	0.002647	0.003	
85	10'-0			3		8'-0	120	17.439	
86	10'-0		37.13	3.2600		8'-0	0.001634	0.013	
86	10'-0			3		2'-8½	120	17.452	
1119	10'-0		26.55	3.2600		2'-8½	0.000879	0.002	
1119	10'-0			3		5'-3½	120	17.455	
87	10'-0		10.46	3.2600		5'-3½	0.000157	0.001	
87	10'-0			1½	(See Notes)	56'-4½	120	17.456	PO(9'-11)
						19'-9½			
96	10'-0		10.46	1.6820		76'-2	0.003933	0.300	PO(9'-11)
96	10'-0			3		5'-3½	120	17.755	
								0.000	
747	10'-0		10.46	3.2600		5'-3½	0.000157	0.001	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
747	10'-0		16.10	3		2'-8½	120	17.756	Flow (q) from Route 16
100	10'-0		26.55	3.2600		2'-8½	0.000879	-0.000 0.002	
100	10'-0		10.58	3		8'-0	120	17.758	Flow (q) from Route 44
123	10'-0		37.13	3.2600		8'-0	0.001634	0.013	
123	10'-0		11.06	3	(See Notes)	3'-0½	120	17.771	Flow (q) from Route 45
124	10'-0		48.19	3.2600	(See Notes)	20'-2 23'-2½	0.002647	0.000 0.061	T(20'-2)
124	10'-0		91.59	3		0'-0	120	17.833	Flow (q) from Route 20
45	10'-0		139.78	3.2600		0'-0	0.018983	0.000	
								17.833	Total(Pt) Route 15
1119	10'-0			2	(See Notes)	66'-6½	120	17.455	• • • • • **Route 16** • • • • • PO(12'-3½)
747	10'-0		16.10	2.1570	(See Notes)	49'-2½ 115'-9½	0.002601	0.000 0.301	2T(12'-3½), PO(12'-3½)
								17.756	Total(Pt) Route 16
36	10'-0			2	(See Notes)	10'-0	120	14.811	• • • • • **Route 17** • • • • • PO(12'-3½)
54	20'-0		40.66	2.1570	(See Notes)	12'-3½ 22'-3½	0.014447	-4.334 0.322	
								10.799	Total(Pt) Route 17
125	10'-0		6.58	1½	(See Notes)	20'-9	120	15.502	• • • • • **Route 18** • • • • • PO(9'-11), Flow (q) from Route 30 E(4'-11½)
126	10'-0		6.58	1.6820	(See Notes)	14'-10 35'-7	0.001670	0.059	
126	10'-0		6.82	1½	(See Notes)	8'-0	120	15.561	Flow (q) from Route 31
127	10'-0		13.40	1.6820	(See Notes)	9'-11 17'-11	0.006227	0.111	T(9'-11)
127	10'-0		14.64	1½	(See Notes)	18'-6	120	15.672	Flow (q) from Route 32
128	10'-0		28.05	1.6820	(See Notes)	9'-11 28'-4½	0.024405	0.693	T(9'-11)
128	10'-0			1½	(See Notes)	8'-0	120	16.365	
129	10'-0		17.67	1.6820	(See Notes)	9'-11 17'-11	0.010380	0.186	T(9'-11)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
129	10'-0			1½	(See Notes)	171'-3½	120	16.551	
						9'-11	0.003047		PO(9'-11)
130	10'-0		9.11	1.6820		181'-2½		0.552	
130	10'-0		8.56	3		8'-0	120	17.103	Flow (q) from Route 38
							0.000414		
131	10'-0		17.67	3.2600		8'-0		0.003	
131	10'-0		10.38	3	(See Notes)	2'-8½	120	17.106	Flow (q) from Route 40
						20'-2	0.000972		T(20'-2)
132	10'-0		28.05	3.2600		22'-10½		0.022	
132	10'-0		85.15	3	(See Notes)	0'-0	120	17.129	Flow (q) from Route 19
						20'-2	0.012849		T(20'-2)
11	10'-0		113.20	3.2600		20'-2		0.259	
11	10'-0			3	(See Notes)	2'-0	120	17.388	T(20'-2)
						20'-2	0.002200		
119	10'-0		43.60	3.2600		22'-2		0.049	
								17.436	Total(Pt) Route 18
52	10'-0		12.56	3	(See Notes)	2'-1½	120	15.167	**• • • • • Route 19 • • • • •** Flow (q) from Route 9
						20'-2	0.006917		T(20'-2)
48	10'-0		80.99	3.2600		22'-3		0.154	
48	10'-0		38.32	3	(See Notes)	1'-7	120	15.321	Flow (q) from Route 21
						9'-5	0.014164		E(9'-5)
133	10'-0		119.32	3.2600		10'-11½		0.155	
133	10'-0			3		103'-5½	120	15.477	
							0.008628		
10	10'-0		91.27	3.2600		103'-5½		0.893	
10	10'-0			3		100'-0½	120	16.370	
							0.007588		
132	10'-0		85.15	3.2600		100'-0½		0.759	
								17.129	Total(Pt) Route 19
9	10'-0		15.88 + 6.12	1½	(See Notes)	22'-5	120	16.371	**• • • • • Route 20 • • • • •** PO(9'-11), Flow (q) from Route 22 and 39
						19'-9½	0.015570		T(9'-11)
72	10'-0		22.00	1.6820		42'-2½		0.657	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
72	10'-0			1½	(See Notes)	78'-2½	120	17.028	T(9'-11)
						19'-9½	0.004109		
66	10'-0		10.71	1.6820		98'-0		0.403	PO(9'-11)
66	10'-0		69.60	3		8'-5	120	17.431	Flow (q) from Route 33
							0.006808		
64	10'-0		80.30	3.2600		8'-5		0.057	
64	10'-0		11.29	3		39'-8	120	17.488	Flow (q) from Route 42
							0.008684	0.000	
124	10'-0		91.59	3.2600		39'-8		0.344	
								17.833	Total(Pt) Route 20
50	10'-0			3		32'-2	120	15.202	• • • • • **Route 21** • • • • •
							0.003290	0.000	
49	10'-0		54.20	3.2600		32'-2		0.106	
49	10'-0			3		7'-8½	120	15.308	
							0.001733	-0.000	
48	10'-0		38.32	3.2600		7'-8½		0.013	
								15.321	Total(Pt) Route 21
49	10'-0			1½	(See Notes)	105'-0½	120	15.308	• • • • • **Route 22** • • • • •
						19'-9½	0.008517	-0.000	PO(9'-11)
9	10'-0		15.88	1.6820		124'-10		1.063	PO(9'-11)
								16.371	Total(Pt) Route 22
34	10'-0		18.03	3		6'-9½	120	15.093	• • • • • **Route 23** • • • • •
							0.000429		Flow (q) from Route 24
57	10'-0		18.03	3.2600		6'-9½		0.003	
								15.096	Total(Pt) Route 23
83	10'-0			1½	(See Notes)	56'-4½	120	14.272	• • • • • **Route 24** • • • • •
						19'-9½	0.010777	-0.000	PO(9'-11)
34	10'-0		18.03	1.6820		76'-2		0.821	PO(9'-11)
								15.093	Total(Pt) Route 24
81	10'-0			1½	(See Notes)	49'-1½	120	14.541	• • • • • **Route 25** • • • • •
						19'-9½	0.000596	-0.000	PO(9'-11)
59	10'-0		3.77	1.6820		68'-11		0.041	PO(9'-11)
								14.582	Total(Pt) Route 25

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
81	10'-0			1½	(See Notes)	56'-4½	120	14.541	• • • • • **Route 26** • • • • •
						19'-9½	0.007617	-0.000	PO(9'-11)
56	10'-0		14.95	1.6820		76'-2		0.580	PO(9'-11)
								15.121	Total(Pt) Route 26
60	10'-0			1½	(See Notes)	49'-1½	120	14.618	• • • • • **Route 27** • • • • •
						19'-9½	0.002223	0.000	PO(9'-11)
76	10'-0		7.68	1.6820		68'-11		0.153	PO(9'-11)
76	10'-0			1½	(See Notes)	56'-4½	120	14.771	PO(9'-11)
						19'-9½	0.005138	-0.000	
55	10'-0		12.08	1.6820		76'-2		0.391	PO(9'-11)
								15.163	Total(Pt) Route 27
80	15'-1			2	(See Notes)	4'-5	120	11.320	• • • • • **Route 28** • • • • •
						12'-3½	0.001229		T(12'-3½)
229	15'-1		10.73	2.1570		16'-8½		0.021	
								11.341	Total(Pt) Route 28
83	10'-0			1½	(See Notes)	49'-1½	120	14.272	• • • • • **Route 29** • • • • •
						19'-9½	0.004005	-0.000	PO(9'-11)
58	10'-0		10.56	1.6820		68'-11		0.276	PO(9'-11)
								14.548	Total(Pt) Route 29
134	10'-0			3		7'-0	120	15.501	• • • • • **Route 30** • • • • •
							0.000067		
125	10'-0		6.58	3.2600		7'-0		0.000	
								15.502	Total(Pt) Route 30
135	10'-0			3		8'-0	120	15.499	• • • • • **Route 31** • • • • •
							0.000248		
134	10'-0		13.40	3.2600		8'-0		0.002	
134	10'-0			1½	(See Notes)	13'-9	120	15.501	PO(9'-11)
						19'-9½	0.001786		
126	10'-0		6.82	1.6820		33'-6½		0.060	T(9'-11)
								15.561	Total(Pt) Route 31
133	10'-0			3	(See Notes)	2'-8½	120	15.477	• • • • • **Route 32** • • • • •
						20'-2	0.000972		T(20'-2)
135	10'-0		28.05	3.2600		22'-10½		0.022	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes
									Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
135	10'-0			1½	(See Notes)	13'-9	120	15.499	PO(9'-11)
127	10'-0		14.64	1.6820		9'-11	0.007334		
						23'-7½		0.173	
								15.672	Total(Pt) Route 32
11	10'-0		43.60	3		8'-3½	120	17.388	• • • • • **Route 33** • • • • • Flow (q) from Route 18
66	10'-0		69.60	3.2600			0.005225		
						8'-3½		0.043	
								17.431	Total(Pt) Route 33
37	10'-0			3	(See Notes)	6'-5½	120	14.932	• • • • • **Route 34** • • • • • T(20'-2)
51	10'-0		88.47	3.2600		20'-2	0.008144	-0.000	
						26'-7½		0.217	
51	10'-0			3		10'-0	120	15.149	
50	10'-0		70.71	3.2600			0.005380		
						10'-0		0.054	
50	10'-0			1½	(See Notes)	99'-5½	120	15.202	PO(9'-11)
71	10'-0		16.51	1.6820		19'-9½	0.009151		T(9'-11)
						119'-3		1.091	
71	10'-0		17.76	1½	(See Notes)	6'-5½	120	16.294	Flow (q) from Route 46
39	10'-0		34.27	1.6820		9'-11	0.035349	0.000	PO(9'-11)
						16'-4½		0.579	
								16.872	Total(Pt) Route 34
46	10'-0		19.74	3		0'-7	120	17.845	• • • • • **Route 35** • • • • • Flow (q) from Route 14
67	10'-0		57.92	3.2600			0.003720		
						0'-7		0.002	
67	10'-0			3		9'-0	120	17.847	
68	10'-0		44.60	3.2600			0.002294		
						9'-0		0.021	
68	10'-0			1½	(See Notes)	89'-0½	120	17.868	PO(9'-11)
43	10'-0		19.24	1.6820		19'-9½	0.012157		PO(9'-11)
						108'-10½		1.323	
								19.191	Total(Pt) Route 35

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
68	10'-0		19.24	3		9'-0	120	17.868	• • • • • **Route 36** • • • • • Flow (q) from Route 35
69	10'-0		25.35	3.2600		9'-0	0.000807	0.007	
69	10'-0			1½	(See Notes)	89'-0½	120	17.875	PO(9'-11)
44	10'-0		25.35	1.6820		19'-9½ / 108'-10½	0.020247	2.204	PO(9'-11)
								20.079	Total(Pt) Route 36
38	10'-0			3	(See Notes)	2'-6½	120	14.932	• • • • • **Route 37** • • • • • T(20'-2)
70	10'-0		14.47	3.2600		20'-2 / 22'-8	0.000286	-0.000 / 0.006	
								14.938	Total(Pt) Route 37
136	10'-0		8.56	3		7'-0	120	17.102	• • • • • **Route 38** • • • • • Flow (q) from Route 41
130	10'-0		8.56	3.2600		7'-0	0.000108	0.001	
								17.103	Total(Pt) Route 38
10	10'-0			3	(See Notes)	8'-3½	120	16.370	• • • • • **Route 39** • • • • • T(20'-2)
9	10'-0		6.12	3.2600		20'-2 / 28'-5½	0.000058	0.002	
								16.371	Total(Pt) Route 39
128	10'-0			1½	(See Notes)	171'-3½	120	16.365	• • • • • **Route 40** • • • • • T(9'-11)
131	10'-0		10.38	1.6820		19'-9½ / 191'-1	0.003879	0.741	PO(9'-11)
								17.106	Total(Pt) Route 40
129	10'-0			1½	(See Notes)	178'-3½	120	16.551	• • • • • **Route 41** • • • • • T(9'-11)
136	10'-0		8.56	1.6820		24'-9 / 203'-0½	0.002716	0.551	E(4'-11½), PO(9'-11)
								17.102	Total(Pt) Route 41
72	10'-0		10.71	1½	(See Notes)	86'-7½	120	17.028	• • • • • **Route 42** • • • • • Flow (q) from Route 20
64	10'-0		11.29	1.6820		14'-10 / 101'-5½	0.004534	0.460	E(4'-11½), PO(9'-11)
								17.488	Total(Pt) Route 42

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
67	10'-0			1½	(See Notes)	89'-0½	120	17.847	• • • • • **Route 43** • • • • • PO(9'-11)
						19'-9½	0.006160		
41	10'-0		13.33	1.6820		108'-10½		0.671	PO(9'-11)
								18.518	Total(Pt) Route 43
86	10'-0			1½	(See Notes)	56'-4½	120	17.452	• • • • • **Route 44** • • • • • PO(9'-11)
						19'-9½	0.004018		
100	10'-0		10.58	1.6820		76'-2		0.306	PO(9'-11)
								17.758	Total(Pt) Route 44
85	10'-0			1½	(See Notes)	56'-4½	120	17.439	• • • • • **Route 45** • • • • • PO(9'-11)
						19'-9½	0.004361		
123	10'-0		11.06	1.6820		76'-2		0.332	PO(9'-11)
								17.771	Total(Pt) Route 45
51	10'-0			1½	(See Notes)	89'-5½	120	15.149	• • • • • **Route 46** • • • • • PO(9'-11)
						19'-9½	0.010481		
71	10'-0		17.76	1.6820		109'-3		1.145	T(9'-11)
								16.294	Total(Pt) Route 46
62	10'-0			1½	(See Notes)	116'-0	120	14.936	• • • • • **Route 47** • • • • • PO(9'-11)
						19'-9½	0.030682		
42	10'-0		31.74	1.6820		135'-10		4.167	PO(9'-11)
								19.103	Total(Pt) Route 47
61	10'-0			1½	(See Notes)	116'-0	120	14.911	• • • • • **Route 48** • • • • • PO(9'-11)
						19'-9½	0.038055		
44	10'-0		35.66	1.6820		135'-10		5.168	PO(9'-11)
								20.079	Total(Pt) Route 48

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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
BalV	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				

Hydraulic Overview

Job Number: F23007
Report Description: Light Hazard (D)

Job

Job Number: F23007	Designer: TWC
Job Name: THE SPRINGS OF BALLENTINE	Phone: 919-553-2356 / FAX:
Address 1: 40 RAWLS CLUB RD	State Certification/License Number: 16269FS
Address 2: FUQUAY-VARINA, NC 27526	AHJ:
Address 3:	Job Site/Building:

System

Density: 0.10 gpm/ft²	Area of Application: 1500 ft² (Actual 1570 ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 22.50 at 16.143	Hose Streams: 100.00
Coverage Per Sprinkler: 225 ft²	Number Of Sprinklers Calculated: 16 0
System Pressure Demand: 65.080	System Flow Demand: 337.74
Total Demand: 437.74 @ 65.080	Pressure Result: +29.730 (31.4%)

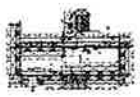
Supplies

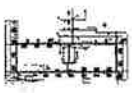
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

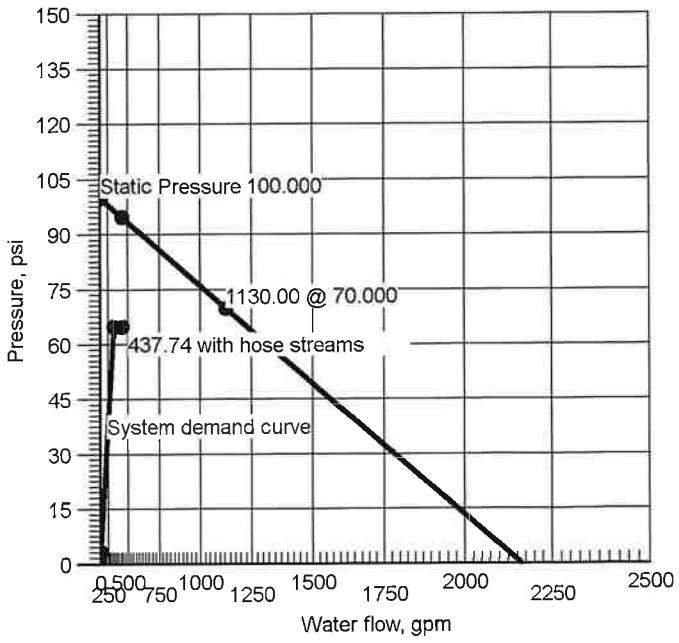
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR (15)	50.242	47.65	337.74

SPRINGS BALLENTINE FP





Water Supply at Node 19 (1130.00, 0.00, 100.000, 70.000)



Hydraulic Calculations

for

Project Name: THE SPRINGS OF BALLENTINE
Location: 40 RAWLS CLUB RD, FUQUAY-VARINA, NC 27526,
Drawing Name: SPRINGS BALLENTINE FP

Calculation Date: 5/15/2023

Design

Remote Area Number:	D
Occupancy Classification:	Light Hazard
Density	0.10 gpm/ft²
Area of Application:	1500 ft² (Actual 1570 ft²)
Coverage per Sprinkler:	225 ft²
Type of sprinklers calculated:	Pendent
No. of sprinklers calculated:	16
No. of nozzles calculated:	0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 19 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 19: 437.74 @ 65.080 (Safety Margin = 29.730)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/OtherA N/A

Name of Contractor:
Address: ,
Phone Number:
Name of designer: TWC
Authority Having Jurisdiction:

Notes:

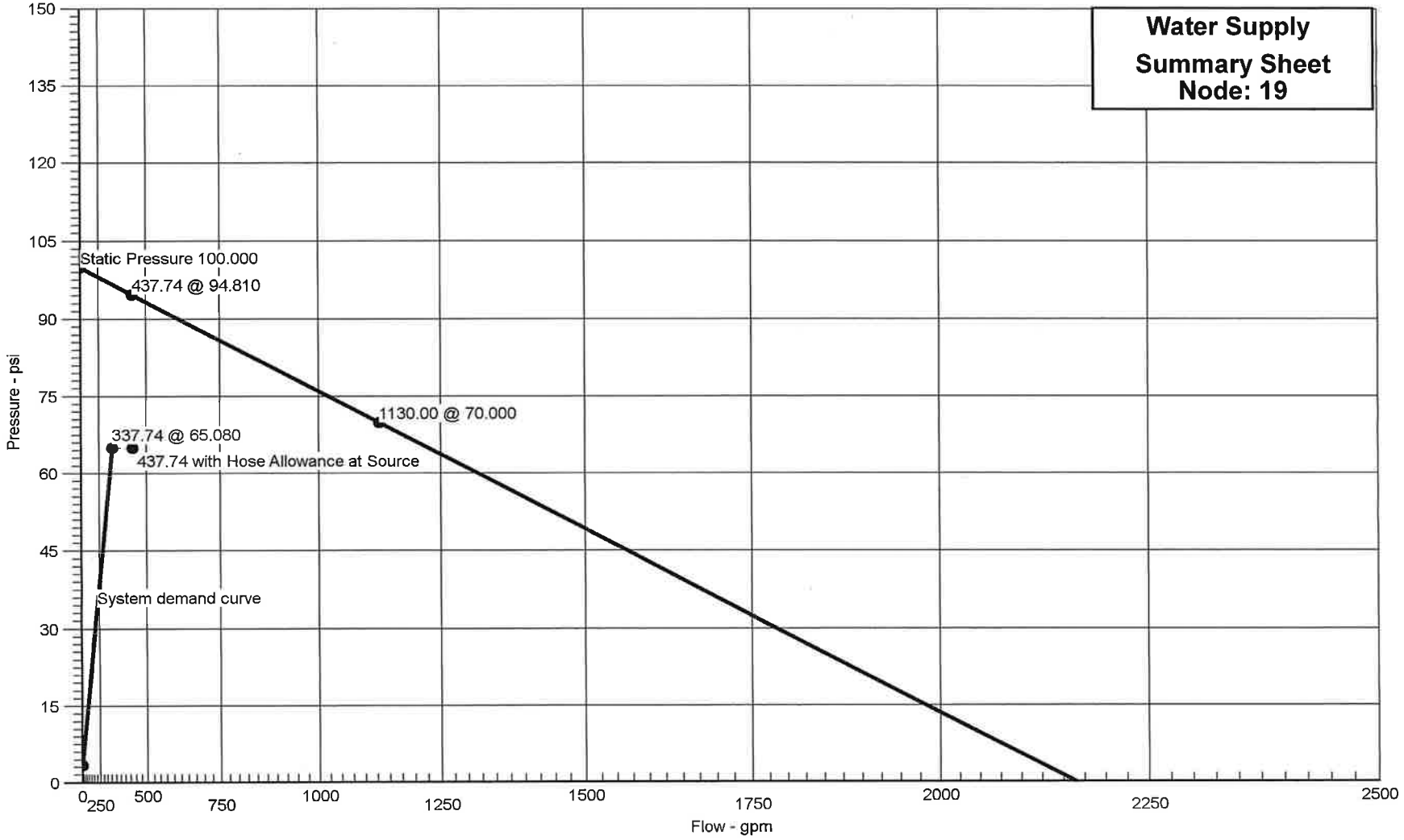
Automatic peaking results Left: N/A Right: 66.065

Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: D

$N^{1.85}$

Date: 5/15/2023

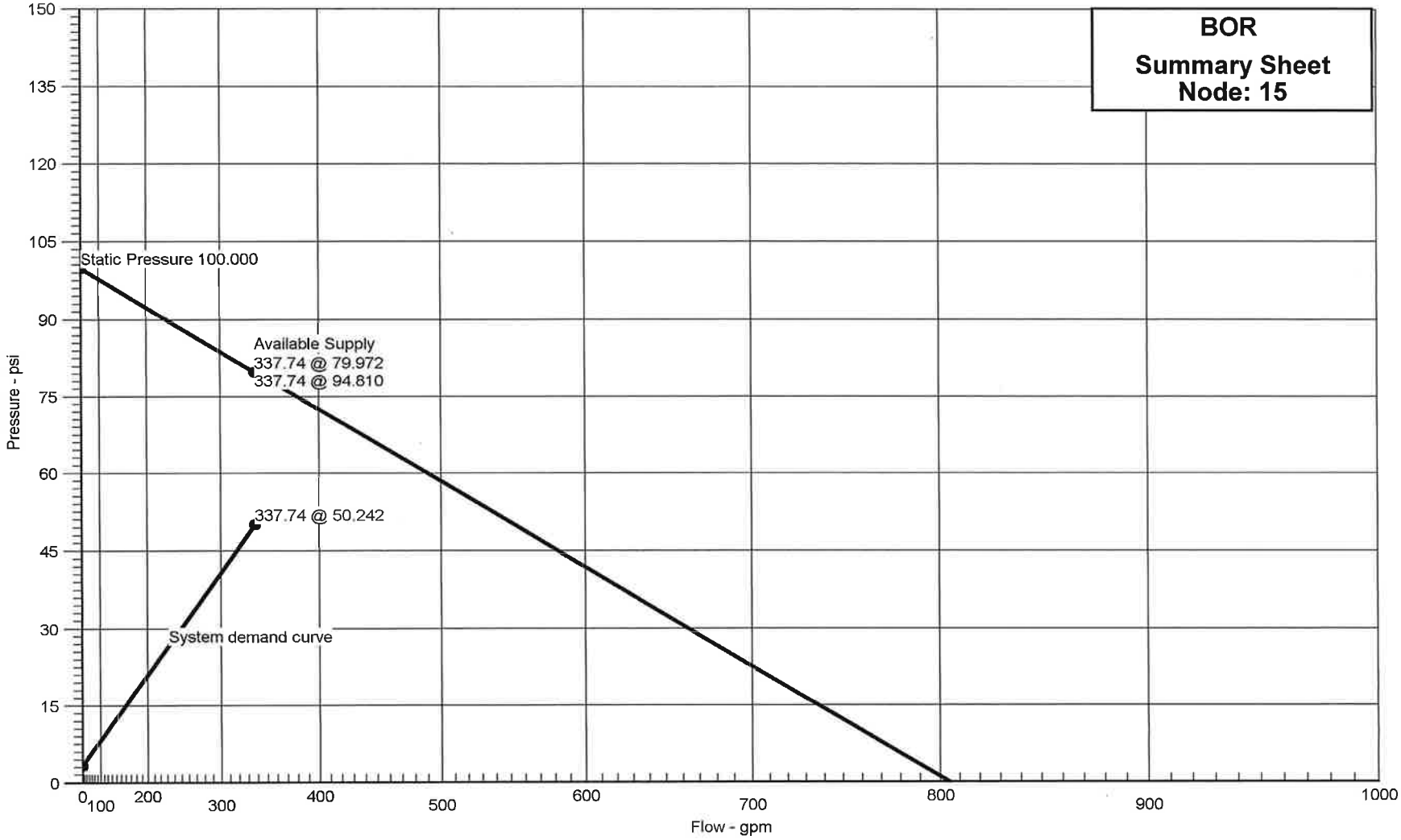


Hydraulic Graph

Job Name: THE SPRINGS OF BALLENTINE
Remote Area Number: D

$N^{1.85}$

Date: 5/15/2023



Summary Of Outflowing Devices

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
Sprinkler	401	18.47	14.82	5.6	10.879			
Sprinkler	402	18.52	14.82	5.6	10.941			
Sprinkler	403	18.56	14.82	5.6	10.980			
Sprinkler	404	18.56	14.82	5.6	10.984			
Sprinkler	405	18.67	14.82	5.6	11.115			
Sprinkler	406	18.85	14.82	5.6	11.335			
Sprinkler	407	19.11	14.82	5.6	11.640			
Sprinkler	408	19.82	14.82	5.6	12.522			
⇨ **Sprinkler**	**409**	**22.50**	**22.50**	**5.6**	**16.143**			
Sprinkler	410	22.51	22.50	5.6	16.151			
Sprinkler	411	22.68	22.50	5.6	16.408			
Sprinkler	412	23.24	22.50	5.6	17.217			
Sprinkler	413	23.91	14.82	5.6	18.229			
Sprinkler	414	23.92	14.82	5.6	18.240			
Sprinkler	415	23.99	14.82	5.6	18.345			
Sprinkler	416	24.45	14.82	5.6	19.067			

⇨ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required Pressure (psi)
19	Water Supply	100.000	70.000	1130.00	94.810	437.74	65.080

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	1'-0	Supply	65.080	337.74	
401	9'-0	Sprinkler	10.879	18.47	
402	9'-0	Sprinkler	10.941	18.52	
403	9'-0	Sprinkler	10.980	18.56	
404	9'-0	Sprinkler	10.984	18.56	
405	9'-0	Sprinkler	11.115	18.67	
406	9'-0	Sprinkler	11.335	18.85	
407	9'-0	Sprinkler	11.640	19.11	
408	9'-0	Sprinkler	12.522	19.82	
409	9'-0	Sprinkler	16.143	22.50	
410	9'-0	Sprinkler	16.151	22.51	
411	9'-0	Sprinkler	16.408	22.68	
412	9'-0	Sprinkler	17.217	23.24	
413	9'-0	Sprinkler	18.229	23.91	
414	9'-0	Sprinkler	18.240	23.92	
415	9'-0	Sprinkler	18.345	23.99	
416	9'-0	Sprinkler	19.067	24.45	
7	10'-0		11.848		
9	10'-0		32.283		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
10	10'-0		32.279		
11	10'-0		32.045		
12	20'-0		28.060		
13	20'-0		28.818		
14	10'-0		44.953		
15	1'-0	Gauge	50.242		
16	-3'-0		52.024		
17	1'-0		51.703		
18	1'-0		64.899		
34	10'-0		32.762		
35	10'-0		33.121		
36	10'-0		33.134		
37	10'-0		33.137		
38	10'-0		33.137		
39	10'-0		33.538		
40	10'-0		33.882		
41	10'-0		33.949		
42	10'-0		34.233		
43	10'-0		34.274		
44	10'-0		34.698		
45	10'-0		33.052		
46	10'-0		33.141		
47	10'-0		11.965		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
48	10'-0		32.641		
49	10'-0		32.690		
50	10'-0		32.942		
51	10'-0		33.005		
52	10'-0		32.742		
53	20'-0		28.439		
54	20'-0		28.824		
55	10'-0		32.744		
56	10'-0		32.755		
57	10'-0		32.761		
58	10'-0		33.167		
59	10'-0		33.168		
60	10'-0		33.168		
61	10'-0		33.176		
62	10'-0		33.175		
63	10'-0		12.282		
64	10'-0		32.327		
66	10'-0		32.265		
67	10'-0		33.143		
68	10'-0		33.158		
69	10'-0		33.163		
70	10'-0		33.170		
71	10'-0		33.346		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
72	10'-0		32.285		
74	10'-0		11.844		
76	10'-0		33.133		
81	10'-0		33.125		
83	10'-0		33.121		
85	10'-0		32.070		
86	10'-0		32.089		
87	10'-0		32.093		
88	20'-0		30.248		
89	10'-0		11.887		
90	10'-0		37.845		
91	10'-0		37.853		
93	10'-0		12.111		
94	10'-0		12.699		
96	10'-0		32.527		
97	10'-0		13.603		
98	10'-0		17.801		
99	10'-0		17.809		
100	10'-0		32.531		
119	10'-0		32.066		
120	10'-0		18.097		
121	10'-0		19.002		
122	10'-0		19.893		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
123	10'-0		32.550		
124	10'-0		32.639		
125	10'-0		32.130		
126	10'-0		31.343		
127	10'-0		29.742		
128	10'-0		21.498		
129	10'-0		18.605		
130	10'-0		30.745		
131	10'-0		30.948		
132	10'-0		32.045		
133	10'-0		32.428		
134	10'-0		32.134		
135	10'-0		32.163		
136	10'-0		30.706		
137	10'-0		19.905		
138	10'-0		20.021		
139	10'-0		20.819		
747	10'-0		32.528		
1119	10'-0		32.092		

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
409	9'-0	5.6	22.50	1	(See Notes)	3'-11	120	16.143	• • • • • Route 1 • • • • •
98	10'-0		22.50	1.0490		9'-0 12'-11	0.161813	-0.434 2.091	Sprinkler, 2E(2'-0), PO(5'-0)
98	10'-0			1½	(See Notes)	65'-7½	120	17.801	
129	10'-0		18.58	1.6820		4'-11½ 70'-7	0.011390	0.804	E(4'-11½)
129	10'-0		59.35	1½	(See Notes)	8'-0	120	18.605	Flow (q) from Route 5
128	10'-0		77.93	1.6820		9'-11 17'-11	0.161633	2.893	T(9'-11)
128	10'-0		29.05	1½	(See Notes)	18'-6	120	21.498	Flow (q) from Route 13
127	10'-0		106.98	1.6820		9'-11 28'-4½	0.290471	8.245	T(9'-11)
127	10'-0			1½	(See Notes)	13'-9	120	29.742	T(9'-11)
135	10'-0		50.40	1.6820		19'-9½ 33'-6½	0.072180	2.420	PO(9'-11)
135	10'-0		56.58	3	(See Notes)	2'-8½	120	32.163	Flow (q) from Route 32
133	10'-0		106.98	3.2600		20'-2 22'-10½	0.011575	0.265	T(20'-2)
133	10'-0		34.64	3	(See Notes)	1'-7	120	32.428	Flow (q) from Route 34
48	10'-0		141.62	3.2600		9'-5 10'-11½	0.019448	0.213	E(9'-5)
48	10'-0			3	(See Notes)	2'-1½	120	32.641	T(20'-2)
52	10'-0		64.46	3.2600		20'-2 22'-3	0.004534	0.101	
52	10'-0			2	(See Notes)	10'-0	120	32.742	PO(12'-3½)
53	20'-0		11.44	2.1570		12'-3½ 22'-3½	0.001382	-4.334 0.031	
53	20'-0		10.89	2	(See Notes)	56'-4½	120	28.439	T(12'-3½), Flow (q) from Route 30
54	20'-0		22.33	2.1570		24'-7½ 80'-11½	0.004766	-0.000 0.386	T(12'-3½)
54	20'-0		10.08	2	(See Notes)	119'-3	120	28.824	T(12'-3½), Flow (q) from Route 24
88	20'-0		32.40	2.1570		30'-9 150'-0	0.009493	-0.001 1.424	E(6'-2), T(12'-3½)

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
88	20'-0		37.48	2	(See Notes)	58'-4	120	30.248	Flow (q) from Route 2
90	10'-0		69.88	2.1570		24'-7½	0.039342	4.335	T(12'-3½), PO(12'-3½)
						82'-11		3.263	
90	10'-0			3		1'-4½	120	37.845	
91	10'-0		69.88	3.2600		1'-4½	0.005264	0.007	
91	10'-0		267.86	3	(See Notes)	44'-11	120	37.853	Flow (q) from Route 17
14	10'-0		337.74	3.2600		28'-2½	0.097089	7.101	3E(9'-5)
						73'-1½			
14	10'-0			4	(See Notes)	7'-9½	120	44.953	
15	1'-0		337.74	4.2600		44'-9	0.026382	3.902	f, sCV(28'-11½), BV(15'-9½), BOR
						52'-7		1.387	
15	1'-0			6	(See Notes)	4'-0	120	50.242	
16	-3'-0		337.74	6.3570		8'-9½	0.003756	1.734	EE(8'-9½)
						12'-9½		0.048	
16	-3'-0			6	(See Notes)	358'-0½	140	52.024	
17	1'-0		337.74	6.2800		113'-5½	0.002997	-1.734	2E(22'-1), T(47'-3½), 2EE(11'-0½)
						471'-6½		1.413	
17	1'-0			6	(See Notes)	12'-0	120	51.703	
18	1'-0		337.74	6.3570		40'-3	0.003756	13.196	2LtE(11'-4), BFP(-13.000), E(17'-7)
						52'-3			
18	1'-0			6	(See Notes)	13'-2	140	64.899	
19	1'-0		337.74	6.2800		47'-3½	0.002997	0.181	S, T(47'-3½)
						60'-5			
			100.00					65.080	Hose Allowance At Source
19			437.74						Total(Pt) Route 1
410	9'-0	5.6	22.51	1	(See Notes)	3'-11	120	16.151	• • • • • **Route 2** • • • • •
99	10'-0		22.51	1.0490		9'-0	0.161883	-0.434	Sprinkler,
						12'-11		2.092	2E(2'-0), PO(5'-0)
99	10'-0		3.92	1½		13'-2	120	17.809	Flow (q) from Route 43
120	10'-0		26.43	1.6820		13'-2	0.021862	0.288	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
120	10'-0		22.68	1½		13'-2	120	18.097	Flow (q) from Route 3
121	10'-0		49.11	1.6820		13'-2	0.068796	0.906	
121	10'-0		23.24	1½	(See Notes)	73'-2	120	19.002	Flow (q) from Route 4
136	10'-0		72.35	1.6820		9'-11 83'-1	0.140867	11.703	PO(9'-11)
136	10'-0			3		7'-0	120	30.706	
130	10'-0		72.35	3.2600		7'-0	0.005613	0.039	
130	10'-0		91.20	3		8'-0	120	30.745	Flow (q) from Route 7
131	10'-0		163.55	3.2600		8'-0	0.025382	0.203	
131	10'-0		67.21	3	(See Notes)	2'-8½ 20'-2	120	30.948	Flow (q) from Route 15
132	10'-0		230.76	3.2600		22'-10½	0.047988	1.098	T(20'-2)
132	10'-0			3		0'-0	120	32.045	
11	10'-0		185.74	3.2600		0'-0	0.032119	0.000	
11	10'-0			3		2'-0	120	32.045	
119	10'-0		99.83	3.2600		2'-0	0.010185	0.020	
119	10'-0			2	(See Notes)	10'-0 12'-3½	120	32.066 -4.333	PO(12'-3½)
12	20'-0		41.01	2.1570		22'-3½	0.014678	0.327	
12	20'-0			2	(See Notes)	60'-10½ 30'-9	120	28.060 -0.002	T(12'-3½)
13	20'-0		30.12	2.1570		91'-7½	0.008293	0.760	E(6'-2), T(12'-3½)
13	20'-0		7.36	2	(See Notes)	90'-5½ 24'-7½	120	28.818	T(12'-3½), Flow (q) from Route 18
88	20'-0		37.48	2.1570		115'-1	0.012424	1.430	T(12'-3½)
								30.248	Total(Pt) Route 2
411	9'-0	5.6	22.68	1	(See Notes)	3'-11 9'-0	120	16.408 -0.434	• • • • • **Route 3** • • • • • Sprinkler,
120	10'-0		22.68	1.0490		12'-11	0.164263	2.123	2E(2'-0), PO(5'-0)

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								18.097	Total(Pt) Route 3
412	9'-0	5.6	23.24	1	(See Notes)	3'-11	120	17.217	• • • • • **Route 4** • • • • • Sprinkler,
121	10'-0		23.24	1.0490		9'-0 12'-11	0.171741	-0.434 2.219	2E(2'-0), PO(5'-0)
								19.002	Total(Pt) Route 4
401	9'-0	5.6	18.47	1	(See Notes)	3'-6	120	10.879	• • • • • **Route 5** • • • • • Sprinkler,
7	10'-0		18.47	1.0490		9'-0 12'-6	0.112322	-0.434 1.402	2E(2'-0), PO(5'-0)
7	10'-0		3.47	1½		7'-7	120	11.848	Flow (q) from Route 6
47	10'-0		21.94	1.6820		7'-7	0.015493	0.118	
47	10'-0		18.56	1½		6'-7	120	11.965	Flow (q) from Route 8
63	10'-0		40.50	1.6820		6'-7	0.048155	0.317	
63	10'-0		18.85	1½	(See Notes)	54'-10 9'-11	120	12.282	Flow (q) from Route 10
129	10'-0		59.35	1.6820		64'-9	0.097664	6.322	T(9'-11)
								18.605	Total(Pt) Route 5
402	9'-0	5.6	18.52	1	(See Notes)	2'-10	120	10.941	• • • • • **Route 6** • • • • • Sprinkler,
74	10'-0		18.52	1.0490		9'-0 11'-10	0.112915	-0.434 1.337	2E(2'-0), PO(5'-0)
74	10'-0			1½		6'-7	120	11.844	
7	10'-0		3.47	1.6820		6'-7	0.000511	0.003	
								11.848	Total(Pt) Route 6
403	9'-0	5.6	18.56	1	(See Notes)	2'-10	120	10.980	• • • • • **Route 7** • • • • • Sprinkler,
89	10'-0		18.56	1.0490		9'-0 11'-10	0.113283	-0.434 1.341	2E(2'-0), PO(5'-0)
89	10'-0		15.05	1½		6'-7	120	11.887	Flow (q) from Route 44
93	10'-0		33.61	1.6820		6'-7	0.034109	0.224	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
93	10'-0		18.67	1½		7'-7	120	12.111	Flow (q) from Route 9
94	10'-0		52.28	1.6820		7'-7	0.077234	0.587	
94	10'-0		19.11	1½		6'-7	120	12.699	Flow (q) from Route 11
97	10'-0		71.39	1.6820		6'-7	0.137424	0.904	
97	10'-0		19.82	1½	(See Notes)	69'-4½	120	13.603	Flow (q) from Route 12
130	10'-0		91.20	1.6820	(See Notes)	9'-11 79'-3½	0.216217	17.142	PO(9'-11)
								30.745	Total(Pt) Route 7
404	9'-0	5.6	18.56	1	(See Notes)	3'-6	120	10.984	• • • • • **Route 8** • • • • • Sprinkler,
47	10'-0		18.56	1.0490	(See Notes)	9'-0 12'-6	0.113327	-0.434 1.415	2E(2'-0), PO(5'-0)
								11.965	Total(Pt) Route 8
405	9'-0	5.6	18.67	1	(See Notes)	3'-6	120	11.115	• • • • • **Route 9** • • • • • Sprinkler,
93	10'-0		18.67	1.0490	(See Notes)	9'-0 12'-6	0.114573	-0.434 1.430	2E(2'-0), PO(5'-0)
								12.111	Total(Pt) Route 9
406	9'-0	5.6	18.85	1	(See Notes)	2'-10	120	11.335	• • • • • **Route 10** • • • • • Sprinkler,
63	10'-0		18.85	1.0490	(See Notes)	9'-0 11'-10	0.116667	-0.434 1.381	2E(2'-0), PO(5'-0)
								12.282	Total(Pt) Route 10
407	9'-0	5.6	19.11	1	(See Notes)	3'-6	120	11.640	• • • • • **Route 11** • • • • • Sprinkler,
94	10'-0		19.11	1.0490	(See Notes)	9'-0 12'-6	0.119568	-0.434 1.493	2E(2'-0), PO(5'-0)
								12.699	Total(Pt) Route 11
408	9'-0	5.6	19.82	1	(See Notes)	2'-10	120	12.522	• • • • • **Route 12** • • • • • Sprinkler,
97	10'-0		19.82	1.0490	(See Notes)	9'-0 11'-10	0.127929	-0.434 1.514	2E(2'-0), PO(5'-0)
								13.603	Total(Pt) Route 12
413	9'-0	5.6	23.91	1	(See Notes)	2'-7	120	18.229	• • • • • **Route 13** • • • • • Sprinkler,
122	10'-0		23.91	1.0490	(See Notes)	9'-0 11'-7	0.181065	-0.434 2.097	2E(2'-0), PO(5'-0)

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
122	10'-0			1½		11'-8	120	19.893	
137	10'-0		5.14	1.6820		11'-8	0.001055	0.012	
137	10'-0		23.92	1½		61'-1½	120	19.905	Flow (q) from Route 14
128	10'-0		29.05	1.6820		61'-1½	0.026047	1.592	
								21.498	Total(Pt) Route 13
414	9'-0	5.6	23.92	1	(See Notes)	2'-7	120	18.240	• • • • • **Route 14** • • • • • Sprinkler,
137	10'-0		23.92	1.0490		9'-0 / 11'-7	0.181167	-0.434 / 2.099	2E(2'-0), PO(5'-0)
								19.905	Total(Pt) Route 14
415	9'-0	5.6	23.99	1	(See Notes)	2'-7	120	18.345	• • • • • **Route 15** • • • • • Sprinkler,
138	10'-0		23.99	1.0490		9'-0 / 11'-7	0.182125	-0.434 / 2.110	2E(2'-0), PO(5'-0)
138	10'-0		18.77	1½		15'-0	120	20.021	Flow (q) from Route 40
139	10'-0		42.76	1.6820		15'-0	0.053246	0.799	
139	10'-0		24.45	1½	(See Notes)	72'-6	120	20.819	Flow (q) from Route 16
131	10'-0		67.21	1.6820		9'-11 / 82'-4½	0.122930	10.128	PO(9'-11)
								30.948	Total(Pt) Route 15
416	9'-0	5.6	24.45	1	(See Notes)	2'-7	120	19.067	• • • • • **Route 16** • • • • • Sprinkler,
139	10'-0		24.45	1.0490		9'-0 / 11'-7	0.188746	-0.434 / 2.186	2E(2'-0), PO(5'-0)
								20.819	Total(Pt) Route 16
45	10'-0		145.67	3	(See Notes)	89'-0½	120	33.052	• • • • • **Route 17** • • • • • Flow (q) from Route 19
40	10'-0		85.20	3.2600		20'-2 / 109'-2½	0.007596	0.830	T(20'-2)
40	10'-0		83.18	3		2'-6½	120	33.882	Flow (q) from Route 21
41	10'-0		168.38	3.2600		2'-6½	0.026788	-0.000 / 0.068	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
41	10'-0		14.72 + 12.82	3		8'-0	120	33.949	Flow (q) from Route 47 and 51
42	10'-0		195.93	3.2600		8'-0	0.035455	0.284	
42	10'-0		15.13	3		1'-0	120	34.233	Flow (q) from Route 52
43	10'-0		211.06	3.2600		1'-0	0.040684	0.041	
43	10'-0		17.54	3		9'-0	120	34.274	Flow (q) from Route 37
44	10'-0		228.60	3.2600		9'-0	0.047160	0.424	
44	10'-0		18.42 + 20.85	3	(See Notes)	29'-9	120	34.698	Flow (q) from Route 28 and 38
91	10'-0		267.86	3.2600		20'-2 49'-10½	0.063230	3.155	T(20'-2)
								37.853	Total(Pt) Route 17
45	10'-0		145.67	3		1'-11	120	33.052	• • • • • Route 18 • • • • •
46	10'-0		60.47	3.2600		20'-2 22'-1	0.004028	-0.000 0.089	T(20'-2), Flow (q) from Route 19
46	10'-0			2	(See Notes)	7'-6	120	33.141	PO(12'-3½)
13	20'-0		7.36	2.1570		12'-3½ 19'-9½	0.000611	-4.335 0.012	
								28.818	Total(Pt) Route 18
86	10'-0			3		2'-8½	120	32.089	• • • • • Route 19 • • • • •
1119	10'-0		32.41	3.2600		2'-8½	0.001271	0.003	
1119	10'-0			3		5'-3½	120	32.092	
87	10'-0		12.76	3.2600		5'-3½	0.000227	0.001	
87	10'-0			1½	(See Notes)	56'-4½	120	32.093	PO(9'-11)
96	10'-0		12.76	1.6820		19'-9½ 76'-2	0.005689	0.433	PO(9'-11)
96	10'-0			3		5'-3½	120	32.527	
747	10'-0		12.76	3.2600		5'-3½	0.000227	0.000 0.001	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
747	10'-0		19.65	3		2'-8½	120	32.528	Flow (q) from Route 20
100	10'-0		32.41	3.2600		2'-8½	0.001271	-0.000 0.003	
100	10'-0		12.91	3		8'-0	120	32.531	Flow (q) from Route 35
123	10'-0		45.33	3.2600		8'-0	0.002363	0.019	
123	10'-0		13.50	3	(See Notes)	3'-0½	120	32.550	Flow (q) from Route 48
124	10'-0		58.82	3.2600	(See Notes)	20'-2 23'-2½	0.003828	0.000 0.089	T(20'-2)
124	10'-0		86.85	3	(See Notes)	0'-0	120	32.639	Flow (q) from Route 26
45	10'-0		145.67	3.2600	(See Notes)	20'-2 20'-2	0.020489	0.413	T(20'-2)
								33.052	Total(Pt) Route 19
1119	10'-0			2	(See Notes)	66'-6½	120	32.092	• • • • • **Route 20** • • • • •
747	10'-0		19.65	2.1570	(See Notes)	49'-2½ 115'-9½	0.003762	0.000 0.436	PO(12'-3½) 2T(12'-3½), PO(12'-3½)
								32.528	Total(Pt) Route 20
35	10'-0		7.47 + 17.73	3		5'-2½	120	33.121	• • • • • **Route 21** • • • • •
81	10'-0		25.20	3.2600		5'-2½	0.000798	0.004	Flow (q) from Route 22 and 23
81	10'-0			3		6'-0	120	33.125	
76	10'-0		33.08	3.2600		6'-0	0.001320	0.008	
76	10'-0			3		0'-6½	120	33.133	
36	10'-0		41.67	3.2600		0'-6½	0.002023	0.001	
36	10'-0			3		2'-1½	120	33.134	
37	10'-0		31.59	3.2600		2'-1½	0.001212	0.003	
37	10'-0		67.72	3		0'-0	120	33.137	Flow (q) from Route 25
38	10'-0		99.31	3.2600		0'-0	0.010086	0.000	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
38	10'-0			3		88'-10½	120	33.137	
39	10'-0		64.30	3.2600		88'-10½	0.004513	0.401	
39	10'-0		18.88	3	(See Notes)	27'-1½	120	33.538	Flow (q) from Route 45
40	10'-0		83.18	3.2600		20'-2 47'-3½	0.007267	0.344	T(20'-2)
								33.882	Total(Pt) Route 21
52	10'-0		11.44	3		0'-6½	120	32.742	• • • • • **Route 22** • • • • • Flow (q) from Route 1
55	10'-0		53.02	3.2600		0'-6½	0.003159	0.002	
55	10'-0			3		6'-0	120	32.744	
56	10'-0		40.97	3.2600		6'-0	0.001961	0.012	
56	10'-0			3		5'-2½	120	32.755	
57	10'-0		29.25	3.2600		5'-2½	0.001051	0.005	
57	10'-0			3		6'-9½	120	32.761	
34	10'-0		11.52	3.2600		6'-9½	0.000188	0.001	
34	10'-0			1½	(See Notes)	56'-4½	120	32.762	PO(9'-11)
83	10'-0		11.52	1.6820		19'-9½ 76'-2	0.004706	0.000 0.358	PO(9'-11)
83	10'-0			3		6'-9½	120	33.121	
35	10'-0		7.47	3.2600		6'-9½	0.000084	0.001	
								33.121	Total(Pt) Route 22
57	10'-0			2	(See Notes)	66'-6½	120	32.761	• • • • • **Route 23** • • • • • PO(12'-3½)
35	10'-0		17.73	2.1570		49'-2½ 115'-9½	0.003111	0.000 0.360	2T(12'-3½), PO(12'-3½)
								33.121	Total(Pt) Route 23
36	10'-0			2	(See Notes)	10'-0	120	33.134	• • • • • **Route 24** • • • • • PO(12'-3½)
54	20'-0		10.08	2.1570		12'-3½ 22'-3½	0.001094	-4.334 0.024	

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value
								28.824	Total(Pt) Route 24
49	10'-0		9.44 + 77.16	3		32'-2	120	32.690	• • • • • **Route 25** • • • • •
								-0.000	Flow (q) from Route 27 and 36
50	10'-0		86.60	3.2600		32'-2	0.007829	0.252	
50	10'-0			3		10'-0	120	32.942	
51	10'-0		76.95	3.2600		10'-0	0.006292	0.063	
51	10'-0			3	(See Notes)	6'-5½	120	33.005	
						20'-2		0.000	
37	10'-0		67.72	3.2600		26'-7½	0.004967	0.132	T(20'-2)
								33.137	Total(Pt) Route 25
132	10'-0		185.74	3		100'-0½	120	32.045	• • • • • **Route 26** • • • • •
									Flow (q) from Route 2
10	10'-0		45.02	3.2600		100'-0½	0.002334	0.234	
10	10'-0			3	(See Notes)	8'-3½	120	32.279	T(20'-2)
						20'-2			
9	10'-0		10.38	3.2600		28'-5½	0.000155	0.004	
9	10'-0			1½	(See Notes)	22'-5	120	32.283	PO(9'-11)
						19'-9½			
72	10'-0		0.94	1.6820		42'-2½	0.000046	0.002	T(9'-11)
72	10'-0		2.14	1½	(See Notes)	86'-7½	120	32.285	Flow (q) from Route 46
						14'-10			
64	10'-0		3.08	1.6820		101'-5½	0.000410	0.042	E(4'-11½), PO(9'-11)
64	10'-0		83.77	3		39'-8	120	32.327	Flow (q) from Route 33
								0.000	
124	10'-0		86.85	3.2600		39'-8	0.007870	0.312	
								32.639	Total(Pt) Route 26
9	10'-0			1½	(See Notes)	105'-0½	120	32.283	• • • • • **Route 27** • • • • •
						19'-9½		0.000	PO(9'-11)
49	10'-0		9.44	1.6820		124'-10	0.003256	0.406	PO(9'-11)
								32.690	Total(Pt) Route 27

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
56	10'-0			1½	(See Notes)	56'-4½	120	32.755	• • • • • **Route 28** • • • • •
						19'-9½	0.004857	0.000	PO(9'-11)
81	10'-0		11.72	1.6820		76'-2		0.370	PO(9'-11)
81	10'-0			1½	(See Notes)	49'-1½	120	33.125	PO(9'-11)
						19'-9½	0.000617	-0.000	
59	10'-0		3.84	1.6820		68'-11		0.042	PO(9'-11)
59	10'-0		4.05	3		6'-0	120	33.168	Flow (q) from Route 31
							0.000093		
60	10'-0		7.89	3.2600		6'-0		0.001	
60	10'-0		3.47	3	(See Notes)	31'-9½	120	33.168	Flow (q) from Route 29
						9'-5	0.000183		E(9'-5)
61	10'-0		11.36	3.2600		41'-2½		0.008	
61	10'-0		7.06	1½	(See Notes)	116'-0	120	33.176	PO(9'-11), Flow (q) from Route 39
						19'-9½	0.011207		PO(9'-11)
44	10'-0		18.42	1.6820		135'-10		1.522	
								34.698	Total(Pt) Route 28
55	10'-0			1½	(See Notes)	56'-4½	120	32.744	• • • • • **Route 29** • • • • •
						19'-9½	0.005116	0.000	PO(9'-11)
76	10'-0		12.05	1.6820		76'-2		0.390	PO(9'-11)
76	10'-0			1½	(See Notes)	49'-1½	120	33.133	PO(9'-11)
						19'-9½	0.000510	-0.000	
60	10'-0		3.47	1.6820		68'-11		0.035	PO(9'-11)
								33.168	Total(Pt) Route 29
12	20'-0			2	(See Notes)	214'-6½	120	28.060	• • • • • **Route 30** • • • • •
						86'-2	0.001263	-0.001	T(12'-3½)
53	20'-0		10.89	2.1570		300'-8		0.380	2E(6'-2), 5T(12'-3½)
								28.439	Total(Pt) Route 30
83	10'-0			1½	(See Notes)	49'-1½	120	33.121	• • • • • **Route 31** • • • • •
						19'-9½	0.000681	-0.000	PO(9'-11)
58	10'-0		4.05	1.6820		68'-11		0.047	PO(9'-11)
58	10'-0			3		12'-0	120	33.167	
							0.000027		
59	10'-0		4.05	3.2600		12'-0		0.000	

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
								33.168	Total(Pt) Route 31
125	10'-0		23.29	3		7'-0	120	32.130	• • • • • **Route 32** • • • • • Flow (q) from Route 42
134	10'-0		23.29	3.2600		7'-0	0.000690	0.005	
134	10'-0		33.29	3		8'-0	120	32.134	Flow (q) from Route 41
135	10'-0		56.58	3.2600		8'-0	0.003562	0.028	
								32.163	Total(Pt) Route 32
11	10'-0			3	(See Notes)	8'-3½	120	32.045	• • • • • **Route 33** • • • • • T(20'-2)
66	10'-0		85.91	3.2600		20'-2 28'-5½	0.007713	0.219	
66	10'-0			3		8'-5	120	32.265	
64	10'-0		83.77	3.2600		8'-5	0.007362	0.062	
								32.327	Total(Pt) Route 33
10	10'-0		10.38	3		103'-5½	120	32.279	• • • • • **Route 34** • • • • • Flow (q) from Route 26
133	10'-0		34.64	3.2600		103'-5½	0.001437	0.149	
								32.428	Total(Pt) Route 34
119	10'-0		41.01	3		1'-0½	120	32.066	• • • • • **Route 35** • • • • • Flow (q) from Route 2
85	10'-0		58.82	3.2600		1'-0½	0.003828	0.004	
85	10'-0			3		8'-0	120	32.070	
86	10'-0		45.33	3.2600		8'-0	0.002363	0.019	
86	10'-0			1½	(See Notes)	56'-4½ 19'-9½	120	32.089	PO(9'-11)
100	10'-0		12.91	1.6820		76'-2	0.005811	0.443	PO(9'-11)
								32.531	Total(Pt) Route 35
48	10'-0		64.46	3		7'-8½	120	32.641	• • • • • **Route 36** • • • • • Flow (q) from Route 1
49	10'-0		77.16	3.2600		7'-8½	0.006323	0.000 0.049	
								32.690	Total(Pt) Route 36

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
46	10'-0		7.36	3		0'-7	120	33.141	• • • • • **Route 37** • • • • • Flow (q) from Route 18
67	10'-0		53.11	3.2600		0'-7	0.003169	0.002	
67	10'-0			3		9'-0	120	33.143	
68	10'-0		38.39	3.2600		9'-0	0.001738	0.016	
68	10'-0			1½	(See Notes)	89'-0½	120	33.158	PO(9'-11)
43	10'-0		17.54	1.6820		19'-9½ 108'-10½	0.010243	PO(9'-11) 1.115	
								34.274	Total(Pt) Route 37
68	10'-0		17.54	3		9'-0	120	33.158	• • • • • **Route 38** • • • • • Flow (q) from Route 37
69	10'-0		20.85	3.2600		9'-0	0.000562	0.005	
69	10'-0			1½	(See Notes)	89'-0½	120	33.163	PO(9'-11)
44	10'-0		20.85	1.6820		19'-9½ 108'-10½	0.014096	PO(9'-11) 1.535	
								34.698	Total(Pt) Route 38
38	10'-0			3	(See Notes)	2'-6½	120	33.137	• • • • • **Route 39** • • • • • T(20'-2)
70	10'-0		35.01	3.2600		20'-2 22'-8	0.001466	-0.000 0.033	
70	10'-0			3		8'-0	120	33.170	
62	10'-0		22.19	3.2600		8'-0	0.000630	0.005	
62	10'-0			3		10'-0	120	33.175	
61	10'-0		7.06	3.2600		10'-0	0.000076	0.001	
								33.176	Total(Pt) Route 39
122	10'-0		5.14	1½		11'-0	120	19.893	• • • • • **Route 40** • • • • • Flow (q) from Route 13
138	10'-0		18.77	1.6820		11'-0	0.011614	0.128	
								20.021	Total(Pt) Route 40

Pipe Information

Node 1 / Node 2	Elev 1 (Foot) / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) / Fitting (Foot) / Total (Foot)	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
127	10'-0		50.40	1½	(See Notes)	8'-0	120	29.742	• • • • • **Route 41** • • • • • Flow (q) from Route 1
						9'-11	0.089391		
126	10'-0		56.58	1.6820		17'-11		1.600	T(9'-11)
126	10'-0			1½	(See Notes)	13'-9	120	31.343	
						9'-11	0.033507		
134	10'-0		33.29	1.6820		23'-7½		0.792	PO(9'-11)
								32.134	Total(Pt) Route 41
126	10'-0			1½	(See Notes)	20'-9	120	31.343	• • • • • **Route 42** • • • • • T(9'-11)
						24'-9	0.017304		
125	10'-0		23.29	1.6820		45'-6		0.787	E(4'-11½), PO(9'-11)
								32.130	Total(Pt) Route 42
98	10'-0		18.58	1½		13'-2	120	17.801	• • • • • **Route 43** • • • • • Flow (q) from Route 1
							0.000641		
99	10'-0		3.92	1.6820		13'-2		0.008	
								17.809	Total(Pt) Route 43
74	10'-0		3.47	1½		5'-6½	120	11.844	• • • • • **Route 44** • • • • • Flow (q) from Route 6
							0.007719		
89	10'-0		15.05	1.6820		5'-6½		0.043	
								11.887	Total(Pt) Route 44
71	10'-0		9.65 + 9.23	1½	(See Notes)	6'-5½	120	33.346	• • • • • **Route 45** • • • • • Flow (q) from Route 49 and 50
						9'-11	0.011736	0.000	
39	10'-0		18.88	1.6820		16'-4½		0.192	PO(9'-11)
								33.538	Total(Pt) Route 45
66	10'-0			1½	(See Notes)	78'-2½	120	32.265	• • • • • **Route 46** • • • • • PO(9'-11)
						19'-9½	0.000209		
72	10'-0		2.14	1.6820		98'-0		0.020	T(9'-11)
								32.285	Total(Pt) Route 46
67	10'-0			1½	(See Notes)	89'-0½	120	33.143	• • • • • **Route 47** • • • • • PO(9'-11)
						19'-9½	0.007408		
41	10'-0		14.72	1.6820		108'-10½		0.806	PO(9'-11)
								33.949	Total(Pt) Route 47

Pipe Information

Node 1 / Node 2	Elev 1 / Elev 2 (Foot)	K-Factor	Flow added this step (q) / Total Flow (Q)	Nominal ID / Actual ID	Fittings & Devices / Equiv. Length (Foot)	Length (Foot) Fitting / Total	C Factor / Pf Friction Loss Per Unit (psi)	Total(Pt) / Elev(Pe) / Friction(Pf)	Notes: Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
85	10'-0			1½	(See Notes)	56'-4½	120	32.070	• • • • • **Route 48** • • • • • PO(9'-11)
						19'-9½	0.006307		
123	10'-0		13.50	1.6820		76'-2		0.480	PO(9'-11)
								32.550	Total(Pt) Route 48
50	10'-0			1½	(See Notes)	99'-5½	120	32.942	• • • • • **Route 49** • • • • • PO(9'-11)
						19'-9½	0.003390		
71	10'-0		9.65	1.6820		119'-3		0.404	T(9'-11)
								33.346	Total(Pt) Route 49
51	10'-0			1½	(See Notes)	89'-5½	120	33.005	• • • • • **Route 50** • • • • • PO(9'-11)
						19'-9½	0.003124		
71	10'-0		9.23	1.6820		109'-3		0.341	T(9'-11)
								33.346	Total(Pt) Route 50
70	10'-0			1½	(See Notes)	116'-0	120	33.170	• • • • • **Route 51** • • • • • PO(9'-11)
						19'-9½	0.005737		
41	10'-0		12.82	1.6820		135'-10		0.779	PO(9'-11)
								33.949	Total(Pt) Route 51
62	10'-0			1½	(See Notes)	116'-0	120	33.175	• • • • • **Route 52** • • • • • PO(9'-11)
						19'-9½	0.007788		
42	10'-0		15.13	1.6820		135'-10		1.058	PO(9'-11)
								34.233	Total(Pt) Route 52

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

(Actual Inside Diameter / Schedule 40 Steel Pipe Inside Diameter) 4.87 = Factor

C Value Multiplier

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
BalV	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				

Hydrant Flow Test Report

Test Date 10/20/2022 **Test Time** 1:15 PM

Location

40 Rawls Club Road
Fuquay-Varina, NC

Tested by

Notes

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

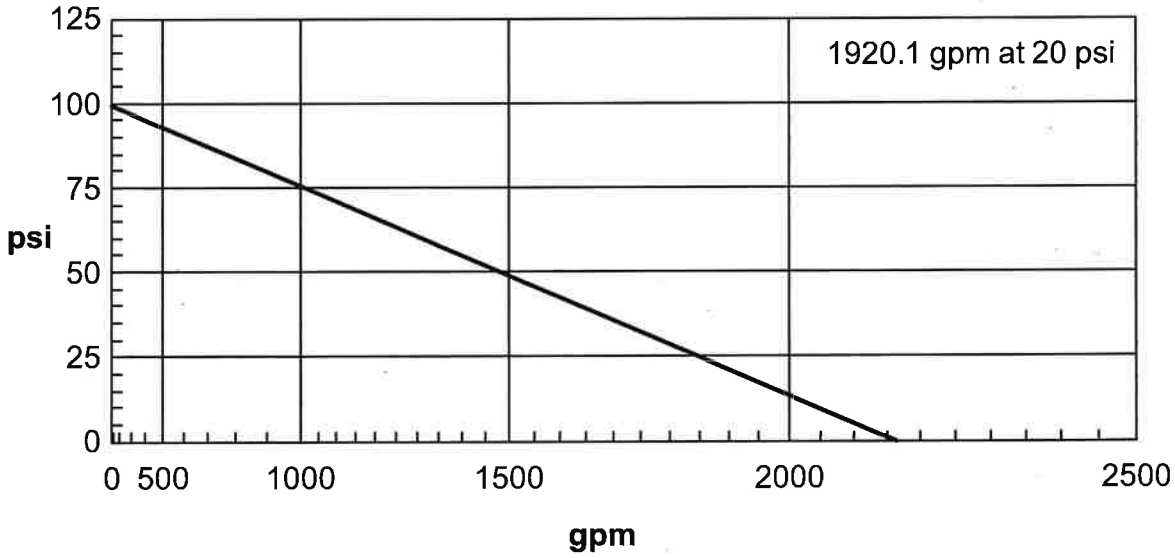
Read Hydrant

100 psi **static pressure**
70 psi **residual pressure**
hydrant elevation

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1		2.5	.9		1130 gpm

Flow Graph



PIPE & FITTINGS

FireLock® Fittings

10.03

Material Specifications:

Fitting:

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

Fitting Coating:

- ☐ Orange enamel
- ☐ Red enamel in Europe, Middle East, Africa, and India
- ☐ Optional: Hot dipped galvanized

Approvals/Listings:

c UL us LISTED FM LPCB VdS

Product Description:

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 couplings that have been Listed or Approved for Fire Protection Services. Use of other couplings or flange adapters may result in bolt pad interference.

Refer to the appropriate listing agency or approval body for pressure ratings. Pressure ratings vary by agency.

Job/Owner

System No.	
Location	

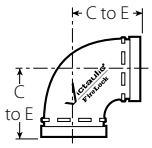
Contractor

Submitted By	
Date	

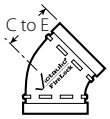
Engineer

Spec Section	
Paragraph	
Approved	
Date	

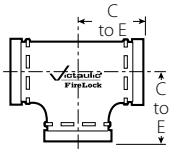
Dimensions:



NO. 001



NO. 003



NO. 002

No. 006

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 001 90° Elbow C to E inches mm	No. 001 90° Elbow Approx. Weight Each Lbs. kg	No. 003 45° Elbow C to E inches mm	No. 003 45° Elbow Approx. Weight Each Lbs. kg	No. 002 Straight Tee C to E inches mm	No. 002 Straight Tee Approx. Weight Each Lbs. kg	No. 006 Cap C to E inches mm	No. 006 Cap Approx. Weight Each Lbs. kg
1 ¼ 32	1.660 42.4	— —	— —	— —	— —	— —	— —	0.82 21	0.3 0.1
1 ½ 40	1.900 48.3	— —	— —	— —	— —	— —	— —	0.82 21	0.4 0.2
2 50	2.375 60.3	2.75 70	1.7 0.8	2.00 51	1.8 0.8	2.75 70	2.4 1.1	0.88 22	0.6 0.3
2 ½ 65	2.875 73.0	3.00 76	3.1 1.4	2.25 57	2.2 1.0	3.00 76	3.6 1.6	0.88 22	1.0 0.5
76.1 mm	3.000 76.1	3.00 76	3.30 1.5	2.25 57	2.4 1.1	3.00 76.2	3.8 1.7	—	—
3 80	3.500 88.9	3.38 86	4.0 1.8	2.50 64	3.1 1.4	3.38 86	5.3 2.4	0.88 22	1.2 0.5
108 mm	4.250 108.0	4.00 102	5.7 2.6	3.00 76	5.1 2.3	4.00 102	7.5 3.4	—	—
4 100	4.500 114.3	4.00 102	6.7 3.0	3.00 76	5.6 2.5	4.00 102	8.7 3.9	1.00 25	2.4 1.1
5 125	5.563 141.3	4.88 124	12.6 5.7	3.25 83	8.3 3.8	4.88 124	15.7 7.1	1.00 25	4.1 1.9
139.7 mm	5.500 139.7	4.88 124.0	12.4 5.6	3.25 82.6	8.2 3.7	4.88 124.0	15.4 6.9	—	—
159 mm	6.250 158.8	5.50 140	12.6 5.7	3.50 89	9.2 4.2	5.50 140	17.9 8.0	—	—
6 150	6.625 168.3	5.50 140	18.3 8.3	3.50 89	11.7 5.3	5.50 140	22.7 10.3	1.00 25	5.9 2.7
165.1 mm	6.500 165.1	5.43 139.7	17.6 7.9	3.50 88.9	11.4 5.2	5.50 139.7	22.0 9.9	—	—
8 200	8.625 219.1	6.81 173	25.5 11.6	4.25 108	20.4 9.3	6.94 176	38.7 17.6	1.13 29	12.7 5.8

Flow Data:

Nominal Size inches mm	Actual Outside Diameter inches mm	Frictional Resistance Equivalent Feet/meters of Straight Pipe[1]			
		Elbows		No. 002 Straight Tee	
		No. 001 90° Elbow	No. 003 45° Elbow	Branch	Run
1 ¼ 32	1.660 42.4	— —	— —	— —	— —
1 ½ 40	1.900 48.3	— —	— —	— —	— —
2 50	2.375 60.3	3.5 1.1	1.8 0.5	8.5 2.6	3.5 1.1
2½ 65	2.875 73.0	4.3 1.3	2.2 0.7	10.8 3.3	4.3 1.3
76.1 mm	3.000 76.1	4.5 1.4	2.3 0.7	11.0 3.4	4.5 1.4
3 80	3.500 88.9	5.0 1.5	2.6 0.8	13.0 4.0	5.0 1.5
108 mm	4.250 108.0	6.4 2.0	3.2 0.9	15.3 4.7	6.4 2.0
4 100	4.500 114.3	6.8 2.1	3.4 1.0	16.0 4.9	6.8 2.1
5 125	5.563 141.3	8.5 2.6	4.2 1.3	21.0 6.4	8.5 2.6
139.7 mm	5.500 139.7	8.3 2.5	4.1 1.3	20.6 6.3	8.3 2.5
159 mm	6.250 158.8	9.4 2.9	4.9 1.5	25.0 7.6	9.6 2.9
6 150	6.625 168.3	10.0 3.0	5.0 1.5	25.0 7.6	10.0 3.0
165.1 mm	6.500 165.1	9.8 3.0	4.9 1.5	24.5 7.5	9.8 3.0
8 200	8.625 219.1	13.0 4.0	5.0 1.5	33.0 10.1	13.0 4.0

[1] The flow data listed is based upon the pressure drop of Schedule 40 pipe.

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 009N/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.

Installation
Reference should always be made to the I-100 Victaulic Field Installation Handbook for the product you are installing. Handbooks are included with each shipment of Victaulic products for complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

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

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.

Trademarks
Victaulic® is a registered trademark of Victaulic Company.

SCHEDULE 10 & 40

Always ready to protect your most valuable assets.

As the leading supplier of steel sprinkler pipe, we understand that there are no second chances in fire suppression. You need products of enduring quality and exceptional strength–plus reliable service. You need Bull Moose.

Bull Moose Fire Sprinkler Pipe Product Information

	Nominal Pipe Size (Inches)	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
SCHEDULE 10	O.D. (in)	1.315	1.660	1.900	2.375	2.875	3.500	4.500	6.625	8.625
	I.D. (in)	1.097	1.442	1.682	2.157	2.635	3.260	4.260	6.357	8.249
	Empty Weight (lb/ft)	1.410	1.810	2.090	2.640	3.530	4.340	5.620	9.290	16.940
	Water Filled Weight (lb/ft)	1.820	2.518	3.053	4.223	5.893	7.957	11.796	23.038	40.086
	C.R.R.	15.27	9.91	7.76	6.27	4.92	3.54	2.50	1.158	1.805
	Pieces per Lift	91	61	61	37	30	19	19	10	7
	Lift Weight (lbs) 21' lengths	2,695	2,319	2,677	2,051	2,224	1,732	2,242	1,951	2,490
	Lift Weight (lbs) 24' lengths	3,079	2,650	3,060	2,344	2,542	1,979	2,563	2,230	2,848
	Lift Weight (lbs) 25' lengths	3,208	2,760	3,187	2,442	2,648	2,062	2,670		

	NPS (In.)	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
SCHEDULE 40		1.315	1.660	1.900	2.375	2.875	3.500	4.500
		1.049	1.380	1.610	2.067	2.469	3.068	4.026
		1.680	2.270	2.720	3.660	5.800	7.580	10.800
		2.055	2.918	3.602	5.114	7.875	10.783	16.316
		1.00	1.00	1.00	1.00	1.00	1.00	1.00
		70	51	44	30	30	19	19
		2,470	2,431	2,513	2,306	3,654	3,024	4,309
		2,822	2,778	2,872	2,635	4,176	3,456	4,925
		2,940	2,894	2,992	2,745	4,350	3,601	5,130

SCHEDULE 10 & 40 ADVANTAGES:

- UL listed (US & Canada) and FM approved
- ASTM A135 and A795 Type E, Grade A Certified
- Complies with NFPA-13, 13R and 14
- Industry-leading hydraulic characteristics
- CRR of 1.0 and greater
- All pipe NDT weld tested

OTHER BENEFITS/SERVICES:

- We have the most stocking locations in the industry, for best delivery and availability
- Plain end or roll groove
- Eddy Guard II™ bacterial-resistant internal coating
- Custom length options
- Hot dipped galvanization
- Reddi-Pipe® red or black pipe eliminates field painting
- Compatible for use in wet, dry, preaction and deluge sprinkler systems
- The only maker with EPDs (to help earn LEED points).

Exclusive maker of Reddi-Pipe®
RED OR BLACK PAINTED PIPE.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

c UL us LISTED

FM APPROVED

NFPA

AFSA American Fire Sprinkler Association

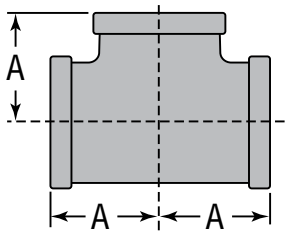
NFSA The Voice of the Fire Sprinkler Industry

BULL MOOSE TUBE

800.325.4467
sales@BullMooseIndustries.com
BullMooseTube.com

FIG. 3205

Straight Tee



c UL us LISTED FM APPROVED

For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil® Sales Representative.

FIGURE 3205 - STRAIGHT TEE

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *25*	500 *3450*	1.50 *38.10*	0.85 *0.39*
1¼ *32*	500 *3450*	1.75 *44.45*	1.22 *0.55*
1½ *40*	500 *3450*	1.94 *49.27*	1.55 *0.70*
2 *50*	500 *3450*	2.25 *57.15*	2.45 *1.11*

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, and FM pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

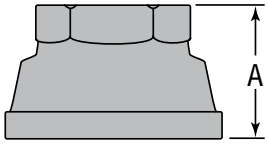
Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

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 approximately three turns beyond hand tight, but no more than four turns.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

FIG. 3221R

Reducing Coupling



c UL us LISTED FM APPROVED

For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil® Sales Representative.

FIGURE 3221R - REDUCING COUPLING

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 x ½ *25 x 15*	500 *3450*	1.69 *42.92*	0.39 *0.18*
1 x ¾ *25 x 20*	500 *3450*	1.69 *42.92*	0.53 *0.24*

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, and FM pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

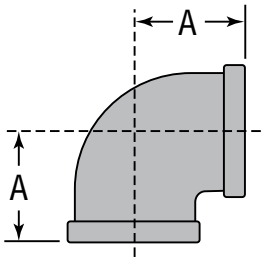
Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

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 approximately three turns beyond hand tight, but no more than four turns.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

FIG. 3201

90° Elbow



c UL us LISTED FM APPROVED

For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil® Sales Representative.

FIGURE 3201 - 90° ELBOW

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *20*	500 *3450*	1.50 *38.10*	0.62 *0.28*
1¼ *32*	500 *3450*	1.75 *44.45*	0.90 *0.41*
1½ *40*	500 *3450*	1.94 *49.276*	1.20 *0.54*
2 *50*	500 *3450*	2.25 *57.15*	1.85 *0.84*

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, and FM pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

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 approximately three turns beyond hand tight, but no more than four turns.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

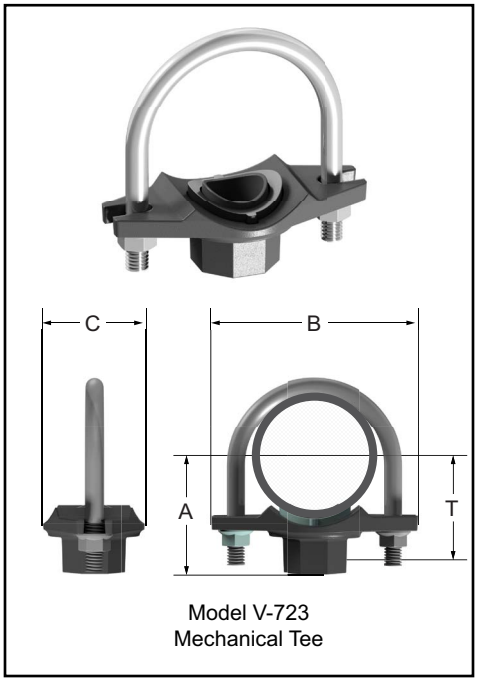
TECHNICAL DATA

HOLE CUT SYSTEM
MODEL V-723 SADDLE LET
MECHANICAL TEE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

VGS® Model V-723 Saddle Let small mechanical tees are available in sizes 1-1/4" through 2-1/2". The Models V-723 mechanical tees provide an easy take-out of a branch outlet without the need for welding. VGS® Mechanical Tees are manufactured at ISO9001 certified facilities an are designed to conform to ASTM and other standards where applicable. Threads are NPT per ANSI B1.20.1.



Model V-723
Mechanical Tee

2. LISTINGS AND APPROVALS

c UL us Guide No. VIZM

FM APPROVED Class 1920

The latest VGS® Technical Data can be acessed at http://www.vikinggroupinc.com.
Scan to visit our Mobile website:

http://vikinggroup.mobi/p/46374

3. TECHNICAL DATA

Specifications:
Maximum working pressure: 300 psi (21 bar)
Ductile iron conforming to ASTM A536
Grade 65-45-12
Standard black finish
Hot dipped Zinc galvanized versions are available (conforming to ASTM A153); when ordering, add a "G" suffix to the Model number.
Rubber compound EPDM Grade E conforming to ASTM D2000, AWWA C606, NSF 61 and IAPMO.
Nuts and Bolts: Zinc plated, Carbon Steel conforming to ASTM A183 Grade 2 (UNC nuts and bolts are a silver chromate color and ISO are a gold chromate color)

Table 1: V-723

Nominal Size in (mm)	Hole Diameter* +1.6, -0 (+0.063, -0) in (mm)	Dimensions			T** in (mm)	Bolt Size in (mm)	Bolt Torque Lb-Ft (Nm)	Weight Lbs (Kgs)
		A in (mm)	B in (mm)	C in (mm)				
1.25 x 0.5 (32 x 15)	1.18 (30)	1.87 (48)	3.5 (89)	2.2 (56)	1.63 (42)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	0.9 (0.41)
1.25 x 0.75 (32 x 20)	1.18 (30)	1.87 (48)	3.5 (89)	2.2 (56)	1.63 (42)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	1.0 (0.45)
1.25 x 1 (32 x 25)	1.18 (30)	2.04 (52)	3.5 (89)	2.2 (56)	1.73 (44)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	1.0 (0.45)
1.5 x 0.5 (40 x 15)	1.18 (30)	2.04 (52)	3.5 (89)	2.2 (56)	1.79 (46)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	0.9 (0.41)
1.5 x 0.75 (40 x 20)	1.18 (30)	2.04 (52)	3.5 (89)	2.2 (56)	1.79 (46)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	0.9 (0.41)
1.5 x 1 (40 x 25)	1.18 (30)	2.04 (52)	3.5 (89)	2.2 (56)	1.69 (43)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	0.9 (0.41)
2 x 0.5 (50 x 15)	1.18 (30)	2.30 (59)	3.86 (98)	2.2 (56)	2.07 (53)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	0.9 (0.41)
2 x 0.75 (50 x 20)	1.18 (30)	2.30 (59)	3.86 (98)	2.2 (56)	2.07 (53)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	0.9 (0.41)
2 x 1 (50 x 25)	1.18 (30)	2.30 (59)	3.86 (98)	2.2 (56)	1.97 (50)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	1.0 (0.45)
2.5 x 0.5 (65 x 15)	1.18 (30)	2.46 (63)	4.37 (111)	2.2 (56)	2.22 (57)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	1.0 (0.45)
2.5 x 0.75 (65 x 20)	1.18 (30)	2.46 (63)	4.37 (111)	2.2 (56)	2.22 (57)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	1.0 (0.45)
2.5 x 1 (65 x 25)	1.18 (30)	2.46 (63)	4.37 (111)	2.2 (56)	2.13 (54)	U-Bolt (3/8ø)	20 - 22 (27 - 30)	1.0 (0.45)

*Hole diameters are suggested hole saw diameters. **T: Take-out (Center of run to end of pipe to be engaged)

VGS®	TECHNICAL DATA	HOLE CUT SYSTEM MODEL V-723 SADDLE LET MECHANICAL TEE

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

4. HOLE CUTTING

The hole-cut method of pipe preparation is required when using mechanical tees, mechanical crosses, and saddle-lets. The method of pipe preparation requires the cutting or drilling of a specified hole size on the centerline of the pipe. Always use the correct hole saw size as shown this data sheet and never use a torch for cutting a hole. After the hole has been cut all rough edges must be removed and the area within 5/8" (16 mm) of the hole should be inspected to ensure a clean smooth surface, free of any indentations or projections that could affect proper gasket sealing. The area within the "A" dimension should also be inspected and must be free for dirt, scale or any imperfection that could affect proper seating or assembly of the fitting.

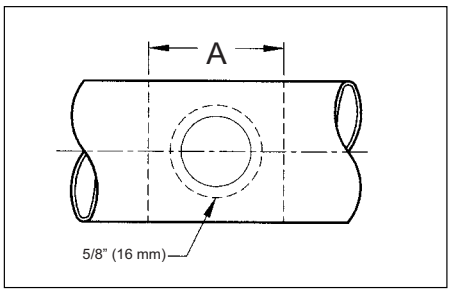


Table 2: Hole Sizes for Mechanical Tees Model V-723

Mechanical Tees Branch Size in (mm)	Hole Dimensions		Surface Preparation "A"
	Hole Saw Size	Maximum Diameter Allowed	
1/2, 3/4, 1 (15, 20, 25)	1-3/16 (30)	1-1/4 (32)	3-1/2 (89)

5. INSTALLATION

NOTES:

- Use a wrench to hold the threaded outlet in place when installing the sprinkler.
- Tighten the nuts evenly.

Table 3: K-factor of Saddle Lets

Outlet Size	1/2"	3/4"	1"
K-factor of Saddle-Lets	K12	K15	K15
Do not install sprinkler directly into Saddle-Let with 1" outlet.			

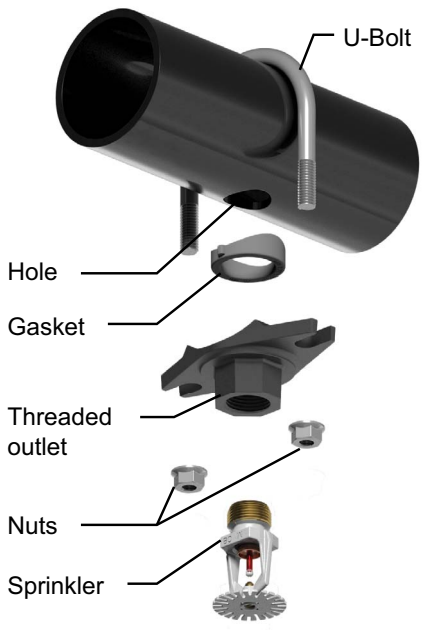


Figure 1: V-723 Saddle-Let Installation

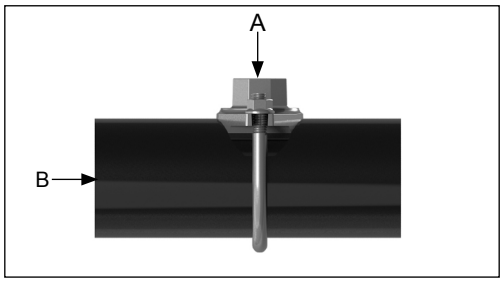
VGS®	TECHNICAL DATA	HOLE CUT SYSTEM MODEL V-723 SADDLE LET MECHANICAL TEE

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

6. FLOW DATA

Equivalent Length of Outlet Size Schedule 40 Carbon Steel Pipe Per UL 213, Section 16 C=120				
Model	**Nominal Inlet Size Inches**	**Nominal Outlet Size Inches**	**Equivalent Length Feet**	**C_V Values**
V-723	1.25	1	6	27
V-723	1.5	1	6	27
V-723	2	1	6	27
V-723	2.5	1	3	38

Flow test data has shown that the total head loss between point A and B for the fittings can be expressed in terms of the pressure difference across the inlet and branch. The pressure difference can be obtained from the relationship below.



Formulas for Cv 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_v = Flow Coefficient

HANGER MATERIAL

Threaded Rods

Low Carbon Steel Threaded Rod

The most economical and most common form of Threaded Rod. Typically used by the plumbing and contracting trades. Used in maintenance departments in various applications including hanging, mounting, bracing, supporting, and fastening applications.

- Low carbon steel according to ASTM A307, Grade A requirements
- Conforms to ASME B18.31.3
- Class 1A rolled threads
- Zinc Plated according to Fe/Zn 3AT Per ASTM F1941
- Hot Dip Galvanized according to ASTM A153 or F2329
- 60,000 psi Min. Tensile Strength

Thread - Coarse																	
		1 ft		2 ft		3 ft			6 ft			10 ft			12 ft		
		Plain	Zinc	Plain	Zinc	Plain	Zinc	Hot Dip Galvanized	Plain	Zinc	Hot Dip Galvanized	Plain	Zinc	Hot Dip Galvanized	Plain	Zinc	Hot Dip Galvanized
Diameter	Thread Size	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
#6	32	-	-	-	-	47002	47052	-	47102	47152	-	-	-	-	-	-	-
#8	32	-	-	-	-	47003	47053	-	47103	47153	-	47136	47186	-	-	-	-
#10	24	-	-	-	-	47004	47054	-	47104	47154	-	47137	47187	-	-	-	-
#12	24	-	-	-	-	47006	47056	-	-	47156	-	-	-	-	-	-	-
1/4"	20	0156376	0156317	0156377	0156318	47007	47057	-	47107	47157	-	47140	47190	-	47207	47257	-
5/16"	18	0156378	0156319	0156379	0156320	47009	47059	-	47109	47159	-	47141	47191	-	47209	47259	-
3/8"	16	0156380	0156321	0156381	0156322	47011	47061	47602	47111	47161	47618	47142	47192	47634	47211	47261	47650
7/16"	14	0156382	0156323	0156383	0156324	47013	47063	0156404	47113	47163	-	47143	47193	-	47213	47263	-
1/2"	13	0156384	0156325	0156385	0156326	47015	47065	47604	47115	47165	47620	47144	47194	47636	47215	47265	47652
9/16"	12	0156386	0156327	0156387	0156328	47017	47067	-	47117	47167	-	47145	47195	-	47217	47267	-
5/8"	11	0156388	0156329	0156389	0156330	47019	47069	47606	47119	47169	47622	47146	47196	47638	47219	47269	47654
3/4"	10	0156390	0156331	0156391	0156332	47021	47071	47607	47121	47171	47623	47147	47197	47639	47221	47271	47655
7/8"	9	0156392	0156333	0156393	0156334	47023	47073	0156408	47123	47173	47624	47148	47198	47640	47223	47273	47656
1"	8	0156394	0156335	0156395	0156336	47025	47075	47609	47125	47175	47625	47149	47199	47641	47225	47275	47657
1-1/8"	7	-	-	-	-	47027	47077	-	47127	47177	47626	47150	47200	47642	47227	47277	47658
1-1/4"	7	-	-	-	-	47028	47078	47611	47128	47178	47627	47151	47201	47643	47228	47278	47659
1-3/8"	6	-	-	-	-	47029	47079	-	47129	47179	-	47233	47237	47644	47229	47279	47660
1-1/2"	6	-	-	-	-	47030	47080	-	47130	47180	47629	47234	47238	47645	47230	47280	47661
1-3/4"	5	-	-	-	-	47031	47081	-	47131	47181	47630	47235	47239	47646	47231	47281	47662
2"	4.5	-	-	-	-	47032	47082	-	47132	47182	-	47236	47240	47647	47232	47282	47663

Thread - Fine							
		3 ft		6 ft		12 ft	
		Plain	Zinc	Plain	Zinc	Plain	Zinc
Diameter	Thread Size	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
#10	32	47005	47055	47105	47155	-	-
1/4"	28	47008	47058	47108	47158	47208	47258
5/16"	24	47010	47060	47110	47160	47210	47260
3/8"	24	47012	47062	47112	47162	47212	47262
7/16"	20	47014	47064	47114	47164	47214	47264
1/2"	20	47016	47066	47116	47166	47216	47266
9/16"	18	47018	47068	47118	47168	-	47268
5/8"	18	47020	47070	47120	47170	47220	47270
3/4"	16	47022	47072	47122	47172	47222	47272
7/8"	14	47024	47074	47124	47174	47224	47274
1"	14	47026	47076	47126	47176	47226	47276
1-1/8"	12	47033	47085	47133	47183	47094	-
1-1/4"	12	47034	47086	47134	47184	47095	47098
1-1/2"	12	47035	47087	47135	47185	47096	-

Left Hand Low Carbon Steel Threaded Rod

The most economical and most common form of Threaded Rod. Typically used by the plumbing and contracting trades. Used in maintenance departments in various applications; left hand threading. Plain Finish, or bare metal finish which may contain a light coating of oil.

- 6 foot lengths

Thread - Left Hand - Coarse		
		Plain
Diameter	Thread Size	Part No.
1/4"	20	47302
5/16"	18	47303
3/8"	16	47304
1/2"	13	47306
5/8"	11	47308
3/4"	10	47309
7/8"	9	47310
1"	8	47311
1-1/8"	7	47312
1-1/4"	7	47313
1-1/2"	6	47315
2"	4.5	47318

Metric Threaded Rod

- Made from heat treated Class 8.8 steel.

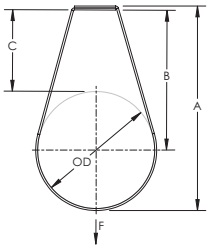
Thread - Coarse				
		Class 4.6		Class 8.8
		Plain	Zinc	Plain
Diameter	Thread Size	Part No.	Part No.	Part No.
M2	0.4	-	0162065	-
M3	0.5	-	0162068	-
M4	0.7	47556	0162070	-
M5	0.8	47570	0162071	-
M6	1.0	47571	0162072	47870
M8	1.25	47572	0162073	47872
M10	1.5	47573	0162075	47873
M12	1.75	47574	0162078	47874
M14	2.0	47575	0162081	47875
M16	2.0	47576	0162083	47876
M18	2.5	47577	0162085	47877
M20	2.5	47578	0162086	47878
M22	2.5	47579	-	47879
M24	3.0	47580	0162088	47880

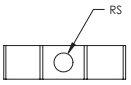
Thread - Coarse				
		Class 4.6		Class 8.8
		Plain	Zinc	Plain
Diameter	Thread Size	Part No.	Part No.	Part No.
M27	3.0	47581	0162089	47881
M30	3.5	47582	0162090	47882
M33	3.5	47733	-	47883
M36	4.0	47583	-	47884
M39	4.0	47734	-	47885
M42	4.5	47735	-	47886
M48	5.0	47737	-	-

Thread - Fine		
		Class 4.6
		Zinc
Diameter	Thread Size	Part No.
M8	1.0	0162074
M10	1.0	0162077
M10	1.25	0162076
M12	1.25	0162080
M12	1.5	0162079
M14	1.5	0162082
M16	1.5	0162084

105 Stainless Steel Loop Hanger

- Recommended for the suspension of stationary stainless steel pipe lines
- Conforms with Federal Specification WW-H-171 (Type 7), Manufacturers Standardization Society (MSS) SP-58 (Type 7)



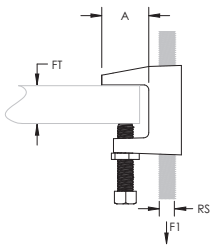


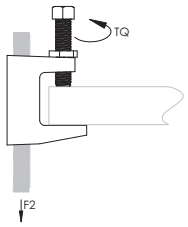
Material: Stainless Steel 304 (EN 1.4301)

Part Number	Pipe Size	Outer Diameter OD	Rod Size RS	A	B	C	Static Load F
1050050S4	1/2"	0.675"	3/8"	2 7/8"	2 5/16"	1 7/8"	600 lb
1050075S4	3/4"	1.050"	3/8"	3 1/8"	2 3/8"	1 7/8"	600 lb
1050100S4	1"	1.315"	3/8"	3 3/8"	2 9/16"	1 7/8"	600 lb
1050125S4	1 1/4"	1.660"	3/8"	3 3/4"	2 11/16"	1 7/8"	600 lb
1050150S4	1 1/2"	1.900"	3/8"	4 1/16"	2 15/16"	2"	600 lb
1050200S4	2"	2.375"	3/8"	4 7/16"	3 1/16"	1 7/8"	600 lb
1050250S4	2 1/2"	2.875"	1/2"	4 15/16"	3 5/16"	1 7/8"	970 lb
1050300S4	3"	3.500"	1/2"	5 9/16"	3 5/8"	1 7/8"	970 lb
1050350S4	3 1/2"	4.000"	1/2"	6 1/16"	3 7/8"	1 7/8"	970 lb
1050400S4	4"	4.500"	5/8"	6 9/16"	4 1/8"	1 7/8"	1,250 lb
1050500S4	5"	5.563"	5/8"	7 5/8"	4 11/16"	1 7/8"	1,250 lb
1050600S4	6"	6.625"	3/4"	8 3/4"	5 1/16"	1 3/4"	1,600 lb
1050800S4	8"	8.625"	3/4"	10 3/4"	6 1/16"	1 3/4"	1,800 lb

300 Universal Beam Clamp

- Conforms with Federal Specification WW-H-171 (Type 23), Manufacturers Standardization Society ANSI®/MSS-SP-58 (Type 19 and 23)





Material: Steel

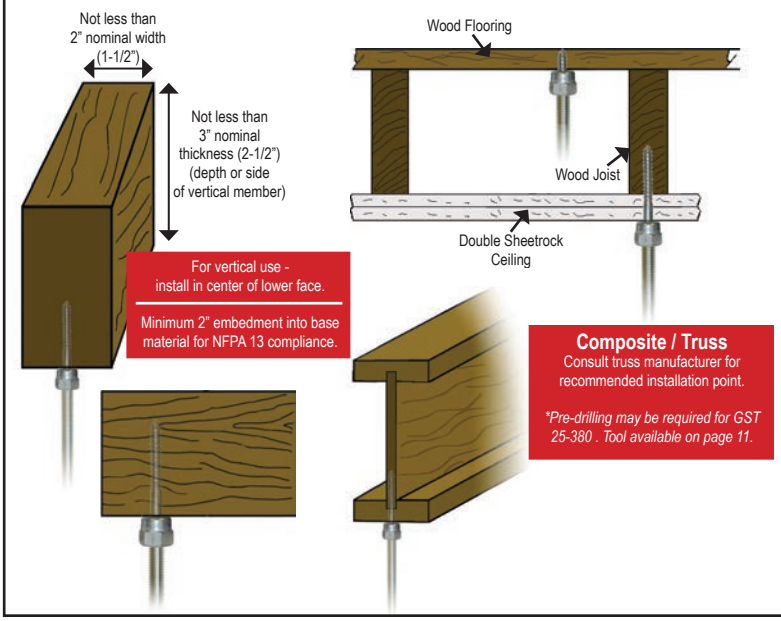
Part Number	Rod Size RS	Flange Thickness FT	A	Torque TQ	Static Load 1 F1	Static Load 2 F2	Certifications	Standard Packaging Quantity
Finish: Plain								
3000037PL	3/8"	13/16" Max	1 1/8"	5 ft lb	500 lb	250 lb	cULus, FM	100 pc
3000050PL	1/2"	13/16" Max	1 1/8"	8 ft lb	950 lb	760 lb	cULus, FM	50 pc
3000062PL	5/8"	13/16" Max	1 1/8"	5 ft lb	950 lb	760 lb	cULus	50 pc
3000075PL	3/4"	13/16" Max	1 1/8"	5 ft lb	950 lb	760 lb	cULus	50 pc
3000087PL	7/8"	13/16" Max	1 1/8"	5 ft lb	950 lb	760 lb	cULus	50 pc
Finish: Electrogalvanized								
3000037EG	3/8"	13/16" Max	1 1/8"	5 ft lb	500 lb	250 lb	cULus, FM	100 pc
3000050EG	1/2"	13/16" Max	1 1/8"	8 ft lb	950 lb	760 lb	cULus, FM	50 pc
3000062EG	5/8"	13/16" Max	1 1/8"	5 ft lb	950 lb	760 lb	cULus	50 pc
3000075EG	3/4"	13/16" Max	1 1/8"	5 ft lb	950 lb	760 lb	cULus	50 pc
3000087EG	7/8"	13/16" Max	1 1/8"	5 ft lb	950 lb	760 lb	cULus	50 pc

Setscrew must be tightened and torqued onto the sloped side of the I-beam.

Recognizing that torque wrenches are generally not used or available on many job sites, the setscrew should be tightened so it contacts the I-beam and then an additional 1/4 to 1/2 turn added.

SAMMYS® FOR WOOD - Vertical Application

Application



Product Features

- No pre-drilling required.
- Quick to install using the Sammy Nut Driver with an 18V cordless drill/driver.
- Saves time from traditional methods.
- Reduces installation costs.
- Manufactured in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Box Qty	Case Qty
VERTICAL MOUNT									
	1/4"	8002957	GST 100	1/4 x 1"	210 (7/16" OSB) 670 (3/4" Ply)			25	125
	1/4"	8003957	GST 200	1/4 x 2"	1760 (Fir)			25	125
UL	3/8"	8007957	GST 10	1/4 x 1"	210 (7/16" OSB) 670 (3/4" Ply)	300		25	125
UL FM	3/8"	8008957	GST 20	1/4 x 2"	1760 (Fir)	850	1475	25	125
UL	3/8"	8068925	GST 20-SS	1/4 x 2"	1760 (Fir)	850		25	125
UL	3/8"	8009925	GST 25-380	3/8 x 2-1/2"	2113 (Fir)	1500		25	125
UL FM	3/8"	8010957	GST 30	1/4 x 3"	2060 (Fir)	1500	1475	25	125
	3/8"	8069925	GST 30-SS	1/4 x 3"	2060 (Fir)			25	125
	1/2"	8013925	GST 2	1/4 x 2"	1760 (Fir)			25	125
	1/2"	8015925	GST 3	1/4 x 3"	2275 (Fir)			25	125

#14 Black Nut Driver Part # 8113910

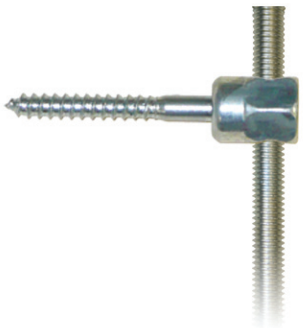
#14 SW Red Nut Driver Part # 8114910

MANUFACTURED U.S.A.

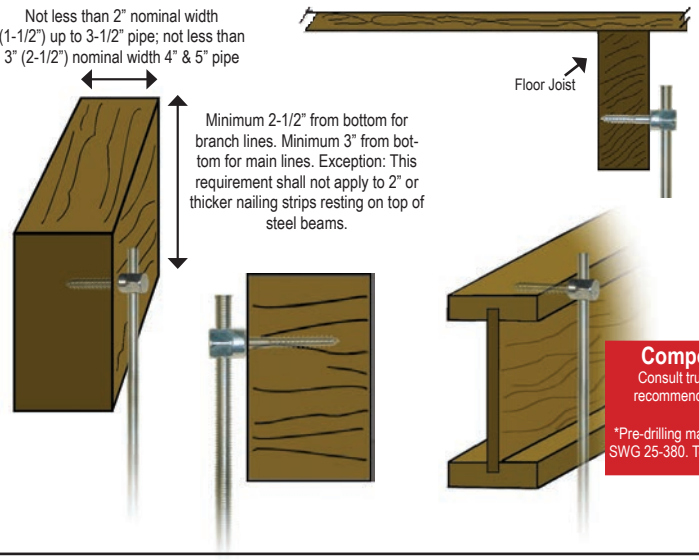
RoHS Compliant

SPECIAL NUT DRIVER SYSTEM: The nut drivers were designed with a unique spin-off feature which provides a fast and safe installation each time. When the face of the driver comes into contact with the material you are installing into, continue drilling until nut driver spins free. Installation is then complete. Warranty requires the use of the appropriate nut driver for installations.

SIDEWINDER® FOR WOOD - Horizontal Application



Application



Composite / Truss
Consult truss manufacturer for recommended installation point.

*Pre-drilling may be required for Model SWG 25-380. Tool available on page 11.

Watch a video demonstration at www.itwbuildex.com

Product Features

- No pre-drilling required.
- Quick to install using the Sammy Nut Driver with an 18V cordless drill/driver.
- Saves time from traditional methods.
- Reduces installation costs.
- Manufactured in the U.S.A.

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	Box Qty	Case Qty
HORIZONTAL MOUNT								
	1/4"	8019957	SWG 200	1/4 x 2"	1725 (Fir)		25	125
	3/8"	8020957	SWG 10	1/4 x 1"	622 (Fir)	300	25	125
	3/8"	8021957	SWG 20	1/4 x 2"	1725 (Fir)	1050	25	125
	3/8"	8073925	SWG 20-SS	1/4 x 2"	1725 (Fir)	850	25	125
	3/8"*	8022925	SWG 25-380	3/8 x 2-1/2"	2249 (Fir)	1500	25	125
	3/8"	8023925	SWG 30	1/4 x 3"	1884 (Fir)		25	125

#14 SW Red Nut Driver Part # 8114910

* May require pre-drilling; consult joist manufacturer.

SAMMYS SWIVEL HEAD™ FOR WOOD - Swivel Application

Application

Product Features

- Eliminates distortion of threaded rod.
- Accommodates up to 3 ½" x 12 pitch roof.
- Allows 17° deflection from vertical.
- Saves time from traditional methods.
- Reduces installation costs.
- Manufactured in the U.S.A.

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thickness	Box Qty	Case Qty
SWIVEL MOUNT										
	3/8"	8139957	SH-GST 20	1/4 x 2"	1257 (Fir)	1050	1475		25	125
	3/8"*	8269957	SH-GST/CST 20	5/16 x 1-3/4"	1903 Dim. Lumber 1406 @ 45°off vertical Dim. Lumber	1500 850 @ 45°			25	125
	1/2"	8303957	SH-GST/CST 2.0	5/16 x 1-3/4"	903 Dim. Lumber 1406 @ 45°off vertical Dim. Lumber				25	125

#14 Black Nut Driver Part # 8113910

#14 SH Orange Nut Driver Part # 8273910

* May require pre-drilling; consult joist manufacturer.

SPRINKLER HEADS

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
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

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)

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

* 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.

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
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

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 23560MB[2]

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.

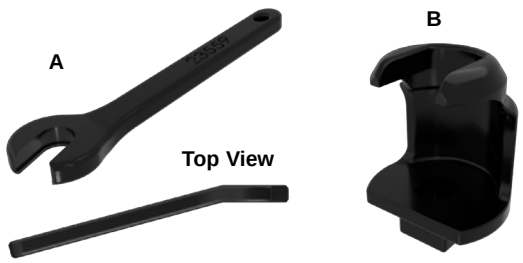


Figure 1: Sprinkler Wrenches

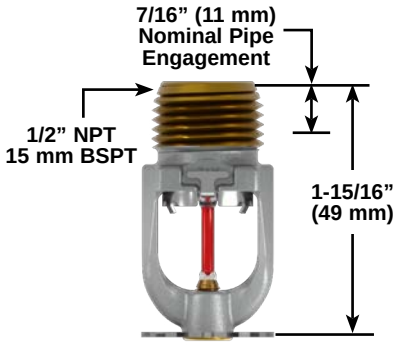


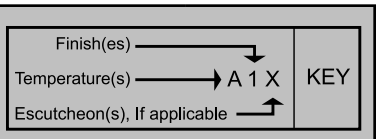
Figure 2: Sprinkler Dimensions

VIKING®	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
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

APPROVAL CHART

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



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

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 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.

VIKING®	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
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

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.

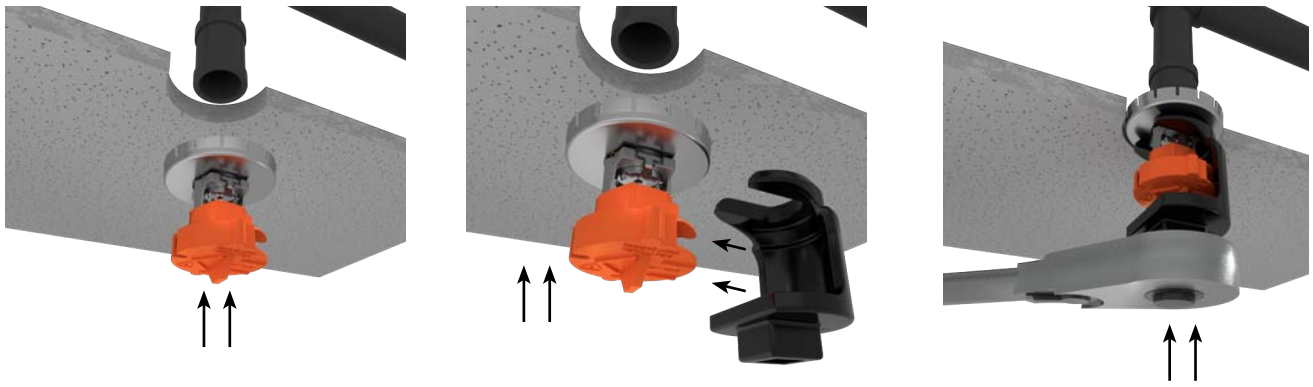


Figure 3: Recessed Installation (with Recessed Socket Wrench)
****A 1/2" ratchet is required (not available from Viking).**

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.

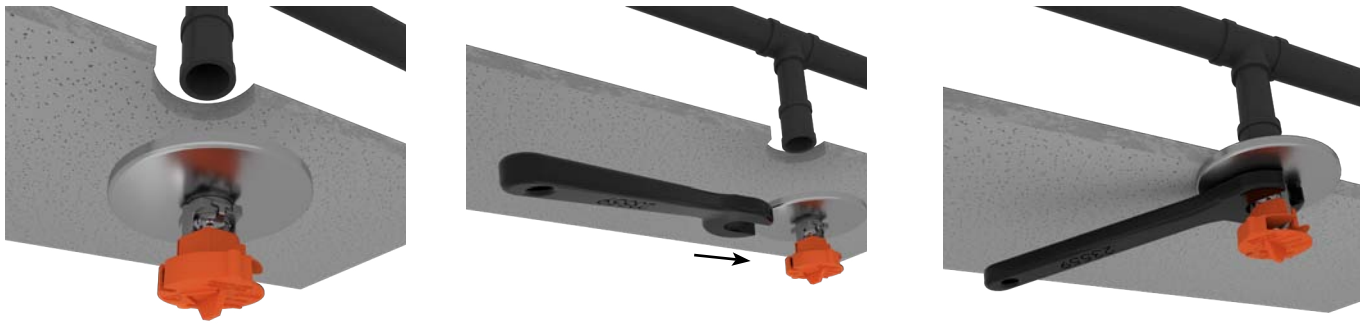


Figure 4: Installation (with Standard Wrench)

TECHNICAL DATA

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
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

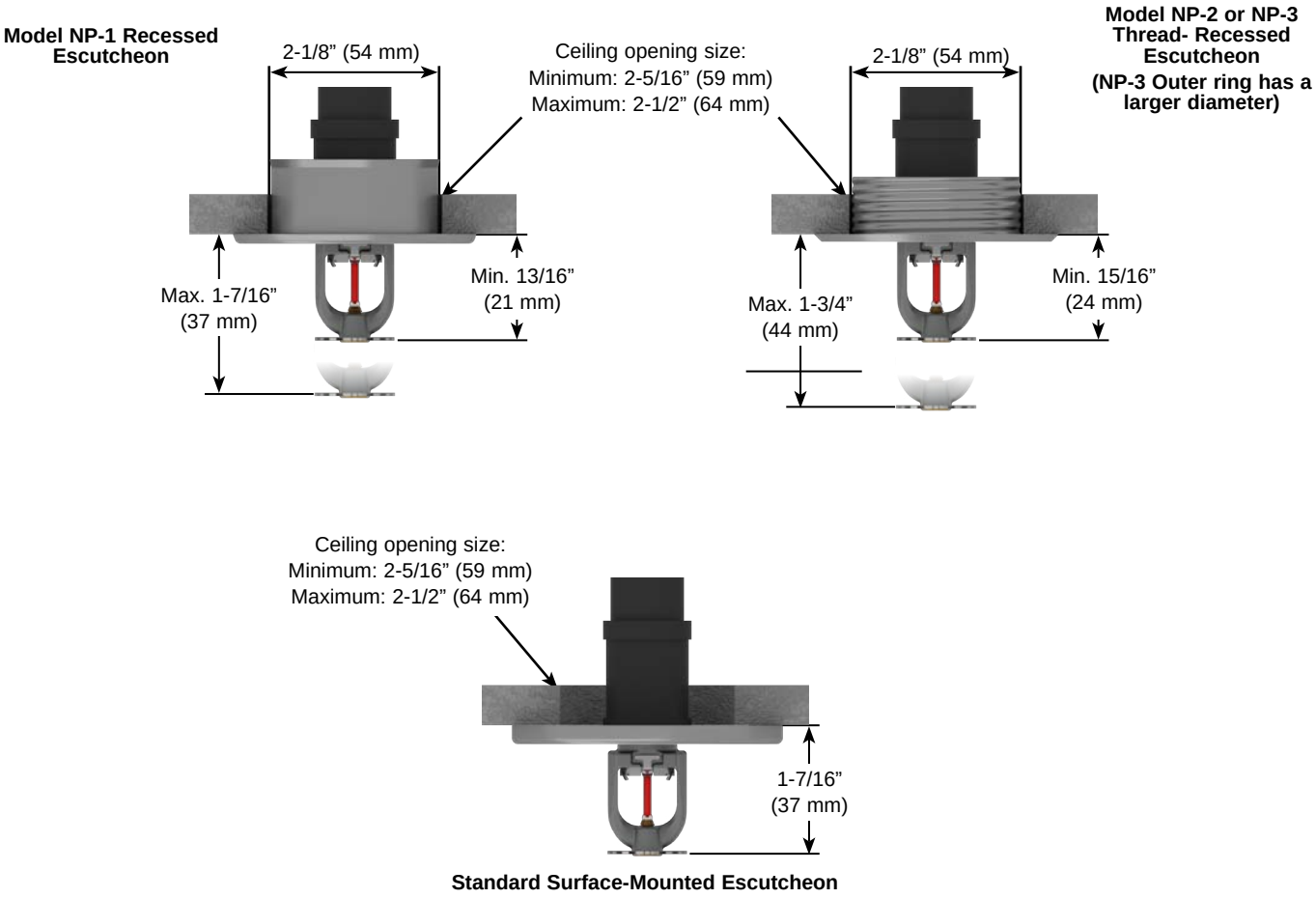


Figure 5: Installation Dimensions with Viking Escutcheons

Series DS-1 Dry-Type Sprinklers 5.6K Pendent, Upright, and Horizontal Sidewall Quick Response, Standard Coverage

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

Scan the QR code or enter the URL in a web browser to access the most up-to-date electronic version of this document. Data rates may apply.

docs.jci.com/tycofire/series-ds-1-dry-5_6-k-pen-up-side-quick

General Description

TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are decorative glass bulb automatic sprinklers designed for commercial use. Dry-type sprinklers are typically used where:

- pendent sprinklers are required on dry pipe systems that are exposed to freezing temperatures; for example, sprinkler drops from unheated portions of buildings
- sprinklers and/or a portion of the connecting piping are exposed to freezing temperatures; for example, sprinkler drops from wet systems into freezers, sprinkler sprigs from wet systems into unheated attics, or horizontal piping extensions through a wall to protect an unheated areas such as loading docks, overhangs, and building exteriors
- sprinklers are used on systems that are seasonally drained to avoid freezing for example, vacation areas

NOTICE

The Series DS-1 Dry-Type Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

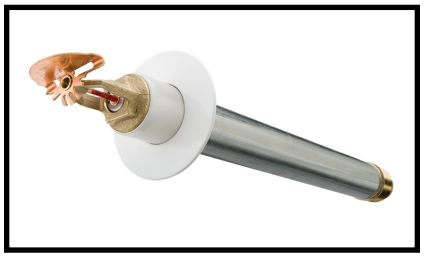
The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.

Sprinkler Identification Numbers (SINs)

3/4 in. NPT:
TY3935 – Pendent
TY3735 – Horizontal Sidewall

1 in. NPT:
TY3235 – Pendent
TY3135 – Upright
TY3335 – Horizontal Sidewall



Technical Data

Approvals
UL and C-UL Listed
FM Approved
EAC Approved
NYC Approved under MEA 352-01-E

Previous New York City Approval and MEA certification numbers apply to product as shown in this data sheet. In accordance with Section BC 3502 of the Construction Code, current NYC Approvals for use in the City of New York apply to all products that contain UL or FM Approvals and Listings; therefore, not all products currently Approved for use in the City of New York will carry an actual MEA Certification number.

See Tables A and B for Approvals details.

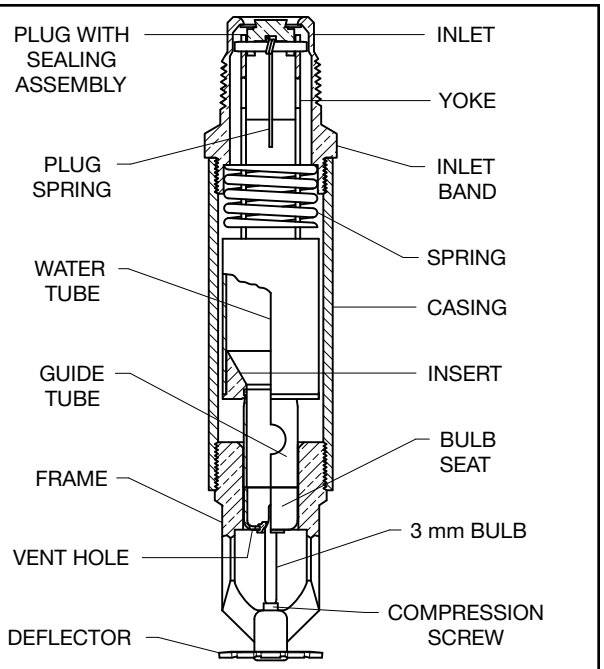


FIGURE 1
SERIES DS-1, 3/4 IN. NPT, DRY-TYPE SPRINKLER ASSEMBLY

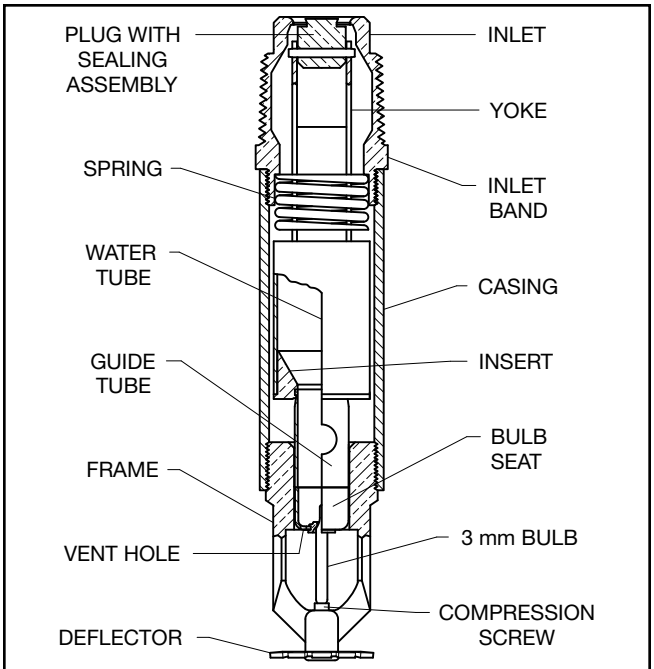


FIGURE 2
SERIES DS-1, 1 IN. NPT AND ISO 7-R 1 DRY-TYPE SPRINKLER ASSEMBLY

Maximum Working Pressure
175 psi (12,1 bar)

Inlet Thread Connections
3/4 in. NPT
1 in. NPT or ISO 7-R 1

Discharge Coefficient
K=5.6 gpm/psi½ (80,6 lpm/bar½)

Temperature Ratings
See Tables A and B

Finishes
Sprinkler: Natural Brass, Chrome Plated, or Signal White

Escutcheon: Signal White, Chrome Plated, or Brass Plated

Physical Characteristics

Inlet	Copper
Plug	Copper
Yoke	Stainless Steel
Casing	Galvanized Carbon Steel
Insert	Bronze
Bulb Seat	Stainless Steel
Bulb	Glass
Compression Screw	Bronze
Deflector	Bronze
Frame	Bronze
Guide Tube	Stainless Steel
Water Tube	Stainless Steel
Spring	Stainless Steel
Plug Spring*	Stainless Steel
Sealing Assembly	Beryllium Nickel w/TEFLON
Escutcheon	Carbon Steel or Stainless Steel

* For 3/4 in. NPT only

Operation

When the TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are in service, water is prevented from entering the assembly by the Plug with Sealing Assembly in the Inlet of the Sprinkler. See Figures 1 and 2.

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb, and the Bulb Seat is released.

The compressed Spring is then able to expand and push the Water Tube as well as the Guide Tube outward. This action simultaneously pulls inward on the Yoke, withdrawing the Plug with Sealing Assembly from the Inlet and allowing the sprinkler to activate and flow water.

Design Criteria

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are intended for use in fire sprinkler systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency; for example, UL Listing is based on NFPA 13 requirements.

Sprinkler Fittings
Install the 3/4 or 1 in. NPT Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 in. NPT outlet or run of the following fittings:

- malleable or ductile iron threaded tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150)
- cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125)

Do not install the DS-1 Sprinklers into an elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow, potentially damaging the Inlet seal.

The unused outlet of the threaded tee is plugged as shown in Figure 13.

You can also install the Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 in. NPT outlet of a GRINNELL Figure 730 Mechanical Tee. However, the use of the Figure 730 Tee for this arrangement is limited to wet pipe systems.

The configuration shown in Figure 12 is only applicable for wet pipe systems where the sprinkler fitting and water-filled pipe above the sprinkler fitting are not subject to freezing and where the length of the Dry-Type Sprinkler has the minimum exposure length depicted in Figure 11. See the Exposure Length section.

For wet pipe system installations of the 1 in. NPT Series DS-1 Dry-Type Sprinklers connected to CPVC piping, use only the following TYCO CPVC fittings:

- 1 in. x 1 in. NPT Female Adapter (P/N 80145)
- 1 in. x 1 in. x 1 in. NPT Sprinkler Head Adapter Tee (P/N 80249)

		3/4 in. NPT								
		TY3935 Pendent with Recessed Escutcheon (Figure 4)			**TY3935 Pendent** with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6)			**TY3735 Horizontal Sidewall** with Top of Deflector-to-Ceiling Distance of 4 to 12 in. (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	**Bulb Color Code**	**Finish**								
		Natural Brass	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**
135°F (57°C)	Orange	1, 2			1, 2			1*, 2*		
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue									

Notes:
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.)
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.)
* Light and Ordinary Hazard occupancies only

TABLE A
3/4 IN. NPT SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS LABORATORY LISTINGS AND APPROVALS

		1 in. NPT (and ISO 7-R 1)								
		TY3235 Pendent with Recessed Escutcheon (Figure 4)			**TY3235 Pendent** with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6) TY3135 Upright without Escutcheon[5] (Figure 7)			**TY3335 Horizontal Sidewall** with Top of Deflector-to-Ceiling Distance of 4 to 12 in. (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	**Bulb Color Code**	**Finish**								
		Natural Brass	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**
135°F (57°C)	Orange	1, 2, 3, 4, 6		1, 2, 4, 6	1, 2, 3, 4, 6		1, 2, 4, 6	1*, 2*, 3**, 4, 6		1*, 2*, 4, 6
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue	1, 2, 4, 6								

Notes:
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.)
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.)
3. Approved by Factory Mutual Research Corporation (maximum order length of48 in.)
4. Approved by the City of New York under MEA 352-01-E
5. The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only
6. EAC Approved
* Light and Ordinary Hazard occupancies only
** Light Hazard occupancies only

TABLE B
1 IN. NPT (AND ISO 7-R 1) SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS LABORATORY LISTINGS AND APPROVALS

For wet pipe system installations of the the 3/4 in. NPT Series DS-1 Sprinklers connected to CPVC piping, use in the 3/4 in. x 3/4 in. NPT Female Adapter (P/N 80142).

For dry pipe system installations, use only the side outlet of maximum 2 1/2 in. reducing tee when locating the Series DS-1 Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 13 to assure complete water drainage from above the Series DS-1 Dry-Type Sprinklers and the branch line. Failure to do so may result in pipe freezing and water damage.

NOTICE

Do not install the Series DS-1 Dry-Type Sprinkler into any other type fitting. Failure to use the appropriate fitting may result in one of the following:

- *failure of the sprinkler to operate properly due to formation of ice over the inlet Plug or binding of the Inlet Plug*
- *insufficient engagement of the Inlet pipe threads with consequent leakage*

Drainage

In accordance with the minimum requirements of the NATIONAL FIRE

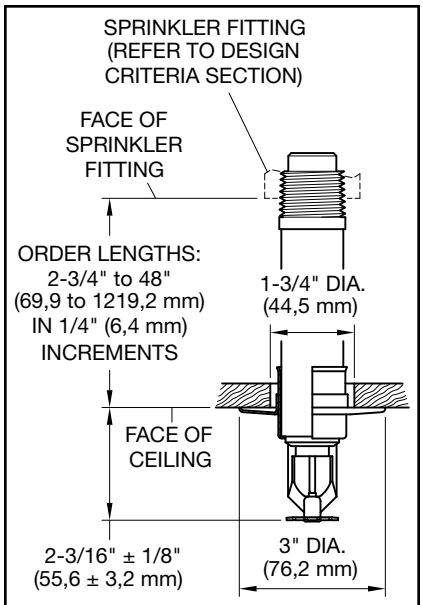


FIGURE 3
PENDENT TY3235 AND TY3935 WITH STANDARD ESCUTCHEON

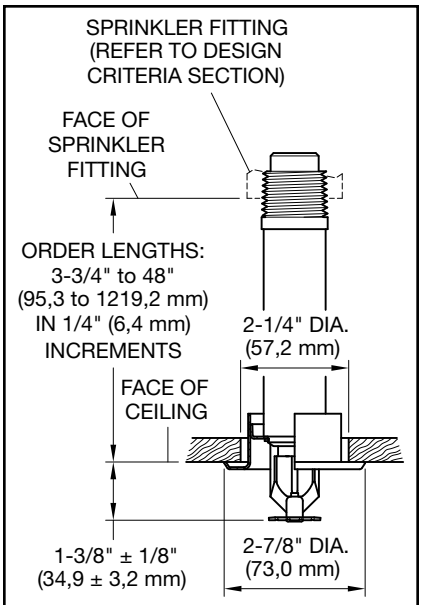


FIGURE 4
PENDENT TY3235 AND TY3935 WITH RECESSED ESCUTCHEON

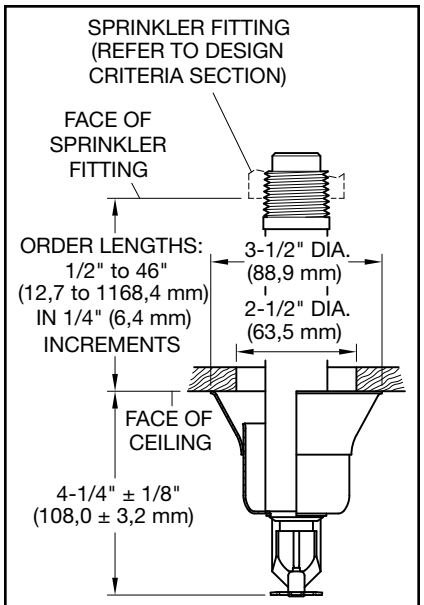


FIGURE 5
PENDENT TY3235 AND TY3935 WITH DEEP ESCUTCHEON

PROTECTION ASSOCIATION for dry pipe sprinkler systems, branch, cross, and feed-main piping connected to Dry Sprinklers and subject to freezing temperatures must be pitched for proper drainage.

Exposure Length
When using Dry Sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use Table C to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. See Figure 11 for an example.

Clearance Space
In accordance with NFPA 13, when connecting an area subject to freezing and an area containing a wet pipe sprinkler system, the clearance space around the sprinkler barrel of Dry-Type Sprinklers must be sealed. Due to temperature differences between two areas, the potential for the formation of condensation in the sprinkler and subsequent ice build-up is increased. If this condensation is not controlled, ice build-up can occur that might damage the dry-type sprinkler and/or prevent proper operation in a fire situation.

Use of the Model DSB-2 Dry Sprinkler Boot, described in Technical Data Sheet TFP591 and shown in Figures 14 and 15, can provide the recommended seal.

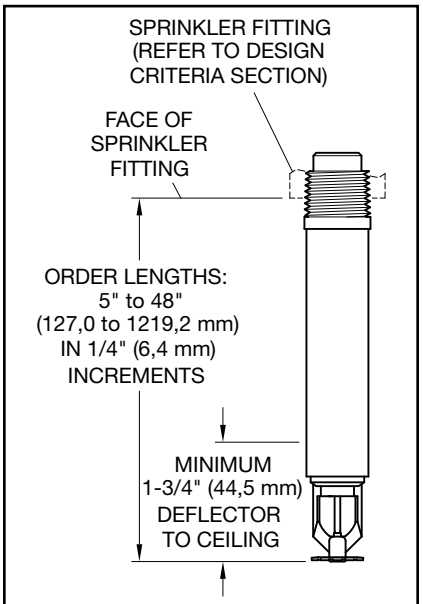


FIGURE 6
PENDENT TY3235 AND TY3935 WITHOUT ESCUTCHEON

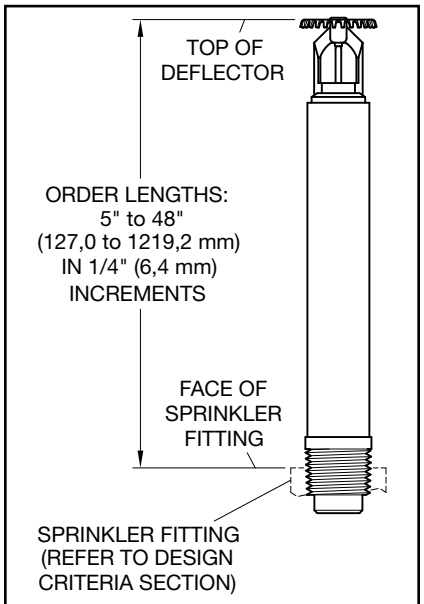


FIGURE 7
UPRIGHT TY3135 WITHOUT ESCUTCHEON, 1 IN. NPT ONLY

Installation

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage must be installed in accordance with this section.

General Instructions
The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section. See the Design Criteria section for other important requirements regarding piping design and sealing of the clearance space around the Sprinkler Casing.

Do not install any bulb-type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm) for the 135°F (57°C) rating to 1/8 in. (3,2 mm) for the 286°F (141°C) rating.

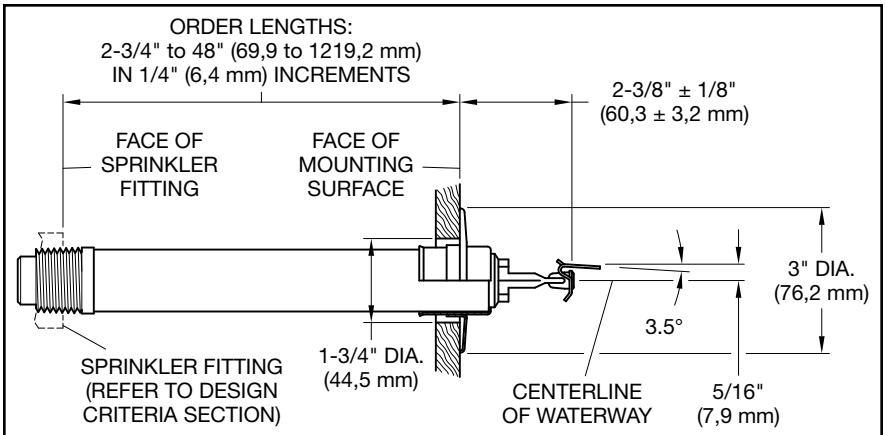


FIGURE 8
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH STANDARD ESCUTCHEON

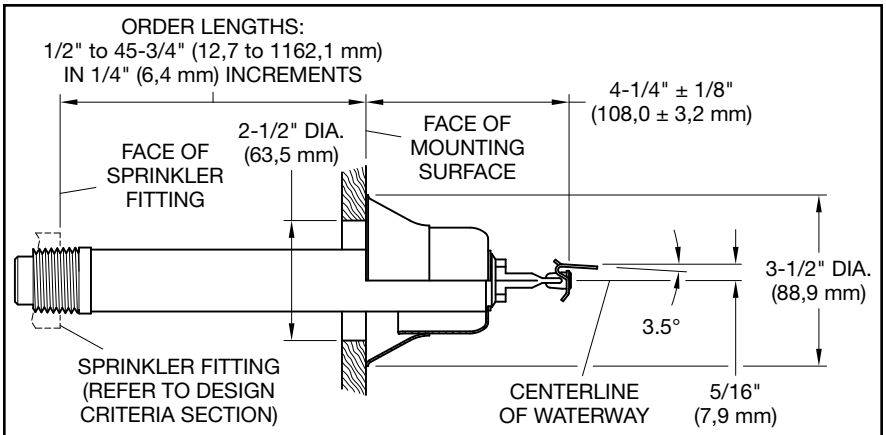


FIGURE 9
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH DEEP ESCUTCHEON

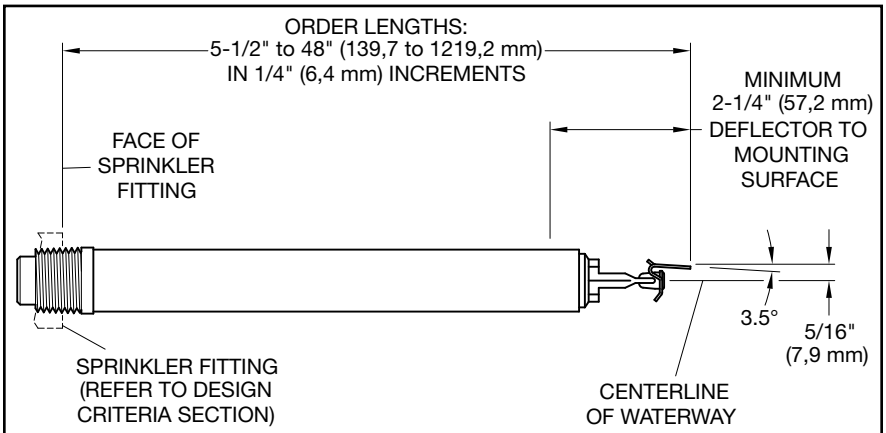


FIGURE 10
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITHOUT ESCUTCHEON

- A leak-tight 3/4 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 10 to 20 lb-ft (13,4 to 26,8 N·m).
- A leak-tight 1 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 20 to 30 lb-ft (26,8 to 40,2 N·m).

Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in an Escutcheon Plate by under or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Step 1. Install pendent sprinklers only in the pendent position, and install upright sprinklers only in the upright position. The deflector of a pendent or upright sprinkler must be parallel to the ceiling.

Install horizontal sidewall sprinklers in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. Ensure the word “TOP” on the Deflector faces the ceiling.

Step 2. With a non-hardening pipe-thread sealant such as TEFLON tape applied to the Inlet threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 3. Wrench-tighten the sprinkler using either:

- a pipe wrench on the Inlet Band or the Casing, see Figures 1 and 2
- the W-Type 7 Sprinkler Wrench on the Wrench Flat, see Figure 16

Apply the Wrench Recess of the W-Type 7 Sprinkler Wrench to the Wrench Flat.

Note: *If sprinkler removal becomes necessary, remove the sprinkler using the same wrenching method noted above. Sprinkler removal is easier when a non-hardening sealant was used and torque guidelines were followed. After removal, inspect the sprinkler for damage.*

Step 4. After installing the ceiling or wall and applying a ceiling finish, slide on the outer piece of the escutcheon until it comes in contact with the ceiling or wall. Do not lift the ceiling panel out of its normal position.

When using the Deep Escutcheon, hold the outer piece in contact with the mounting surface (ceiling or wall). Then rotate the inner piece approximately 1/4 turn with respect to the outer piece, to hold the Deep Escutcheon firmly together.

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area(1)		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length(2), in. (mm)		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (305)	3 (75)	0
-10°F (-23°C)	14 (355)	4 (100)	1 (25)
-20°F (-29°C)	14 (355)	6 (150)	3 (75)
-30°F (-34°C)	16 (405)	8 (200)	4 (100)
-40°F (-40°C)	18 (455)	8 (200)	4 (100)
-50°F (-46°C)	20 (510)	10 (255)	6 (150)
-60°F (-51°C)	20 (510)	10 (255)	6 (150)

Notes:
1. For protected area temperatures that occur between values listed above, use the next cooler temperature.
2. These lengths are inclusive of wind velocities up to 30 mph (18,6 kph).

TABLE C
EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS MINIMUM RECOMMENDED LENGTHS

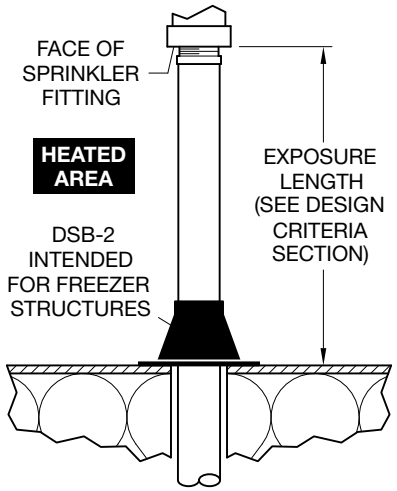


FIGURE 11
EXPOSURE LENGTH

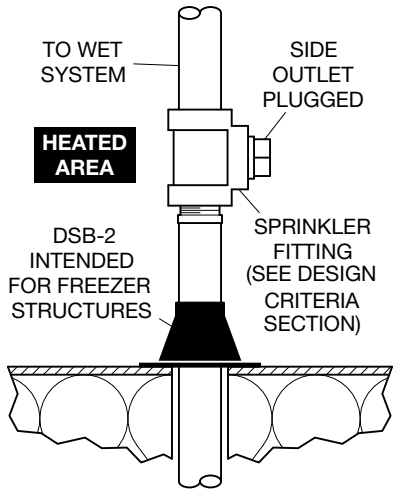


FIGURE 12
SPRINKLER FITTING UNHEATED AREA

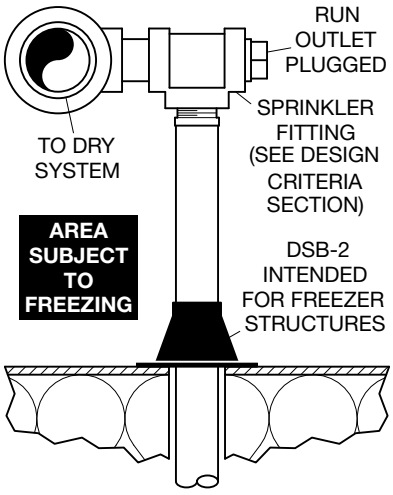


FIGURE 13
SPRINKLER FITTING HEATED AREA

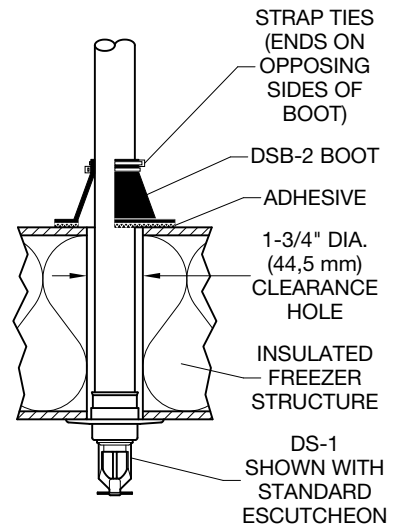


FIGURE 14
MODEL DSB-2 DRY SPRINKLER BOOT WITH PENDENT SERIES DS-1 DRY-TYPE SPRINKLER

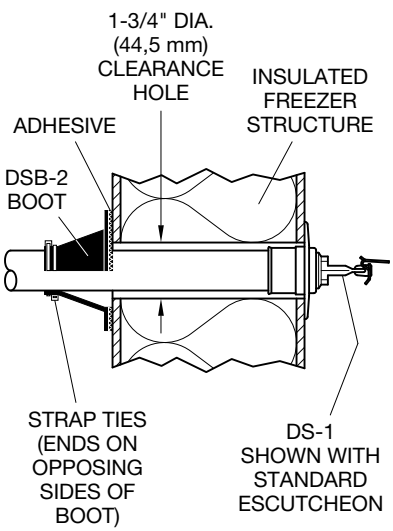


FIGURE 15
MODEL DSB-2 DRY SPRINKLER BOOT WITH SIDEWALL SERIES DS-1 DRY-TYPE SPRINKLER

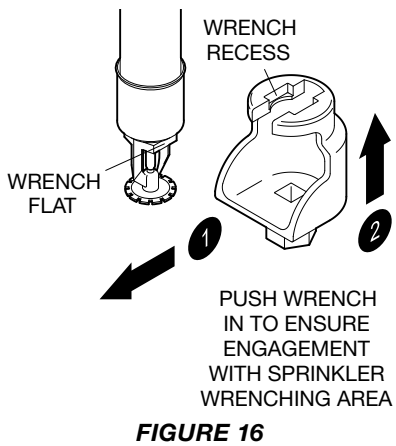


FIGURE 16
W-TYPE 7 SPRINKLER WRENCH

Care and Maintenance

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection systems from the proper authorities and notify all personnel who may be affected by this action.

Absence of the outer piece of an escutcheon, which is used to cover a clearance hole, can delay the time to sprinkler operation in a fire situation.

A Vent Hole is provided in the Bulb Seat (see Figures 1 and 2) to indicate if the Dry-Type Sprinkler is remaining dry. Evidence of leakage from the Vent Hole indicates potential leakage past the Inlet seal and the need to remove the sprinkler to determine the cause of leakage for example, an improper installation or an ice plug. Close the fire protection system control valve and drain the system before removing the sprinkler.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. See the Installation Section.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION, such as NFPA 25, in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and Part Number (P/N).

DS-1 Dry-Type Sprinklers
When ordering TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage, specify the following information:

- SIN:
  Pendent – TY3935 or TY3235
  Sidewall – TY3735 or TY3335
  Upright – TY3135
- 5.6 K-factor
- Deflector Style:
  Upright, Pendent, or Horizontal Sidewall
- Quick Response, Standard Coverage, Dry-Type Sprinkler
- Order Length:
  Dry-Type Sprinklers are furnished based upon Order Length as measured per Figures 3 through 10. After taking the measurement, round it to the nearest 1/4 in. increment.
- Inlet Connections:
  3/4 in. NPT, 1 in. NPT, or ISO 7-R 1
- Temperature Rating
- Sprinkler Finish
- Escutcheon Style and Finish, as applicable
- Part Number (P/N) from Table D

  The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only.

  Part Numbers are for 3/4 in. and 1 in. NPT standard order sprinklers. Orders for all other sprinkler assemblies must be accompanied by a complete description. Refer to the Price List for a complete listing of Part Numbers.

Replacement Escutcheons
Order replacement escutcheons separately.

Note: *Style 10 Recessed Escutcheons are shipped as assemblies comprised of closure ring and mounting plate. The included mounting plate is not used for Dry Type Sprinkler applications, discard accordingly.*

Specify: (specify type), (specify) finish, P/N (specify):

Recessed (Style 10)
Brass Plated 56-701-2-010
Signal White (RAL9003) 56-701-4-010
Chrome Plated 56-701-9-010

Standard (Push-On)
White Color 91-106-0-007
Brass Plated 91-106-2-007
Chrome Plated 91-106-9-007

Deep
Brass Plated 91-107-2-010
White 91-107-4-007
Chrome Plated 91-107-9-007

Sprinkler Wrench
Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001

Sprinkler Boot
Specify: Model DSB-2 Dry Sprinkler Boot, P/N 63-000-0-002

This Part Number includes one (1) Boot, two (2) Strap Ties, and 1/3 oz of Adhesive (a sufficient quantity for installing one boot).

P/N* 60–XXX–X–XXX

		SIN
01	Pendent with Standard Escutcheon (3/4 in. NPT)	TY3935 (Figure 3)
02	Pendent with Deep Escutcheon (3/4 in. NPT)	TY3935 (Figure 5)
03	Pendent with Recessed Escutcheon (3/4 in. NPT)	TY3935 (Figure 4)
04	Pendent without Escutcheon (3/4 in. NPT)	TY3935 (Figure 6)
05	Sidewall with Standard Escutcheon (3/4 in. NPT)	TY3735 (Figure 8)
06	Sidewall with Deep Escutcheon (3/4 in. NPT)	TY3735 (Figure 9)
07	Sidewall without Escutcheon (3/4 in. NPT)	TY3735 (Figure 10)
36	Pendent with Standard Escutcheon (1 in. NPT)	TY3235 (Figure 3)
33	Pendent with Deep Escutcheon (1 in. NPT)	TY3235 (Figure 5)
37	Pendent with Recessed Escutcheon (1 in. NPT)	TY3235 (Figure 4)
32	Pendent without Escutcheon (1 in. NPT)	TY3235 (Figure 6)
34	Sidewall with Standard Escutcheon (1 in. NPT)	TY3335 (Figure 8)
43	Sidewall with Deep Escutcheon (1 in. NPT)	TY3335 (Figure 9)
44	Sidewall without Escutcheon (1 in. NPT)	TY3335 (Figure 10)
38	Upright without Escutcheon (1 in. NPT)	TY3135 (Figure 7)

	SPRINKLER FINISH	ESCUTCHEON FINISH[1]
0	CHROME PLATED	SIGNAL WHITE (RAL9003) POLYESTER
1	NATURAL BRASS	SIGNAL WHITE (RAL9003) POLYESTER
2	NATURAL BRASS	BRASS PLATED
4	SIGNAL WHITE (RAL9003) POLYESTER	SIGNAL WHITE (RAL9003) POLYESTER
8	CHROME PLATED	STAINLESS STEEL
9	CHROME PLATED	CHROME PLATED

	SAMPLE ORDER LENGTH[2]
055	5.50 in.
082	8.25 in.
180	18.00 in.
187	18.75 in.
372	37.25 in.
480	48.00 in.

	TEMPERATURE RATING
0	135°F (57°C)
1	155°F (68°C)
2	175°F (79°C)

	TEMPERATURE RATING
3	200°F (93°C)
4	286°F (141°C)

Notes:
1. Escutcheon Finish applies to sprinklers provided with escutcheons.
2. Dry-Type Sprinklers are furnished based upon "Order Length" as measured per Figures 3 through 10, as applicable, and for each individual sprinkler where it is to be installed. After the measurement is taken, round it to the nearest 1/4 in. increment.

* Use Prefix "I" for ISO 7-R 1 Connection (for example, I-60-360-4-055).

TABLE D
SERIES DS-1 DRY-TYPE SPRINKLERS
PART NUMBER SELECTION

1400 Pennbrook Parkway, Lansdale, PA 19446 | Telephone +1-215-362-0700

Johnson Controls

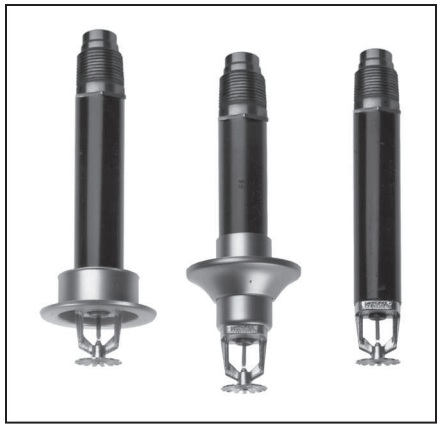
VIKING®

TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION



Viking Quick Response Dry Pendent Sprinklers are thermosensitive spray sprinklers suitable for use in areas subject to freezing. The sprinklers are designed for dry systems and preaction systems where it is necessary to prevent water or condensation from entering the drop nipple before sprinkler operation. They may also be installed in spaces subject to freezing and supplied from a wet system in an adjacent heated area.

Viking Quick Response Dry Pendent Sprinklers are available in various finishes and temperature ratings to meet design requirements. The special Polyester and Electroless Nickel PTFE (ENT) coatings have been investigated for installation in corrosive atmospheres and are listed/approved as corrosion resistant as indicated in the Approval Charts. (Note: FM Global has no approval classification for Polyester coatings as corrosion resistant.)

NOTE: When installed in some corrosive environments, the Polyester finish may change color. This natural discoloration over time is not in itself an indication of corrosion and should not be treated as such. All sprinklers installed in corrosive environments should be replaced or tested as described in NFPA 25 on a more frequent basis.

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Classes 2013 and 2015

NYC Approved: MEA 89-92-E Volume 15

Refer to Approval Chart 1 and Design Criteria on page 105d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 105e for FM Approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Minimum Operating Pressure: 7 psi (0.5 bar)
Maximum Working Pressure: 175 psi (12 bar).
Factory tested pneumatically to 100 psi (6.89 bar)
Thread size: 1” NPT or 25 mm BSP
Nominal K-Factor: 5.6 U.S. (80.6 metric*) for all listed and approved lengths.

* 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.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Covered by the following U.S. Patents: 8,636,075

Material Standards:

Frame Casting: Brass UNS-C84400
Deflector: Brass UNS-C26000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Compression Screw: Brass UNS-C36000
Pip Cap: Brass UNS-C31400 or UNS-C31600
Pip Cap Adapter: Brass UNS-C36000
Orifice: Copper UNS-C22000 or UNS-C11000
Tube: ERW Hydraulic Steel Tube
Support (Internal): Stainless Steel UNS-S30400
Barrel: Steel Pipe UNS-G10260, Electrodeposited Epoxy Base finish
Barrel End and Threads: QM Brass
Sleeve (for Adjustable Standard style only): Brass UNS-C26000 or UNS-C26800

Escutcheon Materials:

Adjustable Standard Dry Escutcheons: Brass UNS-C26000 or UNS-C26800
Recessed Dry Escutcheons: Cold Rolled Steel UNS-G10080

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

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

ENT Coated Adjustable and Recessed Escutcheons: Stainless Steel UNS-S30400

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

Order Quick Response Dry Pendent Sprinklers by first adding the appropriate suffix for the sprinkler finish, the appropriate suffix for the temperature rating, and then the suffix for the length ("A" dimension) to sprinkler base part number. Order in a specific length noted as the "A" dimension. The "A" dimension is the distance from the face of the fitting (tee) to the desired finished surface of the ceiling.

These sprinklers are listed and approved in lengths from 1-1/2" to 45-1/2" (38.1 mm to 1,156 mm) for the adjustable standard style, 3" to 47" (76.2 mm to 1,194 mm) for the plain barrel style, and 3-1/4" to 47-1/2" (82.5 mm to 1,207 mm) for the adjustable recessed style.

Lengths exceeding the standard lengths are available, with no approvals, on a "made-to-order" basis: Recessed Dry Pendent up to 65-1/2" (1,664 mm). Adjustable Standard Dry Pendent up to 63-1/2" (1,613 mm). Plain Barrel Dry Pendent up to 65" (1,651 mm). Contact the manufacturer for more information.

Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, and ENT = JN

Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D, 200 °F (93 °C) = E, 286 °F (141 °C) = G

For example, sprinkler VK176 with a Chrome finish and a 155 °F (68 °C) temperature rating, and "A" length of 10" = Part No. 08383UFB10.

Available Finishes And Temperature Ratings: Refer to Table 1.

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

Sprinkler Wrenches:

A. Standard Wrench: Part No. 07297W/B (available since 1991)

B. Wrench for recessed sprinklers: Part No. 07565W/B** (available since 1991)

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

Sprinkler Guard: Chrome, with no listings or approvals, for installation on dry pendent sprinklers made after May 1994 only (Part No. 08954).

Replacement Escutcheons:

A. Adjustable Standard Dry Escutcheon: Base Part No. 07741

B. Recessed Dry Escutcheon Cup: Base Part No. 05459A

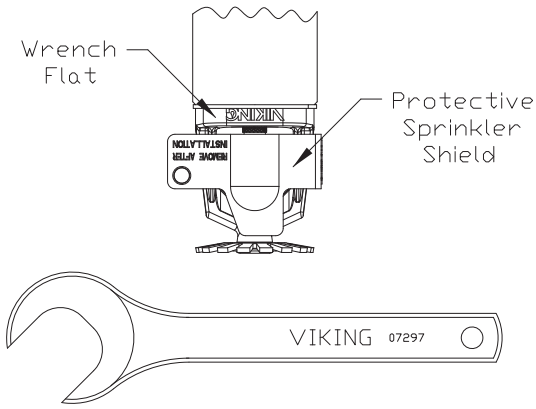


Figure 1: Standard Sprinkler Wrench 07297W/B

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the internal parts to open the waterway. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS & MAINTENANCE

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

7. AVAILABILITY

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

8. GUARANTEE

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

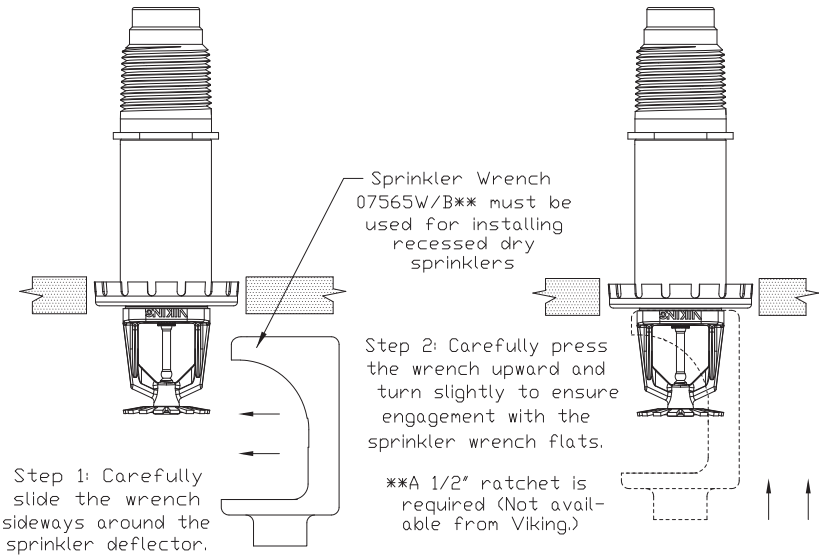


Figure 2: Wrench 07565W/B for Adjustable Recessed Dry Pendent Sprinklers

VIKING®

TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

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

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

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

Sprinkler Finishes: Brass, Chrome, White Polyester, and ENT

Corrosion-Resistant Coating[3,4]: White Polyester and ENT in all temperature ratings

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] The corrosion-resistant Polyester and ENT coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Note: These coatings are NOT corrosion proof. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. Polyester and ENT coatings are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and ENT coatings.

[4] When installed in some corrosive environments, the Polyester finish may change color. This natural discoloration over time is not in itself an indication of corrosion and should not be treated as such. All sprinklers installed in corrosive environments should be replaced or tested as described in NFPA 25 on a more frequent basis.

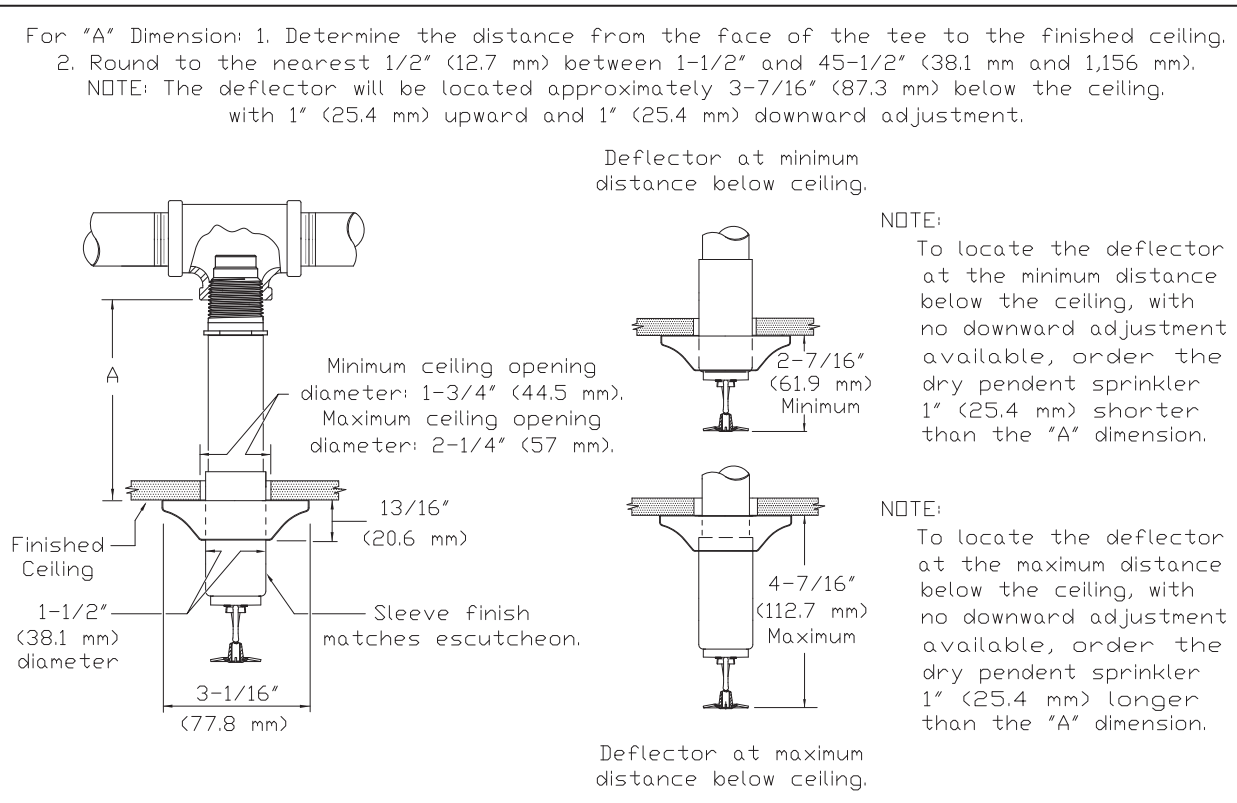


Figure 3: Adjustable Standard Dry Pendent Sprinkler

VIKING®

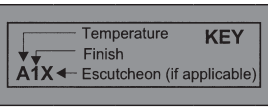
TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

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

Approval Chart 1 (UL)

Quick Response Dry Pendent Sprinklers
Maximum 175 PSI (12 bar) WWP



Sprinkler Base Part No.[1]	SIN	Style	Thread Size		Nominal K-Factor[2]		Order Length Increment		Listings and Approvals[4] (Refer also to Design Criteria below.)					
			NPT	BSP	U.S.	metric[3]	Inches	mm	cULus[5]	NYC[6]	VdS	LPCB	CE	
08383U	VK176	Adjustable Standard	1”	--	5.6	80.6	1/2”	12.7	A1, A5	A1	--	--	--	--
16457U			--	25 mm	--	80.6	1/2”	12.7	A1, A5	--	--	--	--	--
08385U	VK180	Adjustable Recessed	1”	--	5.6	80.6	1/4”	6.35	B2, B6	B2	--	--	--	--
16453U			--	25 mm	--	80.6	1/4”	6.35	B2, B6	--	--	--	--	--
08387U	VK172	Plain Barrel	1”	--	5.6	80.6	1/2”	12.7	A3	A4	--	--	--	--
16455U			--	25 mm	--	80.6	1/2”	12.7	A3	--	--	--	--	--

Approved Temperature Ratings

A - 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), and 200 °F (93 °C)

Approved Finishes and “A” Dimensions

1 - Chrome or White Polyester[7] sprinkler with a Chrome or White Polyester Sleeve and Escutcheon with “A” dimensions 1-1/2” to 45-1/2” (38.1 mm to 1,156 mm)
2 - Chrome or White Polyester[7] with “A” dimensions 3-1/4” to 47-1/2” (82.5 mm to 1,207 mm)
3 - Chrome, Brass, White Polyester[7], or ENT[7] with “A” dimensions 3” to 47” (76.2 mm to 1,194 mm)
4 - Chrome or Brass with “A” dimensions 3” to 47” (76.2 mm to 1,194 mm)
5 - ENT[7] sprinkler with an ENT[7] Sleeve and Escutcheon with “A” dimensions 1-1/2” to 45-1/2” (38.1 mm to 1,156 mm)
6 - ENT[7] with “A” dimensions 3-1/4” to 47-1/2” (82.5 mm to 1,207 mm)

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.

[2] K-Factor applies for standard lengths (“A” Dimensions indicated above).

[3] 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.

[4] 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.

[5] Listed by Underwriter’s Laboratories for use in the U.S. and Canada.

[6] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 15.

[7] cULus Listed as corrosion resistant.

DESIGN CRITERIA - UL

(Also refer to Approval Chart 1 above.)

NOTE: When using CPVC fittings with Viking dry sprinklers, use only new Nibco Model 5012-S-BI tees. When selecting other CPVC fittings, contact Viking Technical Services.

cULus Listing Requirements:

Standard Dry Pendent Sprinklers are cULus Listed as indicated in Approval Chart 1 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 and obstruction rules contained in NFPA 13 for standard spray pendent sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page DRY1-3 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.

VIKING®

TECHNICAL DATA

QUICK RESPONSE DRY PENDENT SPRINKLERS

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

Approval Chart 2 (FM)

Quick Response Dry Pendent Sprinklers
Maximum 175 PSI (12 bar) WWP

KEY: Temperature, Finish, A1X Escutcheon (if applicable)

Sprinkler Base Part No.[1]	SIN	Style	Thread Size		Nominal K-Factor[2]		Order Length Increment		FM Approvals[4] (Refer also to Design Criteria below.)
			NPT	BSP	U.S.	metric[3]	Inches	mm	
08383U	VK176	Adjustable Standard	1"	--	5.6	80.6	1/2"	12.7	A1
16457U			--	25 mm	--	80.6	1/2"	12.7	A1
08385U	VK180	Adjustable Recessed	1"	--	5.6	80.6	1/4"	6.35	B2
16453U			--	25 mm	--	80.6	1/4"	6.35	B2
08387U	VK172	Plain Barrel	1"	--	5.6	80.6	1/2"	12.7	A3
16455U			--	25 mm	--	80.6	1/2"	12.7	A3

Approved Temperature Ratings

A - 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), and 200 °F (93 °C)

Approved Finishes and "A" Dimensions

1 - Brass, Chrome, White Polyester, or ENT[5] sprinkler with a Brass, Chrome, White Polyester, or ENT[5] Sleeve and Escutcheon with "A" dimensions 1-1/2" to 45-1/2" (38.1 mm to 1,156 mm)
2 - Brass, Chrome, White Polyester, or ENT[5] with "A" dimensions 3-1/4" to 47-1/2" (82.5 mm to 1,207 mm)
3 - Brass, Chrome, White Polyester, or ENT[5] with "A" dimensions 3" to 47" (76.2 mm to 1,194 mm)

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
[2] K-Factor applies for standard lengths ("A" Dimensions indicated above).
[3] 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.
[4] This chart shows the FM Approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.
[5] FM approved as corrosion resistant.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

NOTE: When using CPVC fittings with Viking dry sprinklers, use only new Nibco Model 5012-S-Bl tees. When selecting other CPVC fittings, contact Viking Technical Services.

FM Approval Requirements:

The Dry Pendent Sprinklers in the Approval Chart above are FM Approved as quick response **Non-storage** standard spray sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including 2-0) and Technical Advisory Bulletins. FM Global Loss Prevention Data Sheets and Technical Advisory Bulletins 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 page DRY1-3 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.

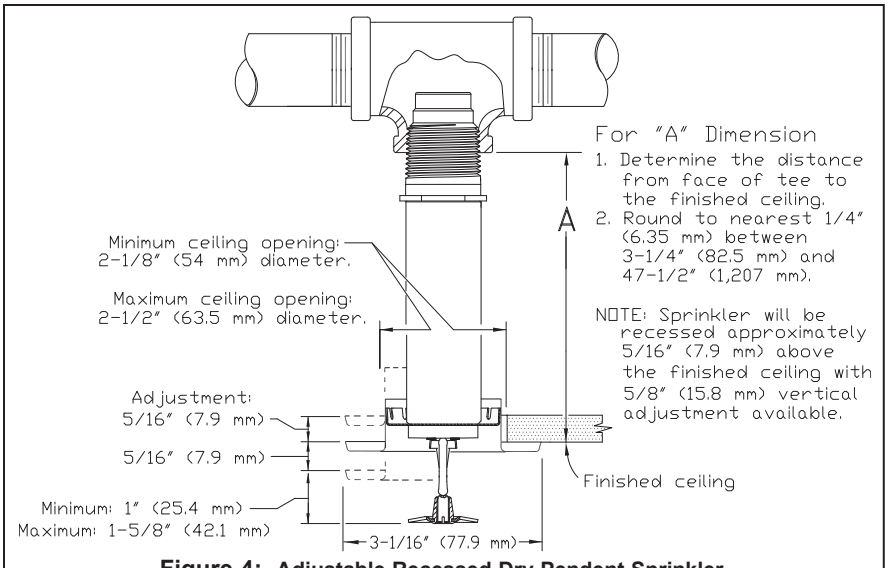


Figure 4: Adjustable Recessed Dry Pendent Sprinkler

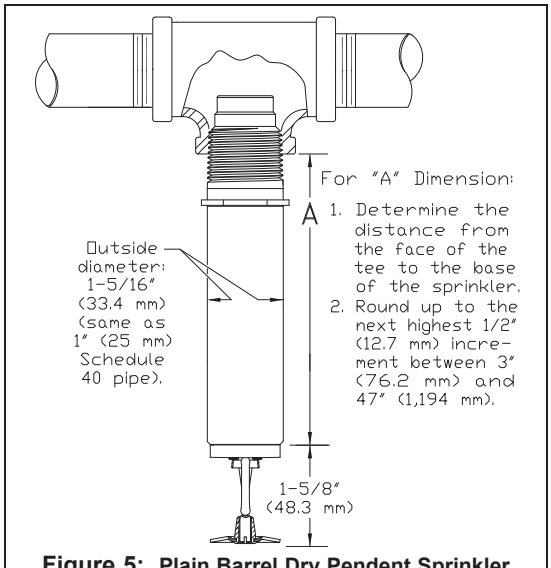
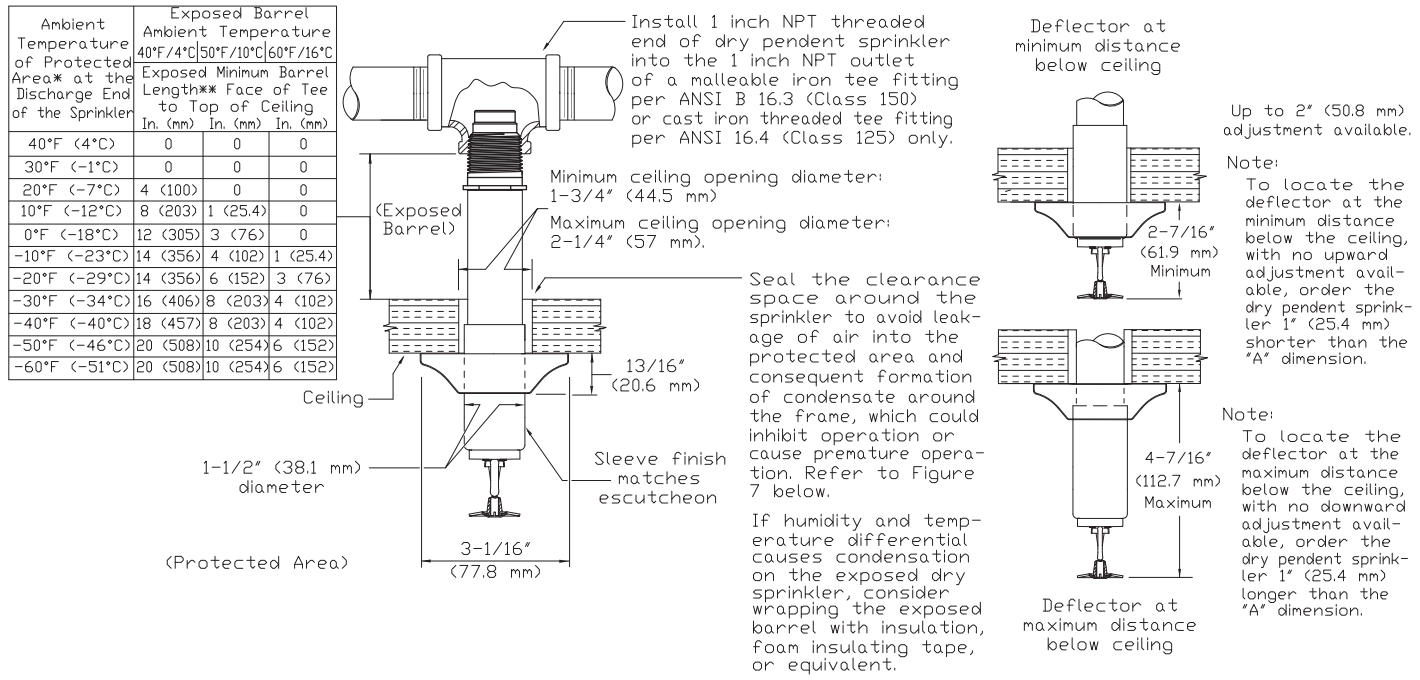


Figure 5: Plain Barrel Dry Pendent Sprinkler

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

Ambient Temperature of Protected Area* at the Discharge End of the Sprinkler	Exposed Barrel Ambient Temperature 40°F/4°C	50°F/10°C	60°F/16°C
	Exposed Minimum Barrel Length** Face of Tee to Top of Ceiling In. (mm)	In. (mm)	In. (mm)
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (203)	1 (25.4)	0
0°F (-18°C)	12 (305)	3 (76)	0
-10°F (-23°C)	14 (356)	4 (102)	1 (25.4)
-20°F (-29°C)	14 (356)	6 (152)	3 (76)
-30°F (-34°C)	16 (406)	8 (203)	4 (102)
-40°F (-40°C)	18 (457)	8 (203)	4 (102)
-50°F (-46°C)	20 (508)	10 (254)	6 (152)
-60°F (-51°C)	20 (508)	10 (254)	6 (152)



*The protected area refers to the area below the ceiling.
The ambient temperature is the temperature at the discharge end of the sprinkler.
For protected area temperatures that occur between the values listed, use the next cooler temperature.

**The minimum required barrel length is not the same as the "A" dimension. Refer to Figures 3-5 for the "A" dimension.
NOTE: Exposed minimum barrel lengths are inclusive up to 30 mph wind velocities.

Figure 6: **Dry Pendent Sprinkler Required Minimum Barrel Length Based on Ambient Temperature in the Protected Area (Adjustable Standard Dry Pendent Sprinkler is Shown)**

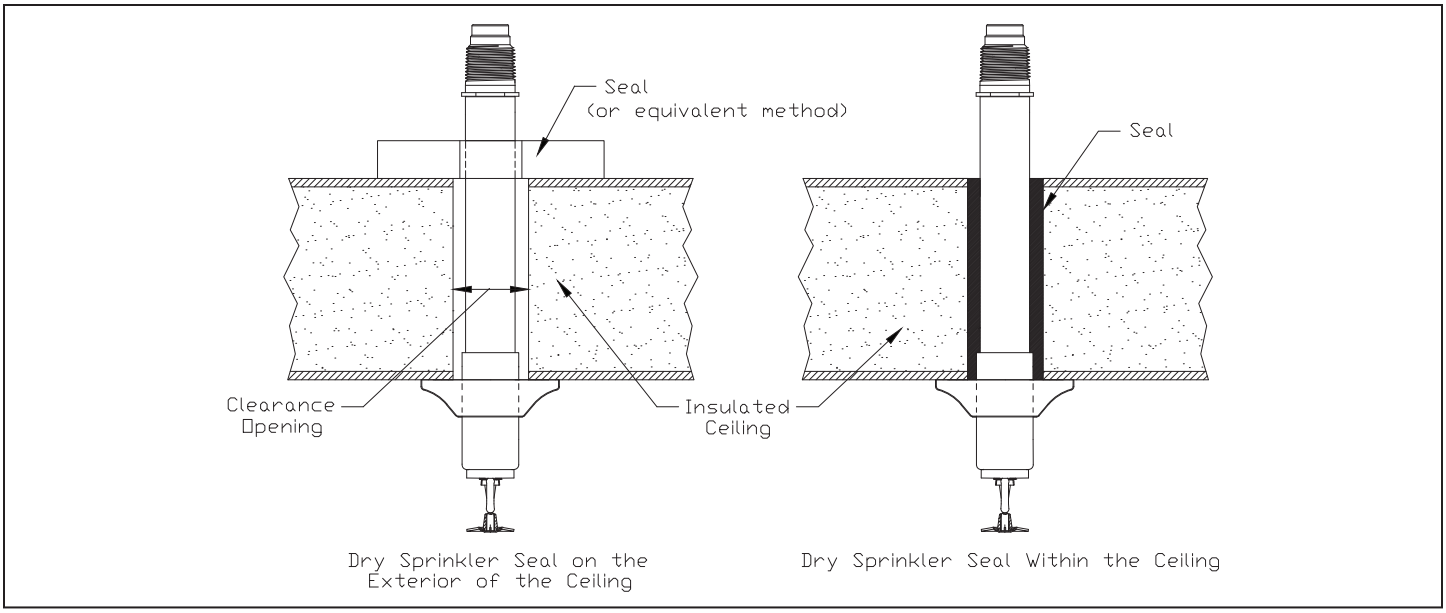


Figure 7: **Dry Sprinkler Seal (Adjustable Standard Dry Pendent Sprinkler is Shown)**

VicFlex™ Style VS1 Dry Sprinkler
Models V3505, V3506, V3509, V3510, V3517, V3518

10.91

1.0 PRODUCT DESCRIPTION

Style

- Pendent, Concealed Pendent, Horizontal Sidewall

K Factor

- 5.6/8.1 S.I.
  For system design purposes, no equivalent length calculations are required.

Sprinkler Length

- 38"/965 mm, 50"/1270 mm, 58"/1475 mm

Nominal Orifice Size

- ½"/13 mm

Maximum Working Pressure

- 175 psi/1200 kPa

Factory Hydrostatic Test

- 100% @ 500 psi/3450 kPa

Minimum Operating Pressure

- 7 psi/48 kPa

Connections

- To branch line (inlet) via 1"/25 mm NPT or 1" BSPT

Minimum Bend Radius:

- **UL:** 2"/51 mm
- **FM**: 7"/178 mm

Maximum Number of 90° Bends:

- **UL:** 4
- **FM**: 2 bends for 38", 3 bends for 50", 4 bends for 58"

Hazard Classifications

- Light and Ordinary Hazard

NOTE

- The VS1 is classified as a dry sprinkler and has no equivalent length.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

2.0 CERTIFICATION/LISTINGS

Approvals/Listings	Model								
	V3505	V3505	V3506	V3506	V3509	V3509	V3510	V3517	V3518
Orifice Size (inches)	½"	½"	½"	½"	½"	½"	½"	½"	½"
Orifice Size (mm)	13	13	13	13	13	13	13	13	13
Nominal K Factor Imperial	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Nominal K Factor S.I.	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Response	Standard	Standard	Quick	Quick	Standard	Standard	Quick	Standard	Quick[1]
Deflector Type	Pendent	Recessed	Pendent	Recessed	Hor. SW	Rec. Hor. SW	Hor. SW, Recessed Hor. Sidewall	Conc. Pend.	Conc. Pend. w/Clean room gasket
Approved Temperature Ratings	**F°/C°**								
FM	135/57	135/57	135/57	135/57	135/57	135/57	135/57	–	135/57
	155/68	155/68	155/68	155/68	155/68	155/68	155/68	–	155/68
	175/79	175/79	175/79	175/79	175/79	175/79	175/79	–	175/79
	200/93	200/93	200/93	200/93	200/93	200/93	200/93	–	200/93
	286/141	–	–	–	286/141	–	–	–	–
UL	135/57	135/57	135/57	135/57	135/57	135/57	135/57	135/57	135/57
	155/68	155/68	155/68	155/68	155/68	155/68	155/68	155/68	155/68
	175/79	175/79	175/79	175/79	175/79	175/79	175/79	175/79	175/79
	200/93	200/93	200/93	200/93	200/93	200/93	200/93	200/93	200/93
	286/141	286/141	286/141	286/141	286/141	–	286/141	–	–

[1] Model V3518 is a Standard Response FM sprinkler.

3.0 MATERIAL SPECIFICATIONS

Deflector: Brass

Bulb: Glass with glycerin solution

Bulb Nominal Diameter:

☐ **Quick Response:** 3.0 mm

☐ **Standard Response:** 5.0 mm

Split Spacers: Stainless steel

Load Screw: Brass

Pip Cap: Stainless steel

Spring Seal Assembly: PTFE tape coated beryllium nickel and stainless steel

Frame: Brass

Flexible Hose: Stainless steel

Collar/Weld Fitting: Stainless steel

Gasket Seal: Victaulic EPDM

Isolation Ring: Nylon

Hose Fittings: Carbon steel, zinc-plated

Inlet Fitting: Brass

Outer Tube: Stainless steel

Concealed Cup: Carbon steel, zinc-plated

Brackets: Carbon steel, zinc-plated

3.1 ACCESSORIES SPECIFICATIONS

Sprinkler Finishes:

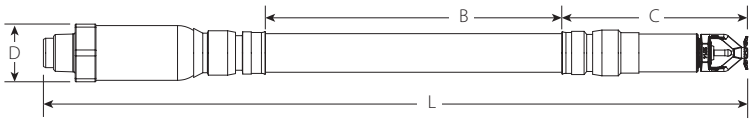
☐ **Standard:** VC-250

☐ White painted RAL 9010

4.0 DIMENSIONS

Product Details and Optional Components

Style VS1 Dry Sprinkler

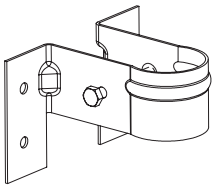


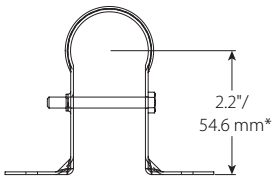
Sprinkler Length inches mm	Overall Length (pendent) L inches mm	Live Length B inches mm	Outlet End Length C inches mm	Maximum OD D inches mm
38 965	39.2 995	25.1 638	6.5 165	2.2 56
50 1270	51.2 1300	37.1 943	6.5 165	2.2 56
58 1475	59.2 1505	45.1 1145	6.5 165	2.2 56

NOTE

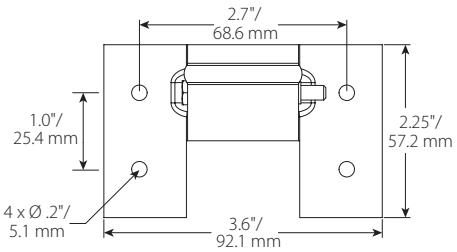
- Add ½" to Overall Length and Outlet End Length for increased length of sidewall deflector

Style VB1 Bracket





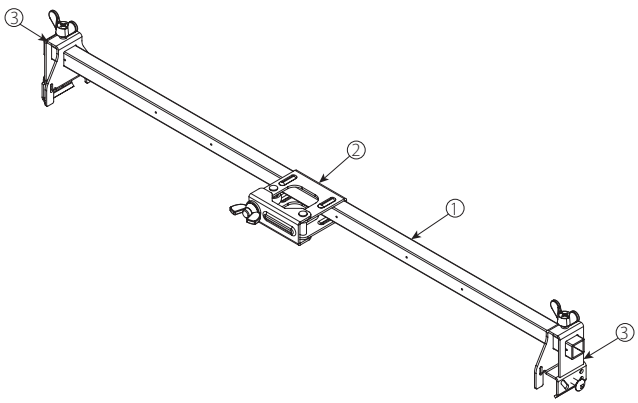
*Note: Theoretical center point of sprinkler in bracket.



4.0 DIMENSIONS (CONTINUED)

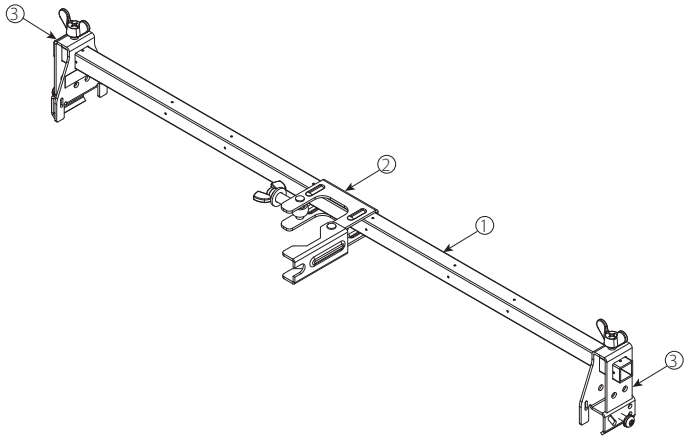
Style VB2 Bracket
Recessed Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee Center Bracket
3	End Bracket



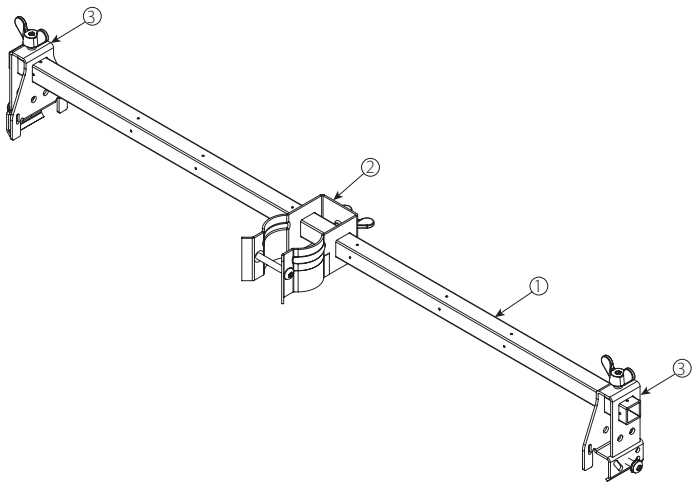
Style VB3 Bracket
Concealed Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee Center Bracket
3	End Bracket



Style VB4 Bracket
Sleeve and Skirt Pendent, Suspended Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Center Bracket
3	End Bracket



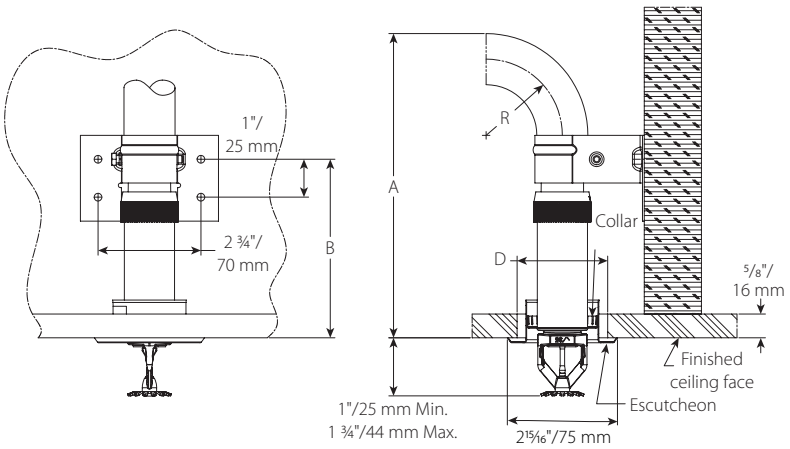
4.1 DIMENSIONS

Sprinkler Finishes: Dimensions and Mounting Conditions

NOTE

- Drawings are shown with ⅝" finished ceiling thickness. Adjustments to "B" and "C" dimensions will be required if finished ceiling thickness deviate from drawing.

Recessed Pendent:



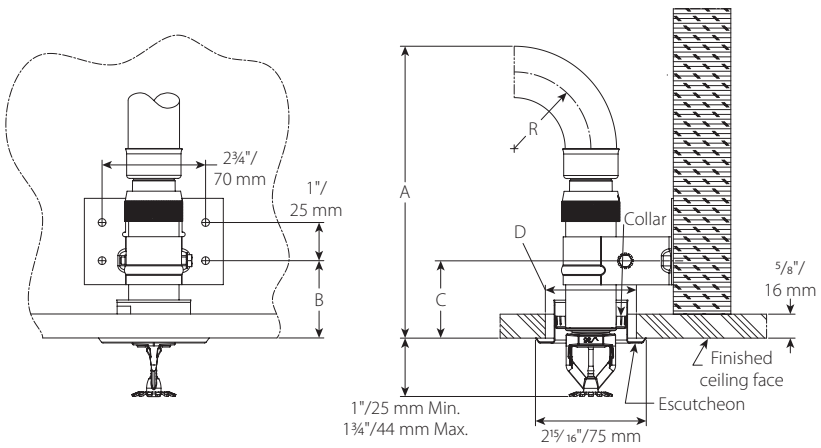
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7 ⅝ 193	12 ⅝ 320
"B" Mounting Screw Hole Location	4 ¾ 119	
Ceiling Hole Diameter "D"	2 – 2 ⅜ 50 – 60	

NOTE

- Dimensions are shown with ¾" escutcheon at middle of height adjustment range.

4.2 DIMENSIONS

Recessed Pendent Alternative Bracket Location



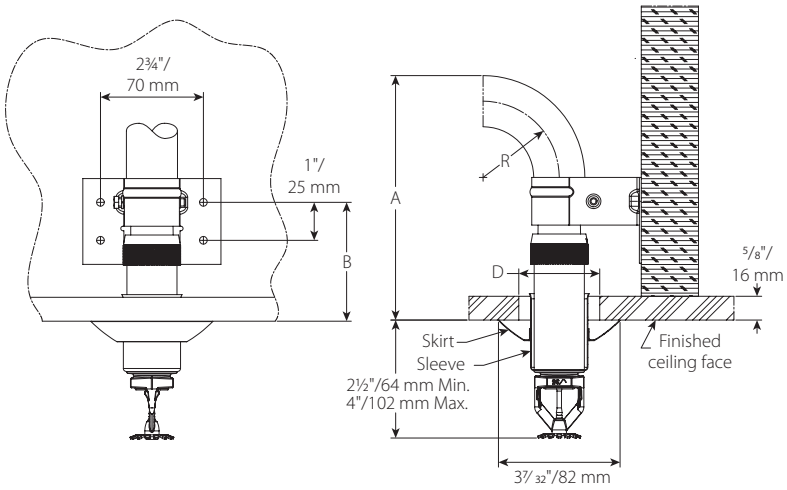
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7⅝ 193	12⅝ 320
"B" Mounting Screw Hole Location	2 50	
Ceiling Hole Diameter "D"	2 – 2⅜ 50 – 60	

NOTE

- Dimensions are shown with ¾" escutcheon at middle of height adjustment range.

4.3 DIMENSIONS

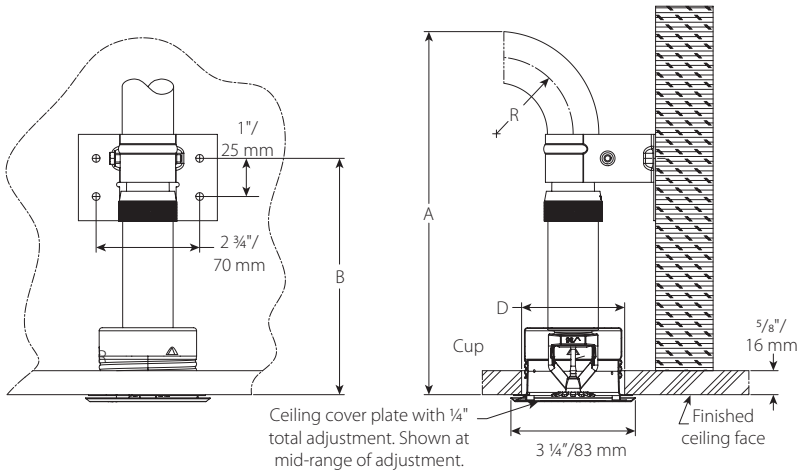
Sleeve and Skirt Pendent



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6½ 163	11½ 290
"B" Mounting Screw Hole Location	3⅛ 79	
Ceiling Hole Diameter "D"	1¾ – 2⅛ 44 – 54	

4.4 DIMENSIONS

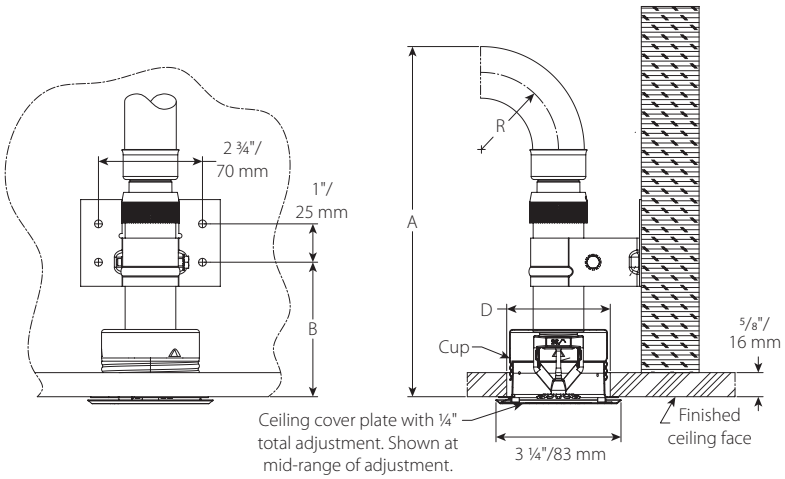
Concealed Pendent



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	9½ 241	14½ 369
"B" Mounting Screw Hole Location	6¼ 157	
Ceiling Hole Diameter "D"	2⅝ – 2¾ 67 – 70	

4.5 DIMENSIONS

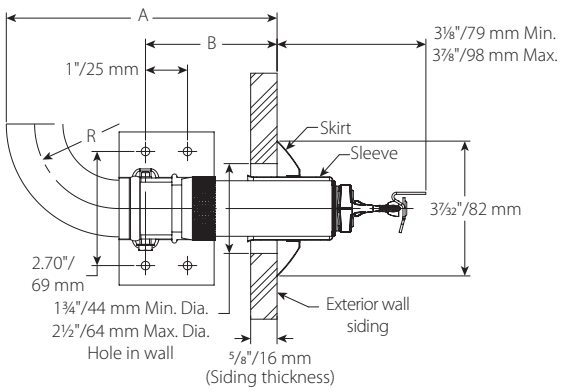
Concealed Pendent Alternative Bracket Location



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	9 ⅛ 231	14 ⅛ 358
"B" Mounting Screw Hole Location	3 ½ 89	
Ceiling Hole Diameter "D"	2 ⅝ – 2 ¾ 67 – 70	

4.6 DIMENSIONS

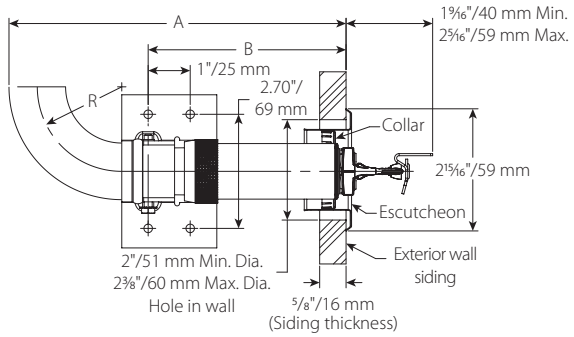
Sleeve and Skirt Sidewall



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6 ½ 163	11 ½ 290
"B" Mounting Screw Hole Location	3 ⅛ 79	
Ceiling Hole Diameter "D"	1 ¾ – 2 ⅛ 44 – 54	

4.7 DIMENSIONS

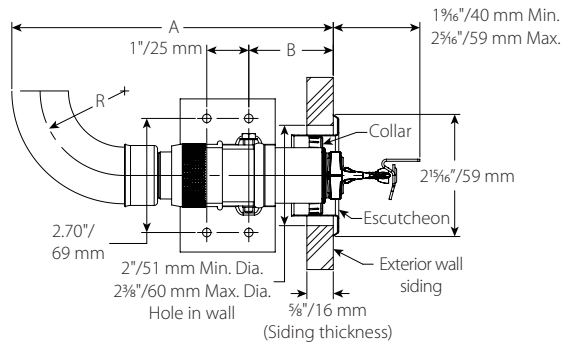
Recessed Sidewall



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	8 203	13 330
"B" Mounting Screw Hole Location	4 ¾ 119	
Ceiling Hole Diameter "D"	2 – 2 ⅜ 51 – 60	

4.8 DIMENSIONS

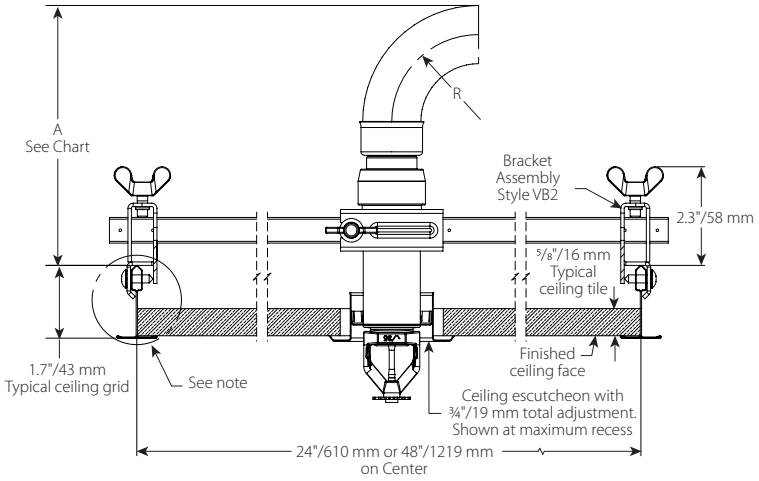
Recessed Sidewall Alternative Bracket Location



Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	8 203	13 330
"B" Mounting Screw Hole Location	2 51	
Ceiling Hole Diameter "D"	2 – 2 ⅜ 51 – 60	

4.9 DIMENSIONS

VB2 Recessed Pendent



Recessed Pendent

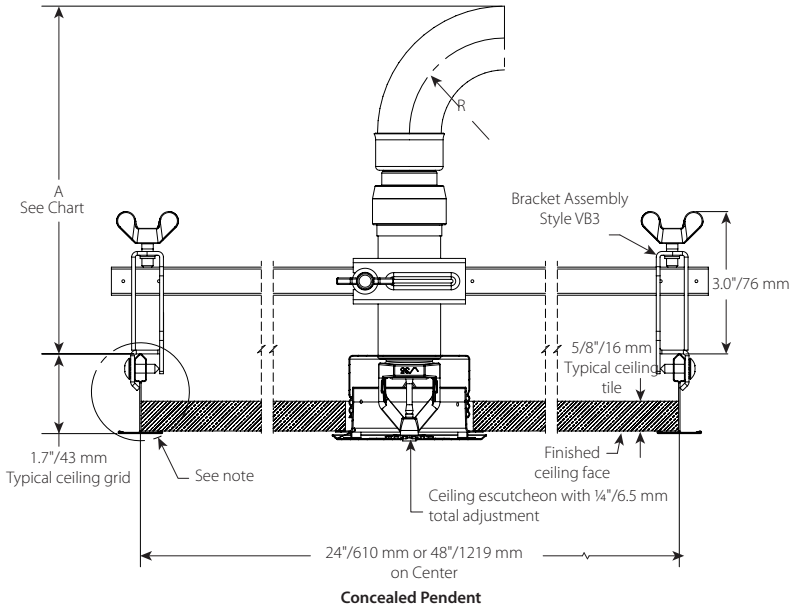
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6½ 163	11½ 290

NOTE

- Victaulic *VicFlex* Style VB2 Bracket assemblies shall be used only with Style VS1 recessed pendent sprinklers.

4.10 DIMENSIONS

VB3 Concealed Pendent



Concealed Pendent

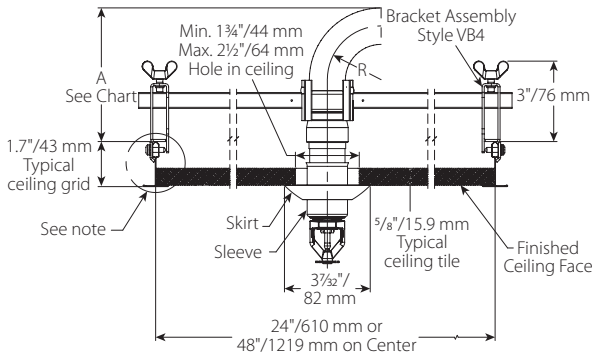
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7⅝ 193	12⅝ 320

NOTE

- Victaulic *VicFlex* Style VB3 Bracket assemblies shall be used only with Style VS1 concealed pendent sprinklers.

4.11 DIMENSIONS

VB4 Sleeve and Skirt Pendent



Sleeve and Skirt Pendent

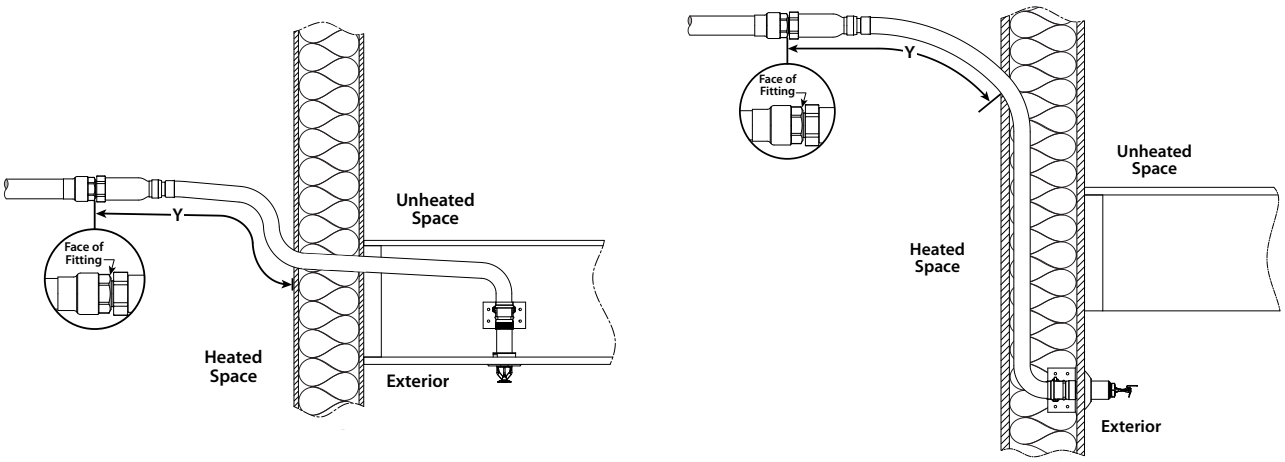
Clearance Chart		
Bend Radius		
	inches mm	inches mm
"R" Minimum Bend Radius	2 51	7 178
"A" Minimum Required Installation Space	5 127	10 254

NOTE

- Victaulic *VicFlex* Style VB2 Bracket assemblies shall be used only with Style VS1 recessed pendent sprinklers.

5.0 PERFORMANCE

Freeze Protection



Ambient Temperature Exposed to Discharge End of Sprinkler °F °C	Exposed Minimum Barrel Length "Y" inches mm		
	40°F/4°C	50°F/10°C	60°F/16°C
40 4	0 0	0 0	0 0
30 -1	0 0	0 0	0 0
20 -7	4 100	0 0	0 0
10 -12	8 200	1 25	0 0
0 -18	12 300	3 75	0 0
-10 -23	14 350	4 100	1 25
-20 -29	14 350	6 150	3 75
-30 -34	16 400	8 200	4 100
-40 -40	18 450	8 200	4 100
-50 -46	20 500	10 250	6 150
-60 -51	20 500	10 250	6 150

NOTE

- Exposed minimum barrel lengths are inclusive up to 30-mph/48-kph wind velocities.

Maximum Allowable Number of Bends

Sprinkler Length inches mm	Maximum Allowable Number of 90° Bends at 2"/51mm Bend Radius for UL Listing	Maximum Allowable Number of 90° Bends at 7"/178mm Bend Radius for FM Approval
38 965	4	2
50 1270	4	3
58 1475	4	4

6.0 NOTIFICATIONS

WARNING

- **Read and understand all instructions before attempting to install any Victaulic products.**
- **Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.**
- **Wear safety glasses, hardhat, and foot protection.**

- **These products shall be used only in fire protection systems that are designed and installed in accordance with current, applicable National Fire Protection Association (NFPA 13, 13D, 13R, etc.) standards, or equivalent standards, and in accordance with applicable building and fire codes. These standards and codes contain important information regarding protection of systems from freezing temperatures, corrosion, mechanical damage, etc.**
- **The installer shall understand the use of this product and why it was specified for the particular application.**
- **The installer shall understand common industry safety standards and potential consequences of improper product installation.**

WARNING

- **It is the responsibility of the system designer to verify suitability of 300-series stainless steel flexible hose for use with the intended fluid media within the piping system and external environments.**
- **The effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on 300-series stainless steel flexible hose must be evaluated by the material specifier to confirm system life will be acceptable for the intended service.**
- **It is the responsibility of the owner of a building or their authorized agent to provide the sprinkler system installer with any knowledge that the water supply might be contaminated with or conducive to the development of microbiologically influenced corrosion (MIC), including as required by NFPA 13. Failure to identify adverse water quality issues may affect the VicFlex product and void the manufacturer's warranty.**

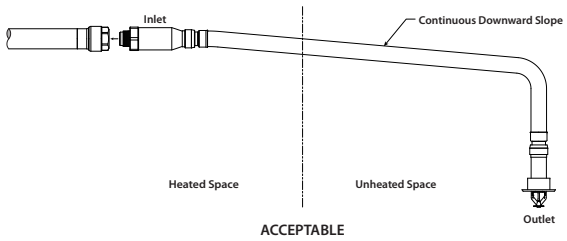
Failure to follow these instructions could cause product failure, resulting in serious personal injury and/or property damage.

DO NOT paint, coat, or firestop the outlet/inlet portion of the Style VS1 Dry Sprinkler. Braided hose and fitting portions of the Style VS1 Dry Sprinkler may be painted or coated, provided that the paint or coating is compatible with stainless steel material. This includes penetration through firestop-filled annular space of a firewall. The firestop material in direct contact with the flexible braided hose will not impede functionality of the Style VS1 Dry Sprinkler, provided that the components are installed in accordance with Victaulic's installation instructions.

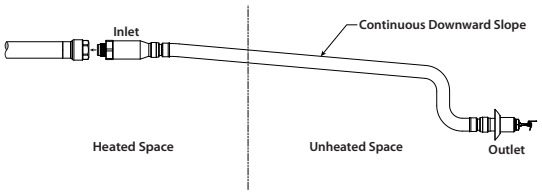
6.0 NOTIFICATIONS (CONTINUED)

Important Installation Notes:

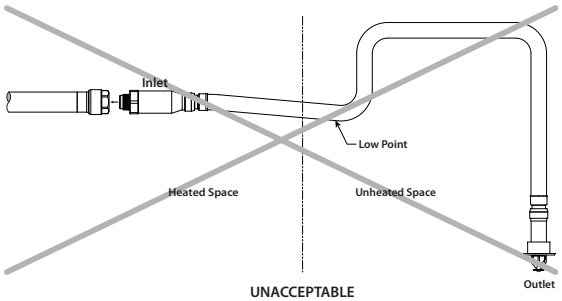
1. Shall be installed only in accordance with NFPA 13 Standard for the the Installation of Sprinkler Systems and applicable FM Data Sheets.
2. Install and tighten swivel hex nut at inlet of sprinkler fitting only.
3. Do not remove deflector or inlet end of sprinkler.



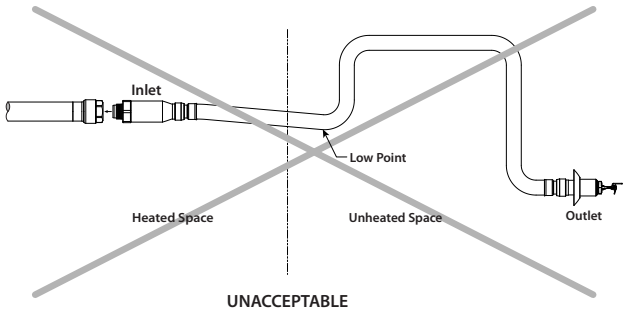
ACCEPTABLE



ACCEPTABLE



UNACCEPTABLE



UNACCEPTABLE

6.0 NOTIFICATIONS (CONTINUED)

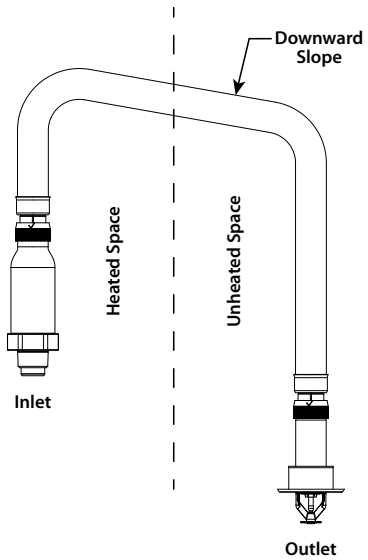
FOR DRY SYSTEMS ONLY:

- The Style VS1 Dry Sprinkler's inlet shall be installed only into the outlet of a fitting (excluding elbows) or welded outlet that meets the dimensional requirements of ANSI B16.3 and ANSI B16.4, Class 125 and Class 150. Use a sample fitting to confirm proper engagement and to verify that there is no interference between the sprinkler and the fitting.

Style VS1 Dry Sprinklers in an unheated space shall be installed with a continuous downward slope along its entire length from the branch line fitting to the sprinkler. No localized low points shall be present along the length of the Style VS1 Dry Sprinkler.

Style VS1 Dry Sprinklers in an unheated space are not permitted to be installed into the top of the branch line piping. Style VS1 Dry Sprinklers shall be installed into the side or from the bottom of the branch line piping.

In a heated space, if a portion of the Style VS1 Dry Sprinkler is installed from the top of a branch line and then extends into an unheated space, it shall be installed with a continuous downward slope along the entire length from the inside wall to the outlet of the sprinkler. No localized low points shall be present along the length of the sprinkler in the unheated space. Refer to the drawing below.



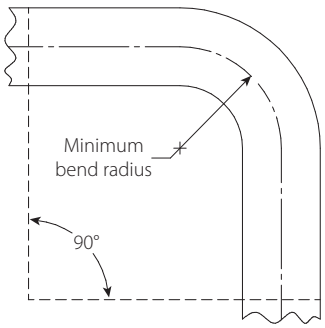
FOR WET SYSTEMS ONLY:

- **DO NOT** install Victaulic® VicFlex™ Style VS1 Dry Sprinklers into any threaded elbow, threaded-by-thread coupling, or fitting that interferes with thread penetration. The inlet of the Victaulic® VicFlex™ Style VS1 Dry Sprinkler **SHALL NOT** bottom out in the fitting. Use a sample fitting to confirm proper engagement.
- To ensure unobstructed flow during operation, the Victaulic® VicFlex™ Style VS1 Dry Sprinkler shall be installed into a fitting that will prevent water and debris from accumulating at the dry sprinkler's inlet.
- Verify that the exposed minimum barrel length in the heated space is measured and maintained in accordance with the table on page 1.

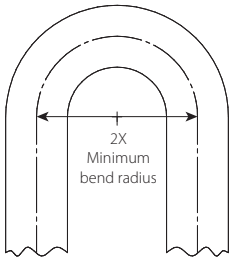
In a heated space, if a portion of the Style VS1 Dry Sprinkler extends into an unheated space, it shall be installed with a continuous downward slope along the entire length from the inside wall to the outlet end of the dry sprinkler. No localized low points shall be present along the length of the sprinkler in the unheated space. Refer to the drawing above.

7.0 REFERENCE MATERIALS

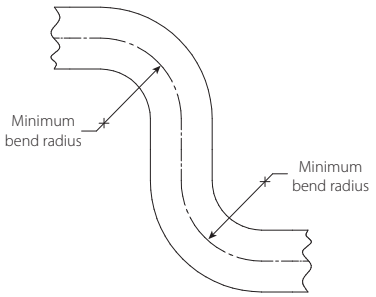
ONE BEND

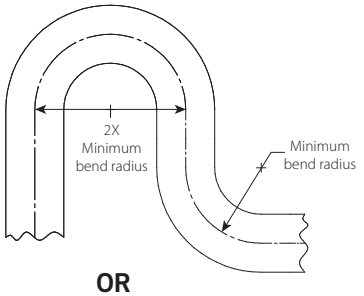


TWO BENDS

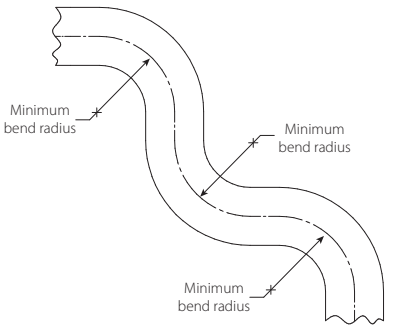


OR





OR



NOTE

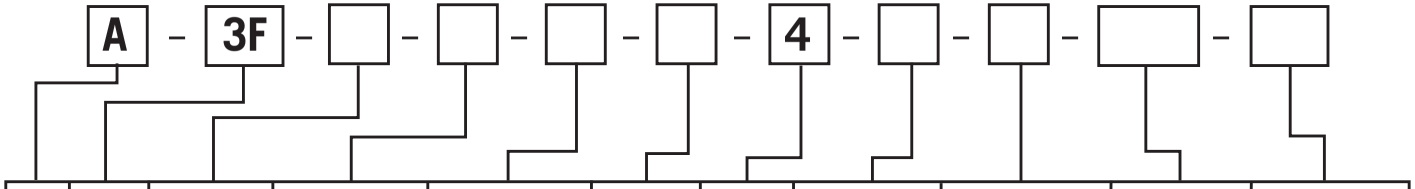
For out-of-plane (three-dimensional) bends, care must be taken to avoid imparting torsional stress on the sprinkler.

Bill To:	
Company Name	
Address	
State/Province	Zip Code/Postal Code
Phone No.	Email
Fax No.	

Ship To:	
Order No.	Date
Company Name	
Address	
State/Province	Zip Code/Postal Code
Tag	

Quantity (as specified below): ☐ If units of different size, type or other option are required, please attach additional form(s) with their specification(s) separately.

VicFlex™ Dry Sprinkler Model VS1



Class	Style	Thread	Deflector Style	Temperature	Response	K Factor	Finish	Recessed Escutcheon Material	Size		Escutcheon Style †
									Code	Inches	
A	3F = V35	3 = 1" NPT 8 = 25 mm BSP	B = Pendent C = Horizontal Sidewall P - Concealed	A = 135°F/57°C C = 155°F/68°C E = 175°F/79°C F = 200°F/93°C J = 286°F/141°C	Q = Quick S = Std.	4 = K5.6	4 = White N = VC-250 ‡	W = White Stainless Steel X = Stainless Steel 0 = Concealed	380 = 38" 500 = 50" 580 = 58"		12 = Recessed 13 = Sleeve and Skirt 15 = Concealed

‡ VC-250 sprinkler finish sold standard on the VicFlex Dry Sprinkler Model VS1.

7.0 REFERENCE MATERIALS (CONTINUED)

29.01: Victaulic Terms and Conditions of Sale

I-VICFLEX.VS1: Victaulic® VicFlex™ Style VS1 Dry Sprinkler Installation Instructions

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.

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

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.

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

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

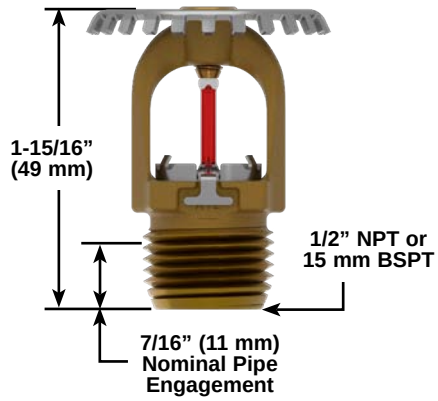


Figure 2: Sprinkler Dimensions

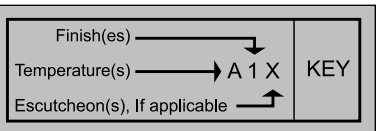
TECHNICAL DATA

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

APPROVAL CHART

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



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.

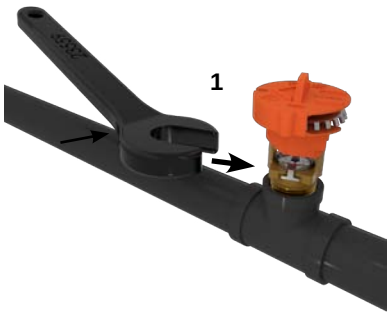
NOTE: The FM Installation guidelines may differ from UL and/or NFPA criteria.

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.

VIKING®	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. 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.

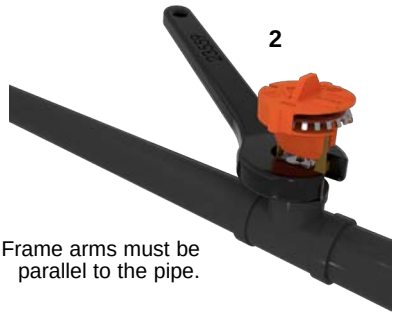


Figure 3: Installation

MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

TECHNICAL DATA

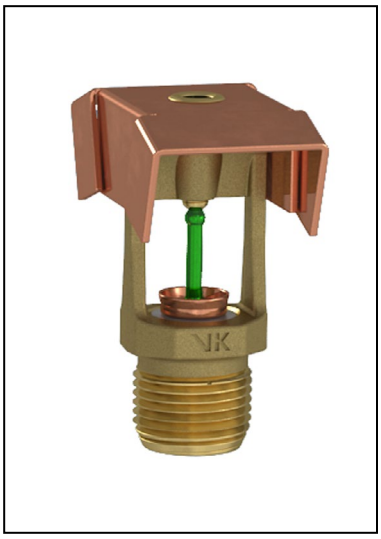
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com.

1. DESCRIPTION

The Model V-BB (Back to Back) is a Specific Application Attic Sprinkler designed to provide superior fire protection in combustible and non-combustible sloped attic spaces when compared to standard spray attic protection. With specific application criteria for use with Model V-SD (Single Directional) and VK696 Attic Upright Specific Application Sprinklers, Viking attic sprinklers provide an extended coverage spacing alternative to standard spray sprinklers. They make it possible to use a single line of piping at the attic peak, eliminating the need for branch lines and greatly reducing the number of required sprinklers and associated material and installation costs. Model V-BB sprinklers also have lower minimum flow and pressure requirements than competitive products.

Viking Attic Sprinklers can be installed with either steel or CPVC piping (CPVC allowed on wet pipe systems only), and are available in brass or with corrosion-resistant Electroless Nickel PTFE (ENT) coatings where salt water and other corrosive elements are a consideration. They are cULus Listed with specific application guidelines for use as special sprinklers as defined by the National Fire Protection Association (NFPA), and are cULus Listed for extended coverage in combustible and non-combustible construction. The cULus Listing was achieved using full-scale fire tests within wood truss construction.

The Model V-BB Attic Sprinkler provides a reduced response time due to its narrow ridge spacing of 6 ft. (1,8 m) and long throw pattern (up to 30 ft. in each direction measured horizontally), and is offered in three different slope ranges and two different orifice sizes (K=5.6 or 8.0). Listed for specific pitches 4:12<7:12, 7:12<10:12, and 10:12≤12:12; and spans of 60 ft. and 40 ft. The 8.0K can protect up to 80 ft. span when used along with the Model Attic Upright VK696.



V-BB Sprinkler		
8.0K	**5.6K**	**Pitch**
VK681	VK684	4:12 < 7:12
VK682	VK685	7:12 < 10:12
VK683	VK686	10:12 ≤ 12:12

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

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

Refer to the Approval Chart on page 4.

3. TECHNICAL DATA

Specifications:

Minimum Operating Pressure: See Design Criteria - UL
Rated to 175 psi (12 bar) water working pressure
Factory tested hydrostatically to 500 psi (34.5 bar)
Thread size: 1/2” (15 mm) or 3/4” (19 mm) NPT
Nominal K-Factor: 5.6 U.S. (80.6 metric*) or 8.0 (115.2 metric*)

* 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.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-5/8” (67,6 mm)
Covered by the following US Patent No.: 9,149,818

Material Standards:

Frame Casting: Brass UNS-C84400 or QM Brass
Deflector: Brass UNS-C23000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape
Screw: Brass UNS-C36000
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

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

To order the Attic Sprinkler, add the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, ENT = JN
Temperature Suffix: E = 200 °F (93.3 °C)

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.

Available Finishes And Temperature Ratings:
Refer to the approval chart on page 4.

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking website under Technical Data)

Sprinkler Wrench:
Standard Wrench: Part No. 10896W/B

Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A
B. Twelve-head capacity: Part No. 01725A

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During a fire condition, the heat sensitive liquid in the glass bulb expands, 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 to extinguish or control the fire, and protect the piping in the interstitial space.

6. INSPECTIONS, TESTS AND MAINTENANCE

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

7. AVAILABILITY

The Model V-BB Specific Application Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

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

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Intermediate	200 °F (93.3 °C)	150 °F (65°C)	Green
Sprinkler Finishes: Brass, ENT[3]			

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] cULus Listed as corrosion resistant.

TECHNICAL DATA

MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

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.

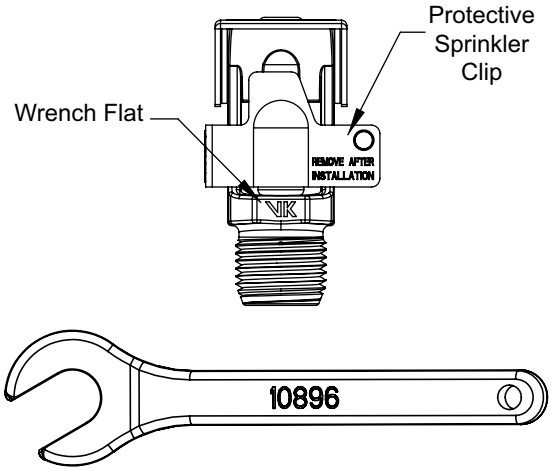


Figure 1:
Standard Sprinkler Wrench 10896W/B

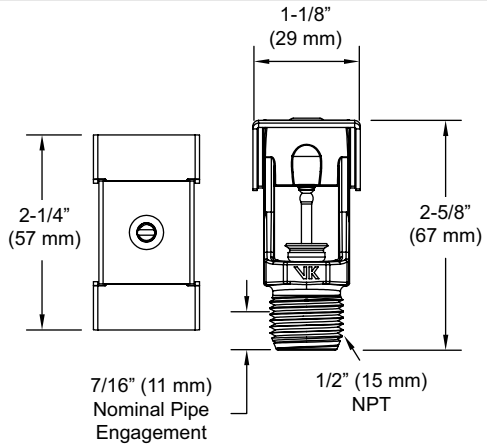


Figure 2a:
Sprinkler Dimensions - 5.6K

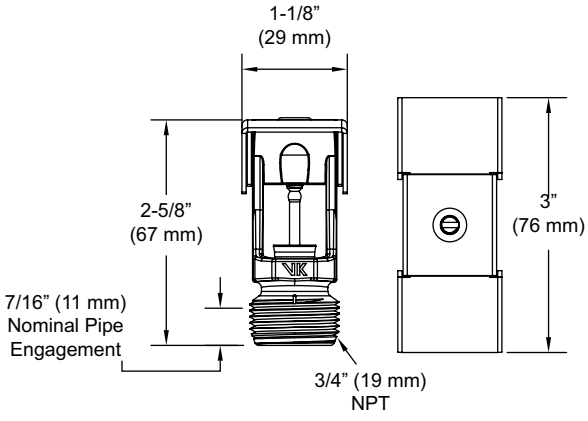


Figure 2b:
Sprinkler Dimensions - 8.0K

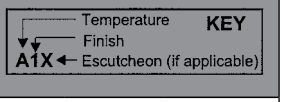
TECHNICAL DATA

MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

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.

Approval Chart 1

Viking V-BB Specific Application Sprinkler
For Combustible and Non-Combustible Sloped Attic Spaces



Part Number[1]	SIN	Maximum Pressure	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals[3]				
			NPT	BSP	U.S.	metric[2]	Inches	mm	cULus[4]	FM	LPCB	CE	
19627	VK684	175 psi	1/2"	15 mm	5.6	80,6	2-5/8	68	A1, A2	--	--	--	--
19801	VK685	175 psi	1/2"	15 mm	5.6	80,6	2-5/8	68	A1, A2	--	--	--	--
19754	VK686	175 psi	1/2"	15 mm	5.6	80,6	2-5/8	68	A1, A2	--	--	--	--
19626	VK681	175 psi	3/4"	20 mm	8.0	115,2	2-5/8	68	A1, A2	--	--	--	--
19798	VK682	175 psi	3/4"	20 mm	8.0	115,2	2-5/8	68	A1, A2	--	--	--	--
19751	VK683	175 psi	3/4"	20 mm	8.0	115,2	2-5/8	68	A1, A2	--	--	--	--

Approved Temperature Rating	Approved Finishes
A - 200 °F (93.3 °C)	1 - Brass, 2 - ENT[5]

[1] Also refer to Viking's current price schedule.

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

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

[4] Listed by Underwriters Laboratories Inc for use in the United States and Canada.

[5] cULus Listed as corrosion resistant.

DESIGN CRITERIA - UL Chart 1

(Also refer to Approval Chart 1)
Allowable , flow, pressure and slope for attic protection using Viking V-BB Sprinklers

Sprinkler Base Part Number	SIN	Type	Thread Size		Nominal K-Factor		Allowable Roof Span[2] ft. (m)	Minimum Flow		Minimum Pressure		Pitch[1]	Dry Pipe System Maximum Water Delivery Time[3] (in seconds)
			NPT	BSP	U.S.	metric		GPM	LPM	PSI	BAR		
19627	VK684	V-BB	1/2"	15 mm	5.6	80,6	≤40 (12,2)	24	91	18.4	1,3	4:12 < 7:12	See footnote 3
19801	VK685	V-BB	1/2"	15 mm	5.6	80,6	≤40 (12,2)	24	91	18.4	1,3	7:12 < 10:12	See footnote 3
19754	VK686	V-BB	1/2"	15 mm	5.6	80,6	≤40 (12,2)	24	91	18.4	1,3	10:12 ≤ 12:12	See footnote 3
19626	VK681	V-BB	3/4"	20 mm	8.0	115,2	≤60 (18,3)	38	144	22.6	1,5	4:12 < 7:12	See footnote 3
19798	VK682	V-BB	3/4"	20 mm	8.0	115,2	≤60 (18,3)	38	144	22.6	1,5	7:12 < 10:12	See footnote 3
19751	VK683	V-BB	3/4"	20 mm	8.0	115,2	≤60 (18,3)	38	144	22.6	1,5	10:12 ≤12:12	See footnote 3

[1] Pitch and slope indicate the incline of a roof, expressed as a proportion of the vertical to the horizontal.

[2] Refer to the Viking Attic Upright VK696 data sheet for roof spans over 60 ft (18,29 m) up to 80 ft (24,38 m) wide.

[3] Refer to NFPA 13, 2013, Section 7.2.3.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page SR1-3 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.

VIKING®	TECHNICAL DATA	MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

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.

ADDITIONAL DESIGN CRITERIA - UL Chart 2

(Also refer to DESIGN CRITERA Chart 1)
Allowable roof span, flow, pressure and slope for attic protection using Viking V-BB Sprinklers

Design Criteria: Flow and Pressures refer to Design Chart 1.

System Type:
Wet systems and dry systems.

Antifreeze Systems:
Use only listed antifreeze in accordance with the applicable NFPA standard as follows:

Option 1: Use any listed antifreeze in accordance with the manfacturer's installation instructions.

Option 2: For a Light Hazard Unoccupied attic
1. System Volume ≤200 gal (764 L)
2. Use freezemaster™ antifreeze (refer to Manufacturer's documentation)
3. Viking Attic Sprinklers (V-BB, V-HIP, V-SD, VK696, VK697)
4. Calculate the number of sprinklers in the hydraulically remote area in accordance with wet system criteria.*

*** NOTE:** For systems greater than 40 Gal (151 L), pipe sizing shall be determined using both the Darcy-Weisbach and Hazen-Williams approved hydraulic calculations. Because of the density of freezemaster™ antifreeze, the K-factor must be adjusted, and the friction loss must be considered in the system design.

Piping Types:
Steel (wet and dry) CPVC (wet systems only).
Occupancy Classification: Light hazard only.

Viking V-BB Sprinkler Spacing

Maximum Coverage Area:
400 ft² (37,16 m²) as measured along the slope.
Coverage area is determined by the twice the maximum distance thrown measured along the slope, multiplied by the distance along the branch line.
Example: 60' (18,3 m) span with a 10:12 slope, when measured along the slope provides a distance of approximately 39'-1" (11,9 m). This number must be multiplied by 2 to equal the overall span, which would be approximately 78'-2" (23,8 m).
400 ft² divided by 78'-2" (23,8 m) allows a maximum spacing along the branchline of 5'-1" (15,5 m).

Along the Branch Line:
Minimum Spacing: 4'-0" (1,2 m) between V-BB's and from V-SD's. 7'-0" (2,1 m) from Viking Attic Uprights. 6'-0" (1,8 m) from Standard Spray Sprinklers
Maximum Spacing: 6'-0" (1,8 m) between V-BB's and from V-SD's.

Measured Down the Slope:
Minimum Spacing: 26'-0" (7,9 m) from Viking Attic Uprights and Standard Spray Sprinklers.

Deflector Position below Peak, Ridge, or Deck:
For all roof pitches as per the listing from 4:12 – 12:12 the maximum deflector distance down is 22" (560 mm), and the minimum deflector distance down is 16" (405 mm).

Deflector Position above Scissor Truss:
For all roof pitches as per the listing from 4:12 – 12:12 the minimum distance above a scissor truss is 18" (458 mm).

Maximum distance from center line of the ridge:
6" (152 mm) on either side of the center line.

Minimum distance from Truss:
6" (152 mm) from nearest edge of the truss.

Draft Curtains:
Where used to allow Attic Upright Sprinkler installation shall be constructed to contain heat, may be constructed of minimum ½" (13 mm) plywood or equivalent.
Continues on next page.

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.

Continued from previous page.

Use of UL Listed CPVC Blazemaster Piping (Wet Systems Only):
Can be used to supply the sprinklers protecting the floor below the combustible concealed space when covered with 6" (152 mm) of non-combustible insulation over the horizontal or vertical piping, and extending 12" (304 mm) on both sides of the center line of the piping. If the piping is located in the joist, the width of the joist channel must be entirely covered to 6" (152 mm) above the top of the piping. The area above the piping must be protected with the Model V-BB's, V-SD's, or the Attic Upright Sprinklers.

Listed CPVC Blazemaster piping may also be used exposed to feed wet systems using Viking V-BB sprinklers in accordance with the following requirements, and in accordance with Figure 15:

- Risers are vertical and protected by V-BB or V-SD sprinklers located a maximum of 12 (304 mm)" away from the riser centerline.
- Model V-BB or V-SD sprinklers are mounted directly to the branchline.
- Model V-BB or V-SD sprinklers are installed on arm-overs a maximum of 6" (152 mm) laterally from the center line of the branch line.
- Model V-BB or V-SD sprinklers are installed on Vertical Sprigs attached to the branchline.
- Model V-BB or V-SD sprinklers are installed on angled sprigs a maximum of 6" (152 mm) laterally from the centerline of the branchline.
- Installed with a minimum lateral distance of 18" (456 mm) from any device that produces and releases heat, i.e. attic furnace, kitchen or bathroom exhaust fan, flue vents, heat lamps, and other such devices.

NOTICE Insulation requirements are provided solely for Fire Protection purposes and not for freeze protection.

NOTICE Non-combustible insulation being used needs to be verified for chemical compatibility with the CPVC piping at www.lubrizol.com

Obstruction Criteria:
Refer to Figures 4—14
Refer to Sections 8.8.5.2.1.3 and 8.8.5.2.1.7 of NFPA 13, 2013 for requirements if installed on greater than 2-1/2" (64 mm) diameter piping.

Hydraulic Requirements:
Viking V-BB Sprinklers must be calculated in accordance with the following figures and guidelines.
The design area shall include the most hydraulically demanding sprinklers, and in certain cases may require more than one set of calculations to verify the system's design.
The following figures cover Hydraulic Requirements for Viking V-BB Sprinklers only, and when installed with Attic Upright or Standard Spray Sprinklers.
For areas using Viking V-SD Sprinklers refer to the applicable data sheets.

Refer to Figures-unless otherwise noted, all Figures portray a 60' (18,3 m) roof span:
Figure 16 – V-BB Sprinklers
Figure 17 – V-BB Sprinklers & Attic Upright or Standard Spray Sprinklers Beyond an Obstruction
Figure 18 – V-BB Sprinklers & Attic Upright or Standard Spray Sprinklers at the Hip
Figure 19 – V-BB Sprinklers & Attic Upright or Standard Spray Sprinklers in a Dormer, at a Hip, or at an Ell.
Figure 20 – V-BB Sprinklers & Attic Upright or Standard Spray Sprinklers separated by compartmentalization.

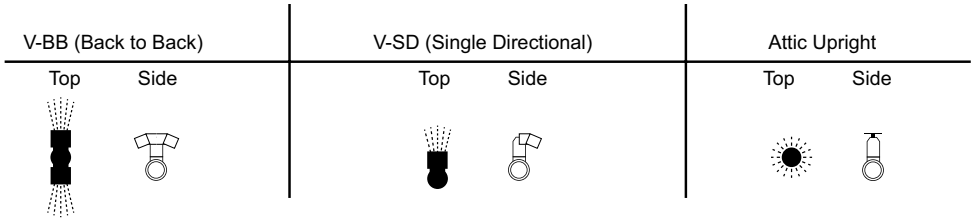


Figure 3: Sprinkler Type Legend

VIKING®

TECHNICAL DATA

MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

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.

Refer to figures 4 and 5 below-unless otherwise noted, all Figures portray a 60' (18,3 m) roof span. Maximum 6" (152 mm) obstruction allowed provided it sits at least 36" (914 mm) vertically below the Viking V-BB Sprinkler. Larger or closer obstructions require an additional sprinkler on the opposite side of the obstruction. This criteria only limits the obstructions that run across the trusses or rafters, not the top chord of the trusses or the depth of the rafter.

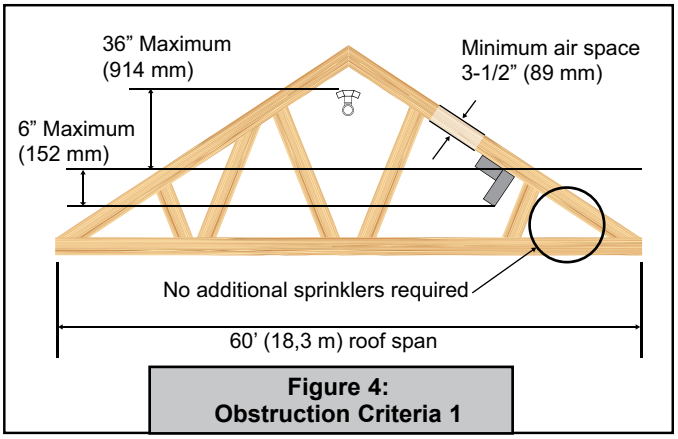


Figure 4:
Obstruction Criteria 1

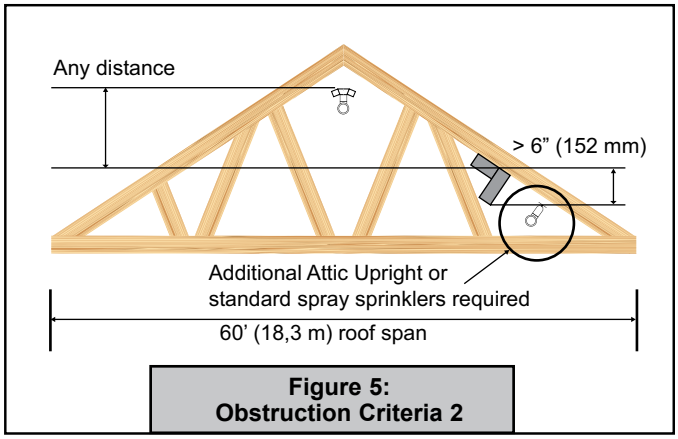


Figure 5:
Obstruction Criteria 2

Refer to Figures 6 and 7 below where the maximum spacing for Attic Upright Sprinklers is 12 ft. (3,7 m) and standard spray sprinklers is 15 ft (4,6 m). Any horizontal obstruction that is 4 ft. (1,2 m) or less in width requires minimum 6" (152 mm) clearance over the top to allow for sufficient water flow over and under. The clearance must be measured perpendicular to and from the bottom of the rafter. If the clearance is less than 6" (152 mm), an additional sprinkler is required on the opposite side of the obstruction. If the obstruction is more than 4 ft. (1,2 m) wide, an additional sprinkler is required underneath.

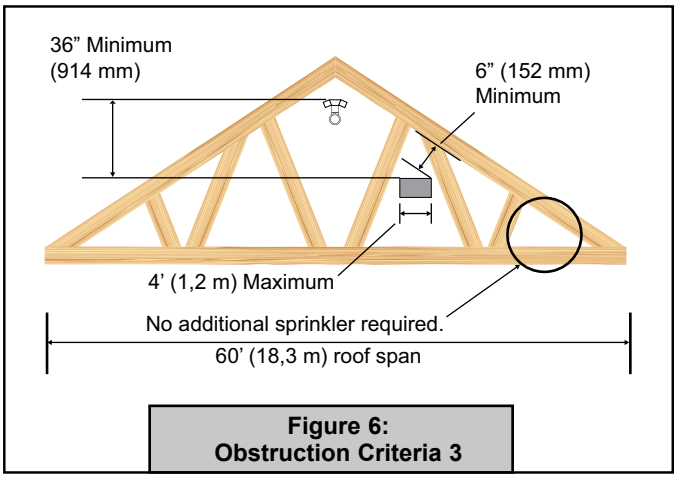


Figure 6:
Obstruction Criteria 3

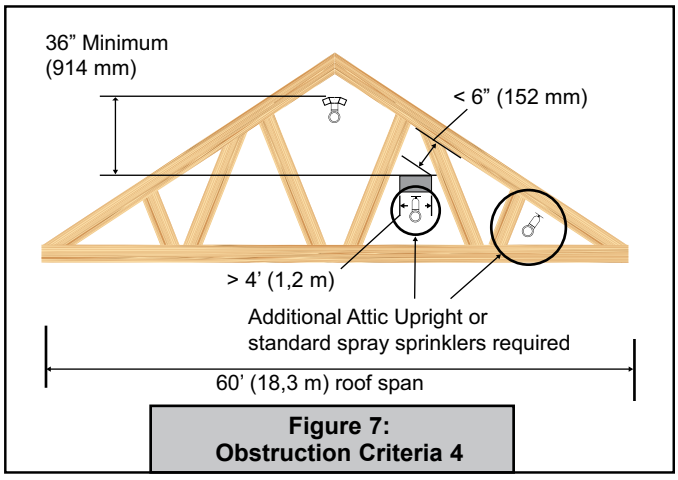


Figure 7:
Obstruction Criteria 4

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.

Refer to Figure 8 below. For vertical obstructions, the maximum dimension of the obstruction is the width and the horizontal distance is measured horizontally.

TABLE 2: OBSTRUCTION CRITERIA

Dimension X	Distance Y	Additional Sprinklers Required Beyond Obstruction
Maximum Horizontal Dimension of Obstruction	Minimum Horizontal Distance to Obstruction	
All vertical obstructions	< 6” (152 mm)	YES
1/2” - 1” (13 mm - 25 mm)	6” (152 mm)	NO
1” - 4” (25 mm - 102 mm)	12” (305 mm)	NO
4” - 8” (101 mm - 203 mm)	24” (610 mm)	NO
8” - 10 “ (203,mm - 254 mm)	5’-0” (1,5 m)	NO
10” - 20” (254 mm - 508 mm)	10’-0” (3,0 m)	NO
20” - 30” (508 mm - 762mm)	15’-0” (4,6 m)	NO
30” - 40 “ (762 mm - 1016 mm)	20’-0” (6,1 m)	NO
40” - 48” (1016 mm - 1219 mm)	25’-0” (7,6 m)	NO
> 48” (1219 mm)	Any distance	YES

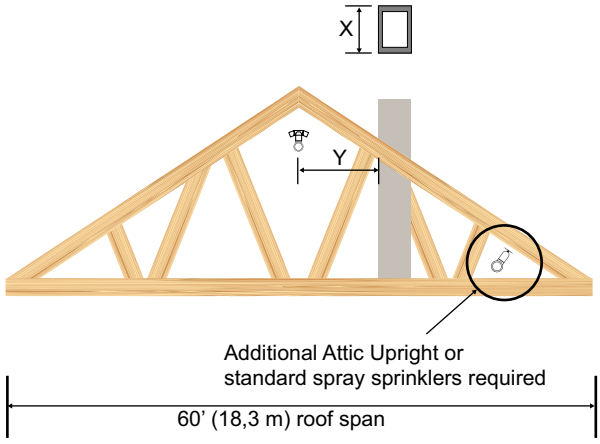


Figure 8:
Obstruction Criteria 5

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.

If a V-BB Sprinkler is 36” (914 mm) or greater avove the space, and 36” (914 mm) or greater clearance above the space is present, additional sprinklers are not needed.

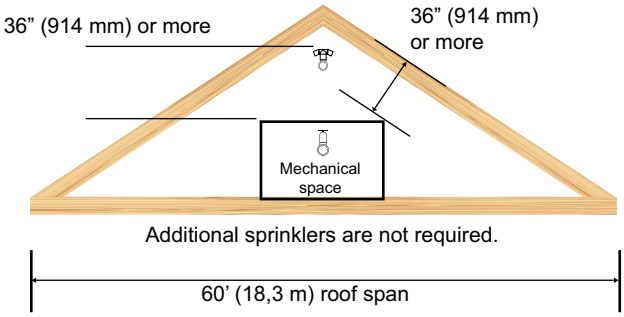


Figure 9:
Obstruction Criteria 6

If a V-BB sprinkler is 36” (914 mm) or greater above the space, and a 12” - 36” (304 - 914 mm) clearance above the space is present, intermediate level standard sprinklers are required.

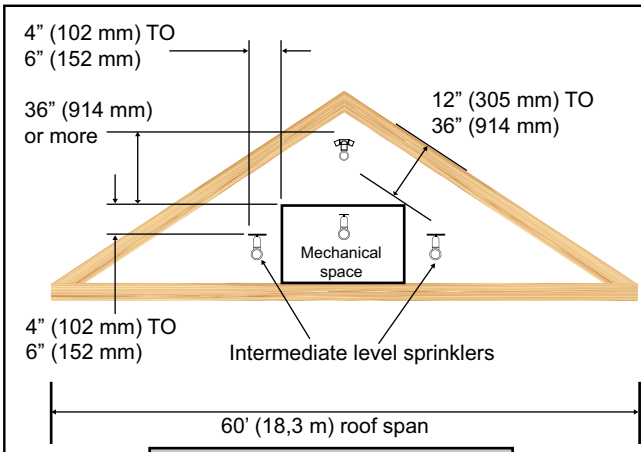


Figure 10:
Obstruction Criteria 7

Otherwise, the area outside the mechanical space is to be protected as shown using standard spray sprinklers as necessary or by building a shear wall and installing V-SD Sprinklers.

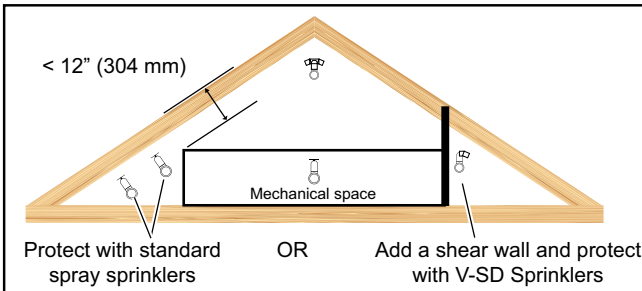


Figure 11:
Obstruction Criteria 8

VIKING®

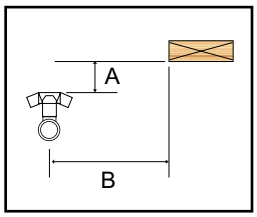
TECHNICAL DATA

MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

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.

If a V-BB Sprinkler can be installed below or between stiffeners and 16 to 22” (404 to 559 mm) distance to peak can be maintained, as well as A and B clearances to the stiffeners, no additional sprinklers are required.

A	B		
	VK681 VK684	VK682 VK685	VK683 VK686
0”	0”	0”	0”
A >0”	A +15”	A +10”	A +8”



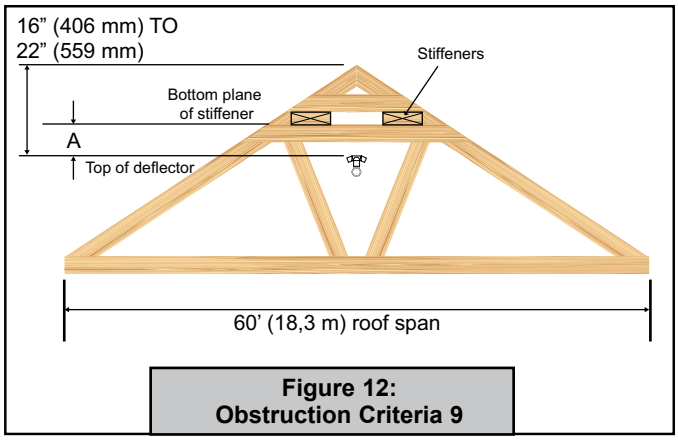


Figure 12:
Obstruction Criteria 9

When the stiffeners are located a minimum of 12” (305 mm) below the V-BB Sprinkler, the stiffeners are 7-12” (190 mm) maximum wide, the openings are 12” (305 mm) minimum, and there is 70% minimum open area, no additional sprinklers are required.

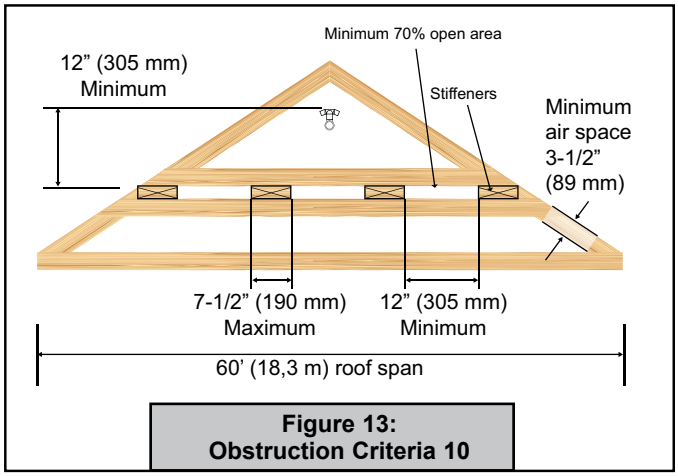


Figure 13:
Obstruction Criteria 10

Otherwise, additional sprinklers are required as shown.

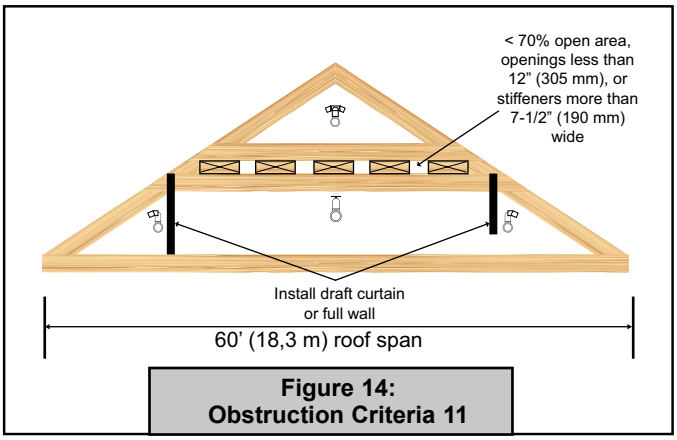


Figure 14:
Obstruction Criteria 11

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.

X = 6” (150 mm) MAXIMUM
Y= 12” (300 mm) MAXIMUM

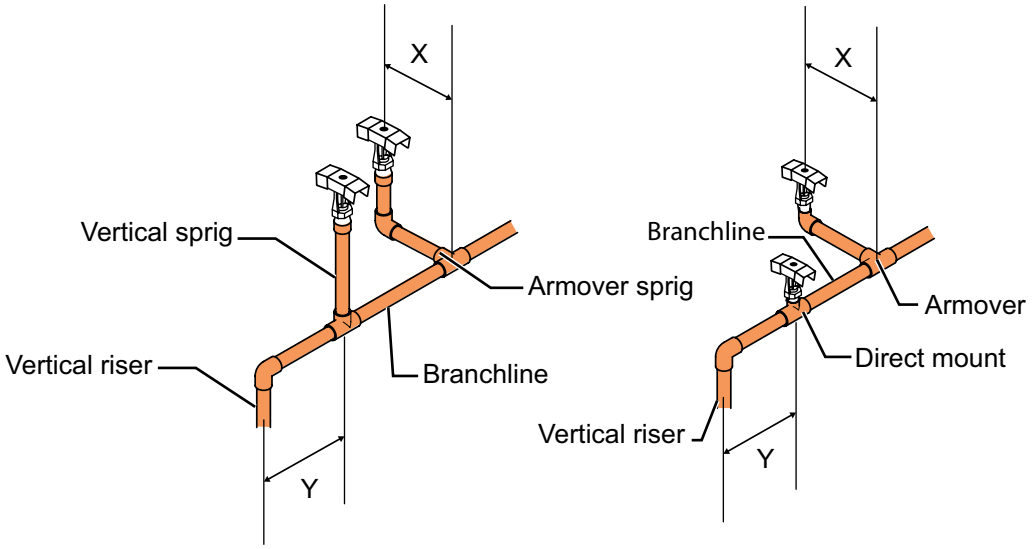
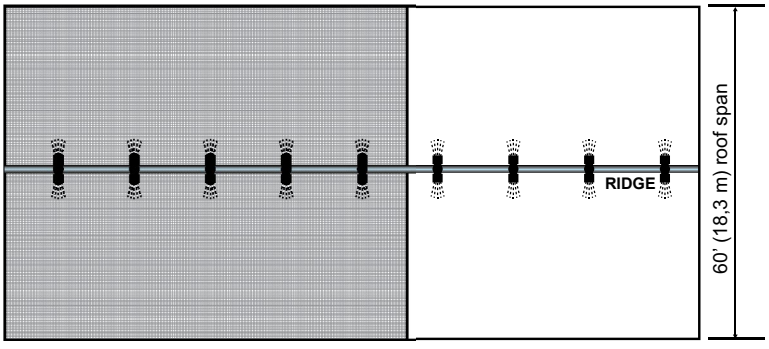


Figure 15:
Exposed CPVC with V-BB Sprinklers

Wet Systems: Calculate the most demanding 5 sprinklers.

Dry Systems: Calculate the most demanding 7 sprinklers.



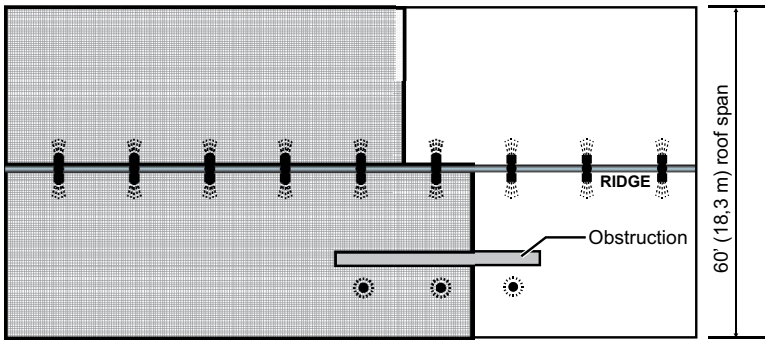
NOTE: Wet system shown.

Figure 16:
V-BB Sprinklers

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.

Wet Sytems: Calculate the most demanding 5 V-BB sprinklers and add up to 2 of the most demanding Attic Upright or Standard Spray Sprinklers.

Dry Sytems: Calculate the most demanding 7 V-BB sprinklers and add up to 2 of the most demanding Attic Upright or Standard Spray Sprinklers.



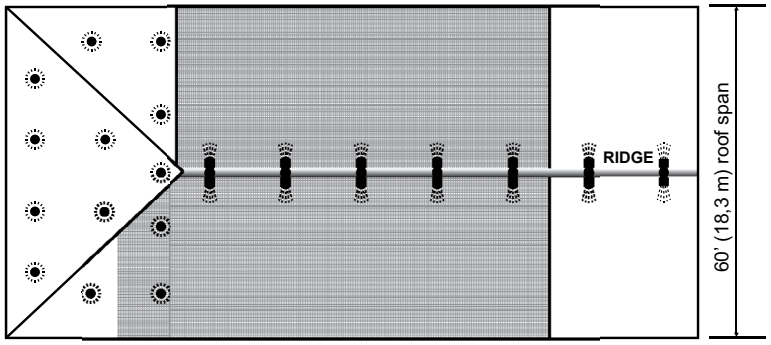
NOTE: Wet system shown.

Figure 17:
V-BB and Attic Upright or Standard Spray Sprinklers Beyond an Obstruction

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.

Wet Sytems: Calculate the most demanding 5 V-BB sprinklers plus the 2 most demanding Attic Upright Sprinklers, and then calculate the most demanding area up to 1500 ft² (137m²) having Attic Upright sprinklers. Use the most demanding calculation.

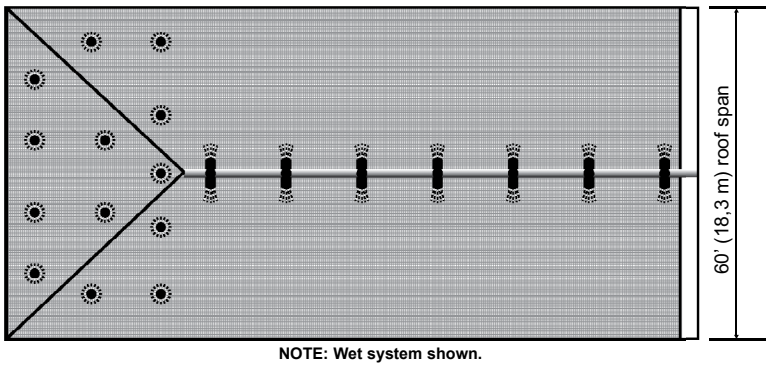
Wet Sytems: Calculate the most demanding 5 V-BB Sprinklers and add up to 2 of the most demanding Standard Spray Sprinklers, then calculate the most demanding remote design area (including ALL sprinkler types) per NFPA 13. For example, area reduction for quick response and 30% increase for sloped ceilings. Use the most demanding calculation.



NOTE: Wet system shown.

Dry Sytems: Calculate the most demanding 7 V-BB sprinklers plus the 2 most demanding Attic Upright sprinklers, and then calculate the most demanding area up to 1950 ft² (181 m²) having Attic Upright sprinklers. Use the most demanding calculation.

Dry Sytems: Calculate the most demanding 7 V-BB Sprinklers and add up to 2 of the most demanding Standard Spray Sprinklers, then calculate the most demanding remote design area (including ALL sprinkler types) per NFPA 13. For example, 30% increase for sloped ceilings and 30% increase for dry systems. Use the most demanding calculation.



NOTE: Wet system shown.

Figure 18:
V-BB and Attic Upright or Standard Spray Sprinklers at the Hip

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.

Where the quantity of Attic Upright or Standard Spray sprinklers in each dormer, cross, or ell is 4 or less and all of the dormers, crosses and ells meet the maximum 4 standard sprinkler criteria, calculate the V-BB demand as shown in Figures 16 and 17, and add up to 2 of the most demanding Attic Upright or Standard Spray sprinklers in the dormer, cross, or ell that is adjacent to the Attic Upright Sprinklers that are bing included in teh demand calculation.

Where the quantity of Attic Upright or Standard Spray sprinklers in any dormer, cross, or ell is greater than four, refer to Figure 18.

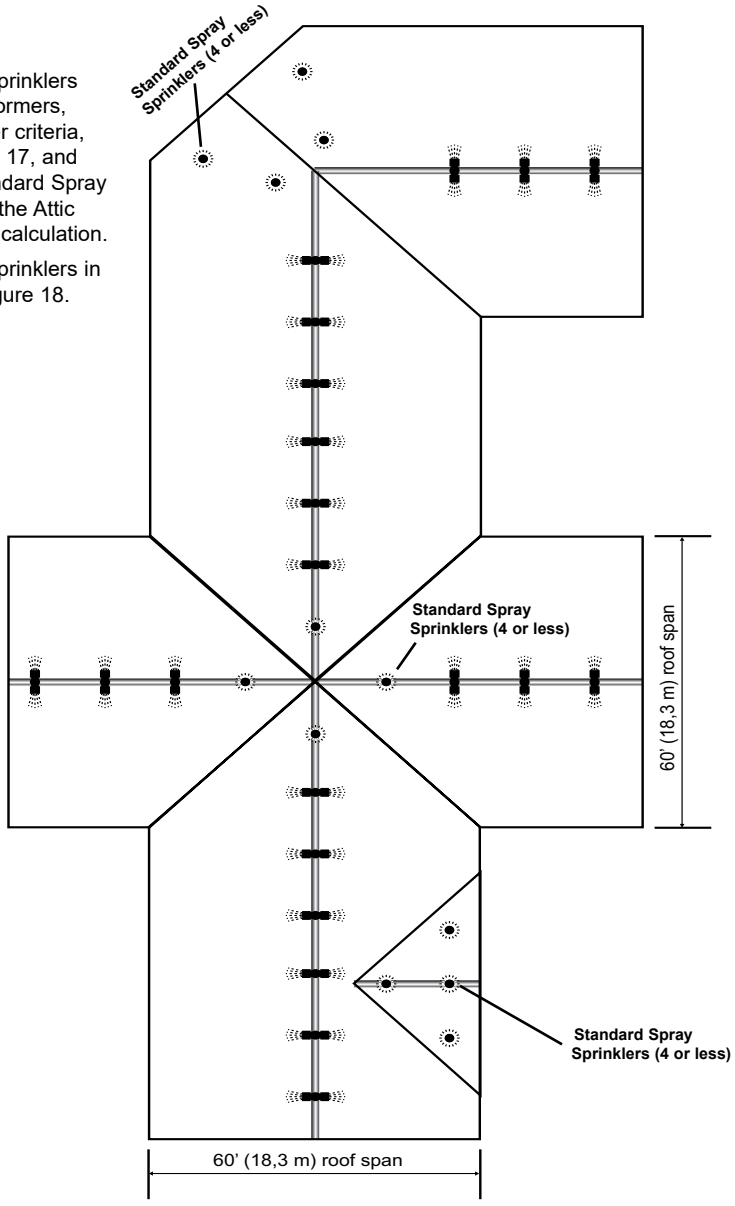
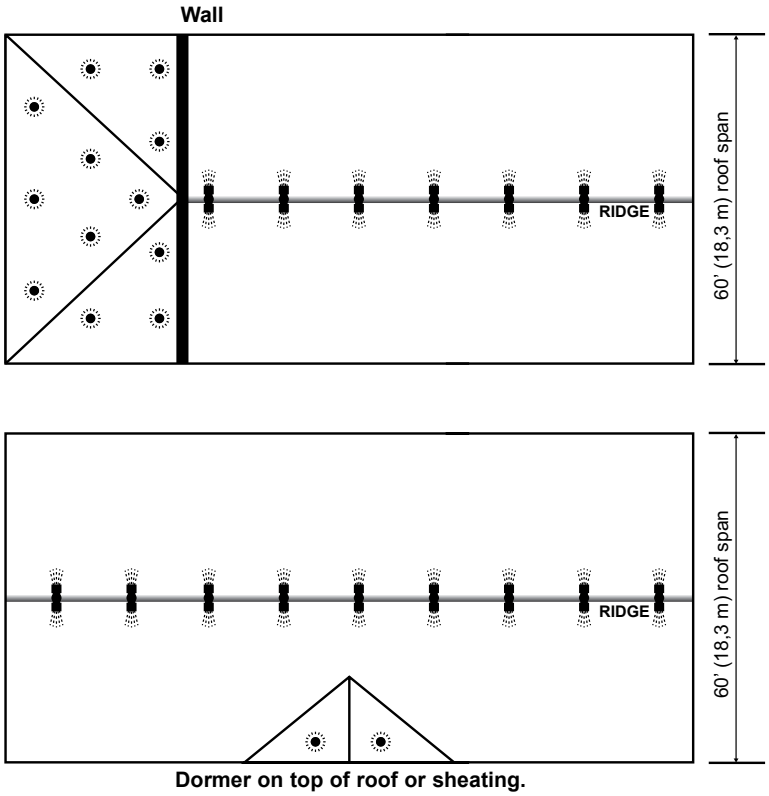


Figure 19:
V-BB Sprinklers and Attic Upright or Standard Spray Sprinklers in a Dormer, at a Hip or at an Ell

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.

Calculate the V-BB demand as described in Figures 16 and 17, then calculate the Attic Upright or Standard Spray Sprinklers per NFPA 13. use the most demanding calculation.



Dormer on top of roof or sheating.

Figure 20:
V-BB Sprinklers and Attic Upright or Standard Spray Sprinklers Separated by Compartmentalization

BULLETIN

CARE AND HANDLING OF SPRINKLERS

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

SPRINKLERS ARE FRAGILE - HANDLE WITH CARE!

General Handling and Storage:

- Store sprinklers in a cool, dry place.
- Protect sprinklers during storage, transport, handling, and after installation.
- Use the original shipping containers. DO NOT place sprinklers loose in boxes, bins, or buckets.
- Keep sprinklers separated at all times. DO NOT allow metal parts to contact sprinkler operating elements.

For Pre-Assembled Drops:

- Protect sprinklers during handling and after installation.
- For recessed assemblies, use the protective sprinkler cap (Viking Part Number 10364).

Sprinklers with Protective Shields or Caps:

- DO NOT remove shields or caps until after sprinkler installation and there no longer is potential for mechanical damage to the sprinkler operating elements.
- **Sprinkler shields or caps MUST be removed BEFORE placing the system in service!**
- Remove the sprinkler shield by carefully pulling it apart where it is snapped together.
- Remove the cap by turning it slightly and pulling it off the sprinkler.

Sprinkler Installation:

- DO NOT use the sprinkler deflector or operating element to start or thread the sprinkler into a fitting.
- **Use only the designated sprinkler head wrench!** Refer to the current sprinkler technical data page to determine the correct wrench for the model of sprinkler used.
- DO NOT install sprinklers onto piping at the floor level.
- Install sprinklers after the piping is in place to prevent mechanical damage.
- DO NOT allow impacts such as hammer blows directly to sprinklers or to fittings, pipe, or couplings in close proximity to sprinklers. Sprinklers can be damaged from direct or indirect impacts.
- DO NOT attempt to remove drywall, paint, etc., from sprinklers.
- **Take care not to over-tighten the sprinkler and/or damage its operating parts!**

  Maximum Torque:

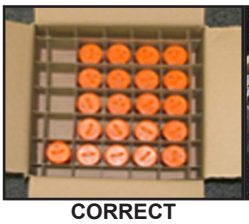
  1/2" NPT: 14 ft-lbs. (19.0 N-m)

  3/4" NPT: 20 ft-lbs. (27.1 N-m)

  1" NPT: 30 ft-lbs. (40.7 N-m)

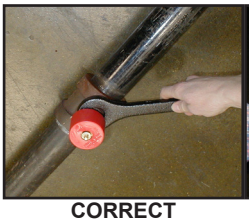
CORRECT
(Original container used)

INCORRECT
(Placed loose in box)



CORRECT
(Protected with caps)

INCORRECT
(Protective caps not used)



CORRECT
(Piping is in place at the ceiling)

INCORRECT
(Sprinkler at floor level)

CORRECT
(Special installation wrenches)

INCORRECT
(Designated wrench not used)

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

⚠ WARNING

Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed. Sprinklers that have been painted in the field must be replaced per NFPA 13. Protect sprinklers from paint and paint overspray in accordance with the installation standards. Do not clean sprinklers with soap and water, ammonia, or any other cleaning fluid. Do not use adhesives or solvents on sprinklers or their operating elements.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

VIKING | BULLETIN | CARE AND HANDLING OF SPRINKLERS

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

PROTECTIVE SPRINKLER SHIELDS AND CAPS

General Handling and Storage:

Many Viking sprinklers are available with a plastic protective cap or shield temporarily covering the operating elements. The snap-on shields and caps are factory installed and are intended to help protect the operating elements from mechanical damage during shipping, storage, and installation. NOTE: It is still necessary to follow the care and handling instructions on the appropriate sprinkler technical data sheets* when installing sprinklers with bulb shields or caps.

WHEN TO REMOVE THE SHIELDS AND CAPS:

NOTE: SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

Remove the shield or cap from the sprinkler only after checking all of the following:

- The sprinkler has been installed*.
- The wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.

SHIELDS AND CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!

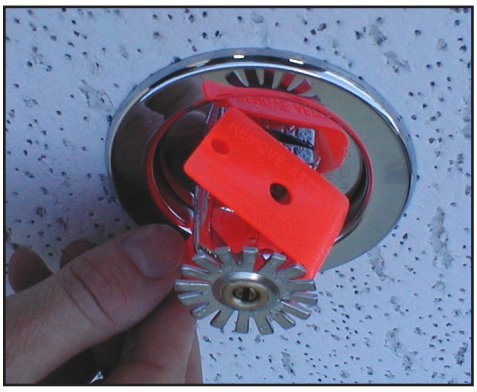


Figure 1: Sprinkler shield being removed from a pendent sprinkler.

Figure 2: Sprinkler cap being removed from a pendent sprinkler.

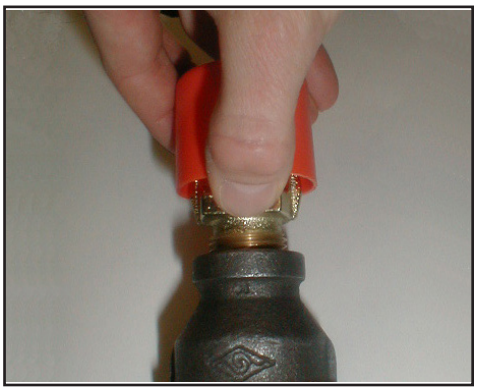


Figure 3: Sprinkler cap being removed from and upright sprinkler.

HOW TO REMOVE SHIELDS AND CAPS:

No tools are necessary to remove the shields or caps from sprinklers. DO NOT use any sharp objects to remove them! **Take care not to cause mechanical damage to sprinklers when removing the shields or caps.** When removing caps from fusible element sprinklers, use care to prevent dislodging ejector springs or damaging fusible elements. NOTE: Squeezing the sprinkler cap excessively could damage sprinkler fusible elements.

- To remove the shield, simply pull the ends of the shield apart where it is snapped together. Refer to Figure 1.
- To remove the cap, turn it slightly and pull it off the sprinkler. Refer to Figures 2 and 3.

NOTICE Refer to the current sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.

⚠WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

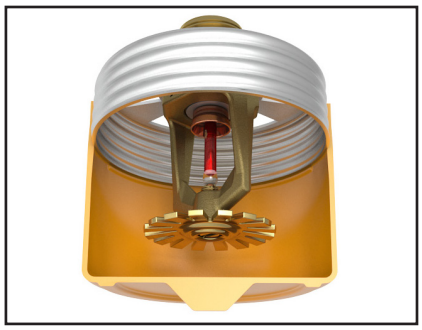
*** Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.**

BULLETIN

CARE AND HANDLING OF SPRINKLERS

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

⚠CAUTION CONCEALED COVER ASSEMBLIES ARE FRAGILE!
TO ASSURE SATISFACTORY PERFORMANCE OF THE PRODUCT, HANDLE WITH CARE.



Concealed Sprinkler and Adapter Assembly with Protective Cap

Concealed Sprinkler and Adapter Assembly (Protective Cap Removed)

Cover Plate Assembly (Pendent Cover 12381 shown)

GENERAL HANDLING AND STORAGE INSTRUCTIONS:

- Do not store in temperatures exceeding 100 °F (38 °C). Avoid direct sunlight and confined areas subject to heat.
- Protect sprinklers and cover assemblies during storage, transport, handling, and after installation.
  -- Use original shipping containers.
  -- Do not place sprinklers or cover assemblies loose in boxes, bins, or buckets.
- Keep the sprinkler bodies covered with the protective sprinkler cap any time the sprinklers are shipped or handled, during testing of the system, and while ceiling finish work is being completed.
- Use only the designated Viking recessed sprinkler wrench (refer to the appropriate sprinkler data page) to install these sprinklers. **NOTE:** The protective cap is temporarily removed during installation and then placed back on the sprinkler for protection until finish work is completed.
- Do not over-tighten the sprinklers into fittings during installation.
- Do not use the sprinkler deflector to start or thread the sprinklers into fittings during installation.
- Do not attempt to remove drywall, paint, etc., from the sprinklers.
- Remove the plastic protective cap from the sprinkler before attaching the cover plate assembly. **PROTECTIVE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!**

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

VIKING

BULLETIN

CARE AND HANDLING OF SPRINKLERS

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

USE THE FOLLOWING PRECAUTIONS WHEN HANDLING WAX-COATED SPRINKLERS

Many of Viking's sprinklers are available with factory-applied wax coating for corrosion resistance. These sprinklers MUST receive appropriate care and handling to avoid damaging the wax coating and to assure satisfactory performance of the product.

General Handling and Storage of Wax-Coated Sprinklers:

- Store the sprinklers in a cool, dry place (in temperatures below the maximum ambient temperature allowed for the sprinkler temperature rating. Refer to Table 1 below.)
- Store containers of wax-coated sprinklers separate from other sprinklers.
- Protect the sprinklers during storage, transport, handling, and after installation.
- Use original shipping containers.
- Do not place sprinklers in loose boxes, bins, or buckets.

Installation of Wax-Coated Sprinklers:

Use only the special sprinkler head wrench designed for installing wax-coated Viking sprinklers (any other wrench may damage the unit).

- Take care not to crack the wax coating on the units.
- For touching up the wax coating after installation, wax is available from Viking in bar form. Refer to Table 1 below. The coating MUST be repaired after sprinkler installation to protect the corrosion-resistant properties of the sprinkler.
- Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they would be exposed to temperatures exceeding the maximum recommended ambient temperature for the temperature rating used.
- Inspect the coated sprinklers frequently soon after installation to verify the integrity of the corrosion resistant coating. Thereafter, inspect representative samples of the coated sprinklers in accordance with NFPA 25. Close up visual inspections are necessary to determine whether the sprinklers are being affected by corrosive conditions.

TABLE 1

Sprinkler Temperature Rating (Fusing Point)	Wax Part Number	Wax Melting Point	Maximum Ambient Ceiling Temperature[1]	Wax Color
155 °F (68 °C) / 165 °F (74 °C)	02568A	148 °F (64 °C)	100 °F (38 °C)	Light Brown
175 °F (79 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
200 °F (93 °C)	04146A	161 °F (71 °C)	150 °F (65 °C)	Brown
220 °F (104 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown
286 °F (141 °C)	02569A	170 °F (76 °C)	150 °F (65 °C)	Dark Brown

[1] 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.

⚠WARNING Never install sprinklers that have been dropped, damaged, or exposed to temperatures in excess of the maximum ambient temperature allowed.

Refer to the appropriate current technical data pages for complete care, handling, and installation instructions. Data pages are included with each shipment from Viking or Viking distributors. They can also be found on the Web site at www.vikinggroupinc.com.

TECHNICAL DATA — SPRINKLER OVERVIEW

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking fire sprinklers consist of a threaded frame with a specific waterway or orifice size and a deflector for distributing water in a specified pattern. A closed or sealed sprinkler refers to a complete assembly, including the thermosensitive operating element. An open sprinkler does not use an operating element and is open at all times. The distribution of water is intended to extinguish a fire or to control its spread.

Viking sprinklers are available in several models and styles. Refer to specific sprinkler technical data pages for available styles, finishes, temperature ratings, thread sizes, and nominal K-Factors for the particular model selected.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

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

3. TECHNICAL DATA

Pressure Ratings:

Maximum allowable water working pressure is 175 psig (12 Bar) unless rated and specified for high water working pressure [250 psig (17.2 bar)].

Sprinkler Identification:

Viking sprinklers are identified and marked with the word “Viking”, the sprinkler identification number (SIN) consisting of “VK” plus a three digit number*, the model letter, and the year of manufacture.

Available Finishes:

Viking sprinklers are available in several decorative finishes. Some models are available with corrosion-resistant coatings or are fabricated from non-corrosive material. Refer to the sprinkler technical data page for additional information.

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.

K-Factors:

Viking sprinklers are available in several orifice sizes with related K-Factors. The orifice is a tapered waterway and, therefore, the K-Factor given is nominal. Nominal U.S. K-Factors are provided in accordance with the 1999 edition of NFPA 13, Section 3-2.3. Refer to the specific data page for appropriate K-Factor information.

Available Styles:

Viking sprinklers are available for installation in several positions as indicated by a stamping on the deflector. The deflector style dictates the appropriate installation position of the sprinkler; it breaks the solid stream of water issuing from the sprinkler orifice to form a specific spray pattern. The following list indicates the various styles and identification of Viking sprinklers.

UPRIGHT SPRINKLER: A sprinkler intended to be installed with the deflector above the frame so water flows upward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. Marked “SSU” (Standard Sprinkler Upright) or “UPRIGHT” on the deflector.

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. Marked “SSP” (Standard Sprinkler Pendent) or “PENDENT” on the deflector.

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

CONVENTIONAL SPRINKLER: An “old style” sprinkler intended to be installed with the deflector in either the upright or pendent position. The deflector provides a spherical type pattern with 40 to 60 percent of the water initially directed downward and a proportion directed upward. Must be installed in accordance with installation rules for conventional or old style sprinklers. DO NOT USE AS A REPLACEMENT FOR STANDARD SPRAY SPRINKLERS. Marked “C U/P” (Conventional Upright/Pendent) on the deflector.

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

VERTICAL SIDEWALL (VSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The deflector provides a water spray pattern outward in a quarter-spherical pattern and can be installed in the upright or pendent position with the flow arrow in the direction of discharge. Marked “SIDEWALL” on the deflector with an arrow and the word “FLOW”. (Note: Some vertical sidewall sprinklers can only be installed in the upright or pendent position—in this case, the sprinkler will also be marked “UPRIGHT” or “PENDENT”.)

HORIZONTAL SIDEWALL (HSW) SPRINKLER: A sprinkler intended for installation near the wall and ceiling. The special deflector provides a water spray pattern outward in a quarter-spherical pattern. Most of the water is directed away from the nearby wall with a small portion directed at the wall behind the sprinkler. The top of the deflector is oriented parallel with the ceiling or roof. The flow arrows point in the direction of discharge. Marked “SIDEWALL” and “TOP” with an arrow and the word “FLOW”.

EXTENDED COVERAGE (EC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listings. Maximum area of coverage, minimum flow rate, orifice size, and nominal K-Factor are specified in the individual listings. EC sprinklers are intended for Light-Hazard occupancies with smooth, flat, horizontal ceilings unless otherwise specified. In addition to the above markings, the sprinkler is marked “EC”.

QUICK RESPONSE (QR) SPRINKLER: A spray sprinkler with a fast- actuating operating element. The use of quick response sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction (AHJ) prior to installing.

QUICK RESPONSE EXTENDED COVERAGE (QREC) SPRINKLER: A spray sprinkler designed to discharge water over an area having the maximum dimensions indicated in the individual listing. This is a sprinkler with an operating element that meets the criteria for quick response. QREC sprinklers are only intended for Light Hazard occupancies. The sprinkler is marked “QREC”.

FLUSH SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The unit is mounted flush with the ceiling or wall, with the fusible link exposed. Upon actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

CONCEALED SPRINKLER: A decorative spray sprinkler intended for installation with a concealed piping system. The sprinkler is hidden from view by a cover plate installed flush with the ceiling or wall. During fire conditions, the cover plate detaches, and upon sprinkler actuation, the deflector extends beyond the ceiling or wall to distribute water discharge. The sprinkler is marked “SSP”, “PEND”, or “SIDEWALL” and “TOP”.

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. DO NOT RECESS ANY SPRINKLER NOT LISTED FOR USE WITH THE ESCUTCHEON.

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.

DRY SPRINKLER: A special-service sprinkler intended for installation on dry pipe systems or wet pipe systems where the sprinkler is subject to freezing temperatures. The unit consists of a sprinkler permanently secured to an extension nipple with a sealed inlet end to prevent water from entering the nipple until the sprinkler operates. The unit MUST be installed in a tee fitting. Dry upright sprinklers are marked with the “B” dimension [distance from the face of the fitting (tee) to the top of the deflector]. Dry pendent and sidewall sprinklers are marked with the “A” dimension [the distance from the face of fitting (tee) to the finished surface of the ceiling or wall].

LARGE DROP SPRINKLER: A type of special application sprinkler used to provide fire control of specific high-challenge fire hazards. Large drop sprinklers are designed to produce an umbrella-shaped spray pattern downward with a higher percentage of “large” water droplets than standard spray sprinklers. The sprinkler has an extra-large orifice with a nominal K-Factor of 11.2. Marked “HIGH CHALLENGE” and “UPRIGHT”.

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER: A sprinkler intended to provide fire suppression of specific high-challenge fire hazards through the use of a fast response fusible link, 14.0, 16.8, or 25.2 nominal K-Factor, and special deflector. ESFR sprinklers are designed to produce high-momentum water droplets in a hemispherical pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire. Marked “ESFR” and “UPRIGHT” or “PEND”.

INTERMEDIATE LEVEL/RACK STORAGE SPRINKLER: A standard spray sprinkler assembly designed to protect its operating element from the spray of sprinklers installed at higher elevations. The assembly consists of a standard or large orifice upright or pendent sprinkler with an integral upright or pendent water shield and guard assembly. Use only those sprinklers that have been tested and listed for use with the assembly. Refer to the technical data page for allowable sprinkler models.

RESIDENTIAL SPRINKLER: A sprinkler intended for use in the following occupancies: one- and two-family dwellings with the fire protection sprinkler system installed in accordance with NFPA 13D; residential occupancies up to four stories in height with the fire protection system installed in accordance with NFPA 13R; and where allowed by the Authority Having Jurisdiction in residential portions of any occupancy with the fire protection system installed in accordance with NFPA 13.

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

Residential sprinklers have a unique distribution pattern and utilize a “fast response” heat sensitive operating element. They enhance survivability in the room of fire origin and are designed to provide a life safety environment for a minimum of ten minutes. For this reason, residential sprinklers must not be used to replace standard sprinklers unless tested for and approved by the Authority Having Jurisdiction. In addition to standard markings, the unit is identified as “RESIDENTIAL SPRINKLER” or “RES”.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s).

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 or contact The Viking Corporation.

8. GUARANTEE

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

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers and the appropriate sprinkler general care, installation, and maintenance guide. 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. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

TECHNICAL DATA

SPRINKLER GENERAL CARE, INSTALLATION, AND MAINTENANCE GUIDE

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.

1. DESCRIPTION - STANDARD RESPONSE, QUICK RESPONSE, EXTENDED COVERAGE, AND DRY SPRINKLERS

Viking thermosensitive spray sprinklers consist of a small frame and either a glass bulb or a fusible operating element. Available styles include pendent, flush pendent, concealed pendent, upright, horizontal sidewall, vertical sidewall, or conventional, depending on the particular sprinkler model selected.

Viking sprinklers are available with various finishes, temperature ratings, responses, and K-Factors to meet design requirements†. Used in conjunction with one of the corrosion-resistant coatings (for frame style sprinklers), the units provide protection against many corrosive environments. In addition, the special Polyester or Teflon® coatings can be used in decorative applications where colors are desired.

† Refer to the sprinkler technical data page for available styles, finishes, temperature ratings, responses, and nominal K-Factors for specific sprinkler models.

2. LISTINGS AND APPROVALS

Refer to the Approval Charts on the appropriate sprinkler technical data page(s) and/or approval agency listings.

3. TECHNICAL DATA

Specifications:

Refer to the appropriate sprinkler technical data sheet.

Material Standards:

Refer to the appropriate sprinkler technical data sheet.

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

4. INSTALLATION

NOTE: Take care not to over-tighten the sprinkler and/or damage its operating parts!

Maximum Torque:

1/2" NPT: 14 ft-lbs. (19.0 N-m)

3/4" NPT: 20 ft-lbs. (27.1 N-m)

1" NPT: 30 ft-lbs. (40.7 N-m)

A. Care and Handling (also refer to Bulletin - Care and Handling of Sprinklers, Form No. F_091699.)

Sprinklers must be handled with care. They must be stored in a cool, dry place in their original shipping container. Never install sprinklers that have been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed (refer to the temperature chart on the sprinkler technical data page). Never install any glass-bulb sprinkler if the bulb is cracked or if there is a loss of liquid from the bulb. A small air bubble should be present in the glass bulb. Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed immediately. (Note: Installing glass bulb sprinklers in direct sunlight (ultraviolet light) may affect the color of the dye used to color code the bulb. This color change does not affect the integrity of the bulb.)

Sprinklers must be protected from mechanical damage during storage, transport, handling, and after installation. Sprinklers subject to mechanical damage must be protected with an approved sprinkler guard.

Use only sprinklers listed as corrosion resistant when subject to corrosive environments. When installing corrosion-resistant sprinklers, take care not to damage the corrosion-resistant coating. Use only the special wrench designed for installing coated or recessed Viking sprinklers (any other wrench may damage the unit).

Concealed sprinklers must be installed in neutral or negative pressure plenums only!

Use care when locating sprinklers near fixtures that can generate heat. Do not install sprinklers where they could be exposed to temperatures exceeding the maximum recommended ambient temperature for the temperature rating used.

Wet pipe systems must be provided with adequate heat. Sprinklers supplied from dry systems in areas subject to freezing must be listed dry sprinklers, upright, or horizontal sidewall sprinklers installed so that water is not trapped. For dry systems, pendent sprinklers and sidewall sprinklers installed on return bends are permitted, where the sprinklers, return bend, and branch line piping are in an area maintained at or above 40 °F (4 °C).

B. Installation Instructions - Standard Spray Sprinklers

Viking sprinklers are manufactured and tested to meet the rigid requirements of approving agencies. They are designed to be installed in accordance with recognized installation standards. Deviation from the standards or any alteration to sprinklers or cover plate assemblies after they leave the factory including, but not limited to: painting, plating, coating, or modification, may render them inoperative and will automatically nullify the approvals and any guarantee made by The Viking Corporation.

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.

Before installation, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. Sprinklers must be installed after the piping is in place to prevent mechanical damage. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled.

1a. For frame-style sprinklers, install escutcheon (if used), which is designed to thread onto the external threads of the sprinkler. Refer to the appropriate sprinkler data page to determine approved escutcheons for use with specific sprinkler models.

1b. For flush and concealed style sprinklers: Cut the sprinkler nipple so that the ½" or 3/4" (15 mm or 20 mm)* NPT outlet of the reducing coupling is at the desired location, and centered in the opening* in the ceiling or wall.
*Size depends on the sprinkler model used. Refer to the sprinkler technical data page.

2. Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet. **NOTE:** Sprinklers with protective caps or bulb shields must have the caps or shields kept on them when applying pipe-joint compound or tape. *Exception: For domed concealed sprinklers, remove the protective cap for installation, and then place it back on the sprinkler temporarily..*

3. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used. DO NOT use the deflector or fusible element to start or thread the sprinkler into a fitting.
   a. Install the sprinkler onto the piping using the special sprinkler wrench only, taking care not to over-tighten or damage the sprinkler.
   b. For flush and concealed style sprinklers: the internal diameter of the special sprinkler installation wrench is designed for use with the sprinkler contained in the protective cap. *Exception: For domed concealed sprinklers, remove the protective cap for installation, and then place it back on the sprinkler temporarily.* Thread the flush or concealed sprinkler into the ½" or 3/4" (15 mm or 20 mm)* NPT outlet of the coupling by turning it clockwise with the special sprinkler wrench. *Thread size depends on the particular sprinkler model used. Refer to the sprinkler technical data page.

C. Installation Instructions - Dry Sprinklers

WARNING: Viking dry sprinklers are to be installed in the 1" outlet (for dry and preaction systems), or run of malleable, ductile iron, or Nibco CPVC* threaded tee fittings (for wet systems) that meet the dimensional requirements of ANSI B16.3 (Class 150), or cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125), even at branch line ends. The threaded end of the dry sprinkler is designed to allow the seal to penetrate and extend into the fitting to a predetermined depth. This prevents condensation from accumulating and freezing over the sprinkler seal. ***NOTE: When using CPVC fittings with Viking dry sprinklers, use only new Nibco Model 5012-S-BI. When selecting other CPVC fittings, contact Viking Technical Services.**

1. **DO NOT** install the dry sprinkler into a threaded elbow, coupling, or any other fitting that could interfere with thread penetration. Such installation would damage the brass seal.
2. **DO NOT** install dry sprinklers into couplings or fittings that would allow condensation to accumulate above the seal when the sprinkler is located in an area subject to freezing.
3. **NEVER** try to modify dry sprinklers. They are manufactured for specific "A" or "B" dimensions and cannot be modified.

The dry sprinkler must be installed after the piping is in place to prevent mechanical damage. Before installation, be sure to have the correct sprinkler model and style, with the appropriate "A" or "B" dimension(s), temperature rating, orifice size, and response characteristics. Keep sprinklers with protective caps or bulb shields contained within the caps or shields during installation and testing, and any time the sprinkler is shipped or handled. *Exception:* For concealed and adjustable recessed dry sprinklers, the protective caps and shields are removed for installation.

To install the dry sprinkler, refer to the instructions below and the appropriate sprinkler technical data page for illustrated instructions.

Dry upright sprinklers must be installed above the piping, in the upright position only. When installing dry upright or plain barrel style vertical sidewall sprinklers on piping located close to the ceiling, it may be necessary to lower the sprinkler into the fitting from above the ceiling. When installing dry upright or plain barrel vertical sidewall sprinklers from below the ceiling, verify that the opening in the ceiling is a minimum 1-1/2" (38.1 mm) in diameter.

For dry upright or plain barrel vertical sidewall sprinklers in the upright position: First, install the escutcheon (if used) over the threaded end of the sprinkler barrel. Slide the escutcheon past the external threads. NOTE: When installing the dry upright or plain barrel vertical sidewall sprinkler from above the ceiling, it will be necessary to install the escutcheon after lowering the threaded end of the sprinkler through the ceiling penetration.

A. **For all dry sprinklers:** Apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler barrel only, taking care not to allow a build-up of compound or tape over the brass inlet and seal. **NOTE:** Sprinklers with protective caps or bulb shields must be contained within the caps or shields before applying pipe-joint compound or tape.

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.

B. Refer to the appropriate sprinkler technical data page to determine the correct sprinkler wrench for the model of sprinkler used.
C. Install the dry sprinkler on the piping using the special dry sprinkler wrench only, while taking care not to damage the sprinkler. **NOTE:** Thread the sprinkler into the fitting hand tight, plus 1/2 turn with the dry sprinkler wrench.
D. *For adjustable standard and adjustable recessed dry pendent and sidewall sprinklers: Escutcheons can be installed after the sprinklers have been installed onto the piping. Refer to the appropriate sprinkler technical data page for escutcheon installation instructions and illustrations.*

D. Installation Instructions - Testing

4. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards. Viking *high pressure* sprinklers may be hydrostatically tested at a maximum of 300 psi (20.7 bar) for limited periods of time (two hours), for the purpose of acceptance by the Authority Having Jurisdiction.
   a. Make sure the sprinkler is properly tightened. If a thread leak occurs, normally the sprinkler must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal is damaged, the sealing compound or tape is washed out of the joint. Air testing [do not exceed 40 psi (2.76 bar)] the sprinkler piping prior to testing with water may be considered in areas where leakage during testing must be prevented. Refer to the Installation Standards and the Authority Having Jurisdiction.
   b. **Remove plastic protective sprinkler caps or bulb shields AFTER the wall or ceiling finish work is completed where the sprinkler is installed and there no longer is a potential for mechanical damage to the sprinkler operating elements.** To remove the bulb shields, simply pull the ends of the shields apart where they are snapped together. To remove caps from frame style sprinklers, turn the caps slightly and pull them off the sprinklers. **SPRINKLER CAPS OR BULB SHIELDS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!** Retain a protective cap or shield in the spare sprinkler cabinet.
5. For flush style sprinklers: the ceiling ring can now be installed onto the sprinkler body. Align the ceiling ring with the sprinkler body and thread or push it on (depends on sprinkler model) until the outer flange touches the surface of the ceiling. Note the maximum adjustment is 1/4" (6.35 mm). DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipple as required.
6. For concealed sprinklers: the cover assembly can now be attached.
   a. Remove the cover from the protective box, taking care not to damage the cover plate assembly.
   b. Gently place the base of the cover plate assembly over the sprinkler protruding through the opening in the ceiling.
   c. Push the cover plate assembly onto the sprinkler until the unfinished brass flange of the cover plate base (or the cover adapter, if used) touches the surface of the ceiling.
   d. Refer to the applicable technical data sheet to determin the maximum adjustment available for concealed sprinklers. DO NOT MODIFY THE UNIT. If necessary, re-cut the sprinkler drop nipple.

NOTE: If it is necessary to remove the entire sprinkler unit, the system must be taken out of service. See section 6. INSPECTIONS, TESTS AND MAINTENANCE and follow all warnings and instructions.

5. OPERATION

Refer to the appropriate sprinkler technical data page(s). During fire conditions, the operating element fuses or shatters (depending on the type of sprinkler), releasing the pip cap and sealing assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. 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. The sprinkler technical data page may contain installation requirements specific for the sprinkler model selected. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.

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.

6. INSPECTIONS, TESTS AND MAINTENANCE

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

A. Sprinklers must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. Frequency of inspections may vary due to corrosive atmospheres, water supplies, and activity around the sprinkler unit.

B. Sprinklers or cover plate assemblies that have been field painted, caulked, or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced after a specified term of service. Refer to NFPA 25 and the Authority Having Jurisdiction for the specified period of time after which testing and/or replacement is required. Never attempt to repair or reassemble a sprinkler. Sprinklers and cover assemblies that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers and cover assemblies with identical performance characteristics.

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

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

1. Remove the system from service, drain all water, and relieve all pressure on the piping.

2a. For frame-style sprinklers, use the special sprinkler wrench to remove the old sprinkler by turning it counterclockwise to unthread it from the piping.

2b. For flush and concealed style sprinklers: Remove the ceiling ring or cover plate assembly before unthreading the sprinkler body from the piping. Ceiling rings and cover plates can be removed either by gently unthreading them or pulling them off the sprinkler body (depends on the sprinkler model used). After the ceiling ring or cover plate assembly has been removed from the sprinkler body, place the plastic protective cap (from the spare sprinkler cabinet) over the sprinkler to be removed and then fit the sprinkler wrench over the cap. Then use the wrench to unthread the sprinkler from the piping. *Exception: Domed concealed sprinklers are removed without the plastic cap.*

3. Install the new sprinkler unit by following the instructions in section 4. INSTALLATION. Care must be taken to ensure that the replacement sprinkler is the proper model and style, with the correct K-Factor, temperature rating, and response characteristics. A fully stocked spare sprinkler cabinet should be provided for this purpose. For flush or concealed sprinklers: stock of spare ceiling rings or cover plates should also be available in the spare sprinkler cabinet.

E. Place the system back in service and secure all valves. Check for and repair all leaks. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

7. AVAILABILITY

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

8. GUARANTEE

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

VIKING®

BULLETIN

REGULATORY AND HEALTH WARNINGS

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

Regulatory and Health Warnings applying to materials used in the manufacture and construction of fire protection products are provided herin as they relate to legally mandated jurisdictional regions.

⚠ WARNING

STATE OF CALIFORNIA, USA

Installing or servicing fire protection products such as sprinklers, valves, piping etc. can expose you to chemicals including, but not limited to, lead, nickel, butadiene, titaninum dioxide, chromium, carbon black, and acrylonitrile which are known to the State of California to cause cancer or birth defects or other reproductive harm.

For more information, go to **www.P65Warnings.ca.gov**

2. WARRANTY TERMS AND CONDITIONS

For details of warranty, refer to Viking's current list price schedule at **www.vikinggroupinc.com** or contact Viking directly.

Series DS-1 Dry-Type Sprinklers 5.6K Pendent, Upright, and Horizontal Sidewall Quick Response, Standard Coverage

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

Scan the QR code or enter the URL in a web browser to access the most up-to-date electronic version of this document. Data rates may apply.

docs.jci.com/tycofire/series-ds-1-dry-5_6-k-pen-up-side-quick

General Description

TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are decorative glass bulb automatic sprinklers designed for commercial use. Dry-type sprinklers are typically used where:

- pendent sprinklers are required on dry pipe systems that are exposed to freezing temperatures; for example, sprinkler drops from unheated portions of buildings
- sprinklers and/or a portion of the connecting piping are exposed to freezing temperatures; for example, sprinkler drops from wet systems into freezers, sprinkler sprigs from wet systems into unheated attics, or horizontal piping extensions through a wall to protect an unheated areas such as loading docks, overhangs, and building exteriors
- sprinklers are used on systems that are seasonally drained to avoid freezing for example, vacation areas

NOTICE

The Series DS-1 Dry-Type Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

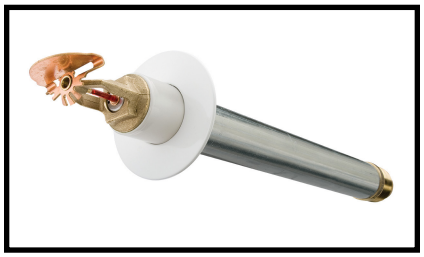
The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.

Sprinkler Identification Numbers (SINs)

3/4 in. NPT:
TY3935 – Pendent
TY3735 – Horizontal Sidewall

1 in. NPT:
TY3235 – Pendent
TY3135 – Upright
TY3335 – Horizontal Sidewall



Technical Data

Approvals
UL and C-UL Listed
FM Approved
EAC Approved
NYC Approved under MEA 352-01-E

Previous New York City Approval and MEA certification numbers apply to product as shown in this data sheet. In accordance with Section BC 3502 of the Construction Code, current NYC Approvals for use in the City of New York apply to all products that contain UL or FM Approvals and Listings; therefore, not all products currently Approved for use in the City of New York will carry an actual MEA Certification number.

See Tables A and B for Approvals details.

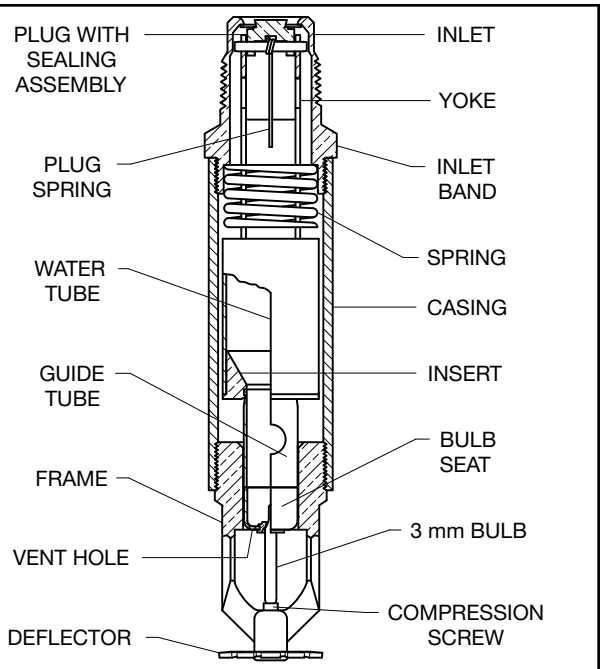


FIGURE 1
SERIES DS-1, 3/4 IN. NPT, DRY-TYPE SPRINKLER ASSEMBLY

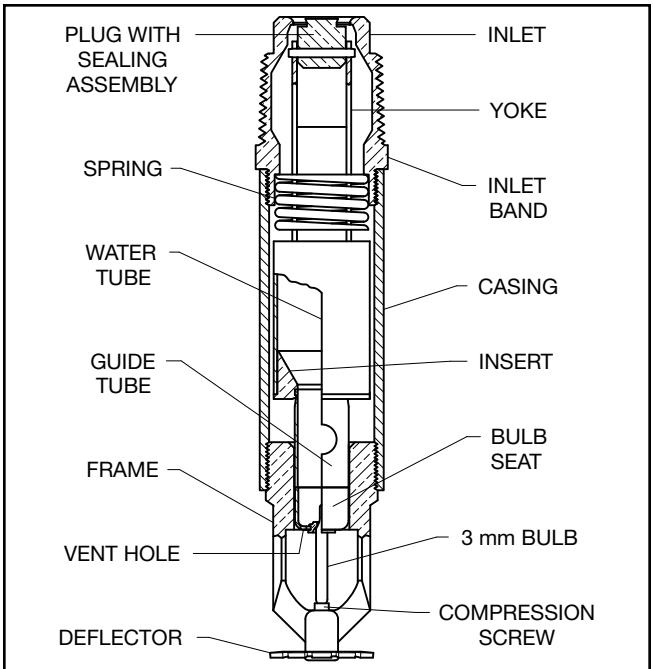


FIGURE 2
SERIES DS-1, 1 IN. NPT AND ISO 7-R 1 DRY-TYPE SPRINKLER ASSEMBLY

Maximum Working Pressure
175 psi (12,1 bar)

Inlet Thread Connections
3/4 in. NPT
1 in. NPT or ISO 7-R 1

Discharge Coefficient
K=5.6 gpm/psi½ (80,6 lpm/bar½)

Temperature Ratings
See Tables A and B

Finishes
Sprinkler: Natural Brass, Chrome Plated, or Signal White

Escutcheon: Signal White, Chrome Plated, or Brass Plated

Physical Characteristics

Inlet	Copper
Plug	Copper
Yoke	Stainless Steel
Casing	Galvanized Carbon Steel
Insert	Bronze
Bulb Seat	Stainless Steel
Bulb	Glass
Compression Screw	Bronze
Deflector	Bronze
Frame	Bronze
Guide Tube	Stainless Steel
Water Tube	Stainless Steel
Spring	Stainless Steel
Plug Spring*	Stainless Steel
Sealing Assembly	Beryllium Nickel w/TEFLON
Escutcheon	Carbon Steel or Stainless Steel

* For 3/4 in. NPT only

Operation

When the TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are in service, water is prevented from entering the assembly by the Plug with Sealing Assembly in the Inlet of the Sprinkler. See Figures 1 and 2.

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb, and the Bulb Seat is released.

The compressed Spring is then able to expand and push the Water Tube as well as the Guide Tube outward. This action simultaneously pulls inward on the Yoke, withdrawing the Plug with Sealing Assembly from the Inlet and allowing the sprinkler to activate and flow water.

Design Criteria

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are intended for use in fire sprinkler systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency; for example, UL Listing is based on NFPA 13 requirements.

Sprinkler Fittings
Install the 3/4 or 1 in. NPT Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 in. NPT outlet or run of the following fittings:

- malleable or ductile iron threaded tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150)
- cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125)

Do not install the DS-1 Sprinklers into an elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow, potentially damaging the Inlet seal.

The unused outlet of the threaded tee is plugged as shown in Figure 13.

You can also install the Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 in. NPT outlet of a GRINNELL Figure 730 Mechanical Tee. However, the use of the Figure 730 Tee for this arrangement is limited to wet pipe systems.

The configuration shown in Figure 12 is only applicable for wet pipe systems where the sprinkler fitting and water-filled pipe above the sprinkler fitting are not subject to freezing and where the length of the Dry-Type Sprinkler has the minimum exposure length depicted in Figure 11. See the Exposure Length section.

For wet pipe system installations of the 1 in. NPT Series DS-1 Dry-Type Sprinklers connected to CPVC piping, use only the following TYCO CPVC fittings:

- 1 in. x 1 in. NPT Female Adapter (P/N 80145)
- 1 in. x 1 in. x 1 in. NPT Sprinkler Head Adapter Tee (P/N 80249)

		3/4 in. NPT								
		TY3935 Pendent with Recessed Escutcheon (Figure 4)			**TY3935 Pendent** with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6)			**TY3735 Horizontal Sidewall** with Top of Deflector-to-Ceiling Distance of 4 to 12 in. (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	**Bulb Color Code**	**Finish**								
		Natural Brass	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**
135°F (57°C)	Orange	1, 2			1, 2			1*, 2*		
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue									

Notes:
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.)
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.)
* Light and Ordinary Hazard occupancies only

TABLE A
3/4 IN. NPT SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS LABORATORY LISTINGS AND APPROVALS

		1 in. NPT (and ISO 7-R 1)								
		TY3235 Pendent with Recessed Escutcheon (Figure 4)			**TY3235 Pendent** with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6) TY3135 Upright without Escutcheon[5] (Figure 7)			**TY3335 Horizontal Sidewall** with Top of Deflector-to-Ceiling Distance of 4 to 12 in. (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	**Bulb Color Code**	**Finish**								
		Natural Brass	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**
135°F (57°C)	Orange	1, 2, 3, 4, 6		1, 2, 4, 6	1, 2, 3, 4, 6		1, 2, 4, 6	1*, 2*, 3**, 4, 6		1*, 2*, 4, 6
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue	1, 2, 4, 6								

Notes:
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.)
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.)
3. Approved by Factory Mutual Research Corporation (maximum order length of48 in.)
4. Approved by the City of New York under MEA 352-01-E
5. The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only
6. EAC Approved
* Light and Ordinary Hazard occupancies only
** Light Hazard occupancies only

TABLE B
1 IN. NPT (AND ISO 7-R 1) SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS LABORATORY LISTINGS AND APPROVALS

For wet pipe system installations of the the 3/4 in. NPT Series DS-1 Sprinklers connected to CPVC piping, use in the 3/4 in. x 3/4 in. NPT Female Adapter (P/N 80142).

For dry pipe system installations, use only the side outlet of maximum 2 1/2 in. reducing tee when locating the Series DS-1 Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 13 to assure complete water drainage from above the Series DS-1 Dry-Type Sprinklers and the branch line. Failure to do so may result in pipe freezing and water damage.

NOTICE

Do not install the Series DS-1 Dry-Type Sprinkler into any other type fitting. Failure to use the appropriate fitting may result in one of the following:

- *failure of the sprinkler to operate properly due to formation of ice over the inlet Plug or binding of the Inlet Plug*
- *insufficient engagement of the Inlet pipe threads with consequent leakage*

Drainage

In accordance with the minimum requirements of the NATIONAL FIRE

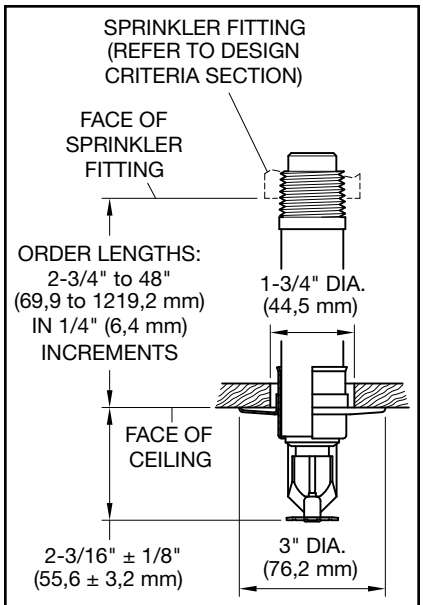


FIGURE 3
PENDENT TY3235 AND TY3935 WITH STANDARD ESCUTCHEON

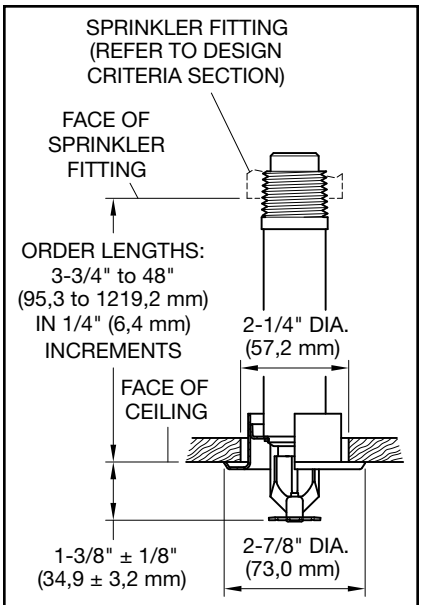


FIGURE 4
PENDENT TY3235 AND TY3935 WITH RECESSED ESCUTCHEON

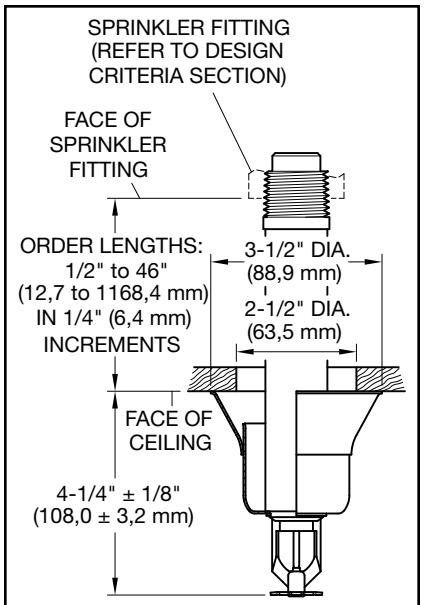


FIGURE 5
PENDENT TY3235 AND TY3935 WITH DEEP ESCUTCHEON

PROTECTION ASSOCIATION for dry pipe sprinkler systems, branch, cross, and feed-main piping connected to Dry Sprinklers and subject to freezing temperatures must be pitched for proper drainage.

Exposure Length
When using Dry Sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use Table C to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. See Figure 11 for an example.

Clearance Space
In accordance with NFPA 13, when connecting an area subject to freezing and an area containing a wet pipe sprinkler system, the clearance space around the sprinkler barrel of Dry-Type Sprinklers must be sealed. Due to temperature differences between two areas, the potential for the formation of condensation in the sprinkler and subsequent ice build-up is increased. If this condensation is not controlled, ice build-up can occur that might damage the dry-type sprinkler and/or prevent proper operation in a fire situation.

Use of the Model DSB-2 Dry Sprinkler Boot, described in Technical Data Sheet TFP591 and shown in Figures 14 and 15, can provide the recommended seal.

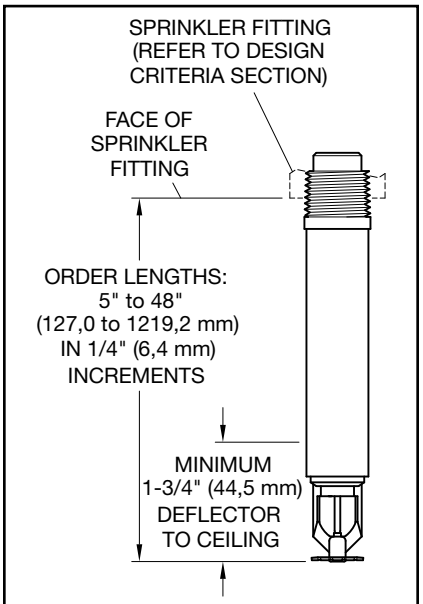


FIGURE 6
PENDENT TY3235 AND TY3935 WITHOUT ESCUTCHEON

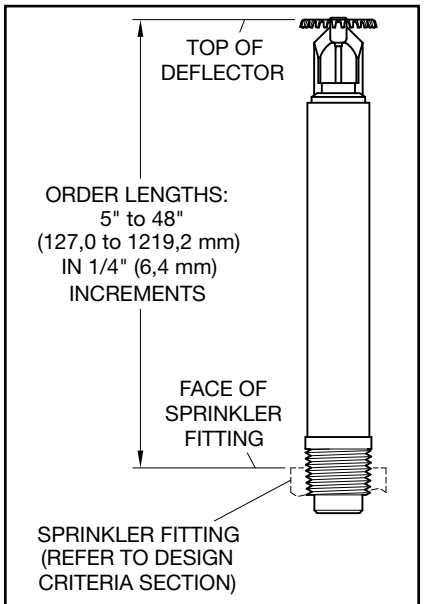


FIGURE 7
UPRIGHT TY3135 WITHOUT ESCUTCHEON, 1 IN. NPT ONLY

Installation

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage must be installed in accordance with this section.

General Instructions
The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section. See the Design Criteria section for other important requirements regarding piping design and sealing of the clearance space around the Sprinkler Casing.

Do not install any bulb-type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm) for the 135°F (57°C) rating to 1/8 in. (3,2 mm) for the 286°F (141°C) rating.

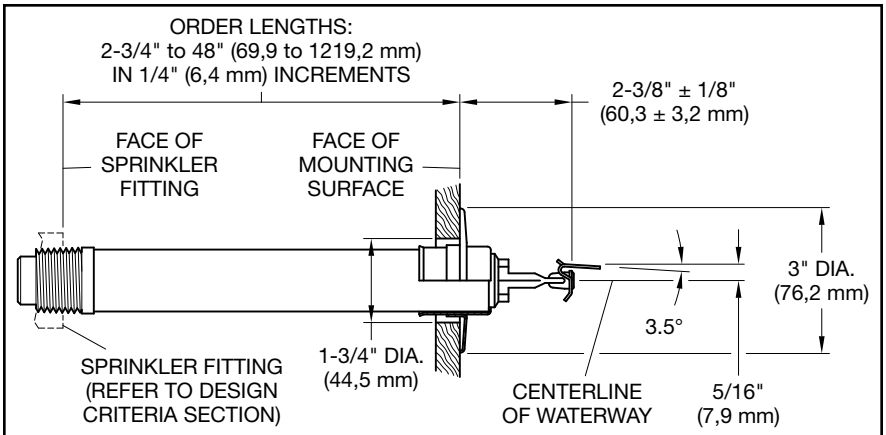


FIGURE 8
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH STANDARD ESCUTCHEON

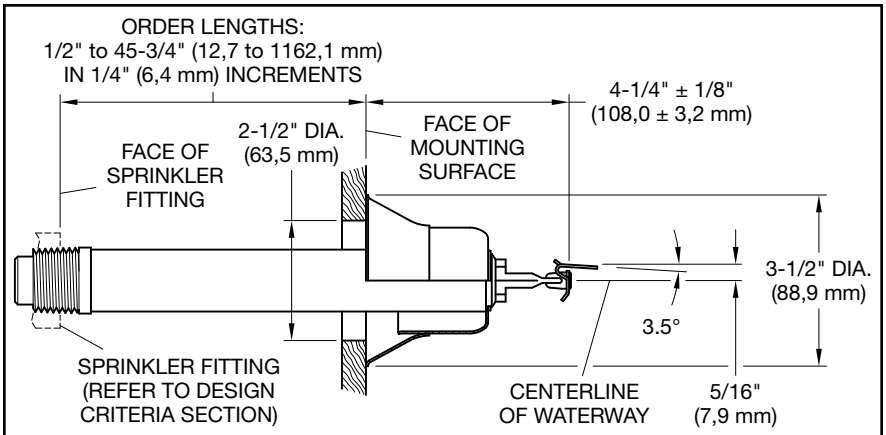


FIGURE 9
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH DEEP ESCUTCHEON

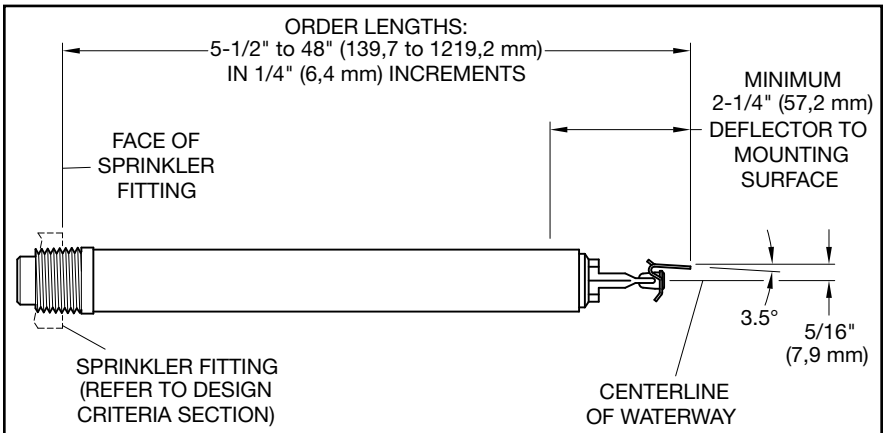


FIGURE 10
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITHOUT ESCUTCHEON

- A leak-tight 3/4 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 10 to 20 lb-ft (13,4 to 26,8 N·m).
- A leak-tight 1 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 20 to 30 lb-ft (26,8 to 40,2 N·m).

Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in an Escutcheon Plate by under or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Step 1. Install pendent sprinklers only in the pendent position, and install upright sprinklers only in the upright position. The deflector of a pendent or upright sprinkler must be parallel to the ceiling.

Install horizontal sidewall sprinklers in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. Ensure the word “TOP” on the Deflector faces the ceiling.

Step 2. With a non-hardening pipe-thread sealant such as TEFLON tape applied to the Inlet threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 3. Wrench-tighten the sprinkler using either:

- a pipe wrench on the Inlet Band or the Casing, see Figures 1 and 2
- the W-Type 7 Sprinkler Wrench on the Wrench Flat, see Figure 16

Apply the Wrench Recess of the W-Type 7 Sprinkler Wrench to the Wrench Flat.

Note: *If sprinkler removal becomes necessary, remove the sprinkler using the same wrenching method noted above. Sprinkler removal is easier when a non-hardening sealant was used and torque guidelines were followed. After removal, inspect the sprinkler for damage.*

Step 4. After installing the ceiling or wall and applying a ceiling finish, slide on the outer piece of the escutcheon until it comes in contact with the ceiling or wall. Do not lift the ceiling panel out of its normal position.

When using the Deep Escutcheon, hold the outer piece in contact with the mounting surface (ceiling or wall). Then rotate the inner piece approximately 1/4 turn with respect to the outer piece, to hold the Deep Escutcheon firmly together.

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area(1)		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length(2), in. (mm)		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (305)	3 (75)	0
-10°F (-23°C)	14 (355)	4 (100)	1 (25)
-20°F (-29°C)	14 (355)	6 (150)	3 (75)
-30°F (-34°C)	16 (405)	8 (200)	4 (100)
-40°F (-40°C)	18 (455)	8 (200)	4 (100)
-50°F (-46°C)	20 (510)	10 (255)	6 (150)
-60°F (-51°C)	20 (510)	10 (255)	6 (150)

Notes:
1. For protected area temperatures that occur between values listed above, use the next cooler temperature.
2. These lengths are inclusive of wind velocities up to 30 mph (18,6 kph).

TABLE C
EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS MINIMUM RECOMMENDED LENGTHS

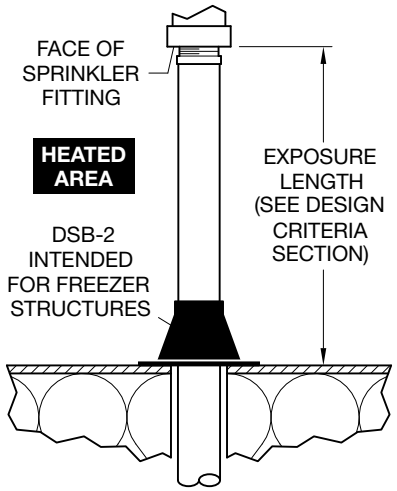


FIGURE 11
EXPOSURE LENGTH

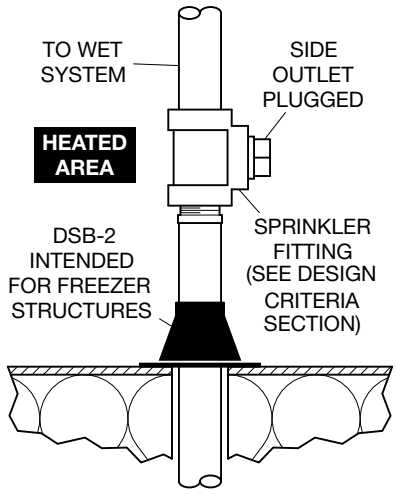


FIGURE 12
SPRINKLER FITTING UNHEATED AREA

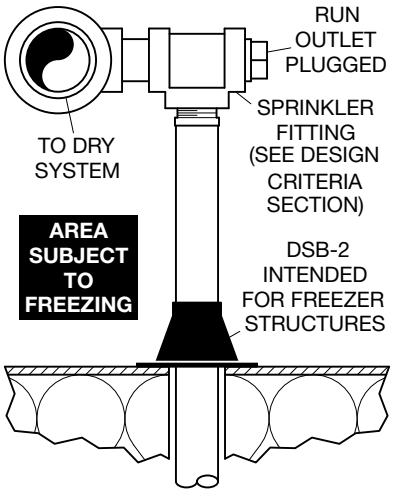


FIGURE 13
SPRINKLER FITTING HEATED AREA

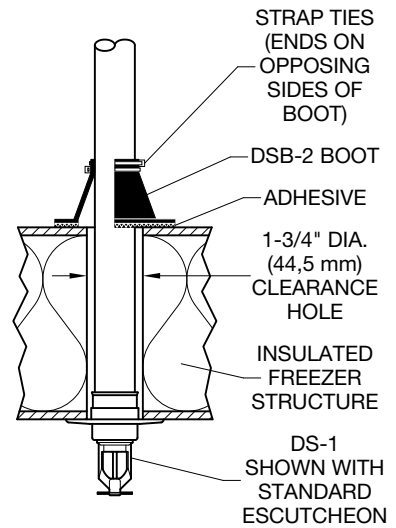


FIGURE 14
MODEL DSB-2 DRY SPRINKLER BOOT WITH PENDENT SERIES DS-1 DRY-TYPE SPRINKLER

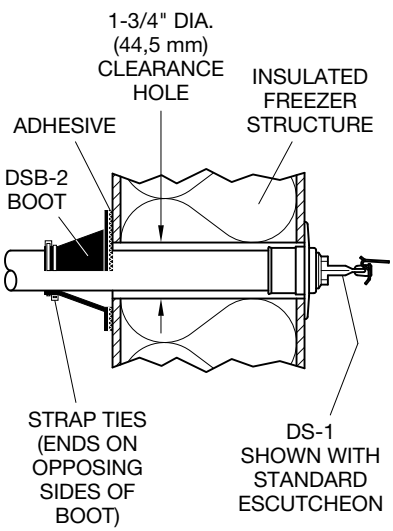


FIGURE 15
MODEL DSB-2 DRY SPRINKLER BOOT WITH SIDEWALL SERIES DS-1 DRY-TYPE SPRINKLER

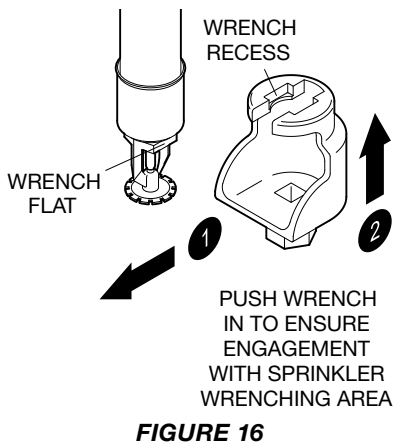


FIGURE 16
W-TYPE 7 SPRINKLER WRENCH

Care and Maintenance

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection systems from the proper authorities and notify all personnel who may be affected by this action.

Absence of the outer piece of an escutcheon, which is used to cover a clearance hole, can delay the time to sprinkler operation in a fire situation.

A Vent Hole is provided in the Bulb Seat (see Figures 1 and 2) to indicate if the Dry-Type Sprinkler is remaining dry. Evidence of leakage from the Vent Hole indicates potential leakage past the Inlet seal and the need to remove the sprinkler to determine the cause of leakage for example, an improper installation or an ice plug. Close the fire protection system control valve and drain the system before removing the sprinkler.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. See the Installation Section.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION, such as NFPA 25, in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and Part Number (P/N).

DS-1 Dry-Type Sprinklers
When ordering TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage, specify the following information:

- SIN:
  Pendent – TY3935 or TY3235
  Sidewall – TY3735 or TY3335
  Upright – TY3135
- 5.6 K-factor
- Deflector Style:
  Upright, Pendent, or Horizontal Sidewall
- Quick Response, Standard Coverage, Dry-Type Sprinkler
- Order Length:
  Dry-Type Sprinklers are furnished based upon Order Length as measured per Figures 3 through 10. After taking the measurement, round it to the nearest 1/4 in. increment.
- Inlet Connections:
  3/4 in. NPT, 1 in. NPT, or ISO 7-R 1
- Temperature Rating
- Sprinkler Finish
- Escutcheon Style and Finish, as applicable
- Part Number (P/N) from Table D

  The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only.

  Part Numbers are for 3/4 in. and 1 in. NPT standard order sprinklers. Orders for all other sprinkler assemblies must be accompanied by a complete description. Refer to the Price List for a complete listing of Part Numbers.

Replacement Escutcheons
Order replacement escutcheons separately.

Note: *Style 10 Recessed Escutcheons are shipped as assemblies comprised of closure ring and mounting plate. The included mounting plate is not used for Dry Type Sprinkler applications, discard accordingly.*

Specify: (specify type), (specify) finish, P/N (specify):

Recessed (Style 10)
Brass Plated 56-701-2-010
Signal White (RAL9003) 56-701-4-010
Chrome Plated 56-701-9-010

Standard (Push-On)
White Color 91-106-0-007
Brass Plated 91-106-2-007
Chrome Plated 91-106-9-007

Deep
Brass Plated 91-107-2-010
White 91-107-4-007
Chrome Plated 91-107-9-007

Sprinkler Wrench
Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001

Sprinkler Boot
Specify: Model DSB-2 Dry Sprinkler Boot, P/N 63-000-0-002

This Part Number includes one (1) Boot, two (2) Strap Ties, and 1/3 oz of Adhesive (a sufficient quantity for installing one boot).

P/N* 60–XXX–X–XXX

		SIN
01	Pendent with Standard Escutcheon (3/4 in. NPT)	TY3935 (Figure 3)
02	Pendent with Deep Escutcheon (3/4 in. NPT)	TY3935 (Figure 5)
03	Pendent with Recessed Escutcheon (3/4 in. NPT)	TY3935 (Figure 4)
04	Pendent without Escutcheon (3/4 in. NPT)	TY3935 (Figure 6)
05	Sidewall with Standard Escutcheon (3/4 in. NPT)	TY3735 (Figure 8)
06	Sidewall with Deep Escutcheon (3/4 in. NPT)	TY3735 (Figure 9)
07	Sidewall without Escutcheon (3/4 in. NPT)	TY3735 (Figure 10)
36	Pendent with Standard Escutcheon (1 in. NPT)	TY3235 (Figure 3)
33	Pendent with Deep Escutcheon (1 in. NPT)	TY3235 (Figure 5)
37	Pendent with Recessed Escutcheon (1 in. NPT)	TY3235 (Figure 4)
32	Pendent without Escutcheon (1 in. NPT)	TY3235 (Figure 6)
34	Sidewall with Standard Escutcheon (1 in. NPT)	TY3335 (Figure 8)
43	Sidewall with Deep Escutcheon (1 in. NPT)	TY3335 (Figure 9)
44	Sidewall without Escutcheon (1 in. NPT)	TY3335 (Figure 10)
38	Upright without Escutcheon (1 in. NPT)	TY3135 (Figure 7)

	SPRINKLER FINISH	ESCUTCHEON FINISH[1]
0	CHROME PLATED	SIGNAL WHITE (RAL9003) POLYESTER
1	NATURAL BRASS	SIGNAL WHITE (RAL9003) POLYESTER
2	NATURAL BRASS	BRASS PLATED
4	SIGNAL WHITE (RAL9003) POLYESTER	SIGNAL WHITE (RAL9003) POLYESTER
8	CHROME PLATED	STAINLESS STEEL
9	CHROME PLATED	CHROME PLATED

	SAMPLE ORDER LENGTH[2]
055	5.50 in.
082	8.25 in.
180	18.00 in.
187	18.75 in.
372	37.25 in.
480	48.00 in.

	TEMPERATURE RATING
0	135°F (57°C)
1	155°F (68°C)
2	175°F (79°C)

	TEMPERATURE RATING
3	200°F (93°C)
4	286°F (141°C)

Notes:
1. Escutcheon Finish applies to sprinklers provided with escutcheons.
2. Dry-Type Sprinklers are furnished based upon "Order Length" as measured per Figures 3 through 10, as applicable, and for each individual sprinkler where it is to be installed. After the measurement is taken, round it to the nearest 1/4 in. increment.

* Use Prefix "I" for ISO 7-R 1 Connection (for example, I-60-360-4-055).

TABLE D
SERIES DS-1 DRY-TYPE SPRINKLERS
PART NUMBER SELECTION

1400 Pennbrook Parkway, Lansdale, PA 19446 | Telephone +1-215-362-0700

Johnson Controls

SWITCHES

POTTER
The Symbol of Protection

OSYSU Series

Outside Screw and Yoke Valve Supervisory Switch

Features

- NEMA 4X* (IP 65) and 6P (IP 67)

  **Enclosure is 4X. For additional corrosion protection of mounting hardware, use model OSYSU-2 CRH*
- -40º to 140º (-40ºC to 60ºC) operating temperature range
- Visual switch indicators
- Two conduit entrances
- Adjustable length trip rod
- Accomodates up to 12AWG wire
- Three position switch detects tampering and valve closure
- Knurled mounting bracket prevents slipping
- Fine adjustment feature for fast, easy installation
- RoHS compliant
- One or two SPDT contact models (-1,-2)

NOTICE

Before any work is done on the fire sprinkler or fire alarm system, the building owner or their authorized representative shall be notified. Before opening any closed valve, ensure that opening the valve will not cause any damage from water flow due to open or missing sprinklers, piping, etc.

SIGNALING c UL us LISTED

FM APPROVED

CE

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

Description

The OSYSU is used to monitor the open position of an OS&Y (outside screw and yoke) type gate valve. This device is available in two models; the OSYSU-1, containing one set of SPDT (Form C) contacts and the OSYSU-2, containing two sets of SPDT (Form C) contacts. These switches mount conveniently to most OS&Y valves ranging in size from 2" to 12" (50mm to 300mm). They will mount on some valves as small as ½" (12,5mm).

The cover is held in place by two tamper resistant screws that require a special tool to remove. The tool is furnished with each device.

Testing

The operation of the OSYSU and its associated protective monitoring system shall be inspected, tested, and maintained in accordance with all applicable local and national codes and standards and/or the Authority Having Jurisdiction (manufacturer recommends quarterly or more frequently). A minimum test shall consist of turning the valve wheel towards the closed position. The OSYSU shall operate within the first two revolutions of the wheel. Fully close the valve and ensure that the OSYSU does not restore. Fully open the valve and ensure that the OSYSU restores to normal only when the valve is fully opened.

⚠ CAUTION

Close the valve fully to determine that the stem threads do not activate the switch. The switch being activated by the stem threads could result in a ***false valve open*** indication.

Technical Specifications

Dimensions	See Fig 8
Weight	1.6 lbs (0,73 kg)
Enclosure	Cover: Die Cast Finish: Red Powder Coat Base: Die Cast Finish: Black Powder Coat All parts have corrosion resistant finishes
Cover Tamper	Tamper Resistant Screws Optional Cover Tamper Switch Available
Contact Ratings	OSYSU-1: One Set of SPDT (Form C) OSYSU-2: Two Sets of SPDT (Form C) 10.0 Amps at 125/250 VAC 2.0 Amps at 30VDC Resistive 10 mAmps minimum at 24 VDC
Environmental Limitations	-40º F to 140ºF (-40ºC to 60ºC) NEMA 4X (IP 65) and NEMA 6P (IP 67) Enclosure (Use suitably rated conduit and connector) Indoor or Outdoor Use (See OSYSU-EX Bulletin 5400705 for Hazardous locations)
Conduit Entrances	Two Knockouts for 1/2" conduit provided (See Notice on Page 6 and Fig. 9 on Page 5)
Service Use	NFPA 13, 13D, 13R, 72

Specifications subject to change without notice

Theory of Operation

The OSYSU is a 3 position switch. The center position is the normal installation position. Normal is when the switch is installed on the OS&Y valve, the valve is fully open and the trip rod of the OSYSU is in the groove of the valve stem. Closing the valve causes the trip rod to ride up out of the groove and activates the switches. Removing the OSYSU from the valve causes the spring to pull the trip rod in the other direction and activates the switches.

Visual Switch Status Indication

There are 3 visual indicators to determine the status of the switches.

Fig 1; the actuator button of the micro switches are on the raised section of the switch actuator.

Fig 2; the trip rod is perpendicular to the base and lined up with the alignment mark on the mounting bracket.

Fig 3; the white visual indicator is visible through the window on the back of the switch actuator.

A final test is to meter the contacts marked COM and N.O. to ensure they are an open circuit when the valve is open and that they close and have continuity within 2 revolutions of turning the valve handwheel towards the closed position and the contacts remain closed as the valve is completely closed and until the valve is completely opened when the trip rod drops back into the groove in the valve stem.

Fig 1

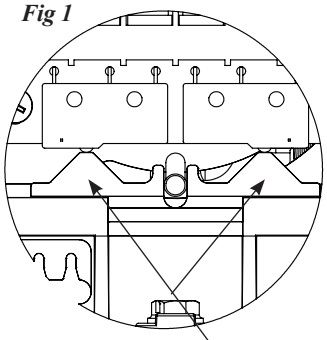


Fig 2

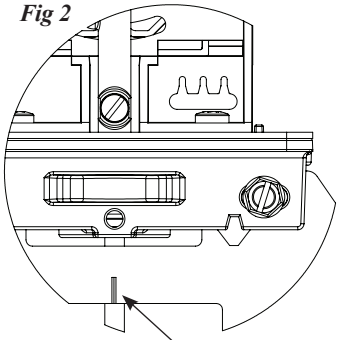


Fig 3

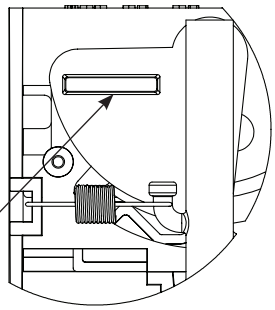


Fig 4

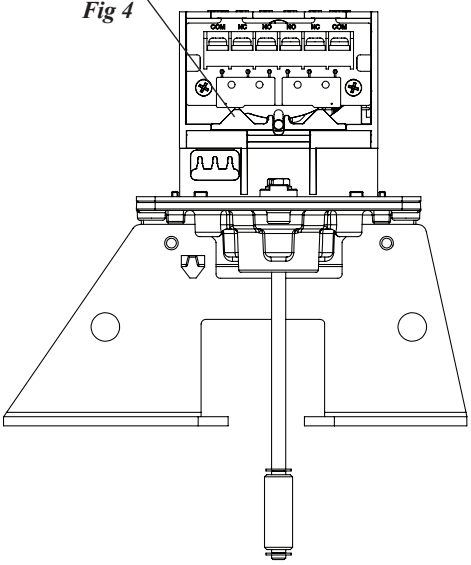


Fig 5

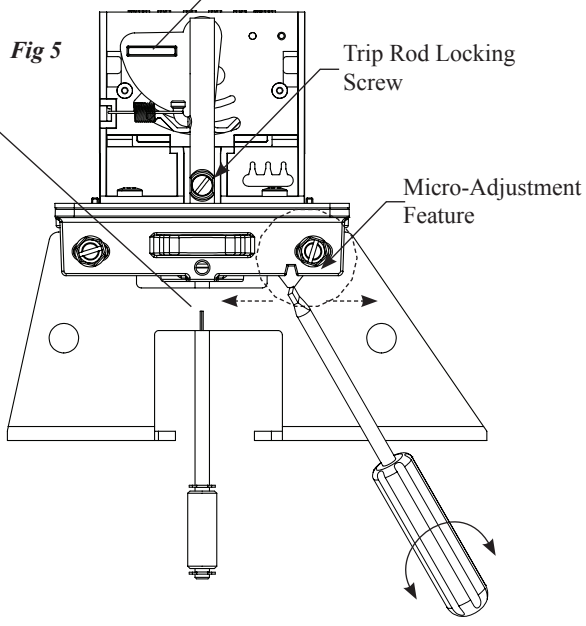
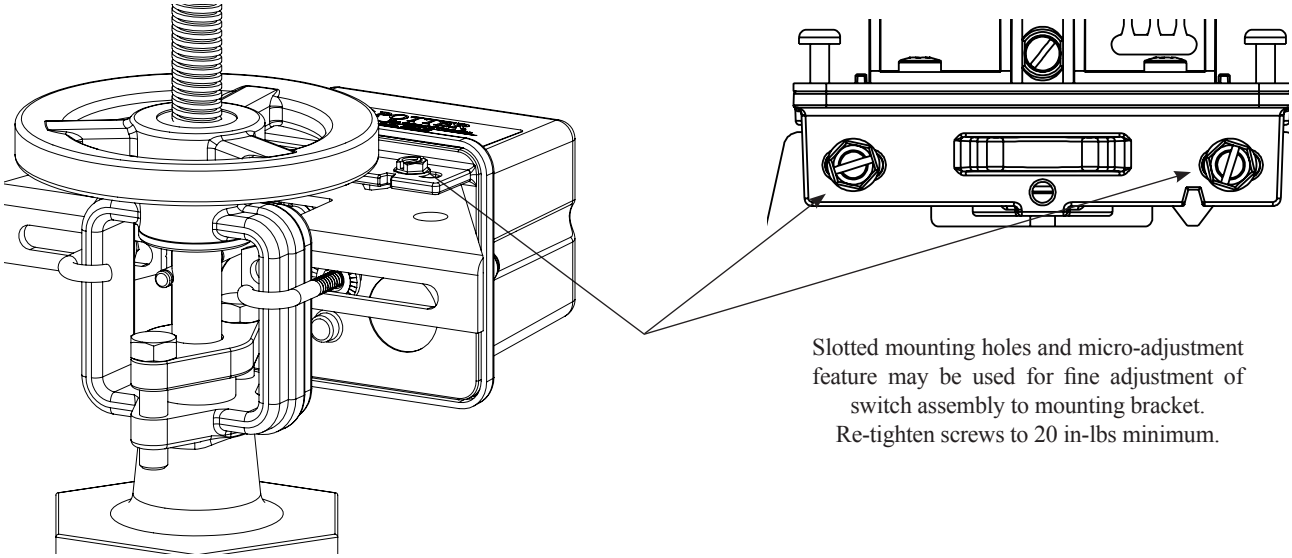


Fig 6

Small Valve Installation - 1/2” Through 2 1/2” Sizes



Slotted mounting holes and micro-adjustment feature may be used for fine adjustment of switch assembly to mounting bracket. Re-tighten screws to 20 in-lbs minimum.

Small Valve Installation

NOTE: If the valve stem is pre-grooved at 1/8” minimum depth; proceed to step 7.

1. Remove and discard "E" ring and roller from the trip rod.
2. With the valve in the FULL OPEN position, locate the OSYSU across the valve yoke as far as possible from the valve gland so that the spring loaded trip rod of the OSYSU is pulled against the non threaded portion of the valve stem. Position the OSYSU with the bracket near the handwheel as shown in Fig. 6 if possible to avoid creating a pinch point between the wheel and the OSYSU.
3. Loosen the locking screw that holds the trip rod in place and adjust the rod length (see Fig. 5). When adjusted properly, the rod should extend past the valve screw, but not so far that it contacts the clamp bar. Tighten the locking screw to 5 in-lbs minimum to hold the trip rod in place and properly seal the enclosure.

   NOTE: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the one (1) inch long notched section (see Fig. 10). Reinstall trip rod and repeat Step 3 procedure.
4. Mount the OSYSU loosely with the carriage bolts and clamp bar supplied. On valves with limited clearance use J-hooks supplied instead of the carriage bolts and clamp bar to mount the OSYSU.
5. Mark the valve stem at the center of the trip rod.
6. Remove the OSYSU. Utilizing a 3/16” or 1/4” diameter straight file, file a 1/8” minimum depth groove centered on the mark on the valve stem. Deburr and smooth the edges of the groove to prevent damage to the valve packing and to allow the trip rod to move easily in and out of the groove as the valve is operated.

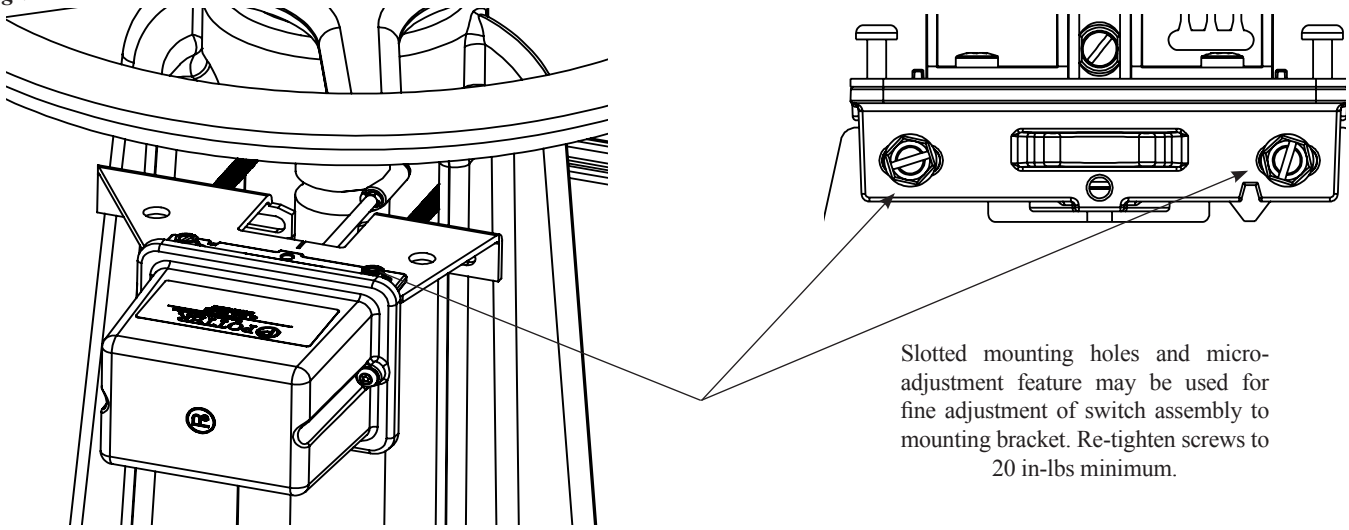
   NOTE: A groove depth of up to approximately 3/16” can make it easier to install the OSYSU so that it does not restore as it rolls over by the threads of the valve stem.
7. Mount the OSYSU on the valve yoke with the spring loaded trip rod of the OSYSU pulled against the valve stem and centered in the groove of the stem. If possible, position the OSYSU with the flat side of the bracket toward the hand wheel, as shown in Fig. 6, to help avoid creating a pinch point between the wheel and OSYSU. When in this preferred mounting position, it is usually best to use the white indicator visible through the window, as illustrated in Fig. 3, to aid in initially locating the OSYSU in the correct position on the yoke. If the unit must be installed inverted with the white indicator no longer easily visible, use the visual indicators of the actuator buttons on the micro-switches, as illustrated in Fig. 1, or the trip rod alignment mark on the bracket, as illustrated in Fig. 2 , to aid in initially locating the OSYSU.
8. Final adjustment can be made by slightly loosening the two screws on the bracket and using the fine adjustment feature (see Fig. 5). The adjustment is correct when the plungers on the switches are depressed by the actuator and there is no continuity between the COM and NO terminals on the switches.
9. Tighten the adjustment screws and all mounting hardware securely (20 in-lbs minimum). Check to insure that the rod moves out of the groove easily and that the switches activate within two turns when the valve is operated from the FULL OPEN towards the CLOSED position.
10. Reinstall the cover and tighten the cover screws to 15 in-lbs minimum to properly seal the enclosure.

⚠ CAUTION

Close the valve fully to determine that the stem threads do not activate the switch. The switch being activated by the stem threads could result in a ***false valve open*** indication.

Large Valve Installation - 3" Through 12" Sizes

Fig 7



Slotted mounting holes and micro-adjustment feature may be used for fine adjustment of switch assembly to mounting bracket. Re-tighten screws to 20 in-lbs minimum.

Large Valve Installation

NOTE: If the valve stem is pre-grooved at 1/8" minimum depth; proceed to step 6.

1. With the valve in the FULL OPEN position, locate the OSYSU across the valve yoke as far from the valve gland as possible so that the spring loaded trip rod of the OSYSU is pulled against the non threaded portion of the valve stem. Position the OSYSU with the bracket near the handwheel as shown in Fig. 7 if possible to avoid creating a pinch point between the wheel and the OSYSU.
2. Mount the OSYSU loosely with the carriage bolts and clamp bar supplied.
3. Loosen the locking screw that holds the trip rod in place and adjust the rod length (see Fig. 5). When adjusted properly, the rod should extend past the valve screw, but not so far that it contacts the clamp bar. Tighten the locking screw to 5 in-lbs minimum to hold the trip rod in place and properly seal the enclosure.

   NOTE: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the one (1) inch long notched section (see Fig. 10). Reinstall trip rod and repeat Step 3 procedure.
4. Mark the valve stem at the center of the trip rod.
5. Remove the OSYSU. Utilizing a 3/8" or ½" diameter straight file, file a 1/8" minimum depth groove centered on the mark on the valve stem. Deburr and smooth the edges of the groove to prevent damage to the valve packing and to allow the trip rod to move easily in and out of the groove as the valve is operated.

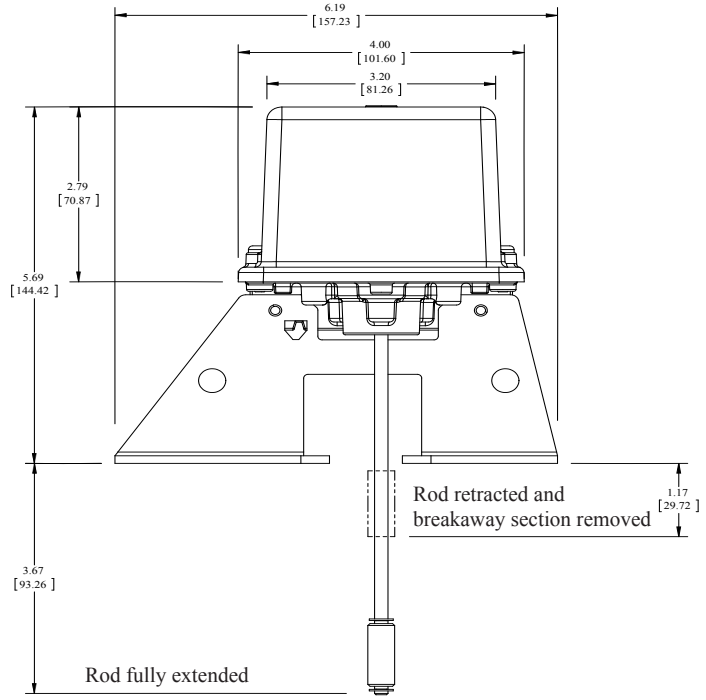
   NOTE: A groove depth of up to approximately 3/16" can make it easier to install the OSYSU so that it does not restore as it rolls over by the threads of the valve stem.
6. Mount the OSYSU on the valve yoke with the spring loaded trip rod of the OSYSU pulled against the valve stem and centered in the groove of the stem. If possible, position the OSYSU with the flat side of the bracket toward the hand wheel, as shown in Fig. 7, to help avoid creating a pinch point between the wheel and OSYSU. When in this preferred mounting position, it is usually best to use the white indicator visible through the window, as illustrated in Fig. 3, to aid in initially locating the OSYSU in the correct position on the yoke. If the unit must be installed inverted with the white indicator no longer easily visible, use the visual indicators of the actuator buttons on the micro-switches, as illustrated in Fig. 1, or the trip rod alignment mark on the bracket, as illustrated in Fig. 2 , to aid in initially locating the OSYSU.
7. Final adjustment can be made by slightly loosening the two screws on the bracket and using the fine adjustment feature (see Fig. 5). The adjustment is correct when the plungers on the switches are depressed by the actuator and there is no continuity between the COM and NO terminals on the switches.
8. Tighten the adjustment screws and mounting hardware securely (minimum 20 in-lbs). Check to insure that the rod moves out of the groove easily and that the switches activate within two turns when the valve is operated from the FULL OPEN towards the CLOSED position.
9. Reinstall the cover and tighten the cover screws to 15 in-lbs minimum to properly seal the enclosure.

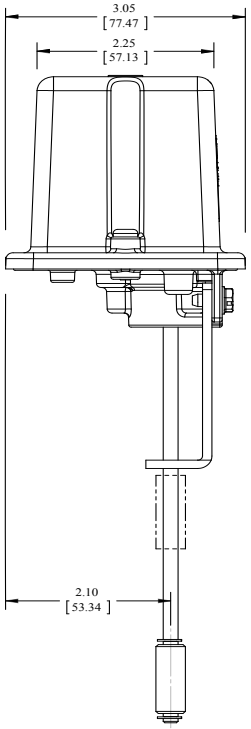
⚠ CAUTION

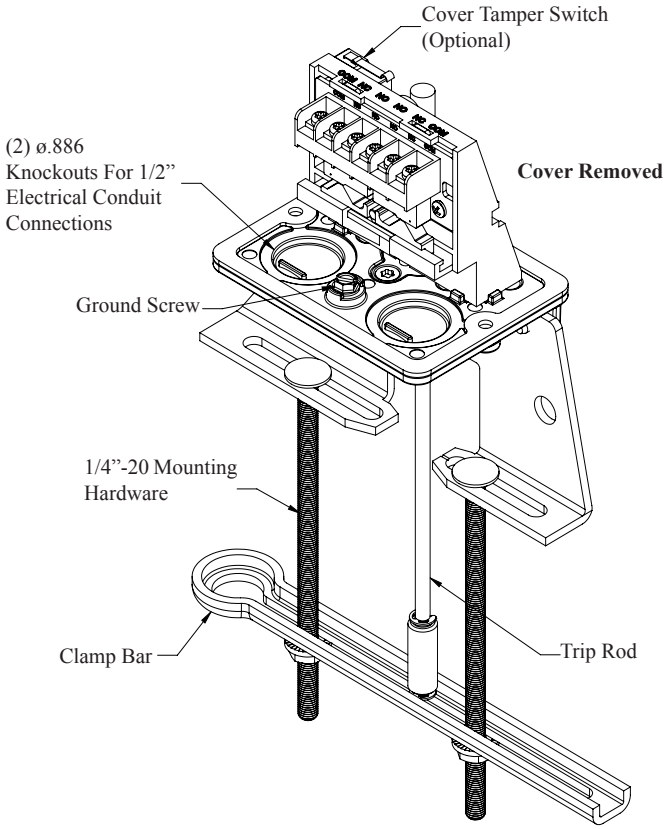
Close the valve fully to determine that the stem threads do not activate the switch. The switch being activated by the stem threads could result in a ***false valve open*** indication.

Dimensions

Fig 8



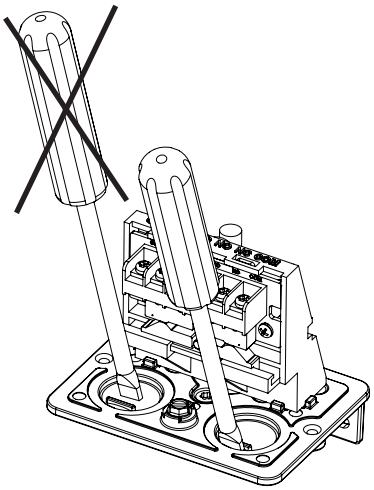




Knockout Removal

Fig 9

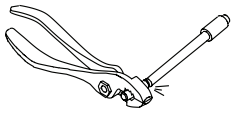
To remove knockouts: Place screwdriver at inside edge of knockouts, not in the center.



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

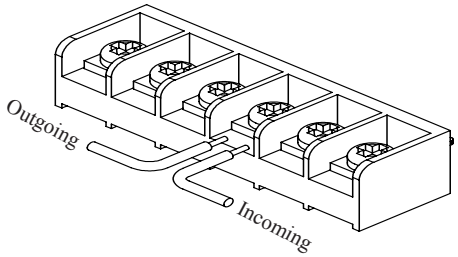
Breaking Excessive Rod Length

Fig 10



Switch Terminal Connections Clamping Plate Terminal

Fig 11



⚠ WARNING

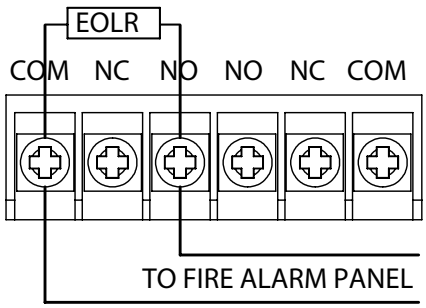
An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal. Failure to sever the wire may render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

NOTICE

All conduit and connectors selected for the installation of this product shall be suitable for the environment for which it is to be used and shall be installed to the manufacturer's installation instructions. For NEMA 4, 4X, 6, 6P installations, the cover screws are recommended to be tightened to 15 in-lbs minimum and the trip rod locking screw tightened to 5 in-lbs minimum to properly seal the enclosure.

Typical Electrical Connections

Fig 12



Ordering Information

Model	Description	Stock No.
OSYSU-1	Outside Screw & Yoke Supervisory Switch (Single switch)	1010102
OSYSU-2	Outside Screw & Yoke Supervisory Switch (Double switch)	1010202
OSYSU-2 CRH	Outside Screw & Yoke Supervisory Switch (Double Switch). Corrosion resistant hardware of 316 stainless steel & nickel plated to ASTM B377 Type V Brackets	1010210
	Cover Screw	5490424
	Hex Key for Cover Screws and Installation Adjustments	5250062
	Optional Cover Tamper Switch Kit	0090200

Engineering Specifications: OS&Y Valves

UL, CUL Listed / FM Approved and CE Marked valve supervisory switches shall be furnished and installed on all OS&Y type valves that can be used to shut off the flow of water to any portion of the fire sprinkler system, where indicated on the drawings and plans and as required by applicable local and national codes and standards. The supervisory switch shall be NEMA 4X and 6P rated and capable of being mounted in any position indoors or out and be completely submerged without allowing water to enter the enclosure.. The enclosure shall be held captive by tamper resistant screws. The device shall contain two ½" conduit entrances and one or two Single Pole Double Throw (SPDT) switches. There shall be a visual indicator to display the status of the switches. To aid in installation, it shall be possible to make fine adjustments to the position of the switch on the valve without loosening the mounting bracket from the valve. The device shall contain an adjustable length trip rod and roller, the trip rod shall be held captive by a set screw accessible upon removal of the cover. The switch contacts shall be rated at 10A, 125/250VAC and 2A, 30VDC. OS&Y Valve supervisory switch shall be model OSYSU-1 for the single switch model and OSYSU-2 for the two switch model manufactured by Potter Electric Signal Company LLC

NOTICE

Supervisory switches have a normal service life of 10-15 years. However, the service life may be significantly reduced by local environmental conditions.

VSR

VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

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

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

⚠ 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.

VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

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.

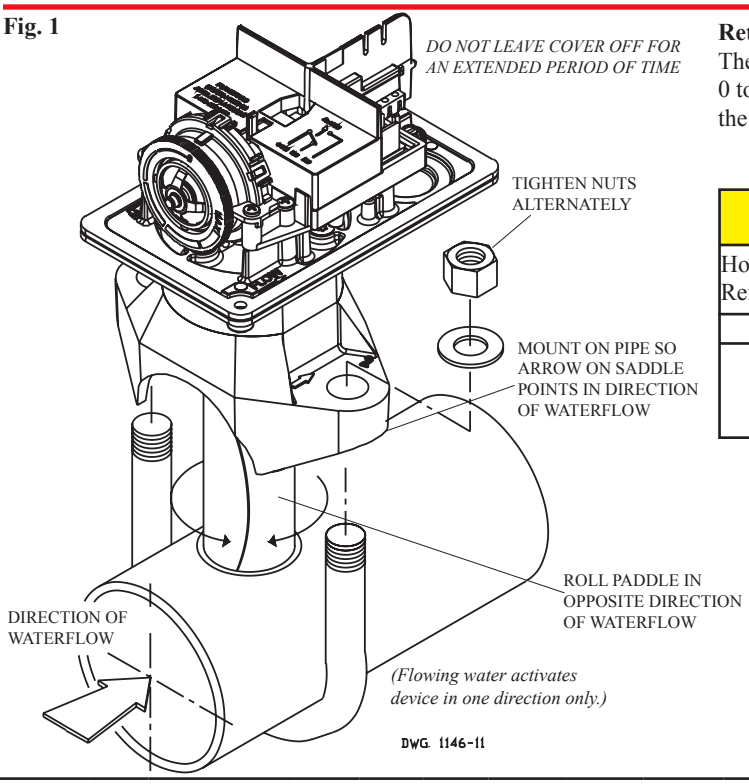
NOTE: Do not leave cover off for an extended period of time.

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

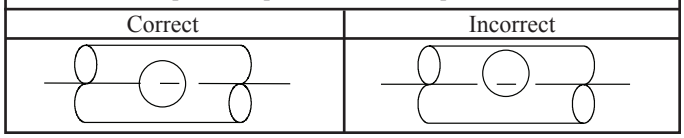


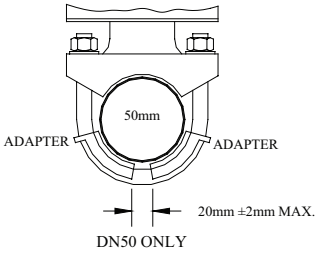
Retard Adjustment

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

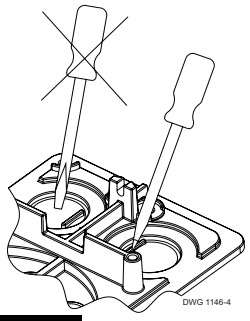
DWG# 1146-1F

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.



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.

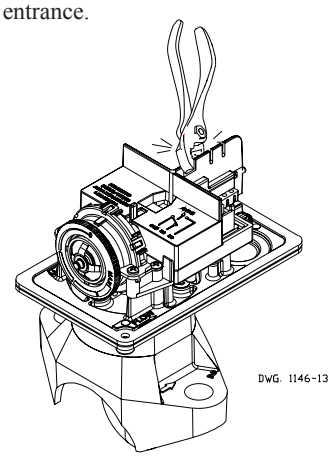
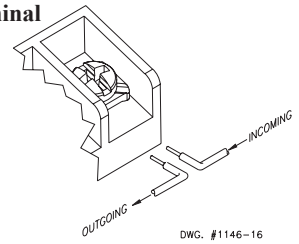


Fig. 4 Switch Terminal Connections Clamping Plate Terminal

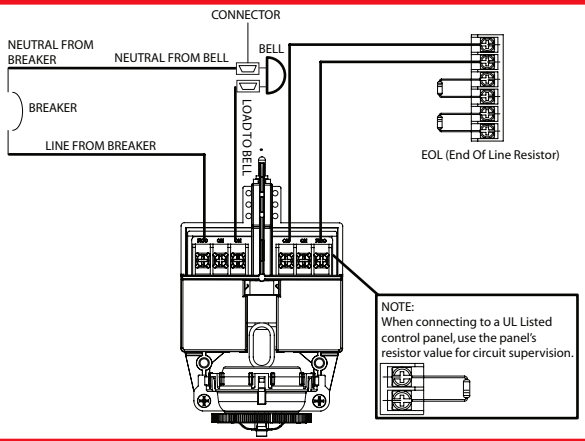


⚠ WARNING

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

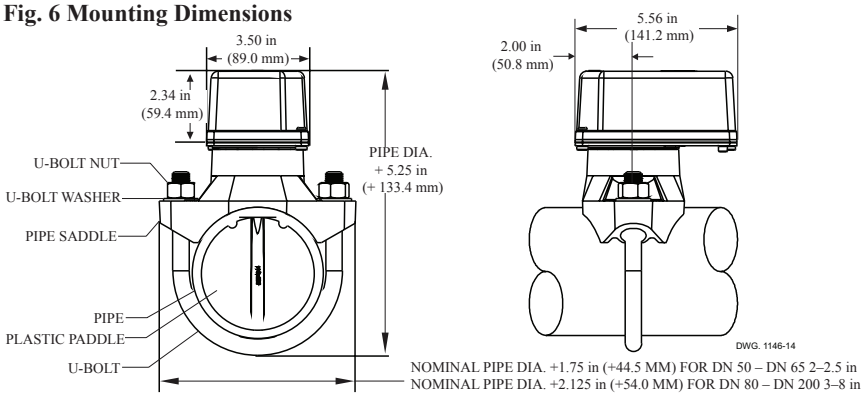
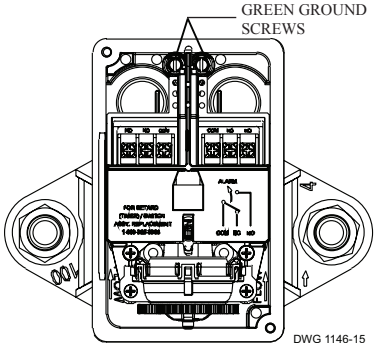


Fig. 7



Maintenance

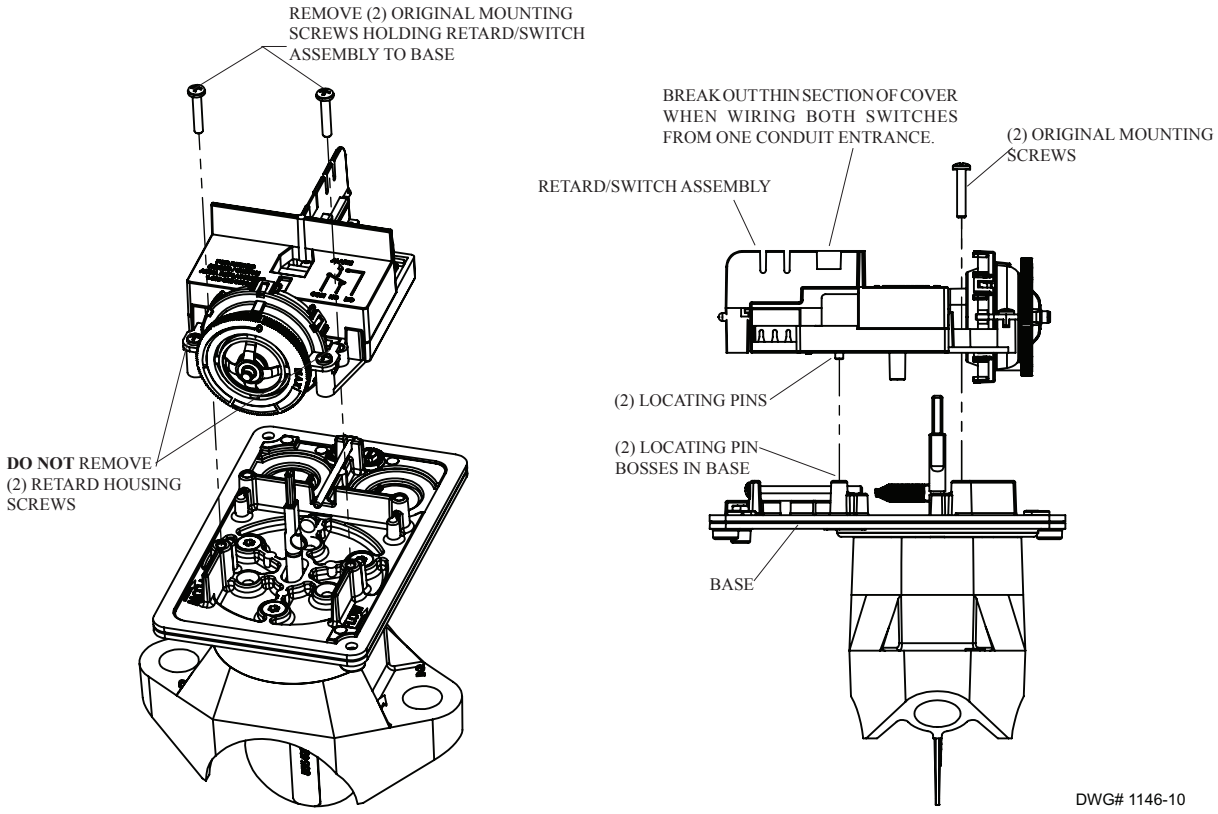
Inspect detectors monthly. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard 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.

POTTER
The Symbol of Protection

BELLS
PBA-AC & MBA-DC

UL, ULC, and FM Approved
Sizes Available: 6" (150mm), 8" (200mm) and 10" (250mm)
Voltages Available: 24VAC
120VAC
12VDC (10.2 to 15.6) Polarized
24VDC (20.4 to 31.2) Polarized
Service Use: Fire Alarm
General Signaling
Burglar Alarm
Environment: Indoor or outdoor use (See Note 1)
-40° to 150°F (-40° to 66°C)
(Outdoor use requires weatherproof backbox.)
Termination: AC Bells - 4 No. 18 AWG stranded wires
DC Bells - Terminal strip
Finish: Red powder coating
Optional: Model BBK-1 weatherproof backbox
Model BBX-1 deep weatherproof backbox

These vibrating type bells are designed for use as fire, burglar 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 weatherproof backbox or BBX-1 deep weatherproof backbox for outdoor applications. Weatherproof backbox model BBK-1, 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

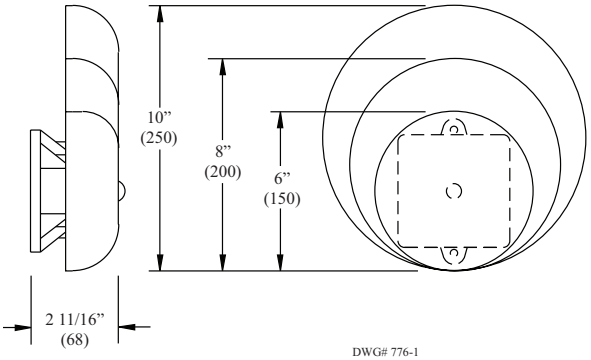
All DC bells are polarized and have built-in transient protection.
* Does not have ULC listing.

⚠ WARNING

In outdoor or wet installations, bell must be mounted with weatherproof backbox, BBK-1 or BBX-1. 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.

Potter Electric Signal Company, LLC • St. Louis, MO, • Phone: 866-572-3005/Canada 888-882-1833 • www.pottersignal.com

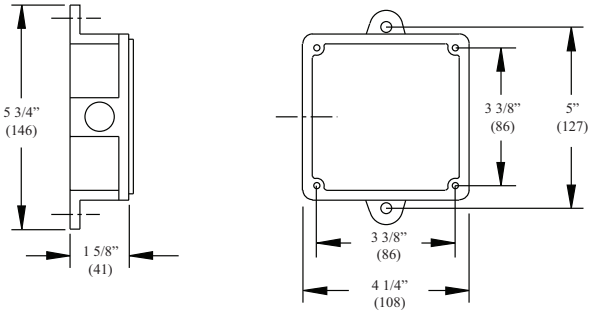
Bells Dimensions Inches (mm)
Fig. 1



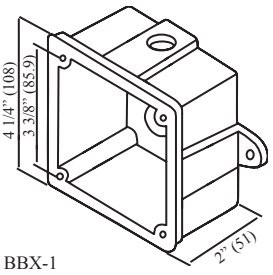
DWG# 776-1

Weatherproof Backbox Dimensions Inches (mm)
Fig. 2

Box has one threaded 1/2" conduit entrance

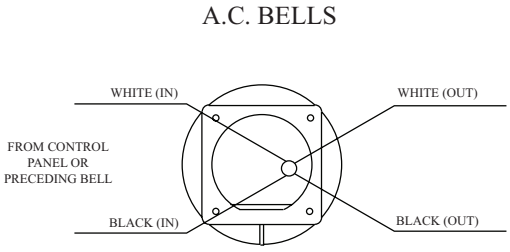


DWG# 776-2



BBX-1

Wiring (rear view)
Fig. 3

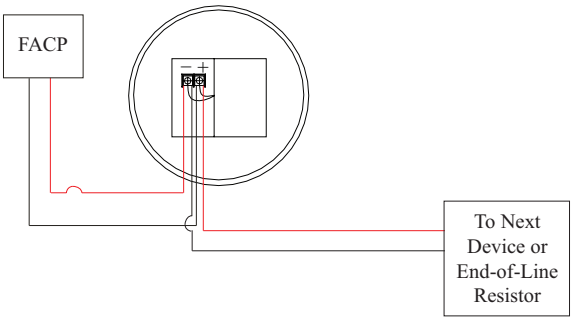


CAUTION:
WHEN ELECTRICAL SUPERVISION IS REQUIRED USE IN AND OUT LEADS AS SHOWN.

NOTES:

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

DWG# 776-3



Installation

1. 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.
2. Remove the gong.
3. Connect wiring (see Fig. 3).
4. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
5. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
6. 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 operating.

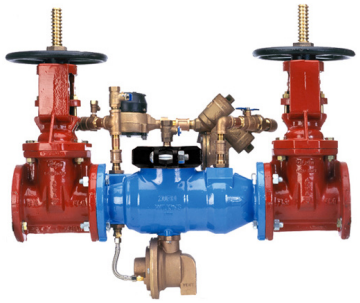
VALVES

Model 375DA

Reduced Pressure Detector Assembly

Application

Designed for installation on water lines in fire protection systems to protect against both backsiphonage and back-pressure of contaminated water into the potable water supply. The Model 375DA shall provide protection where a potential health hazard exists. Incorporates metered by-pass to detect leaks and unauthorized water use.



LEAD FREE

NSF/ANSI/CAN 61

Standards Compliance

(Unless otherwise noted, applies to sizes 2 1/2" thru 10")

- ASSE® Listed 1047
- UL® Classified
- AWWA Compliant C550
- CSA® Certified B64.4 (4" & 6")
- C-UL® Classified
- FM® Approved
- NYC MEA 218-01-M VOL 3
- Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California
- Meets the requirements of NSF/ANSI/CAN 61*

*(0.25% MAX. WEIGHTED AVERAGE LEAD CONTENT)

By-Pass Backflow Assembly 3/4" Model 975XLD

Materials

Main valve body	Ductile Iron ASTM A 536
Access covers	Ductile Iron ASTM A 536
Coatings	NSF Approved fusion epoxy finish
Internals	Stainless steel, 300 Series NORYL™
Fasteners	Stainless Steel, 300 Series
Elastomers	EPDM (FDA approved) Buna Nitrile (FDA approved)
Polymers	NORYL™
Springs	Stainless steel, 300 series
Sensing line	Stainless steel, braided hose

Features

Sizes: 2 1/2", 3", 4", 6", 8", 10"	
Maximum working water pressure	175 PSI
Maximum working water temperature	140°F
Hydrostatic test pressure	350 PSI
End connections (Grooved for steel pipe)	AWWA C606
(Flanged bolt pattern)	ASME B16.42 Class 150

Options (Suffixes can be combined)

- ☐ - with OS & Y gate valves (standard)
- ☐ L - less shut-off valves (flanged body connections)
- ☐ LM - less water meter
- ☐ - with gpm meter (standard)
- ☐ CFM - with cu ft/min meter
- ☐ G - with groove end gate valves
- ☐ FG - with flanged inlet gate connection and grooved outlet gate connection
- ☐ PI - with Post Indicator Gate Valve
- ☐ GF - with flanged inlet connection and grooved outlet connection
- ☐ BG - with grooved end butterfly valves with integral monitor switches (2 1/2" - 10")

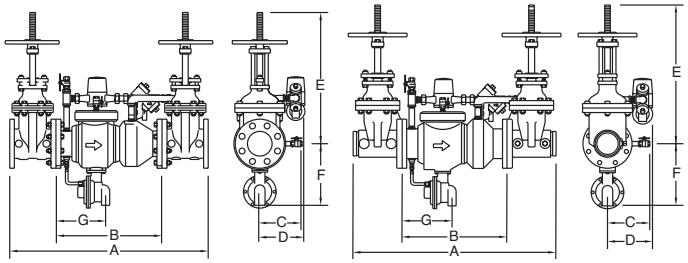
Accessories

- ☐ Air gap (Model AG)
- ☐ Repair kit (rubber only)
- ☐ Thermal expansion tank (Model XT)
- ☐ OS & Y Gate valve tamper switch (OSY-40)
- ☐ QT-SET Quick Test Fitting Set

Attention:
Model 375DA (flange body) and
Model 375ADA
(grooved body) have different lay lengths.

Relief Valve discharge port:
2 1/2" - 6" - 2.75 sq. in.
8" - 10" - 3.69 sq. in.

Model 375DAG SHOWN BELOW



Dimensions & Weights (do not include pkg.)

MODEL 375DA SIZE		DIMENSION (approximate)																				WEIGHT							
		A		A WITH BUTTERFLY VALVES		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		E WITH BUTTERFLY VALVES		F		G		LESS SHUT-OFF VALVES		OS&Y GATE VALVES FLANGED		OS&Y GATE VALVES GROOVED		BUTTERFLY VALVES GROOVED	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
2 1/2	65	31	787	28	711	15 7/8	403	7 1/4	184	9	229	17 3/4	451	15 3/8	391	13 3/4	349	9 1/2	241	8 3/8	213	75	34	185	84	167	76	147	67
3	80	32	813	28 1/2	724	15 7/8	403	7 1/4	184	9	229	20 1/4	514	17	432	13 3/4	349	9 1/2	241	8 3/8	213	78	35	208	94	160	73	130	59
4	100	37 5/8	956	32 8/9	835	19 1/2	495	8	203	9	229	22 1/2	572	18 1/4	464	17	432	11	279	9 1/4	235	116	53	306	139	292	132	200	91
6	150	44 5/8	1133	37 5/8	956	23 1/2	597	10	254	10 1/2	267	30 1/2	775	24 1/4	616	17 1/2	445	12 3/8	314	9 1/4	235	194	88	494	224	468	212	312	142
8	200	60 7/8	1546	53 7/8	1369	37 3/4	959	11	279	15 1/2	394	37	940	28 1/2	724	16 15/16	430	15 3/8	391	16 3/4	426	382	173	858	389	810	367	556	252
10	250	63 7/8	1622	57 7/8	1470	37 3/4	959	11	279	15 1/2	394	45 5/8	1159	34 3/4	883	16 15/16	430	15 3/8	391	16 3/4	426	412	187	1230	558	1164	528	800	363

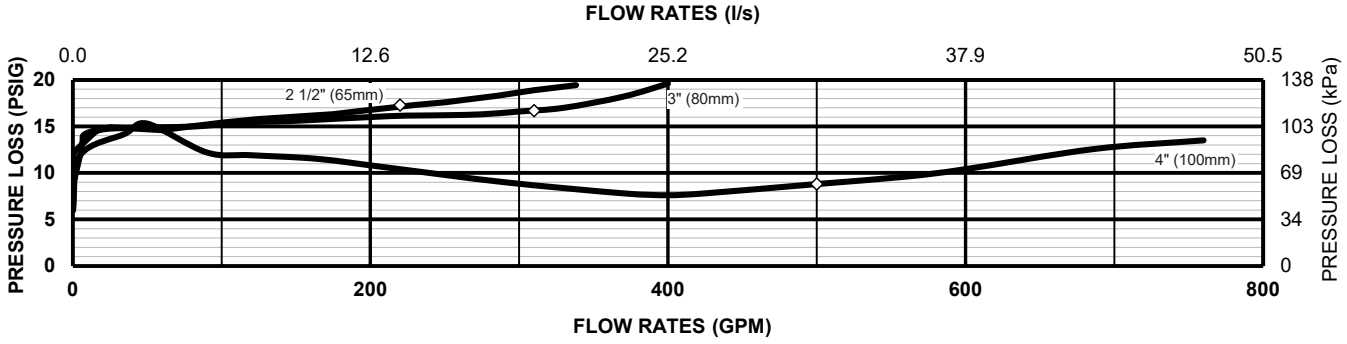
Zurn Industries, LLC | Wilkins
1747 Commerce Way, Paso Robles, CA U.S.A. 93446 Ph. 855-663-9876, Fax 805-238-5766
In Canada | **Zurn Industries Limited**
7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, 877-892-5216
www.zurn.com

Rev. P
Date: 08/20
Document No. BF-375DA
Product No. Model 375DA
Patent zurn.com/patents

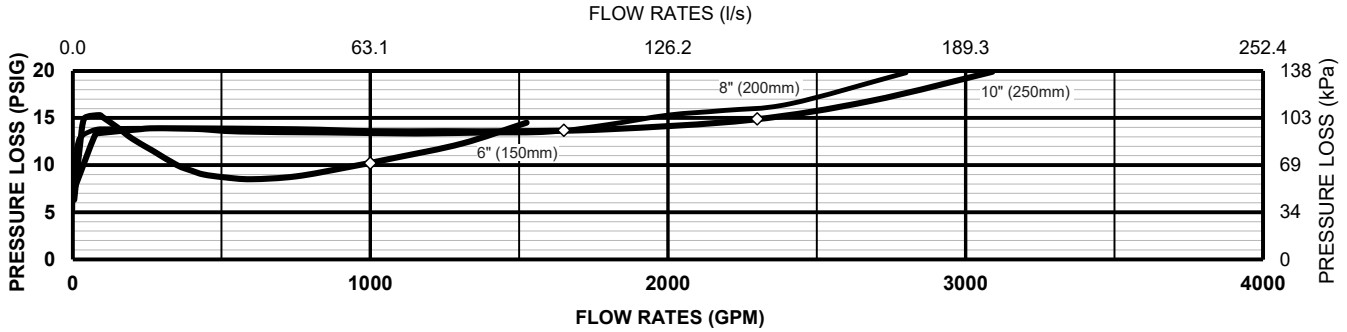
Flow Characteristics

◇Rated Flow (established by approval agencies)

MODEL 375DA 2 1/2", 3" & 4" (STANDARD & METRIC)



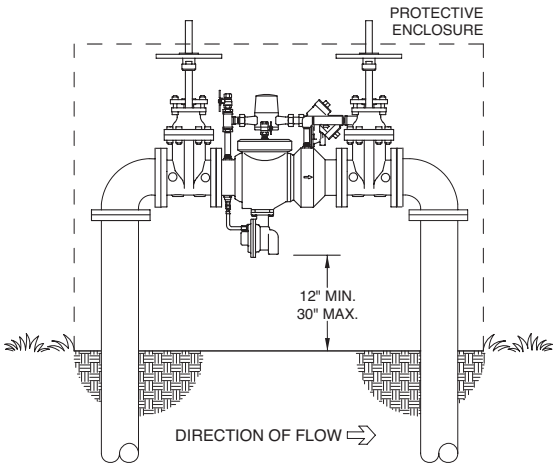
MODEL 375DA 6", 8" & 10" (STANDARD & METRIC)



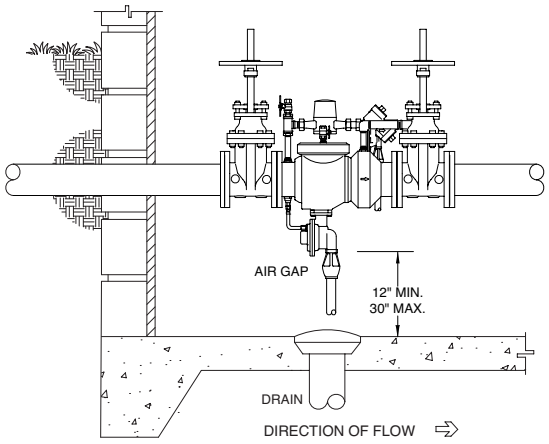
Typical Installation

Local codes shall govern installation requirements. To be installed in accordance with the manufacturer's instructions and the latest edition of the Uniform Plumbing Code. Unless otherwise specified, the assembly shall be mounted at a minimum of 12" (305mm) and a maximum of 30" (762mm) above adequate drains with sufficient side clearance for testing and maintenance. The installation shall be made so that no part of the unit can be submerged.

Capacity thru Schedule 40 Pipe (GPM)				
Pipe size	5 ft/sec	7.5 ft/sec	10 ft/sec	15 ft/sec
2 1/2"	75	112	149	224
3"	115	173	230	346
4"	198	298	397	595
6"	450	675	900	1351
8"	780	1169	1559	2339
10"	1229	1843	2458	3687
12"	1763	2644	3525	5288



OUTDOOR INSTALLATION



INDOOR INSTALLATION

Specifications

The Reduced Pressure Detector Backflow Prevention Assembly shall be certified to NSF/ANSI/CAN 61, ASSE® Listed 1047, and supplied with full port OS & Y gate valves. The main body and access cover shall be epoxy coated ductile iron (ASTM A 536), the seat ring and check valve shall be NORYL™, the stem shall be stainless steel (ASTM A 276) and the seat disc elastomers shall be EPDM. The checks and the relief valve shall be accessible for maintenance without removing the device from the line. The Reduced Pressure Detector Backflow Prevention Assembly shall be a ZURN WILKINS Model 375DA.

Zurn Industries, LLC | Wilkins
1747 Commerce Way, Paso Robles, CA U.S.A. 93446 Ph. 855-663-9876, Fax 805-238-5766
In Canada | **Zurn Industries Limited**
7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, 877-892-5216
www.zurn.com

FireLock® Check Valves
Series 717 Check Valve
Series 717H High Pressure Check Valve

10.08

Series 717
(2½ – 3"/65 – 80 mm)

Series 717
(4 – 12"/100 – 300 mm)

Series 717H
High Pressure Check Valve
(2 – 3"/50 – 80 mm)

1.0 PRODUCT DESCRIPTION

Available Sizes

- 2 – 3"/DN50 – DN80 (Series 717H)
- 2 ½ – 12"/DN50 – DN300 (Series 717)

Pressure Class

- Up to 365 psi/2517 kPa/25 bar
- Working pressure dependent on size of pipe, valve size and approval requirements.

Application

- Designed for use in Fire Protection systems.
- Prevents back flow.
- Single-disc mechanism incorporates a spring-assisted feature for non-slamming operation.
- Can be installed either vertically (flow upwards only) or horizontally.
- Valve body cast with arrow indicator to assist with proper valve orientation.
- Optional upstream and downstream pressure taps included on select sizes. See Section 3.0.
- Provided with grooved ends.
- Rated for ambient temperature use in fire protection systems.

2.0 CERTIFICATION/LISTINGS

NOTE

- Refer to Victaulic submittal publication 10.01 for details

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

2.0 CERTIFICATION/LISTINGS (Continued)

Approvals/Listings

Size	Approval/Listing Service Pressures Series 717H cULus	FM	LPCB	Vds
2"/50 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa
2½"/65 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa
76.1 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa
3"/80 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa

Size	Approval/Listing Service Pressures Series 717 cULus	FM	LPCB	Vds
2½"/65 mm	250 psi/1725 kPa	n/a	365 psi/2517 kPa	n/a
76.1 mm	250 psi/1725 kPa	n/a	365 psi/2517 kPa	16bar/232 psi
3"/80 mm	250 psi/1725 kPa	n/a	365 psi/2517 kPa	16bar/232 psi
4"/100 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	16bar/232 psi
5"/125 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	n/a
139.7 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	16bar/232 psi
6"/150 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	16bar/232 psi
165.1 mm	365 psi/2517 kPa	365 psi/2517 kPa	365 psi/2517 kPa	n/a
8"/200 mm	365 psi/2517 kPa	365 psi/2517 kPa	348 psi/2400 kPa	16bar/232 psi
10"/250 mm	250 psi/1725 kPa	250 psi/1725 kPa	1725 kPa/250 psi	n/a
12"/300 mm	250 psi/1725 kPa	250 psi/1725 kPa	1725 kPa/250 psi	n/a

3.0 SPECIFICATIONS – MATERIAL

Body:

☐ Ductile Iron conforming to ASTM A-536, Grade 65-45-12.

Body Coating:

☐ Series 717H Body: Black Paint
☐ Series 717H Endface: Electroless Nickel conforming to ASTM B-733
☐ Series 717 (2 ½ – 3"/DN65 – DN80): PPS Coating
☐ Series 717 (4 – 12"/DN100 – DN300): Black Paint

Body Seat:

☐ Series 717H: Nitrile O-ring installed into an Electroless Nickel plating conforming to ASTM B-733
☐ Series 717 (2 ½" – 3"/DN65 – DN80): PPS Coated Ductile Iron
☐ Series 717 (4 – 12"/DN100 – DN300): Ductile Iron with Electroless Nickel plating conforming to ASTM B-733

Disc Seal or Coating: (specify choice[1])

☐ **Nitrile (Series 717H only)**
☐ **EPDM**
NOT COMPATIBLE FOR PETROLEUM SERVICES.

Discs:

☐ Series 717H: CF8M Cast Stainless Steel
☐ Series 717 (2 ½ – 3"/DN65 – DN80): Aluminum bronze with elastomer seal
☐ Series 717 (4 – 12"/DN100 – DN300): Elastomer encapsulated disc.

Shaft:

☐ Series 717H: Brass
☐ Series 717 (2 ½ – 3"/DN65 – DN80): Type 416 Stainless Steel
☐ Series 717 (4 – 12"/DN100 – DN300): Type 316 Stainless Steel

Spring:

☐ Type 302/304 Stainless Steel

Shaft Plug:

☐ Series 717H: Carbon Steel Zinc Plated
☐ Series 717: Carbon Steel Zinc Plated

Pipe Plug:

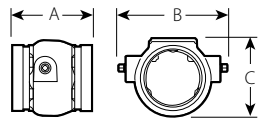
☐ Series 717H: Carbon Steel Zinc Plated
☐ Series 717: Carbon Steel Zinc Plated

Optional Pressure Taps:

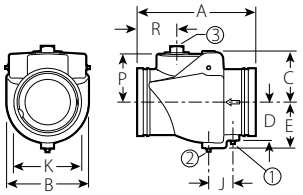
☐ Series 717H: Available on all sizes
☐ Series 717: Available on sizes 4 – 12"/DN100 – DN300

4.0 DIMENSIONS

Series 717

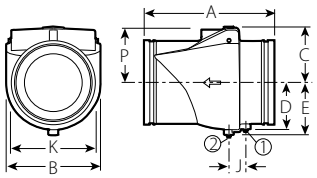


Typical 2 ½ – 3"/65 – 80 mm



① ½" NPT Upstream Drain
② ½" NPT Downstream Drain
③ 2" NPT (Drain Optional)

Typical 4 – 8"/100 – 200 mm



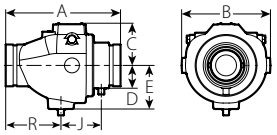
① ½" NPT Upstream Drain
② ½" NPT Downstream Drain

Typical 10 – 12"/250 – 300 mm

Size		Dimensions									Weight
Nominal inches mm	**Actual Outside Diameter** inches mm	**E to E A** inches mm	**B** inches mm	**C** inches mm	**D** inches mm	**E** inches mm	**J** inches mm	**K** inches mm	**P** inches mm	**R** inches mm	**Approximate (Each)** lb kg
2½ 65	2.875 73.0	3.88 99	4.26 108	3.57 91	–	–	–	–	–	–	3.6 1.6
76.1 mm	3.000 76.1	3.88 99	4.26 108	3.57 91	–	–	–	–	–	–	3.6 1.6
3 80	3.500 88.9	4.25 108	5.06 129	4.17 106	–	–	–	–	–	–	4.5 2.0
4 100	4.500 114.3	9.63 245	6.00 152	3.88 99	2.75 70	3.50 89	2.00 51	4.50 114	3.50 89	3.35 85	20.0 9.1
5 125	5.563 141.3	10.50 267	6.80 173	4.50 114	–	4.17 106	2.15 55	5.88 149	4.08 104	3.98 101	27.0 12.3
139.7 mm	5.500 139.7	10.50 267	6.80 173	4.50 114	–	4.17 106	2.15 55	5.88 149	4.08 104	3.98 101	27.0 12.3
6 150	6.625 168.3	11.50 292	8.00 203	5.00 127	–	4.50 114	2.38 61	6.67 169	4.73 120	3.89 99	38.0 17.2
165.1 mm	6.500 165.1	11.50 292	8.00 203	5.00 127	–	4.50 114	2.38 61	6.67 169	4.73 120	3.89 99	38.0 17.2
8 200	8.625 219.1	14.00 356	9.88 251	6.06 154	5.05 128	5.65 144	2.15 55	8.85 225	5.65 144	5.75 146	64.0 29.0
10 250	10.750 273.0	17.00 432	12.00 305	7.09 180	5.96 151	6.69 170	2.15 55	10.92 277	6.73 171	–	100.0 45.4
12 300	12.750 323.9	19.50 495	14.00 356	8.06 205	6.91 176	7.64 194	2.51 64	12.81 925	7.73 196	–	140.0 63.5

4.1 DIMENSIONS

Series 717H



Typical 2"/50 mm – 3"/80 mm

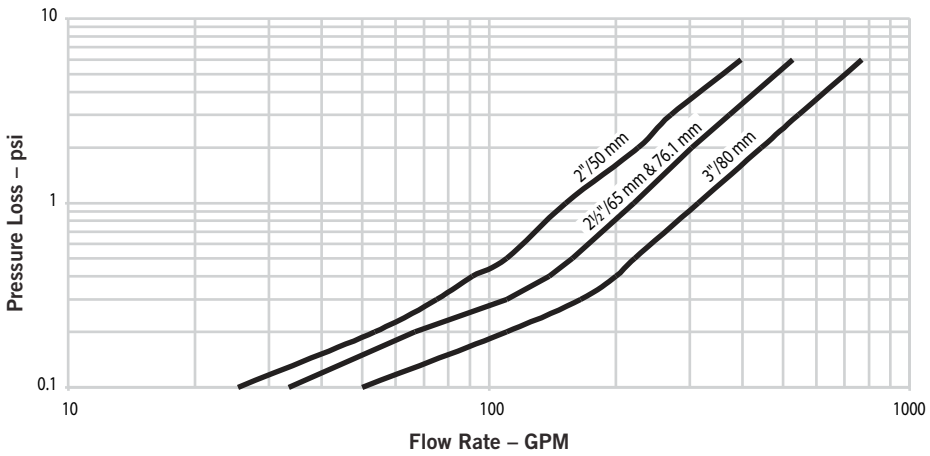
Size	Dimensions									Weight
Nominal inches mm	**E to E** **A** inches mm	**B** inches mm	**C** inches mm	**D** inches mm	**E** inches mm	**J** inches mm	**K** inches mm	**P** inches mm	**R** inches mm	**Approximate (Each)** lb kg
2 50	8.66 219.8	6.46 164.1	3.23 82.1	1.48 37.5	3.02 76.7	2.80 71.0	–	–	4.25 108.0	10.7 4.9
2½ 65	9.37 238.0	6.94 176.3	3.31 84.1	1.66 42.2	3.40 86.4	3.38 85.9	–	–	4.38 111.3	13.8 6.3
76.1 mm	9.37 238.0	6.94 176.3	3.31 84.1	1.66 42.2	3.40 86.4	3.38 85.9	–	–	4.38 111.3	13.8 6.3
3 80	9.62 244.3	7.44 189.0	3.53 89.7	1.91 48.5	3.65 92.7	3.38 85.9	–	–	4.63 117.6	20.0 9.1

5.0 PERFORMANCE

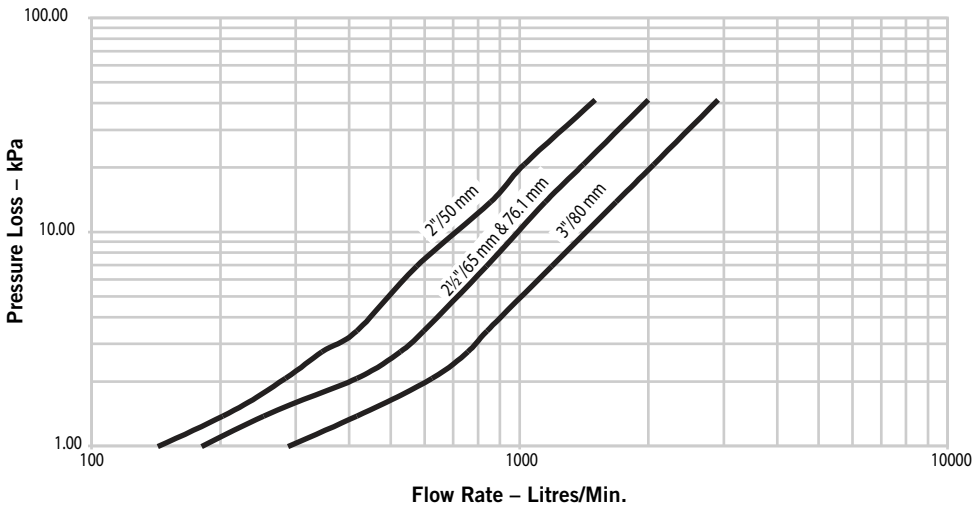
Flow Characteristics

The charts below express the flow of water at 60°F/16°C through valve.

S717H / 717HR



S717H / 717HR

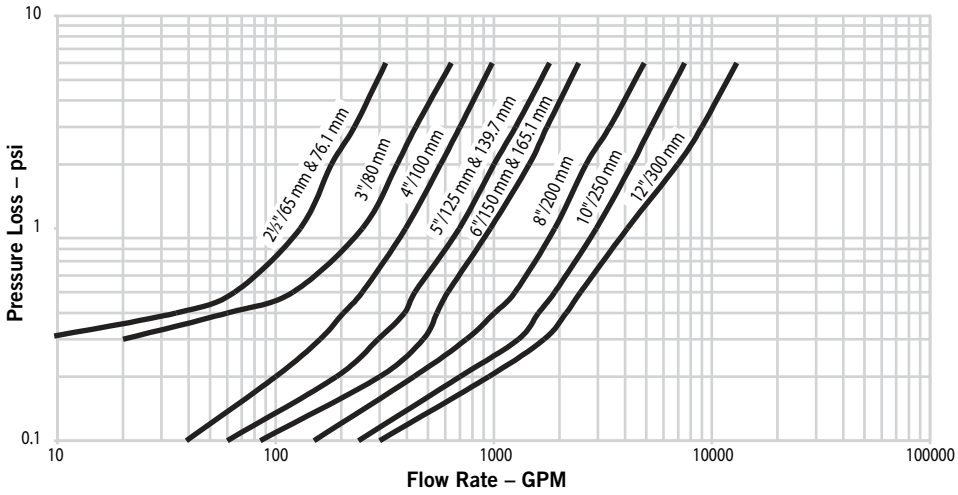


5.1 PERFORMANCE

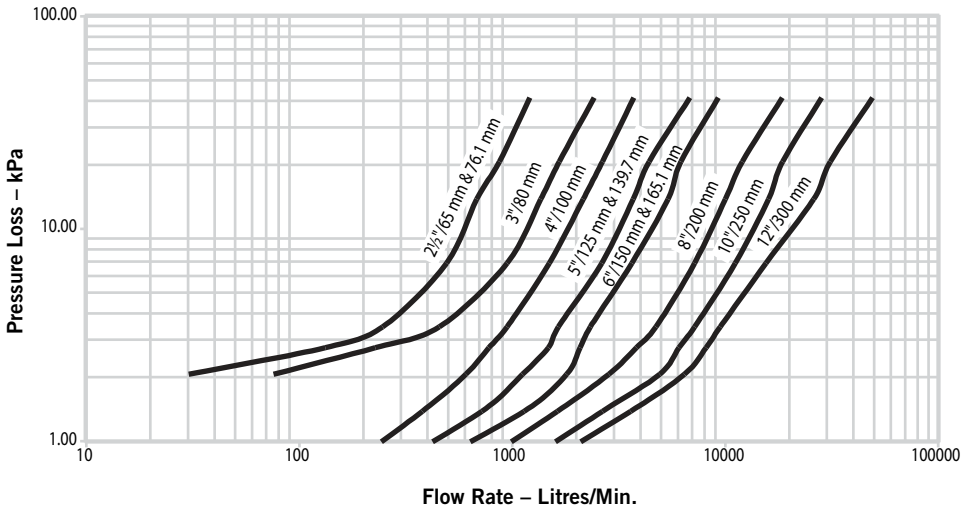
Flow Characteristics

The charts below express the flow of water at 60°F/16°C through valve.

S717 / 717R



S717 / 717R



6.0 NOTIFICATIONS

WARNING

- **Depressurize and drain the piping system before attempting to install, remove, adjust, or maintain any Victaulic piping products.**

7.0 REFERENCE MATERIALS

05.01: Seal Selection Guide
10.01: Regulatory Approval Reference Guide
29.01: Terms and Conditions/Warranty
I-100: Field Installation Handbook

TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

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 Easy Riser® Swing Check Valve is a general purpose rubber-faced check valve approved for use in fire service systems. The valve is for use in wet system risers, preaction system risers and wherever a check valve with a drain connection and gauge connections can be utilized. When used with a flow switch on wet pipe systems not requiring a mechanical alarm, the Easy Riser® Swing Check Valve may replace an alarm check valve.

1-A Features

1. Ductile iron body for less weight and extra strength.
2. Rated to 300 psi (20.7 bar) water working pressure.
3. Rubber-faced clapper hinged to access cover for quick removal and easy servicing. All moving parts can be serviced without removing the valve from the installed position.
4. With the cover/clapper assembly removed, clapper rubber replacement requires removal of only one screw.
5. Valve housing tapped for inlet and outlet pressure gauges, and system main drain.

1-B Accessories

300 PSI (20.7 bar) Trim Package including:
A. All necessary nipples and fittings
B. Main Drain Ball Valve
C. Necessary gauges

2. LISTINGS AND APPROVALS:.

cULus Listed: HMER
FM Approved: Single Check Valves
NYC Department of Buildings: MEA 89-92-E, Vol. XI
VNIIPO (250 psi (17.2 bar) MWP)
CE: Pressure Equipment Directive 97/23/EC (250 psi (17.2 bar) MWP)

3. TECHNICAL DATA

Specifications:

Standard Flanged Connections: ANSI B16.42 Class 150 (mates with ANSI Class 125 and Class 150 flanges).

Standard Grooved Connections: ANSI/AWWA C606

Drain outlet: 2-1/2” and 3” valves - one 1-1/4” (32 mm) NPT; 4”, 6” & 8” valves - 2” (50 mm) NPT

Gauge Outlets: two 1/4” (8 mm) NPT

Other Outlets: two 1/2” (15 mm) NPT

Systems with water working pressures above 175 psi (12 bar) may require extra-heavy pattern fittings. Viking Easy Riser® Swing Check Valve flanges are Ductile Iron ANSI B16.42, Class 150, with a maximum water working pressure of 300 psi (20.7 bar). ANSI B16.42, Class 150 flanges are NOT compatible with ANSI Class 250 or Class 300 flanges. To mate the Easy Riser® Swing Check Valve with ANSI Class 250 or Class 300 flanges, use the grooved-inlet/grooved-outlet style installed with listed grooved/flanged adapters of the appropriate pressure rating. For piping with grooved connections, the grooved-inlet and/or grooved-outlet style Easy Riser® Swing Check Valve may be installed with listed grooved couplings of the appropriate pressure rating.

Material Standards:

Refer to Figure 1.

Ordering Information:

See Table 1 for part numbers and shipping weights.

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

4. INSTALLATION

The Easy Riser® Swing Check Valve must be installed in an area not subject to freezing temperatures or physical damage. When corrosive atmospheres and/or contaminated water supplies are present, it is the owner's responsibility to verify compatibility with the Easy Riser® Swing Check Valve, trim, and associated equipment.

Prior to installing the valve, thoroughly flush the water supply piping to verify that no foreign matter is present.

The Easy Riser® Swing Check Valve may be installed in the vertical position with direction of flow up, or in the horizontal position with the access cover up.

1. Remove all plastic thread protectors from the openings of the Easy Riser® Swing Check Valve.
2. Apply a small amount of pipe-joint compound or tape to the external threads of all pipe connections required. Take care not to allow any compound, tape, or other foreign matter inside any of the nipples or openings of the valve or trim components.
3. Easy Riser® Swing Check Valve Trim Charts are provided with Trim Packages and on the Viking website.
4. Verify that all system components are rated for the water working pressure of the system.

Hydrostatic Test:

The Easy Riser® Swing Check Valve is manufactured and listed for use at a maximum water working pressure of 300 psi (20.7 bar). The valve is factory tested at 600 psi (41.4 bar). Easy Riser® Swing Check Valves may be hydrostatically tested at 350 psi (24.1 bar) and/or 50 psi (3.5 bar) above the normal water working pressure for limited periods of time (two hours) for the purpose of acceptance by the Authority Having Jurisdiction. If air testing is required, DO NOT exceed 40 psi (2.8 bar) air pressure.

5. OPERATION (Refer to Figure 1.)

Water flowing through the Viking Easy Riser® Swing Check Valve lifts the rubber-gasketed clapper (8 and 9) off the seat (12) and flows into the sprinkler piping. When flow through the valve stops, the clapper (8) closes quickly. The rubber gasket (9) forms a tight seal against the brass water seat (12), trapping pressurized water above the clapper and preventing reverse flow from the sprinkler piping.

6. INSPECTIONS, TESTS, AND MAINTENANCE

NOTICE

The owner is responsible for maintaining the fire protection system and devices in proper operating condition.

The Viking Easy Riser® Swing Check Valve and trim must be kept free of foreign matter, freezing conditions, corrosive atmospheres, contaminated water supplies, and any condition that could impair its operation or damage the device.

It is imperative that the system be inspected and tested on a regular basis. The frequency of the inspections may vary due to contaminated water supplies, corrosive water supplies, and corrosive atmospheres. For minimum maintenance and inspection requirements, refer to NFPA 25. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

⚠WARNING

Any system maintenance that involves placing a control valve or detection system out of service may eliminate the fire protection capabilities of that system. Prior to proceeding, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected areas.

6-A. Five-Year Internal Inspection

Internal inspection of check valves is recommended every five years unless inspections and tests indicate more frequent inspections are required. (Refer to Figure 1.)

1. Notify the Authority Having Jurisdiction, remote station alarm monitors, and those in the area affected that the system will be taken out of service. Consideration should be given to employment of a fire patrol in the affected areas.
2. Close the water supply main control valve, placing the system out of service.
3. Open the main drain. If necessary, open the system test valve to vent and completely drain the system.
4. Use the appropriate wrench to loosen and remove cover screws (14), and remove cover and clapper assembly (2-11).
5. Inspect water seat (12). Wipe away all contaminants, dirt, and mineral deposits. DO NOT use solvents or abrasives.
6. Inspect cover and clapper assembly (2-11) and cover gasket (13). Test the hinged clapper (8) for freedom of movement. Renew or replace damaged or worn parts as required.

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

⚠ CAUTION

NEVER apply any lubricant to seats, gaskets, or any internal operating parts of the valve. Petroleum-based grease or oil will damage rubber components and may prevent proper operation.

7. When internal inspection of the Easy Riser® Swing Check Valve is complete, perform step 6 of paragraph 11. MAINTENANCE to re-install cover and clapper assembly (2-11).

6-B. Maintenance (Refer to Figure 1.)

1. Perform steps 1 through 5 of paragraph 6-A, FIVE-YEAR INTERNAL INSPECTION.
2. To replace clapper assembly (3, 6-11):
   a. Remove the cover screws (14) from the cover (2) using a Socket Wrench with a 9/16" socket.
   b. Remove the cover and clapper assembly (2-11) from the valve.
   c. Remove the cover gasket (13) by sliding it over the clapper assembly.
   d. Remove the existing clapper assembly (3, 6-11) from the cover assembly (2):
      i. Remove one of the retaining rings (5) from the clapper hinge pin (4) using a flat head screwdriver.
      ii. Remove the clapper hinge pin (4) from the cover and clapper assembly. This will allow the clapper assembly (3, 6-11) to be removed from the cover assembly (2).
   e. Install the new clapper assembly (3, 6-11) onto the cover assembly (2):
      i. Make sure the clapper rubber (9) is facing opposite the direction of the flow arrow on the inside of the cover (2).
      ii. Line up the holes of the cover assembly (2) and the clapper assembly (3, 6-11) and insert the hinge pin (4).
      iii. Install the retaining ring (5) onto the hinge pin (4).
      iv. Install the cover gasket (13) onto the new cover and clapper assembly (2-11) by sliding the cover gasket (13) over the clapper assembly (3, 6-11) and lining up the holes with the cover (2).
      v. To install the new cover and clapper assembly (2-11) into the valve, slide the clapper assembly into the valve with the clapper rubber (9) lined up with the water seat (12). Ensure the rubber retainer (10) fits inside the seat of the valve (pull back slightly and there should be some resistance).
      vi. Line up the holes of the cover (2) and cover gasket (13) with the valve body (1) and replace the cover screws (14) using a Socket Wrench with a 9/16" socket.
3. To replace the clapper rubber (9):
   i. Remove the cover screws (14) from the cover (2) using a Socket Wrench with a 9/16" socket.
   ii. Remove the cover and clapper assembly (2-11) from the valve.
   iii. Remove the cover gasket (13) by sliding it over the clapper assembly (3, 6-11).
   iv. Use a 7/32" Allen wrench to hold the button head socket screw (11) in place and remove the jam nut (6) from the clapper rubber (9) using a Socket Wrench with a 9/16" socket.
   v. Remove the button head socket screw (11) and sealing washer (7) from the clapper assembly (3, 6-11).
   vi. Remove the clapper rubber retainer (10) from the clapper (8) to free the clapper rubber (9).
   vii. To install the new clapper rubber (9), position the clapper rubber (9) on the clapper assembly so the grooved edge is facing down. This will allow the clapper rubber retainer (10) to fit up into the grooved edge of the clapper rubber (9).
   viii. Install the button head socket screw (11) and sealing washer assembly (7) and the jam nut (6) using a 7/32" Allen wrench and a Socket Wrench with a 9/16" socket.
   ix. Install the cover gasket (13) onto the cover (2) by sliding it over the clapper assembly (3, 6-11).
   x. Re-install the cover and clapper assembly (2-11) back into the valve, with the clapper rubber (9) lined up with the water seat (12). Ensure the clapper rubber retainer (10) fits inside the seat of the valve (pull back slightly and there should be some resistance).
   xi. Line up the holes of the cover (2) and cover gasket (13) with the valve body (1) and replace the cover screws (14) using a Socket Wrench with a 9/16" socket.
4. To replace the cover gasket (13):
   i. Remove the cover screws (14) from the cover (2) using a Socket Wrench with a 9/16" socket.
   ii. Remove the cover and clapper assembly (2-11) from the valve.
   iii. Remove the cover gasket (13) by sliding it over the clapper assembly (3, 6-11).
   iv. Install the new cover gasket (13) by sliding it over the clapper assembly (3, 6-11), onto the cover (2).
5. Reinstall the cover and clapper assembly (2-11) into the valve:
   i. Line up the clapper rubber (9) with the water seat (12). Ensure the clapper rubber retainer (10) fits inside the seat of the valve (pull back slightly and there should be some resistance).
   ii. Line up the holes of the cover (2) and cover gasket (13) with the valve body (1) and replace the cover screws (14) using a Socket Wrench with a 9/16" socket.

VIKING®

TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

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

7. AVAILABILITY

The Viking Easy Riser® Swing Check Valve is available through a network of domestic and international distributors. See the Viking Corp. Web site for closest distributor or contact The Viking Corporation.

8. GUARANTEES

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

Table 1 - Valve Part Numbers and Specifications

Description	Nominal Size	Part Number	Friction Loss*	Shipping Weight
Flange/Flange				
Flange Drilling	**Model F-1**			
ANSI	3"	08505	10 ft. (3.1m)	35 lbs. (16 kg)
ANSI	4"	08508	13 ft. (4.0 m)	44 lbs. (20 kg)
ANSI	6"	08511	20 ft. (6.0 m)	75 lbs. (34 kg)
ANSI/Japan	DN100	09039	13 ft. (4.0 m)	44 lbs. (20 kg)
ANSI/Japan	DN150	09385	20 ft. (6.0 m)	75 lbs. (34 kg)
ANSI/Japan	DN200	14023	23 ft. (7.0 m)	119 lbs. (54 kg)
PN10/16	DN80	08796	10 ft. (3.1m)	35 lbs. (16 kg)
PN10/16	DN100	08797	13 ft. (4.0 m)	44 lbs. (20 kg)
PN10/16	DN150	08835	20 ft. (6.0 m)	75 lbs. (34 kg)
PN10	DN200	08836	23 ft. (7.0 m)	119 lbs. (54 kg)
PN16	DN200	12355	23 ft. (7.0 m)	119 lbs. (54 kg)
Flange/Groove				
Flange Drilling / Pipe O.D.	**Model F-1**			
ANSI / 89mm	3"	08506	10 ft. (3.1m)	27 lbs. (12 kg)
ANSI / 114mm	4"	08509	13 ft. (4.0 m)	37 lbs. (17 kg)
ANSI / 168mm	6"	08512	20 ft. (6.0 m)	64 lbs. (29 kg)
ANSI / 219mm	8"	08515	23 ft. (7.0 m)	119 lbs. (54 kg)
PN10/16 / 89mm	DN80	12648	10 ft. (3.1m)	27 lbs. (12 kg)
PN10/16 / 114mm	DN100	12649	13 ft. (4.0 m)	37 lbs. (17 kg)
PN10/16 / 165mm	DN150	12652	20 ft. (6.0 m)	64 lbs. (29 kg)
PN10/16 / 168mm	DN150	08512	20 ft. (6.0 m)	64 lbs. (29 kg)
PN10 / 219mm	DN200	12651	23 ft. (7.0 m)	119 lbs. (54 kg)
PN16 / 219mm	DN200	12650	23 ft. (7.0 m)	119 lbs. (54 kg)
Groove/Groove				
Pipe O.D.	**Model E-1**			
73mm	2½" / DN65	07929	6 ft. (1.8m)	16 lbs. (7 kg)
76 mm	2½" / DN65	13516	6 ft. (1.8m)	16 lbs. (7 kg)
	Model F-1			
89mm	3" / DN80	08507	10 ft. (3.1m)	20 lbs. (9 kg)
114mm	4" / DN100	08510	13 ft. (4.0 m)	27 lbs. (12 kg)
165mm	DN150	12356	20 ft. (6.0 m)	51 lbs. (23 kg)
168mm	6" / DN150	08513	20 ft. (6.0 m)	51 lbs. (23 kg)
219mm	8" / DN200	08516	23 ft. (7.0 m)	106 lbs. (48 kg)

*Expressed in equivalent length of Schedule 40 pipe based on Hazen & Williams formula: C = 120.

Table 2 - Torque Values for Easy Riser Swing Check Valve Cover Screws

Valve Size	Screw Size	Torque Value
2-1/2" (DN65)	3/8"-16 H.H.C.	19 ft-lb (2.63 kg-m)
3" (DN80)	3/8"-16 H.H.C.	19 ft-lb (2.63 kg-m)
4" (DN100)	3/8"-16 H.H.C.	19 ft-lb (2.63 kg-m)
6" (DN150)	½"-13 H.H.C.	45 ft-lb (6.23 kg-m)
8" (DN200)	5/8"-11 H.H.C.	93 ft-lb (12.9 kg-m)

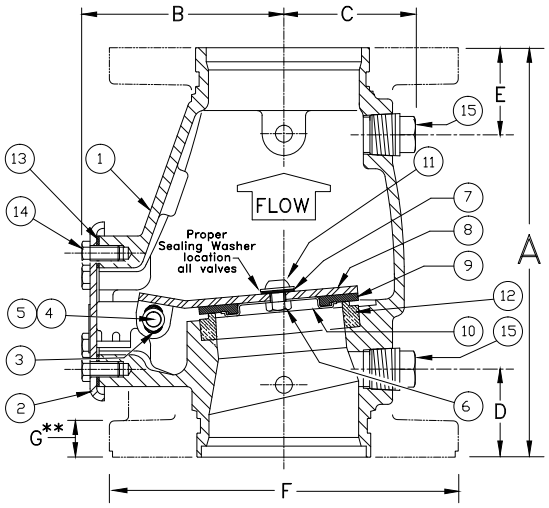
Table 3 - Trim Package Part Numbers

Valve Size	Part Number
Wet System Trim Packages	
2-1/2", 3" (DN65), (DN80)	07236
4", 6", 8", (DN100), (DN150), (DN200)	07237
Preaction System Trim Packages	
2-1/2", 3" (DN65)	13776
4", 6", 8", (DN80), (DN100), (DN150), (DN200)	13777

TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

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



SIZE	A	B	C	D	E	F	G**
2-1/2" (65mm)	9" (228,6)	4-1/2" (114,3)	2-5/8" (66,7)	2" (50,8)	2" (50,8)	Flg-Flg Not Available	
3" (80mm)	10-1/8" (257)	4-13/16" (122,2)	2-11/16" (68,3)	2-9/32" (58.1)	2-9/32" (58.1)	7-7/8" (200)	25/32" (20)
4" (100mm)	10-5/8" (269,9)	5-3/16" (131,8)	3-1/8" (79.4)	2-1/4" (57.2)	2-1/4" (57,2)	9" (228,6)	15/16" (23,81)
6" (150mm)	13-3/8" (340)	6-13/16" (173,3)	4-1/16" (103.2)	2-1/4" (57,2)	2-1/4" (57,2)	11" (279,4)	1" (25,4)
8" (200mm)	17" (431,8)	8-13/16" (223,4)	5" (127)	2-1/2" (63,4)	2-7/8" (73,0)	13-1/2" (342,9)	1-1/8" (28,58)

Dimensions shown in parentheses are millimeter.

* For availability of Flg X Flg, Flg X Grv, or Grv X Grv options refer to Table 1.

** 4", 6", and 8" valves are manufactured with sculptured flanges. Dimension indicates thickness of flange at bolt holes.

Figure 1 - Replacement Parts

ITEM NO.	PART NUMBER E-1 2-1/2" (DN65)	F-1 3" (DN80)	F-1 4" (DN100)	F-1 6" (DN150)	F-1 8" (DN200)	DESCRIPTION	MATERIAL	NO. REQ'D 2-1/2"	3"	4"	6"	8"
1	--	--	--	--	--	Body	Ductile Iron, ASTM A536 (65-45-12)	1	1	1	1	1
2	--	--	--	--	--	Cover Assembly	E-Coated HSLA Steel, A715 and Stainless Steel, UNS-S30400	1	1	1	1	1
3	07576	07576	07576	07576	None	Bushing	Lubricomp 189 Ryton	2	2	2	2	0
4	05355A	05355A	04900A	04991A	05334A	Clapper Hinge Pin	Stainless Steel, UNS-S30400	1	1	1	1	1
5	05445A	05445A	05445A	05445A	05369A	Hinge Pin Retaining Ring	Stainless Steel, UNS-S15700	2	2	2	2	2
6	01755A					Clapper Hex Jam Nut #10-24 UNC	Stainless Steel, UNS-S30400	1	0	0	0	0
		08159	08159			Clapper Hex Jam Nut 3/8"-24 UNF	Stainless Steel, UNS-S30400	0	1	1	0	0
				08144	08144	Clapper Hex Jam Nut ½"-20 UNF	Stainless Steel, UNS-S30400	0	0	0	1	1
7	--	08158	08158	08143	08143	Sealing Washer	EPDM and Stainless Steel	1	1	1	1	1
8	*	*	*	*	*	Clapper	PTFE Coated HR Steel UNS-G10180	1	1	1	1	1
9	*	*	*	*	*	Clapper Rubber	EPDM, ASTM D2000	1	1	1	1	1
10	*	*	*	*	*	Clapper Rubber Retainer	Stainless Steel, UNS-S30400	1	1	1	1	1
11	06595A					H.H.C. Screw, #10-24 UNC x 1/2" (12.7 mm) lg.	Stainless Steel, UNS-S30400	1	0	0	0	0
		10194	10194			Screw, Button Head, Socket, 3/8" - 24 UNF x 1/2 (12.7 mm) lg.	Stainless Steel, UNS-S30400	0	1	1	0	0
				10308		Screw, Button Head, Socket, 1/2" - 20 UNF x 3/4 (19.1 mm) lg.	Stainless Steel, UNS-S30400	0	0	0	1	0
					10686	Screw, Button Head, Socket, 1/2" - 20 UNF x 7/8 (22.2 mm) lg.	Stainless Steel, UNS-S30400	0	0	0	0	1
12	--	--	--	--	--	Seat	Brass, UNS-C84400	1	1	1	1	1
13	05354B	05354B	04649B	04992B	05339C	Cover Gasket	EPDM, ASTM D2000	1	1	1	1	1
14	01517A	01517A	01517A			Screw, Hex Head Cap, 3/8" - 16 UNC x 3/4 (19.1 mm) lg.	Steel, Zinc Plated	4	4	6	0	0
				04993A		Screw, Hex Head Cap, 1/2" - 13 x 7/8 (22.2 mm) lg.	Steel, Zinc Plated	0	0	0	6	0
					01922A	Screw, Hex Head Cap, 5/8" - 11 UNC x 1-1/4" (31.8 mm) lg.	Steel, Zinc Plated	0	0	0	0	6
15	--	--	--	--	--	1/2" (15 mm) NPT Pipe Plug	Steel	2	2	2	2	2

-- Indicates replacement part is not available

* Indicates replacement part only available in a Sub-Assembly listed below.

Sub-Assemblies

3, 6-11	05499B	08518	08519	08520	08521	Clapper Assembly
6, 7, 9-11,13	06343A	08522	08523	08524	08525	Replacement Rubber Kit

TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

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

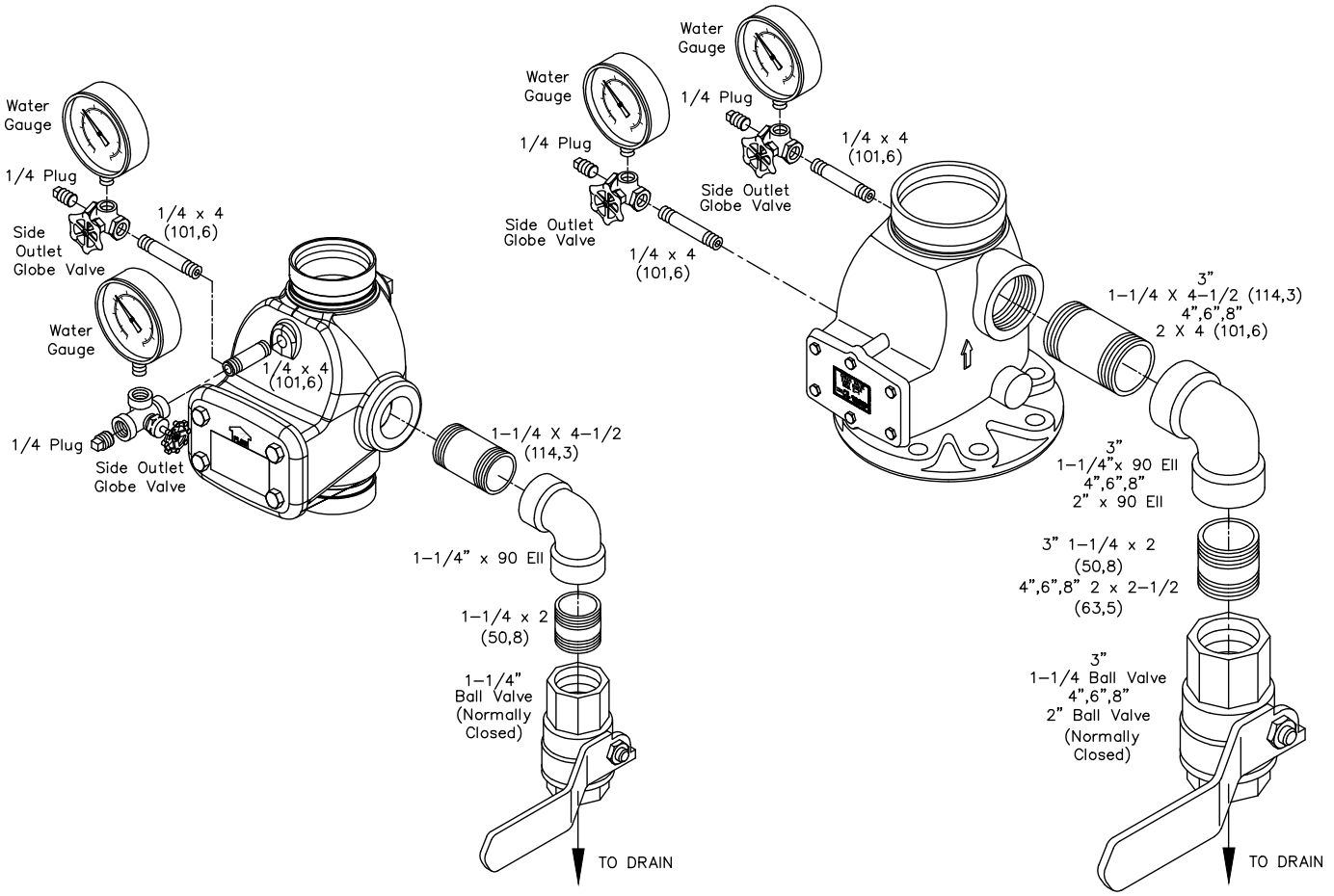


Figure 2

Note 1: 300 psi (20.7 bar) water pressure gauges are provided with trim. 600 psi (41.4 bar) water pressure gauges are available. Order separately when needed*. Refer to Viking's current price schedule.

* NFPA 13 requires gauges to have a minimum limit not less than twice the normal water working pressure at the point where the gauges are installed. When normal water working pressure exceeds 150 psi (10.3 bar), order 600 psi (41.4 bar) water pressure gauges separately.

Note 2: System Drain Ball Valve is UL Listed and FM Approved for 300 psi (20.7 bar) water working pressure.

TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

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

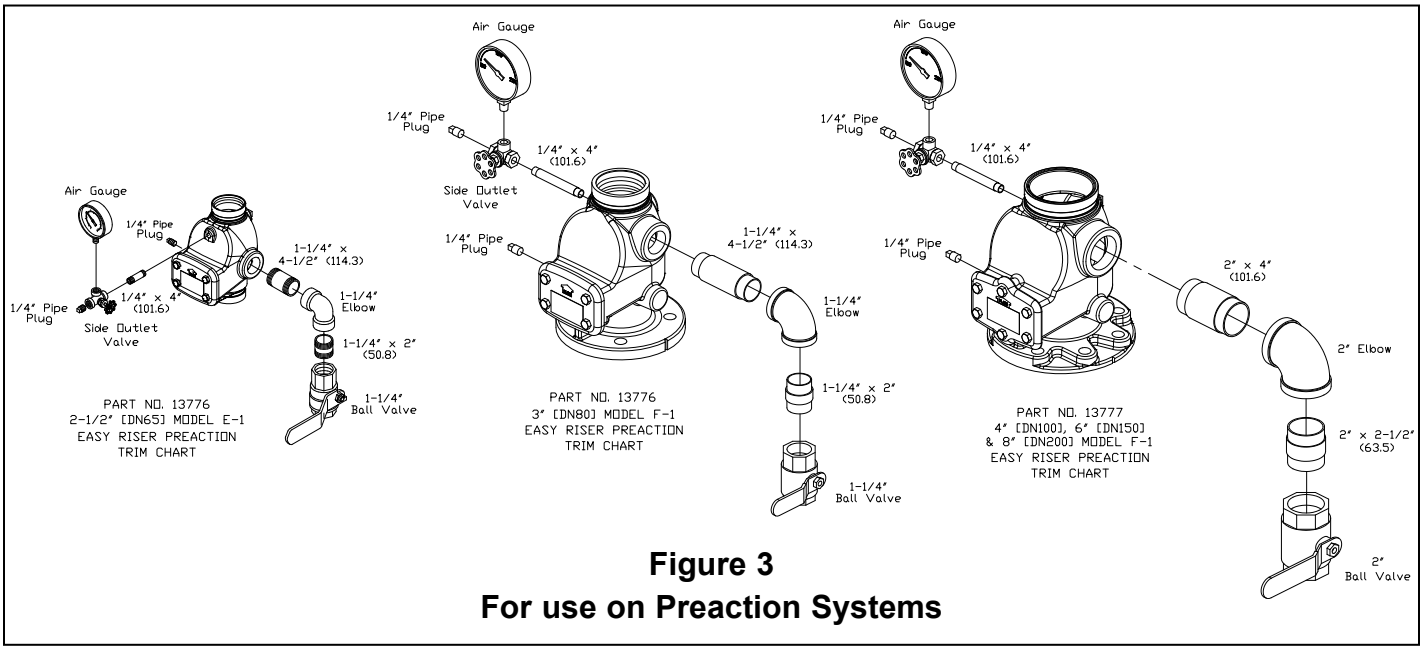
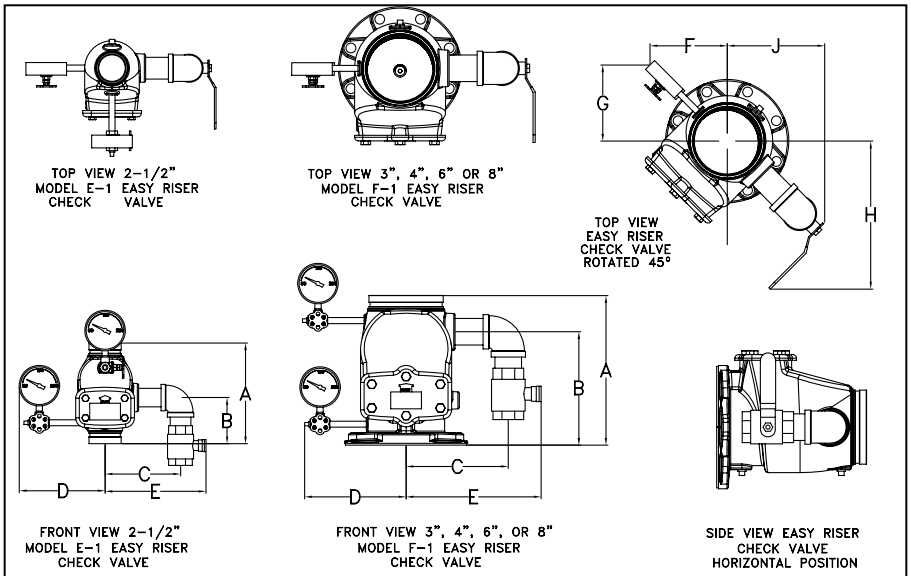


Figure 3
For use on Preaction Systems



SIZE	A	B	C	D	E	F	G	H	J
2-1/2" (65mm)	9" (228,6)	4-1/8" (105)	6-3/4" (171)	7-5/8" (194)	9" (229)	5-1/2" (139)	5-3/8" (137)	10-7/16" (265)	6-5/8" (169)
3" (80mm)	10-1/8" (257)	7-1/4" (184)	6-3/4" (171)	7-7/8" (200)	8-7/8" (226)	5-15/16" (150)	5-7/8" (149)	9-7/8" (251)	6-7/16" (163)
4" (100mm)	10-5/8" (270)	7-3/8" (187)	8-3/8" (213)	8-7/16" (214)	11-5/16" (287)	6-3/16"" (157)	6-1/8" (155)	12-11/16" (322)	8-1/16" (205)
6" (150mm)	13-3/8" (340)	10-1/8" (257)	9-1/8" (232)	9-1/2" (241)	12-1/16" (306)	6-7/8" (175)	6-13/16" (173)	13-3/16" (336)	8-5/8" (219)
8" (200mm)	17" (432)	13-1/8" (333)	9-15/16" (253)	10-3/4" (273)	13-1/16" (332)	7-5/8" (193)	7-1/2" (191)	13-15/16" (354)	9-5/16" (237)

Figure 4

Dimensions in parentheses are millimeter.
Dimensions are approximate.

Replaces Form No. F_011189 Rev 16.1
(Added PN 13516; corrected shipping weight for 08508)

FireLock® Butterfly Valve
Series 705 with Weatherproof Actuator

10.81

1.0 PRODUCT DESCRIPTION

- Available Sizes: 2 – 12"/50 – 300 mm
- cULus Listed, LPCB Listed, FM and VdS Approved for service up to 300 psi/2068 kPa /20 bar.
- Designed for fire protection services only.
- Features a weatherproof actuator housing Approved for indoor and outdoor use.
- Actuation options: Hand wheel (2 – 12"/50 – 300 mm)
- Exclusively for use with pipe and Victaulic products which feature ends formed with the Victaulic Original Groove System (OGS) groove profile (see section 7.0 for Reference Materials).

2.0 CERTIFICATION/LISTINGS

c UL us LISTED FM VdS G410001 LPCB 104j/04

NOTES

- Refer to Victaulic submittal publication 10.01 for details

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

2.1 CERTIFICATION/LISTINGS

Size	Approval/Listing Service Pressures Series 705 Butterfly Valve			
	cULus	FM	Vds	LPCB
2 50	up to 300psi/2068kPa	n/a	up to 300psi/2068kPa	up to 300psi/2068kPa
2½ 65	up to 300psi/2068kPa	up to 300psi/2068kPa	n/a	up to 300psi/2068kPa
76.1 mm	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa
3 80	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa
4 100	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa
5 125	up to 300psi/2068kPa	up to 300psi/2068kPa	n/a	up to 300psi/2068kPa
139.7 mm	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa
6 150	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa
165.1 mm	up to 300psi/2068kPa	up to 300psi/2068kPa	n/a	up to 300psi/2068kPa
8 200	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa	up to 300psi/2068kPa
10 250	up to 300psi/2068kPa	up to 300psi/2068kPa	n/a	up to 300psi/2068kPa
12 300	up to 300psi/2068kPa	up to 300psi/2068kPa	n/a	up to 300psi/2068kPa

3.0 SPECIFICATIONS – MATERIAL

Body: Ductile Iron conforming to ASTM A-536, Grade 65-45-12

End Face, 2 – 6"/50 – 150 mm: Ductile Iron conforming to ASTM A-536, Grade 65-45-12

Seal Retainer, 8 – 12"/200 – 300 mm: Ductile Iron conforming to ASTM A-536, Grade 65-45-12

Body Coating: Black alkyd enamel

Disc: Ductile Iron conforming to ASTM A-536, Grade 65-45-12, with electroless nickel coating conforming to ASTM B-733

Seat: Grade "E" EPDM

Stems: 416 stainless steel conforming to ASTM A-582

Stem Seal Cartridge: C36000 brass

Bearings: Stainless steel with TFE lining

Stem Seals: EPDM

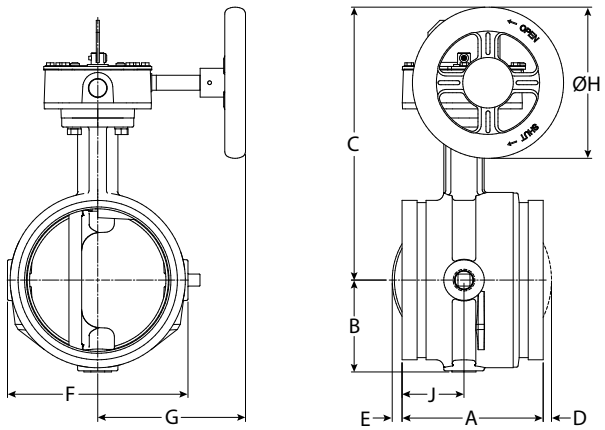
Stem Retaining Ring: Carbon steel

Actuator:

- ☐ 2 – 8"/50 – 200 mm: Brass or bronze traveling nut on a steel lead screw, in a ductile iron housing
- ☐ 10 – 12"/250 – 300 mm: Steel worm and cast iron quadrant gear, in a cast iron housing

4.0 DIMENSIONS

Series 705



Size		Dimensions								
Nominal inches mm	**Actual Outside Diameter** inches mm	**E to E A** inches mm	**B** inches mm	**C** inches mm	**D** inches mm	**E** inches mm	**F** inches mm	**G** inches mm	**DIA H** inches mm	**J** inches mm
2 60.3	2.375 60.3	4.25 108.0	2.28 57.9	6.41 162.8	–	–	4.00 101.6	4.22 107.2	4.50 114.3	2.12 53.8
2½ 73	2.875 73.0	3.77 95.8	2.28 57.9	7.54 191.5	–	–	4.00 101.6	4.22 107.2	4.50 114.3	1.77 45.0
76.1 mm	3.000 76.1	3.77 95.8	2.28 57.9	7.54 191.5	–	–	4.00 101.6	4.22 107.2	4.50 114.3	1.77 45.0
3 88.9	3.500 88.9	3.77 95.8	2.53 64.3	7.79 197.9	–	–	4.50 114.3	4.22 107.2	4.50 114.3	1.77 45.0
108 mm	4.250 108.0	4.63 117.6	2.88 73.2	8.81 223.8	–	–	5.50 139.7	4.22 107.2	4.50 114.3	2.20 55.9
4 114.3	4.500 114.3	4.63 117.6	2.88 73.2	8.81 223.8	–	–	5.50 139.7	4.22 107.2	4.50 114.3	2.20 55.9
133 mm	5.250 133.0	5.88 149.4	3.35 85.1	10.88 276.4	–	–	6.56 166.6	6.19 157.2	6.30 160.0	2.58 65.5
139.7 mm	5.500 139.7	5.88 149.4	3.35 85.1	10.88 276.4	–	–	6.56 166.6	6.19 157.2	6.30 160.0	2.58 65.6
5 141.3	5.563 141.3	5.88 149.4	3.35 85.1	10.88 276.4	–	–	6.56 166.6	6.19 157.2	6.30 160.0	2.58 65.5
159 mm	6.250 159.0	5.88 149.4	3.84 97.5	11.38 289.1	–	0.41 10.4	7.52 191.0	6.19 157.2	6.30 160.0	2.58 65.5
165.1mm	6.500 165.1	5.88 149.4	3.84 97.5	11.38 289.1	–	0.41 10.4	7.52 191.0	6.19 157.2	6.30 160.0	2.58 65.5
6 168.3	6.625 168.3	5.88 149.4	3.84 97.5	11.38 289.1	–	0.41 10.4	7.52 191.0	6.19 157.2	6.30 160.0	1.90 48.3
8 219.1	8.625 219.1	5.33 135.4	5.07 128.8	13.53 343.6	0.80 20.3	1.47 37.3	10.00 254.0	6.19 157.2	8.10 205.7	2.33 59.2
10 273	10.750 273.0	6.40 162.6	6.37 161.8	15.64 397.3	1.41 35.8	1.81 46.0	12.25 311.2	8.10 205.7	9.00 228.6	–
12 323.9	12.750 323.9	6.50 165.1	7.36 186.9	16.64 422.7	2.30 58.4	2.80 71.1	14.25 362.0	8.10 205.7	9.00 228.6	–

NOTE

- Optional ½"/15 mm tap available. Contact Victaulic for details.

5.0 PERFORMANCE

Series 705

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

Nominal Size mm inches	**Outside Diameter** mm inches	**Equivalent** Feet/m of pipe
2 50	2.375 60.3	6 1.8
2½ 65	2.875 73.0	6 1.8
76.1 mm	3.000 76.1	6 1.8
3 80	3.500 88.9	7 2.1
4 100	4.500 114.3	8 2.4
108 mm	108 mm	8 2.4
5 125	5.563 141.3	12 3.7
133 mm	133 mm	12 3.7
139.7 mm	5.500 139.7	12 3.7
6 150	6.625 168.3	14 4.2
159 mm	159 mm	14 4.3
165.1 mm	6.500 165.1	14 4.2
8 200	8.625 219.1	16 4.9
10 250	10.750 273.0	18 5.5
12 300	12.750 323.9	19 5.8

5.1 PERFORMANCE

Series 705

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

Formulas for C_v 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_v = Flow Coefficient

Formulas for K_v values

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

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

Where:
Q = Flow (m^3/hr)
ΔP = Pressure Drop (Bar)
K_v = Flow Coefficient

Valve Size		Full Open
Nominal Size inches mm	**Actual Outside Diameter** inches mm	**Flow Coefficient** C_v
2 50	2.375 60.3	170
2½ 65	2.875 73.0	260
76.1 mm	3.000 76.1	260
3 80	3.500 88.9	440
4 100	4.500 114.3	820
108 mm	108 mm	820
5 125	5.563 141.3	1200
133 mm	133 mm	1200
139.7 mm	5.500 139.7	1200
6 150	6.625 168.3	1800
159 mm	159 mm	1800
165.1 mm	6.500 165.1	1800
8 200	8.625 219.1	3400
10 250	10.750 273.0	5800
12 300	12.750 323.9	9000

Valve Size		Full Open
Nominal Size inches mm	**Actual Outside Diameter** inches mm	**Flow Coefficient** K_v
2 50	2.375 60.3	147
2½ 65	2.875 73.0	225
76.1 mm	3.000 76.1	225
3 80	3.500 88.9	380
4 100	4.500 114.3	710
108 mm	108 mm	710
5 125	5.563 141.3	1040
133 mm	133 mm	1040
139.7 mm	5.500 139.7	1040
6 150	6.625 168.3	1560
159 mm	159 mm	1560
165.1 mm	6.500 165.1	1560
8 200	8.625 219.1	2940
10 250	10.750 273.0	5020
12 300	12.750 323.9	7790

6.0 NOTIFICATIONS

⚠ WARNING

- **Read and understand all instructions before attempting to install, remove, adjust, or maintain 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 death or serious personal injury and property damage.

7.0 REFERENCE MATERIALS

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.
5. 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.
6. A #14 insulated ground lead (green) is provided.

   Switch #1 = S1

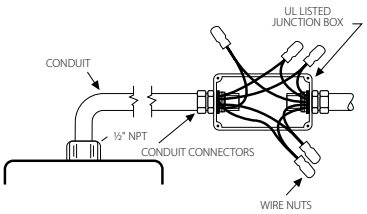
   For connection to the supervisory circuit of a UL Listed alarm control panel

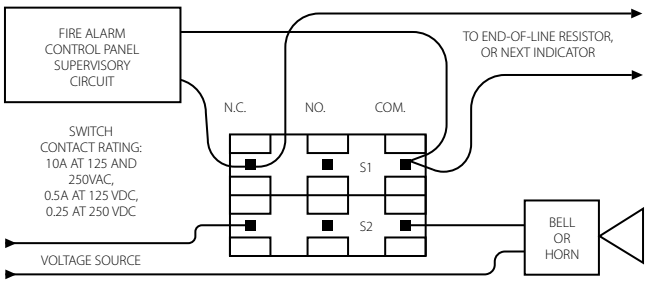
   Switch #2 = S2

   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





Switch 1: 2 leads per terminal
Switch 2: 1 lead per terminal

NOTES

- 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).

7.1 REFERENCE MATERIALS

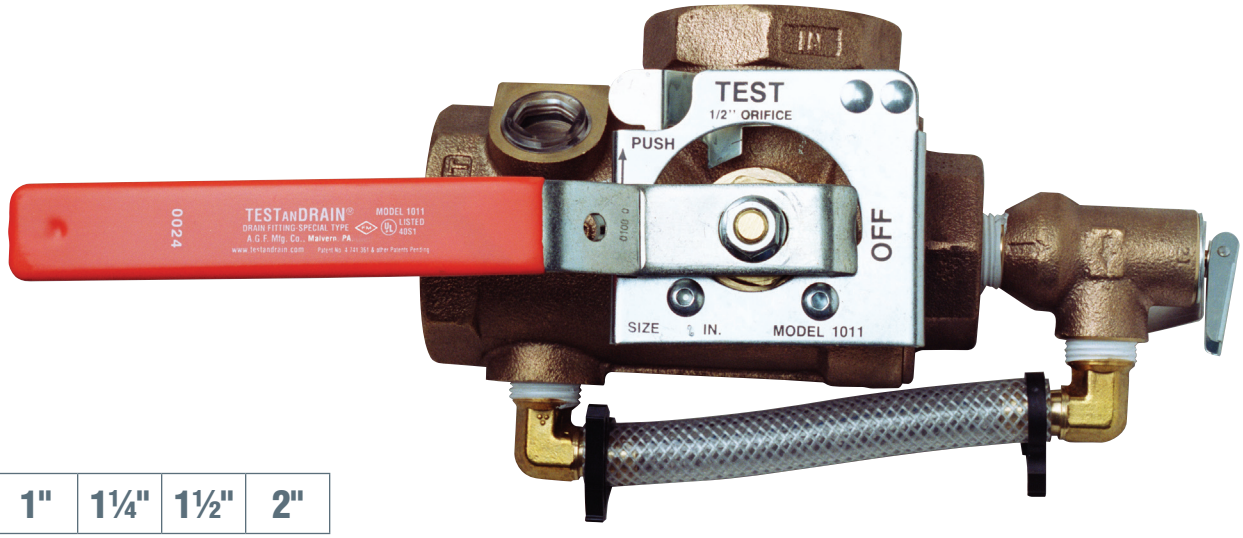
10.01: Regulatory Approval Reference Guide

29.01: Terms and Conditions/Warranty

I-100: Field Installation Handbook

Model 1011A
TESTANDRAIN®

Sectional Floor Control Test and Drain Valve for Systems Requiring Pressure Relief Valve



Sizes:

¾"	1"	1¼"	1½"	2"

The AGF **Model 1011A TESTANDRAIN®** provides the test and express drain functions for wet fire sprinkler systems on multi-story installations requiring pressure relief (NFPA 13 and NFPA 13R). The **Model 1011A** features a **Model 7000 Pressure Relief Valve** with drain pipe.

The **Model 1011A** is available in a full range of sizes (¾" to 2") with NPT connections (BSPT available). The **Model 7000 Pressure Relief Valve** (UL/FM) features a flushing handle and a 175 PSI factory rating (other pressure ratings available).

- Complies with NFPA 13 and NFPA 13R Requirements
- Compact, Single-Handle Ball Valve
- Tamper-Resistant Test Orifice and Sight Glasses
- 300 PSI rated.
- Specifiable orifice sizes: ⅜" (2.8K), 7⁄16" (4.2K), ½" (5.6K), 17⁄32" (8.0K), ⅝" (11.2K, ELO), ¾" (14.0K, ESFR), and K25
- Relieves Excess System Pressure caused by Surges or Temperature Changes
- Shipped with Relief Valve and Bypass Drain Ports Plugged to Expedite Pressure Testing
- Locking Kit Available

Repair kits are available for all **TESTANDRAIN®** valves. Kit includes: Adapter Gasket (1), Ball (1), Valve Seats (2), Stem Packing (1), and Stem Washer (1). ***Valve and orifice size must be specified when ordering.***

NOTE: It is important to note that the pressure rating of the relief valve indicates an operating range of pressure for both opening and closing of the valve. Standard relief valves are required to OPEN in a range of pressure between 90% and 105% of their rating. The valves are required to CLOSE at a pressure above 80% of that rating. The relief valve should be installed where it is easily accessible for maintenance. Care should be taken that the relief valve CANNOT be isolated from the system when the system is operational. A relief valve should NEVER have a shutoff valve or a plug downstream of its outlet.

Reliability, Versatility, Code Compatibility

Model 1011A
TEST AN DRAIN®

Model 1011A 300 PSI Bronze Ball Valve, Model 7000 Pressure Relief Valve
Factory Rated at 175 PSI with other setting available

Dimensions

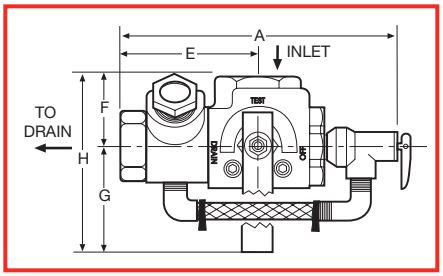
SIZE	A	B	C	D	E	F	G	H
¾"	7 9/16" (191 mm)	1 1/2" (37.5 mm)	2 3/16" (57 mm)	3 5/8" (93 mm)	3 3/8" (86 mm)	1 13/16" (46 mm)	4 9/16" (117 mm)	6 3/8" (162.5 mm)
1"	7 9/16" (191 mm)	1 1/2" (37.5 mm)	2 3/16" (57 mm)	3 5/8" (93 mm)	3 3/8" (86 mm)	1 13/16" (46 mm)	4 9/16" (117 mm)	6 3/8" (162.5 mm)
1¼"	7 15/16" (201 mm)	1 11/16" (43 mm)	2 9/16" (65 mm)	4 1/4" (108 mm)	3 5/8" (91 mm)	1 15/16" (51 mm)	5 9/16" (141 mm)	7 1/2" (192 mm)
1½"	8 15/16" (227 mm)	1 13/16" (45 mm)	3 1/4" (81.5 mm)	5 1/16" (127 mm)	3 7/8" (99 mm)	2 5/8" (67 mm)	8 1/4" (207 mm)	10 7/8" (274 mm)
2"	8 15/16" (227 mm)	1 13/16" (45 mm)	3 1/4" (81.5 mm)	5 1/16" (127 mm)	3 7/8" (99 mm)	2 5/8" (67 mm)	8 1/4" (207 mm)	10 7/8" (274 mm)

The Model 1011A provides the following…

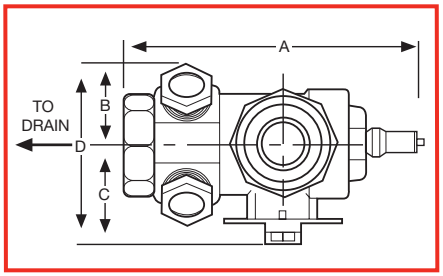
From the 2013 Edition of NFPA 13

Chapter 8.16.2.4.1*	Provisions shall be made to properly drain all parts of the system.
Chapter 8.16.2.4.2 & 8.16.2.4.3	Drain connections, interior sectional or floor control valve(s) – shall be provided with a drain connection having a minimum size as shown in Table 8.16.2.4.2.
Chapter 8.16.2.4.4	Drains shall discharge outside or to a drain capable of handling the flow of the drain.
Chapter A.8.17.4.2	(Wet Pipe System) test connection is permitted to terminate into a drain capable of accepting full flow… using an approved sight test connection containing a smooth bore corrosion-resistant orifice giving a flow equivalent to one sprinkler…
Chapter 8.17.4.2.2	The test connection valve shall be accessible.
Chapter 8.17.4.2.4	shall be permitted to be installed in any location… downstream of the waterflow alarm.
Chapter 8.17.4.3.1	(Dry Pipe System) a trip test connection not less than 1" in diameter, terminating in a smooth bore corrosion-resistant orifice, to provide a flow equivalent to one sprinkler…
Chapter 8.17.4.3.2	The trip test connection… with a shutoff valve and plug not less than 1", at least one of which shall be brass.
Chapter 7.1.2	- a wet pipe system shall be provided with a listed relief valve set to operate at 175 PSI or 10 PSI in excess of the maximum system pressure, whichever is greater.
Chapter 8.16.1.2.3*	A listed relief valve of not less than ½" in size shall be provided on the discharge side of the pressure-reducing valve set to operate at a pressure not exceeding rated pressure of the system.
Chapter A.8.16.1.2.3	- consideration should be given to piping the discharge from the (pressure relief) valve

Model 1011A - Front View



Model 1011A - Plan View



Orifice Sizes

3/8", 7/16", 1/2", 17/32", 5/8" ELO*,
¾" ESFR*, and K25**

Materials

Handle ..... Steel
Stem ..... Rod Brass
Ball..... C.P. Brass
Body ..... Bronze
Valve Seat..... Impregnated Teflon®
Indicator Plate .... Steel
Relief Valve ..... Bronze
Bypass Fittings... Brass
Bypass Tubing.... Nylobraid

Approvals

UL and ULC Listed:
(EX4019 & EX4533)
FM Approved
NYC-BSA No. 720-87-SM

MADE IN U.S.A.

USA Patent # 4741361 and Other Patents Pending

AGF Manufacturing Inc.
100 Quaker Lane, Malvern, PA 19355
Phone: 610-240-4900
Fax: 610-240-4906
www.testandrain.com

Job Name:_____
Architect:_____
Engineer:_____
Contractor:_____

*Available on 1¼" to 2" size units only • **Available on 1½" and 2" size units only

Pressure Gauge
Model 7500

WWW.AGFMANUFACTURING.COM

The AGF Manufacturing Pressure Gauge Model 7500 is a 4" FM Approved and UL Listed pressure gauge designed for use on wet fire sprinkler systems. The Model 7500 is designed to meet the requirements specified in NFPA 13.

Size:

4"

1. M7500 Pressure Gauge
2. M7600 Universal Valve (sold separately)
3. M7500 Pressure Gauge with M7600 Universal Valve

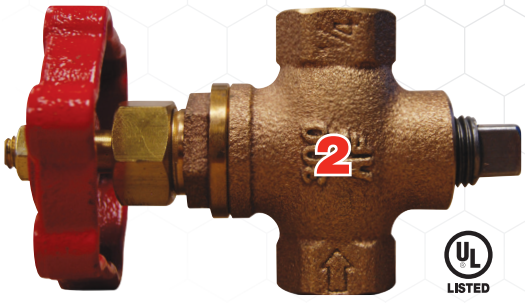
Specifications

Accuracy Class
±3/2/3% of span (ASME B40.100 Grade B)

Operating Temperatures
Ambient: -40° F to 140° F (-40° C to 60° C)
Media: 140° F (+60° C) maximum

Pressure Connection
Material: Copper Alloy
¼" NPT Lower Mount (LM)

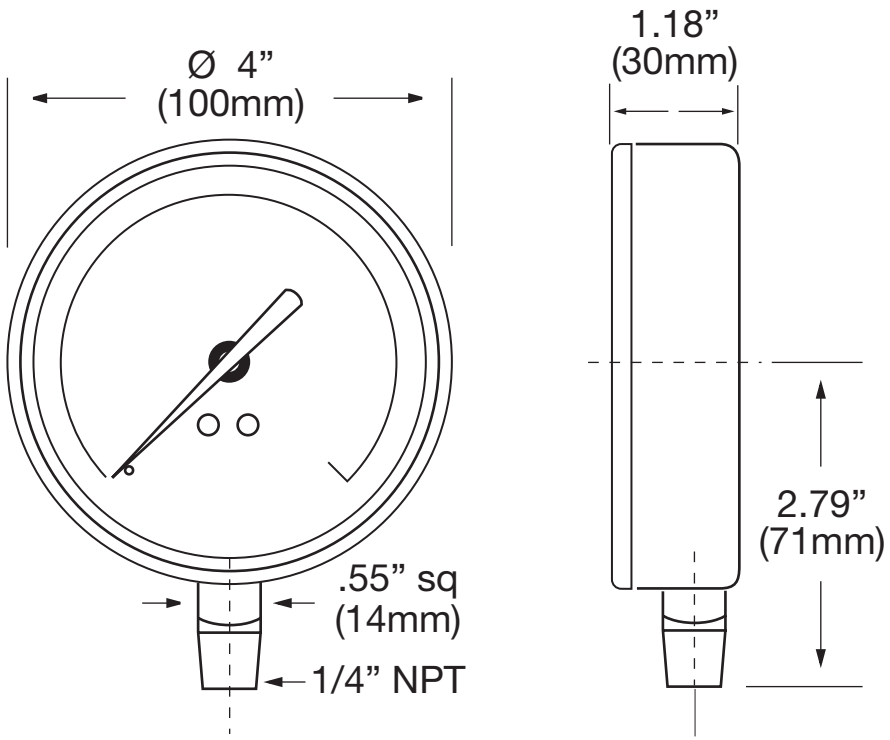
Materials:
Dial: White Aluminum with stop pin
Pointer: Black Aluminum
Case: Black Polycarbonate
Window: Snap-In Clear Polycarbonate

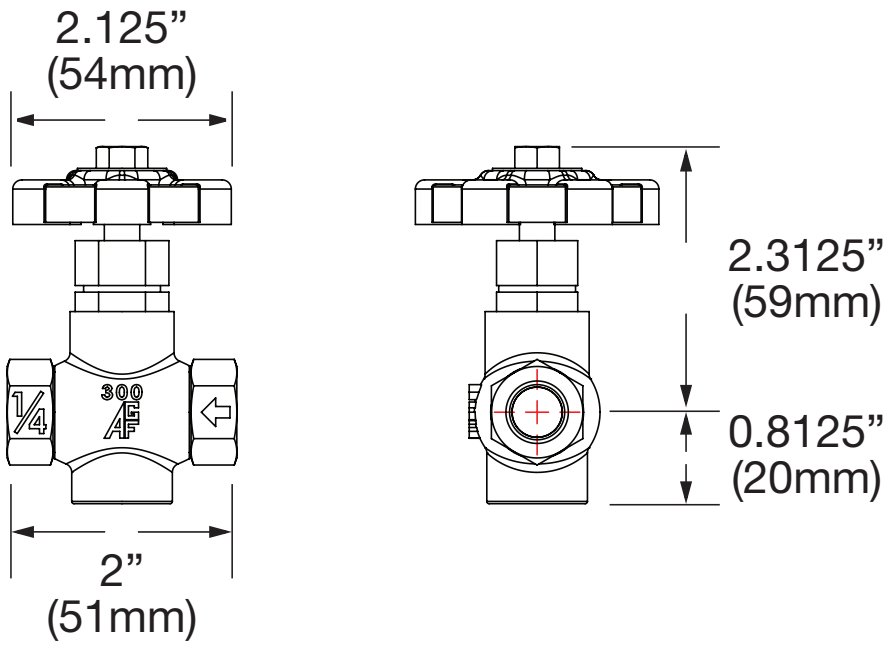


The Model 7600 is a UL Listed, ¼" 3-Way Universal Valve designed to connect the pressure gauge to the sprinkler system. The M7600 has been designed to meet NFPA 13 System Attachments stating: "...each gauge shall be equipped with a shutoff valve and provision for drainage." The M7600 3-Way Universal Valve is sold separately.

Reliability, Versatility, Code Compatibility

Dimensions





Patent Pending

AGF Manufacturing Inc.
100 Quaker Lane, Malvern, PA 19355
Phone: 610-240-4900
Fax: 610-240-4906
www.agfmanufacturing.com

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

GUARDIAN
FIRE EQUIPMENT, INC.
MIAMI, FL
Ph. 800.327.6584 • Fax 800.827.3869

DETAIL AND SUBMITTAL SHEET

6600 Series - Storz Fire Dept Connections and Dry Hydrants

Project/Location: _____ **Date:** _____

Architect/Engineer: _____ **Qty:** _____

Contractor: _____

☑ *Appropriate Selection*

Storz Connections - Used as auxiliary connections through which the fire department can pump water to supplement existing water supplies.

Straight and 30º Angle Pattern Adapters - Locking Storz inlet x Female NPT outlet, forged aluminum with powder coat finish.

Optional Components

- Identification plate - refer to 6400 Series
- Storz caps - refer below

Free-Standing Type - Straight pattern Storz adapter with Storz cap, forged aluminum with powder coat finish and galvanized steel elbow.

Components

- Brass identification plate lettered as required and 18" high cover sleeve.
- Rough chrome plated* finish

Straight Model No.	30º Angle Model No.	Free-Standing	Size
☐ 6614	☐ 6624	☐ 6634*	4" NPT x 4" Storz
☐ 6615	☐ 6625	☐ 6635*	4" NPT x 5" Storz
☐ 6616	☐ 6626	☐ 6636*	4" NPT x 6" Storz
☐ 6617	☐ 6627	☐ 6637*	6" NPT x 4" Storz
☐ 6618	☐ 6628	☐ 6638*	6" NPT x 5" Storz

Identification Plate Lettering (Models 6634 - 6639)
☐ **AUTO SPKR** ☐ **STANDPIPE** ☐ **AUTO SPKR & STANDPIPE**

***Optional Finish:** ☐ **-D** Polished chrome plated

Storz Caps - Blind cap with securing wire or chain, forged aluminum with powder coat finish

Model No.	Size
☐ 6644	4" Storz
☐ 6645	5" Storz

Model No.	Size
☐ 6646	6" Storz

Dry Hydrants - Provides a fire water supply in rural settings where pressurized water systems are insufficient or unavailable. Assemblies include hose thread adapter and strainer constructed of hard-coated aluminum and schedule 40 PVC 5" 90º elbow. Caps (optional) are hard-coated aluminum

Model No.	Hydrant Size
☐ 6664	6" PVC x 4½" male NST
☐ 6665	6" PVC x 5" male NST
☐ 6667	6" PVC x 6" male NST

Model No.	Cap Size
☐ 6674	4½" NST
☐ 6675	5" NST
☐ 6676	6" NST

PVC Suction Strainer

Model No.	Size
☐ 6686	6" Horizontal
☐ 6687	8" Horizontal

Model No.	Size
☐ 6688	6" Vertical (Barrel)
☐ 6689	8" Vertical (Barrel)

Straight Pattern

6614-6619

30º Angle Pattern

6624-6629

Free-Standing Type

6634-6639

Storz Cap

6644-6646

Dry Hydrant

6664-6667

Hydrant Cap

6674-6676

Strainer

6686/6687