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	Design Engineer: 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: 0.10gpm/ft²	Area of Application: 1500ft² (Actual 1343ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 100.00
Coverage Per Sprinkler: 88ft²	Number Of Sprinklers Calculated: 18 0
System Pressure Demand: 62.261	System Flow Demand: 302.08
Total Demand: 402.08 @ 62.261	Pressure Result: +33.304 (34.8%)

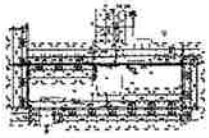
Supplies

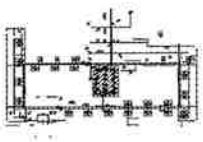
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

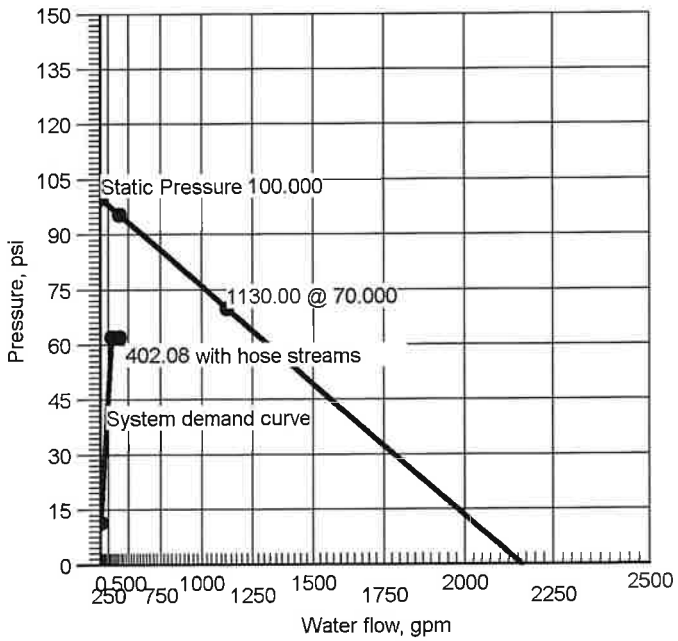
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	45.568	44.75	302.08

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: 2/20/2023

Design

Remote Area Number:	A
Occupancy Classification:	Light Hazard
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1343ft²)
Coverage per Sprinkler:	88ft²
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 @ 62.261 (Safety Margin = 33.304)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/Other: N/A

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

Notes:

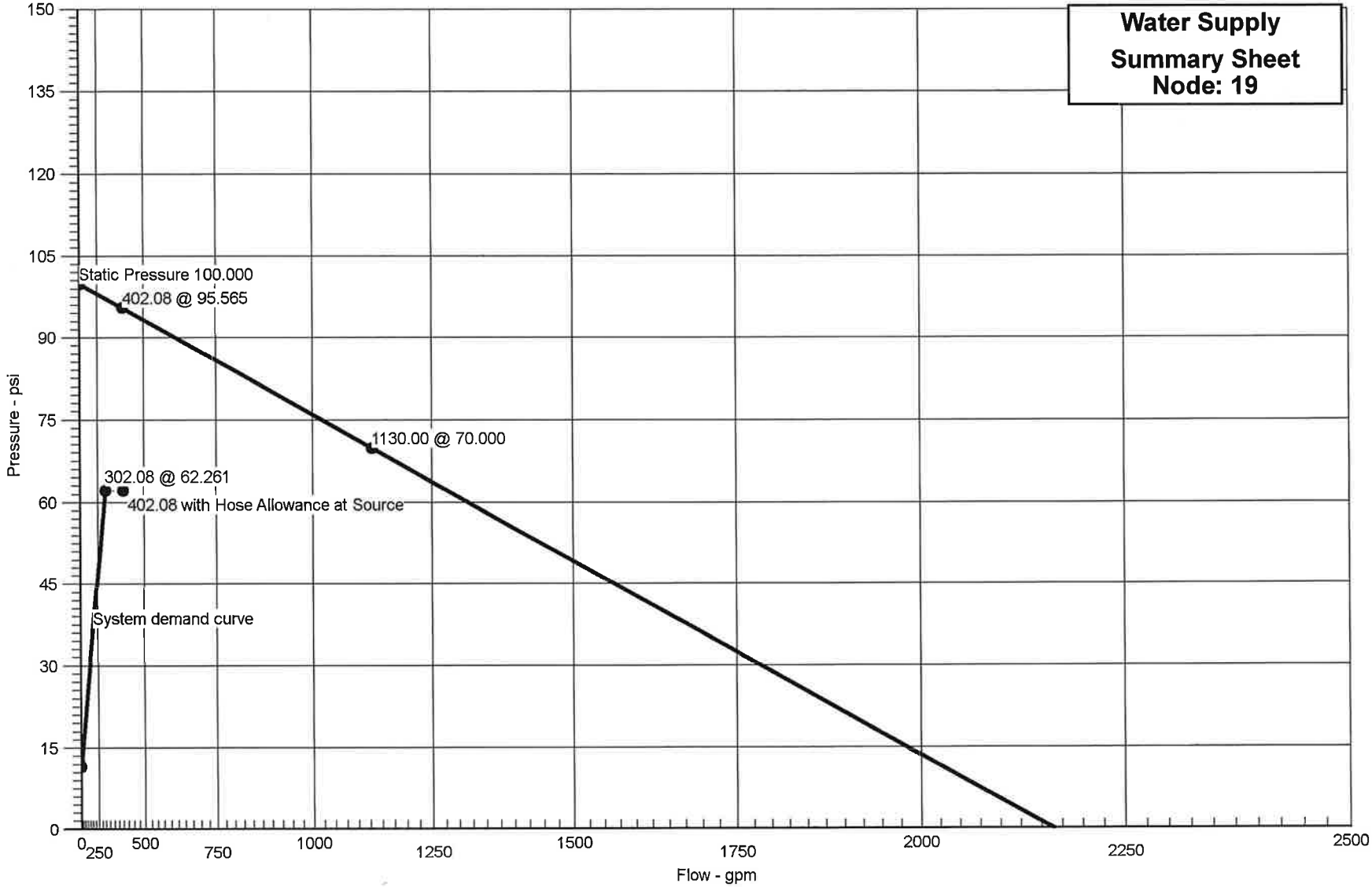
Automatic peaking results Left: 62.261 Right: 62.261

Hydraulic Graph

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

$N^{1.85}$

Date: 2/20/2023



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	62.261

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	-4'-0	Supply	62.261	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		28.731		
11	10'-0		30.144		
12	20'-0		26.053		
13	20'-0		26.652		
14	10'-0		40.538		
15	1'-0	Gauge	45.568		
16	-4'-0		47.805		
17	-4'-0		48.954		
18	-4'-0		62.113		
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		30.576		
35	10'-0		30.842		
36	10'-0		30.864		
37	10'-0		30.868		
38	10'-0		30.868		
39	10'-0		31.229		
40	10'-0		31.531		
41	10'-0		31.586		
42	10'-0		31.817		
43	10'-0		31.850		
44	10'-0		32.195		
45	10'-0		30.910		
46	10'-0		30.978		
48	10'-0		30.529		
49	10'-0		30.581		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
50	10'-0		30.746		
51	10'-0		30.786		
52	10'-0		30.541		
53	20'-0		26.243		
54	20'-0		26.553		
55	10'-0		30.543		
56	10'-0		30.561		
57	10'-0		30.571		
58	10'-0		30.891		
59	10'-0		30.892		
60	10'-0		30.892		
61	10'-0		30.900		
62	10'-0		30.899		
64	10'-0		30.273		
65	17'-8		10.419		
66	10'-0		30.228		
67	10'-0		30.979		
68	10'-0		30.992		
69	10'-0		30.996		
70	10'-0		30.895		
71	10'-0		31.071		
72	10'-0		29.088		
76	10'-0		30.862		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
81	10'-0		30.850		
83	10'-0		30.838		
85	10'-0		30.156		
86	10'-0		30.162		
87	10'-0		30.164		
88	20'-0		27.767		
90	10'-0		34.756		
91	10'-0		34.762		
92	10'-0		30.577		
95	10'-0		30.837		
96	10'-0		30.553		
100	10'-0		30.555		
119	10'-0		30.155		
123	10'-0		30.561		
124	10'-0		30.598		
125	10'-0		30.126		
126	10'-0		30.127		
127	10'-0		30.128		
128	10'-0		30.136		
129	10'-0		30.138		
130	10'-0		30.144		
131	10'-0		30.144		
132	10'-0		30.144		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
133	10'-0		30.126		
134	10'-0		30.126		
135	10'-0		30.126		
136	10'-0		30.144		

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.
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	0.074703	2.287	Sprinkler,
						15'-9½		1.178	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	120	10.988	Flow (q) from Route 16
5	17'-8		90.09	2.1570		12'-3½	0.062939	0.872	T(12'-3½)
						13'-10½			
5	17'-8		86.93	2	(See Notes)	2'-8	120	11.860	Flow (q) from Route 5
6	17'-8		177.02	2.1570		12'-3½	0.219595	3.288	T(12'-3½)
						14'-11½			
6	17'-8		125.07	2	(See Notes)	7'-8	120	15.148	Flow (q) from Route 6
8	10'-0		302.08	2.1570		6'-2	0.590244	3.324	E(6'-2)
						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	120	27.315	
10	10'-0		235.34	3.2600		20'-2	0.049765	1.416	T(20'-2)
						28'-5½			
10	10'-0			3		100'-0½	120	28.731	
132	10'-0		119.16	3.2600		100'-0½	0.014129	1.414	
132	10'-0		2.48	3		0'-0	120	30.144	Flow (q) from Route 27
11	10'-0		121.63	3.2600		0'-0	0.014677	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	30.144	
							0.005348		
119	10'-0		70.48	3.2600		2'-0		0.011	
119	10'-0			2	(See Notes)	10'-0	120	30.155	PO(12'-3½)
						12'-3½	0.010388	-4.333	
12	20'-0		34.02	2.1570		22'-3½		0.232	
12	20'-0			2	(See Notes)	60'-10½	120	26.053	T(12'-3½)
						30'-9	0.006554	-0.002	
13	20'-0		26.52	2.1570		91'-7½		0.601	E(6'-2), T(12'-3½)
13	20'-0		6.24	2	(See Notes)	90'-5½	120	26.652	T(12'-3½), Flow (q) from Route 21
						24'-7½	0.009689		
88	20'-0		32.76	2.1570		115'-1		1.115	T(12'-3½)
88	20'-0		29.73	2	(See Notes)	58'-4	120	27.767	Flow (q) from Route 22
						24'-7½	0.032001	4.335	
90	10'-0		62.50	2.1570		82'-11		2.654	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	34.756	
							0.004282		
91	10'-0		62.50	3.2600		1'-4½		0.006	
91	10'-0		239.58	3	(See Notes)	44'-11	120	34.762	Flow (q) from Route 19
						28'-2½	0.078979		
14	10'-0		302.08	3.2600		73'-1½		5.776	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	40.538	
						44'-9	0.021461	3.902	
15	1'-0		302.08	4.2600		52'-7		1.128	f, CV(28'-11½), BV(15'-9½), BOR
15	1'-0			6	(See Notes)	5'-0	120	45.568	
						17'-7	0.003055	2.168	
16	-4'-0		302.08	6.3570		22'-7		0.069	E(17'-7)
16	-4'-0			6	(See Notes)	358'-0	140	47.805	
						113'-5½	0.002438		
17	-4'-0		302.08	6.2800		471'-5½		1.149	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	-4'-0			6	(See Notes)	12'-0	120	48.954	
						40'-3	0.003055		
18	-4'-0		302.08	6.3570		52'-3		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	-4'-0			6	(See Notes)	13'-2	140	62.113	
						47'-3½	0.002438		
19	-4'-0		302.08	6.2800		60'-5		0.147	S, T(47'-3½)
			100.00					62.261	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 (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.
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 31
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** • • • • •
32	17'-8		16.91	1.0490		7'-0	0.095362	0.288	Sprinkler,
						9'-7½		0.918	E(2'-0), PO(5'-0)
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** • • • • •
23	17'-8		16.98	1.0490		9'-0	0.096122	0.193	Sprinkler,
						10'-11½		1.052	2E(2'-0), PO(5'-0)
								10.438	Total(Pt) Route 9
110	18'-4	5.6	17.07	1	(See Notes)	1'-8	120	9.286	• • • • • **Route 10** • • • • •
33	17'-8		17.07	1.0490		7'-0	0.097023	0.288	Sprinkler,
						8'-8		0.841	E(2'-0), PO(5'-0)
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** • • • • •
27	17'-8		17.07	1.0490		9'-0	0.097096	0.193	Sprinkler,
						10'-11½		1.063	2E(2'-0), PO(5'-0)
								10.549	Total(Pt) Route 11
112	18'-1½	5.6	17.13	1	(See Notes)	1'-11½	120	9.361	• • • • • **Route 12** • • • • •
24	17'-8		17.13	1.0490		9'-0	0.097745	0.193	Sprinkler,
						10'-11½		1.070	2E(2'-0), PO(5'-0)
								10.623	Total(Pt) Route 12
113	18'-1½	5.6	17.24	1	(See Notes)	1'-11½	120	9.473	• • • • • **Route 13** • • • • •
28	17'-8		17.24	1.0490		9'-0	0.098828	0.193	Sprinkler,
						10'-11½		1.082	2E(2'-0), PO(5'-0)
								10.747	Total(Pt) Route 13
114	18'-4½	5.6	17.26	1	(See Notes)	2'-8	120	9.502	• • • • • **Route 14** • • • • •
25	17'-8		17.26	1.0490		7'-0	0.099111	0.301	Sprinkler,
						9'-8		0.957	E(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.
								10.760	Total(Pt) Route 14
115	18'-1½	5.6	17.51	1	(See Notes)	1'-11½	120	9.771	• • • • • **Route 15** • • • • • Sprinkler,
						9'-0	0.101703	0.193	
29	17'-8		17.51	1.0490		10'-11½		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,
						7'-0	0.101979	0.301	
4	17'-8		17.53	1.0490		8'-8½		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,
						9'-0	0.106000	0.193	
30	17'-8		17.90	1.0490		10'-11½		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,
						7'-0	0.106995	0.301	
31	17'-8		17.99	1.0490		11'-8½		1.251	E(2'-0), PO(5'-0)
								11.874	Total(Pt) Route 18
34	10'-0			3		3'-2½	120	30.576	• • • • • **Route 19** • • • • •
							0.000325		
92	10'-0		15.50	3.2600		3'-2½		0.001	
92	10'-0			2	(See Notes)	57'-9	120	30.577	PO(12'-3½)
						49'-2½	0.002425	0.000	
95	10'-0		15.50	2.1570		107'-0		0.259	2T(12'-3½), PO(12'-3½)
95	10'-0			3		3'-2½	120	30.837	
							0.000325		
83	10'-0		15.50	3.2600		3'-2½		0.001	
83	10'-0			3		6'-9½	120	30.838	
							0.000563		
35	10'-0		20.87	3.2600		6'-9½		0.004	
35	10'-0		15.20	3		5'-2½	120	30.842	Flow (q) from Route 24
							0.001548		
81	10'-0		36.06	3.2600		5'-2½		0.008	

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			3		6'-0	120	30.850	
76	10'-0		42.50	3.2600		6'-0	0.002098	0.013	
76	10'-0			3		0'-6½	120	30.862	
36	10'-0		50.14	3.2600		0'-6½	0.002849	0.001	
36	10'-0			3		2'-1½	120	30.864	
37	10'-0		40.26	3.2600		2'-1½	0.001898	0.004	
37	10'-0		52.05	3.2600		0'-0	120	30.868	Flow (q) from Route 40
38	10'-0		92.30	3.2600		0'-0	0.008809	0.000	
38	10'-0			3		88'-10½	120	30.868	
39	10'-0		60.73	3.2600		88'-10½	0.004061	0.361	
39	10'-0		16.95	3.2600	(See Notes)	27'-1½ / 20'-2	120	31.229	Flow (q) from Route 41
40	10'-0		77.68	3.2600		47'-3½	0.006402	0.303	T(20'-2)
40	10'-0		72.88	3.2600		2'-6½	120	31.531	Flow (q) from Route 20
41	10'-0		150.56	3.2600		2'-6½	0.021780	-0.000 / 0.055	
41	10'-0		12.63 + 12.02	3		8'-0	120	31.586	Flow (q) from Route 53 and 58
42	10'-0		175.21	3.2600		8'-0	0.028831	0.231	
42	10'-0		14.01	3		1'-0	120	31.817	Flow (q) from Route 59
43	10'-0		189.22	3.2600		1'-0	0.033240	0.033	
43	10'-0		15.23	3		9'-0	120	31.850	Flow (q) from Route 43
44	10'-0		204.45	3.2600		9'-0	0.038359	0.345	
44	10'-0		16.88 + 18.25	3	(See Notes)	29'-9 / 20'-2	120	32.195	Flow (q) from Route 23 and 44
91	10'-0		239.58	3.2600		49'-10½	0.051437	2.566	T(20'-2)
								34.762	Total(Pt) Route 19

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.
45	10'-0		125.23	3	(See Notes)	89'-0½	120	30.910	• • • • • **Route 20** • • • • •
						20'-2	0.005690		Flow (q) from Route 26
40	10'-0		72.88	3.2600		109'-2½		0.622	T(20'-2)
								31.531	Total(Pt) Route 20
45	10'-0		125.23	3		1'-11	120	30.910	• • • • • **Route 21** • • • • •
						20'-2	0.003085	-0.000	T(20'-2), Flow (q) from Route 26
46	10'-0		52.35	3.2600		22'-1		0.068	
46	10'-0			2	(See Notes)	7'-6	120	30.978	PO(12'-3½)
						12'-3½	0.000451	-4.335	
13	20'-0		6.24	2.1570		19'-9½		0.009	
								26.652	Total(Pt) Route 21
10	10'-0		119.16	3		103'-5½	120	28.731	• • • • • **Route 22** • • • • •
							0.013483		Flow (q) from Route 1
133	10'-0		116.18	3.2600		103'-5½		1.395	
133	10'-0			3	(See Notes)	1'-7	120	30.126	
						29'-7	0.012956		
48	10'-0		113.71	3.2600		31'-1½		0.403	E(9'-5), T(20'-2)
48	10'-0			3		2'-1½	120	30.529	
							0.005828		
52	10'-0		73.83	3.2600		2'-1½		0.012	
52	10'-0			2	(See Notes)	10'-0	120	30.541	PO(12'-3½)
						12'-3½	0.001595	-4.334	
53	20'-0		12.35	2.1570		22'-3½		0.036	
53	20'-0		7.50	2	(See Notes)	56'-4½	120	26.243	
						24'-7½	0.003835	-0.000	T(12'-3½), Flow (q) from Route 33
54	20'-0		19.85	2.1570		80'-11½		0.311	T(12'-3½)
54	20'-0		9.88	2	(See Notes)	119'-3	120	26.553	
						30'-9	0.008097	-0.001	T(12'-3½), Flow (q) from Route 25
88	20'-0		29.73	2.1570		150'-0		1.215	E(6'-2), T(12'-3½)
								27.767	Total(Pt) Route 22
52	10'-0		12.35	3		0'-6½	120	30.541	• • • • • **Route 23** • • • • •
							0.004154		Flow (q) from Route 22
55	10'-0		61.48	3.2600		0'-6½		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
55	10'-0			3		6'-0	120	30.543	
56	10'-0		50.66	3.2600		6'-0	0.002904	0.017	
56	10'-0			3		5'-2½	120	30.561	
57	10'-0		40.41	3.2600		5'-2½	0.001911	0.010	
57	10'-0			3		6'-9½	120	30.571	
34	10'-0		25.21	3.2600		6'-9½	0.000799	0.005	
34	10'-0			1½	(See Notes)	56'-4½	120	30.576	PO(9'-11)
83	10'-0		9.72	1.6820		19'-9½ 76'-2	0.003434	0.000 0.262	PO(9'-11)
83	10'-0			1½	(See Notes)	49'-1½	120	30.838	PO(9'-11)
58	10'-0		4.35	1.6820		19'-9½ 68'-11	0.000776	-0.000 0.053	PO(9'-11)
58	10'-0			3		12'-0	120	30.891	
59	10'-0		4.35	3.2600		12'-0	0.000031	0.000	
59	10'-0		3.81	3		6'-0	120	30.892	Flow (q) from Route 29
60	10'-0		8.16	3.2600		6'-0	0.000099	0.001	
60	10'-0		3.18	3	(See Notes)	31'-9½	120	30.892	Flow (q) from Route 30
61	10'-0		11.34	3.2600		9'-5 41'-2½	0.000182	0.008	E(9'-5)
61	10'-0		5.54	1½	(See Notes)	116'-0	120	30.900	PO(9'-11), Flow (q) from Route 45
44	10'-0		16.88	1.6820		19'-9½ 135'-10	0.009541	1.296	PO(9'-11)
								32.195	Total(Pt) Route 23
57	10'-0			2	(See Notes)	66'-6½	120	30.571	• • • • • **Route 24** • • • • • PO(12'-3½)
35	10'-0		15.20	2.1570		49'-2½ 115'-9½	0.002339	0.000 0.271	2T(12'-3½), PO(12'-3½)
								30.842	Total(Pt) Route 24

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 (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
36	10'-0			2	(See Notes)	10'-0	120	30.864	• • • • • **Route 25** • • • • •
						12'-3½	0.001055	-4.334	PO(12'-3½)
54	20'-0		9.88	2.1570		22'-3½		0.024	
								26.553	Total(Pt) Route 25
100	10'-0		12.05 + 12.11	3		8'-0	120	30.555	• • • • • **Route 26** • • • • •
							0.000738		Flow (q) from Route 38 and 39
123	10'-0		24.16	3.2600		8'-0		0.006	
123	10'-0		12.30	3	(See Notes)	3'-0½	120	30.561	Flow (q) from Route 54
						20'-2	0.001580	0.000	T(20'-2)
124	10'-0		36.46	3.2600		23'-2½		0.037	
124	10'-0		88.78	3	(See Notes)	0'-0	120	30.598	Flow (q) from Route 37
						20'-2	0.015490		T(20'-2)
45	10'-0		125.23	3.2600		20'-2		0.312	
								30.910	Total(Pt) Route 26
128	10'-0		2.48	1½	(See Notes)	8'-0	120	30.136	• • • • • **Route 27** • • • • •
						9'-11	0.000116		Flow (q) from Route 28
129	10'-0		1.56	1.6820		17'-11		0.002	T(9'-11)
129	10'-0			1½	(See Notes)	171'-3½	120	30.138	
						9'-11	0.000034		PO(9'-11)
130	10'-0		0.80	1.6820		181'-2½		0.006	
130	10'-0		0.76	3		8'-0	120	30.144	Flow (q) from Route 46
							0.000005		
131	10'-0		1.56	3.2600		8'-0		0.000	
131	10'-0		0.92	3	(See Notes)	2'-8½	120	30.144	Flow (q) from Route 47
						20'-2	0.000011		T(20'-2)
132	10'-0		2.48	3.2600		22'-10½		0.000	
								30.144	Total(Pt) Route 27
126	10'-0		0.58 + 0.60	1½	(See Notes)	8'-0	120	30.127	• • • • • **Route 28** • • • • •
						9'-11	0.000070		Flow (q) from Route 34 and 55
127	10'-0		1.18	1.6820		17'-11		0.001	T(9'-11)
127	10'-0		1.29	1½	(See Notes)	18'-6	120	30.128	Flow (q) from Route 49
						9'-11	0.000274		
128	10'-0		2.48	1.6820		28'-4½		0.008	T(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.
								30.136	Total(Pt) Route 28
56	10'-0			1½	(See Notes)	56'-4½	120	30.561	• • • • • **Route 29** • • • • •
						19'-9½	0.003793	0.000	PO(9'-11)
81	10'-0		10.25	1.6820		76'-2		0.289	PO(9'-11)
81	10'-0			1½	(See Notes)	49'-1½	120	30.850	PO(9'-11)
						19'-9½	0.000608	-0.000	
59	10'-0		3.81	1.6820		68'-11		0.042	PO(9'-11)
								30.892	Total(Pt) Route 29
55	10'-0			1½	(See Notes)	56'-4½	120	30.543	• • • • • **Route 30** • • • • •
						19'-9½	0.004187	0.000	PO(9'-11)
76	10'-0		10.82	1.6820		76'-2		0.319	PO(9'-11)
76	10'-0			1½	(See Notes)	49'-1½	120	30.862	PO(9'-11)
						19'-9½	0.000434	-0.000	
60	10'-0		3.18	1.6820		68'-11		0.030	PO(9'-11)
								30.892	Total(Pt) Route 30
33	17'-8		11.73	2	(See Notes)	0'-11½	120	10.415	• • • • • **Route 31** • • • • •
						12'-3½	0.000337		Flow (q) from Route 10
65	17'-8		5.33	2.1570		13'-3½		0.004	T(12'-3½)
65	17'-8		15.14	2	(See Notes)	11'-11½	120	10.419	Flow (q) from Route 32
						6'-2	0.004059		
26	17'-8		20.47	2.1570		18'-1½		0.074	E(6'-2)
								10.493	Total(Pt) Route 31
32	17'-8		1.77	2	(See Notes)	11'-11	120	10.320	• • • • • **Route 32** • • • • •
						30'-9	0.002322		Flow (q) from Route 8
65	17'-8		15.14	2.1570		42'-8½		0.099	E(6'-2), 2T(12'-3½)
								10.419	Total(Pt) Route 32
12	20'-0			2	(See Notes)	214'-6½	120	26.053	• • • • • **Route 33** • • • • •
						86'-2	0.000633	-0.001	T(12'-3½)
53	20'-0		7.50	2.1570		300'-8		0.190	2E(6'-2), 5T(12'-3½)
								26.243	Total(Pt) Route 33
125	10'-0		0.58	1½	(See Notes)	20'-9	120	30.126	• • • • • **Route 34** • • • • •
						14'-10	0.000019		PO(9'-11), Flow (q) from Route 35
126	10'-0		0.58	1.6820		35'-7		0.001	E(4'-11½)

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 (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
								30.127	Total(Pt) Route 34
134	10'-0		1.18	3		7'-0	120	30.126	• • • • • **Route 35** • • • • • Flow (q) from Route 36
125	10'-0		0.58	3.2600		7'-0	0.000001	0.000	
								30.126	Total(Pt) Route 35
133	10'-0			3	(See Notes)	2'-8½	120	30.126	• • • • • **Route 36** • • • • • T(20'-2)
						20'-2	0.000011		
135	10'-0		2.48	3.2600		22'-10½		0.000	
135	10'-0			3		8'-0	120	30.126	
134	10'-0		1.18	3.2600		8'-0	0.000003	0.000	
								30.126	Total(Pt) Route 36
11	10'-0			3	(See Notes)	8'-3½	120	30.144	• • • • • **Route 37** • • • • • T(20'-2)
						20'-2	0.002956		
66	10'-0		51.16	3.2600		28'-5½		0.084	
66	10'-0		18.79	3		8'-5	120	30.228	Flow (q) from Route 50
64	10'-0		69.95	3.2600		8'-5	0.005274	0.044	
64	10'-0		18.83	3		39'-8	120	30.273	Flow (q) from Route 51
								0.000	
124	10'-0		88.78	3.2600		39'-8	0.008197	0.325	
								30.598	Total(Pt) Route 37
86	10'-0			3		8'-0	120	30.162	• • • • • **Route 38** • • • • •
87	10'-0		12.05	3.2600		8'-0	0.000204	0.002	
87	10'-0			1½	(See Notes)	56'-4½	120	30.164	PO(9'-11)
						19'-9½			
96	10'-0		12.05	1.6820		76'-2	0.005114	0.389	PO(9'-11)
96	10'-0			3		8'-0	120	30.553	
100	10'-0		12.05	3.2600		8'-0	0.000204	0.002	
								30.555	Total(Pt) Route 38

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
119	10'-0		34.02	3		1'-0½	120	30.155	• • • • • **Route 39** • • • • •
							0.001580		Flow (q) from Route 1
85	10'-0		36.46	3.2600		1'-0½		0.002	
85	10'-0			3		8'-0	120	30.156	
							0.000738		
86	10'-0		24.16	3.2600		8'-0		0.006	
86	10'-0			1½	(See Notes)	56'-4½	120	30.162	PO(9'-11)
						19'-9½	0.005157		
100	10'-0		12.11	1.6820		76'-2		0.393	PO(9'-11)
								30.555	Total(Pt) Route 39
50	10'-0			3		10'-0	120	30.746	• • • • • **Route 40** • • • • •
							0.004022		
51	10'-0		60.42	3.2600		10'-0		0.040	
51	10'-0			3	(See Notes)	6'-5½	120	30.786	
						20'-2	0.003052	0.000	
37	10'-0		52.05	3.2600		26'-7½		0.081	T(20'-2)
								30.868	Total(Pt) Route 40
49	10'-0		39.87 + 29.12	3		32'-2	120	30.581	• • • • • **Route 41** • • • • •
							0.005141		Flow (q) from Route 42 and 56
50	10'-0		68.99	3.2600		32'-2		0.165	
50	10'-0			1½	(See Notes)	99'-5½	120	30.746	PO(9'-11)
						19'-9½	0.002726		
71	10'-0		8.58	1.6820		119'-3		0.325	T(9'-11)
71	10'-0		8.37	1½	(See Notes)	6'-5½	120	31.071	Flow (q) from Route 57
						9'-11	0.009612	0.000	
39	10'-0		16.95	1.6820		16'-4½		0.157	PO(9'-11)
								31.229	Total(Pt) Route 41
48	10'-0			3	(See Notes)	7'-8½	120	30.529	• • • • • **Route 42** • • • • •
						20'-2	0.001864		T(20'-2)
49	10'-0		39.87	3.2600		27'-10½		0.052	
								30.581	Total(Pt) Route 42

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
46	10'-0		6.24	3		0'-7	120	30.978	• • • • • **Route 43** • • • • • Flow (q) from Route 21
67	10'-0		46.11	3.2600		0'-7	0.002439	0.001	
67	10'-0			3		9'-0	120	30.979	
68	10'-0		33.48	3.2600		9'-0	0.001350	0.012	
68	10'-0			1½	(See Notes)	89'-0½	120	30.992	PO(9'-11)
43	10'-0		15.23	1.6820		19'-9½ / 108'-10½	0.007887	0.859	PO(9'-11)
								31.850	Total(Pt) Route 43
68	10'-0		15.23	3		9'-0	120	30.992	• • • • • **Route 44** • • • • • Flow (q) from Route 43
69	10'-0		18.25	3.2600		9'-0	0.000439	0.004	
69	10'-0			1½	(See Notes)	89'-0½	120	30.996	PO(9'-11)
44	10'-0		18.25	1.6820		19'-9½ / 108'-10½	0.011022	1.200	PO(9'-11)
								32.195	Total(Pt) Route 44
38	10'-0			3	(See Notes)	2'-6½	120	30.868	• • • • • **Route 45** • • • • • T(20'-2)
70	10'-0		31.57	3.2600		20'-2 / 22'-8	0.001211	-0.000 / 0.027	
70	10'-0			3		8'-0	120	30.895	
62	10'-0		19.55	3.2600		8'-0	0.000499	0.004	
62	10'-0			3		10'-0	120	30.899	
61	10'-0		5.54	3.2600		10'-0	0.000048	0.000	
								30.900	Total(Pt) Route 45
136	10'-0		0.76	3		7'-0	120	30.144	• • • • • **Route 46** • • • • • Flow (q) from Route 48
130	10'-0		0.76	3.2600		7'-0	0.000001	0.000	
								30.144	Total(Pt) Route 46

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
128	10'-0		2.48	1½	(See Notes)	171'-3½	120	30.136	• • • • • **Route 47** • • • • •
						19'-9½	0.000044		T(9'-11), Flow (q) from Route 28
131	10'-0		0.92	1.6820		191'-1		0.008	PO(9'-11)
								30.144	Total(Pt) Route 47
129	10'-0			1½	(See Notes)	178'-3½	120	30.138	• • • • • **Route 48** • • • • •
						24'-9	0.000030		T(9'-11)
136	10'-0		0.76	1.6820		203'-0½		0.006	E(4'-11½), PO(9'-11)
								30.144	Total(Pt) Route 48
135	10'-0			1½	(See Notes)	13'-9	120	30.126	• • • • • **Route 49** • • • • •
						9'-11	0.000082		PO(9'-11)
127	10'-0		1.29	1.6820		23'-7½		0.002	
								30.128	Total(Pt) Route 49
72	10'-0		37.62	1½	(See Notes)	78'-2½	120	29.088	• • • • • **Route 50** • • • • •
						19'-9½	0.011634		T(9'-11), Flow (q) from Route 52
66	10'-0		18.79	1.6820		98'-0		1.140	PO(9'-11)
								30.228	Total(Pt) Route 50
72	10'-0		37.62	1½	(See Notes)	86'-7½	120	29.088	• • • • • **Route 51** • • • • •
						14'-10	0.011674		Flow (q) from Route 52
64	10'-0		18.83	1.6820		101'-5½		1.185	E(4'-11½), PO(9'-11)
								30.273	Total(Pt) Route 51
9	10'-0			1½	(See Notes)	22'-5	120	27.315	• • • • • **Route 52** • • • • •
						19'-9½	0.042012		PO(9'-11)
72	10'-0		37.62	1.6820		42'-2½		1.773	T(9'-11)
								29.088	Total(Pt) Route 52
67	10'-0			1½	(See Notes)	89'-0½	120	30.979	• • • • • **Route 53** • • • • •
						19'-9½	0.005575		PO(9'-11)
41	10'-0		12.63	1.6820		108'-10½		0.607	PO(9'-11)
								31.586	Total(Pt) Route 53
85	10'-0			1½	(See Notes)	56'-4½	120	30.156	• • • • • **Route 54** • • • • •
						19'-9½	0.005312		PO(9'-11)
123	10'-0		12.30	1.6820		76'-2		0.405	PO(9'-11)
								30.561	Total(Pt) Route 54

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
134	10'-0		1.18	1½	(See Notes)	13'-9	120	30.126	• • • • • **Route 55** • • • • •
						19'-9½	0.000020		PO(9'-11), Flow (q) from Route 36
126	10'-0		0.60	1.6820		33'-6½		0.001	T(9'-11)
								30.127	Total(Pt) Route 55
9	10'-0			1½	(See Notes)	105'-0½	120	27.315	• • • • • **Route 56** • • • • •
						19'-9½	0.026164		PO(9'-11)
49	10'-0		29.12	1.6820		124'-10		3.266	PO(9'-11)
								30.581	Total(Pt) Route 56
51	10'-0			1½	(See Notes)	89'-5½	120	30.786	• • • • • **Route 57** • • • • •
						19'-9½	0.002607		PO(9'-11)
71	10'-0		8.37	1.6820		109'-3		0.285	T(9'-11)
								31.071	Total(Pt) Route 57
70	10'-0			1½	(See Notes)	116'-0	120	30.895	• • • • • **Route 58** • • • • •
						19'-9½	0.005089		PO(9'-11)
41	10'-0		12.02	1.6820		135'-10		0.691	PO(9'-11)
								31.586	Total(Pt) Route 58
62	10'-0			1½	(See Notes)	116'-0	120	30.899	• • • • • **Route 59** • • • • •
						19'-9½	0.006758		PO(9'-11)
42	10'-0		14.01	1.6820		135'-10		0.918	PO(9'-11)
								31.817	Total(Pt) Route 59

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 (B)

Job

Job Number: F23007	Design Engineer: 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: 0.10gpm/ft²	Area of Application: 1500ft² (Actual 216ft²)
Most Demanding Sprinkler Data: 8 K-Factor 38.03 at 22.600	Hose Streams: 100.00
Coverage Per Sprinkler: 180ft²	Number Of Sprinklers Calculated: 6 0
System Pressure Demand: 61.599	System Flow Demand: 229.88
Total Demand: 329.88 @ 61.599	Pressure Result: +35.326 (36.4%)

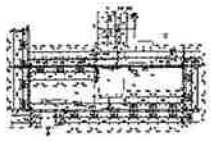
Supplies

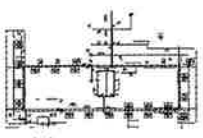
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

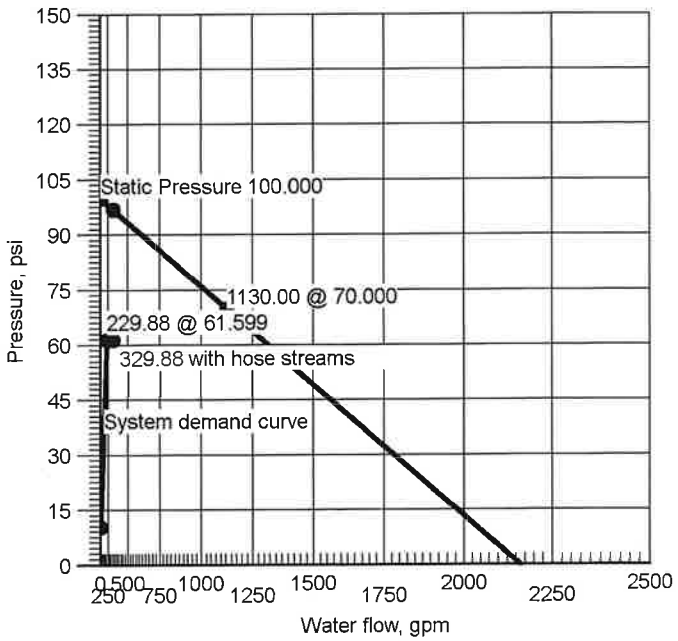
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	45.511	34.08	229.88

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: 2/20/2023

Design

Remote Area Number:	B
Occupancy Classification:	Light Hazard
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 216ft²)
Coverage per Sprinkler:	180ft²
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 @ 61.599 (Safety Margin = 35.326)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/Other: N/A

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

Notes:

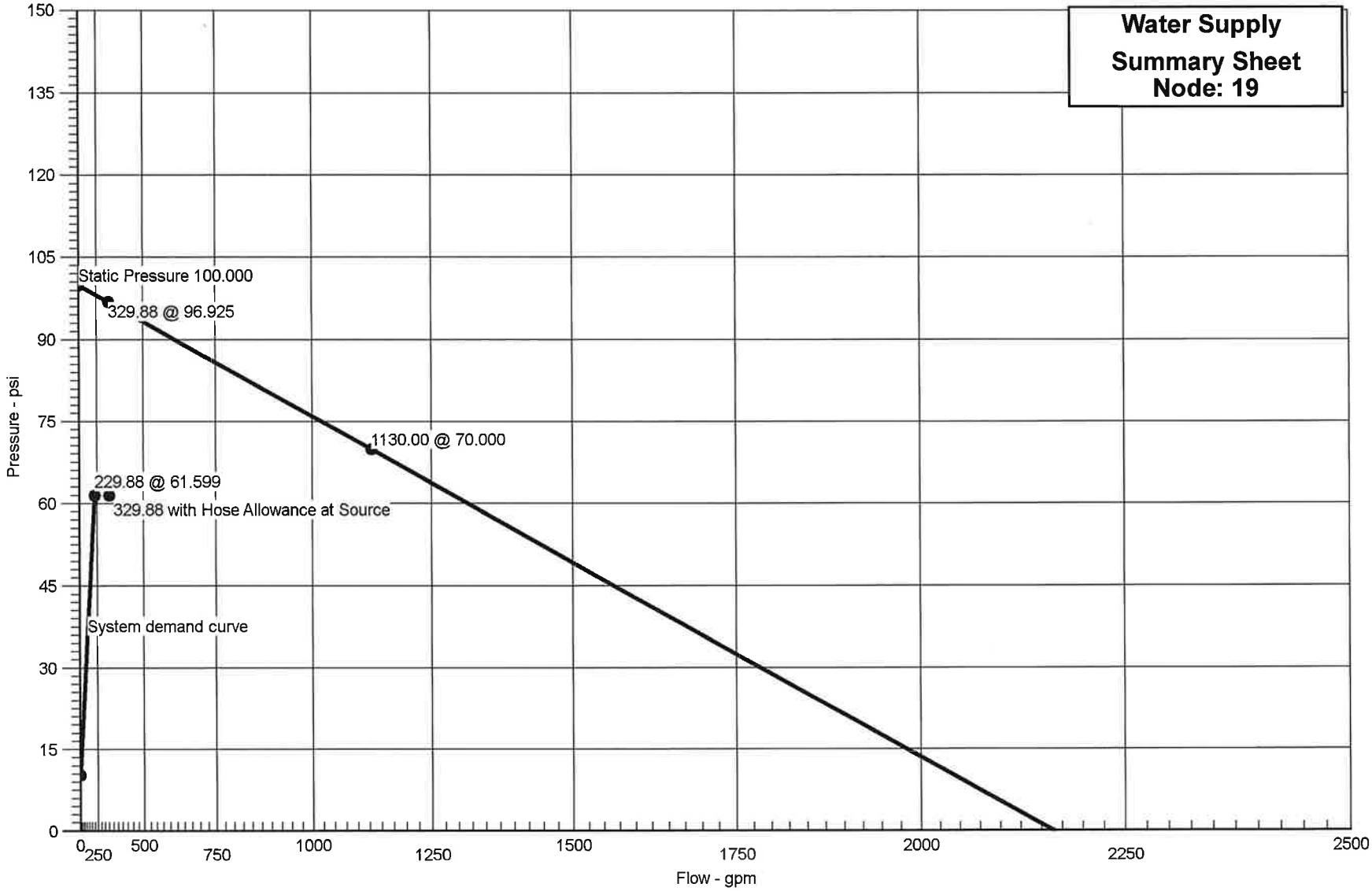
Automatic peaking results Left: 62.237 Right: N/A

Hydraulic Graph

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

$N^{1.85}$

Date: 2/20/2023



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	22.733		
Sprinkler	204	38.44	38.03	8	23.093		
Sprinkler	205	39.03	38.03	8	23.797		
Sprinkler	206	38.20	38.03	8	22.801		

⇨ 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	61.599

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	-4'-0	Supply	61.599	229.88	
201	20'-0	Sprinkler	22.600	38.03	
202	20'-0	Sprinkler	22.608	38.04	
203	20'-0	Sprinkler	22.733	38.14	
204	20'-0	Sprinkler	23.093	38.44	
205	20'-0	Sprinkler	23.797	39.03	
206	20'-0	Sprinkler	22.801	38.20	
9	10'-0		34.953		
10	10'-0		34.953		
11	10'-0		34.846		
12	20'-0		28.315		
13	20'-0		30.618		
14	10'-0		40.929		
15	1'-0	Gauge	45.511		
16	-4'-0		47.720		
17	-4'-0		48.414		
18	-4'-0		61.510		
34	10'-0		35.070		
35	10'-0		35.174		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
36	10'-0		35.183		
37	10'-0		35.185		
38	10'-0		35.185		
39	10'-0		35.365		
40	10'-0		35.514		
41	10'-0		35.547		
42	10'-0		35.683		
43	10'-0		35.703		
44	10'-0		35.909		
45	10'-0		35.082		
46	10'-0		35.086		
48	10'-0		35.057		
49	10'-0		35.070		
50	10'-0		35.138		
51	10'-0		35.154		
52	10'-0		35.056		
53	20'-0		30.401		
54	20'-0		30.845		
55	10'-0		35.057		
56	10'-0		35.064		
57	10'-0		35.068		
58	10'-0		35.198		
59	10'-0		35.198		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
60	10'-0		35.199		
61	10'-0		35.203		
62	10'-0		35.202		
64	10'-0		34.888		
66	10'-0		34.868		
67	10'-0		35.087		
68	10'-0		35.095		
69	10'-0		35.098		
70	10'-0		35.200		
71	10'-0		35.290		
72	10'-0		34.913		
76	10'-0		35.182		
81	10'-0		35.177		
83	10'-0		35.173		
85	10'-0		34.691		
86	10'-0		34.695		
87	10'-0		34.696		
88	20'-0		31.450		
90	10'-0		37.440		
91	10'-0		37.444		
92	10'-0		35.071		
95	10'-0		35.172		
96	10'-0		34.944		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
100	10'-0		34.945		
119	10'-0		34.690		
123	10'-0		34.949		
124	10'-0		34.972		
125	10'-0		35.039		
126	10'-0		35.032		
127	10'-0		35.019		
128	10'-0		34.949		
129	10'-0		34.930		
130	10'-0		34.876		
131	10'-0		34.875		
132	10'-0		34.873		
133	10'-0		35.041		
134	10'-0		35.039		
135	10'-0		35.039		
136	10'-0		34.876		

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
201	20'-0	8	38.03	2	(See Notes)	6'-0	120	22.600	• • • • • Route 1 • • • • • Sprinkler
202	20'-0		11.52	2.1570		6'-0	0.001401	0.008	
202	20'-0	8	38.04	2	(See Notes)	6'-0	120	22.608	Sprinkler
203	20'-0		49.56	2.1570		6'-0	0.020832	0.125	
203	20'-0	8	38.14	2	(See Notes)	6'-0	120	22.733	Sprinkler
204	20'-0		87.70	2.1570		6'-0	0.059889	0.359	
204	20'-0	8	38.44	2	(See Notes)	6'-0	120	23.093	Sprinkler
205	20'-0		126.14	2.1570		6'-0	0.117328	0.704	
205	20'-0	8	39.03	2	(See Notes)	4'-11	120	23.797	Sprinkler,
12	20'-0		165.17	2.1570		18'-5½ 23'-4½	0.193183	0.001 4.518	E(6'-2), T(12'-3½)
12	20'-0			2	(See Notes)	60'-10½	120	28.315	T(12'-3½)
13	20'-0		54.86	2.1570		30'-9 91'-7½	0.025148	-0.002 2.304	E(6'-2), T(12'-3½)
13	20'-0			2	(See Notes)	90'-5½	120	30.618	T(12'-3½)
88	20'-0		27.98	2.1570		24'-7½ 115'-1	0.007235	0.833	T(12'-3½)
88	20'-0		20.43	2	(See Notes)	58'-4	120	31.450	Flow (q) from Route 11
90	10'-0		48.41	2.1570		24'-7½ 82'-11	0.019949	4.335 1.655	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	37.440	
91	10'-0		48.41	3.2600		1'-4½	0.002669	0.004	
91	10'-0		181.47	3	(See Notes)	44'-11	120	37.444	Flow (q) from Route 2
14	10'-0		229.88	3.2600		28'-2½ 73'-1½	0.047651	3.485	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	40.929	
15	1'-0		229.88	4.2600		44'-9 52'-7	0.012948	3.902 0.681	f, CV(28'-11½), BV(15'-9½), BOR

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.
15	1'-0			6	(See Notes)	5'-0	120	45.511	
						17'-7	0.001843	2.168	E(17'-7)
16	-4'-0		229.88	6.3570		22'-7		0.042	
16	-4'-0			6	(See Notes)	358'-0	140	47.720	
						113'-5½	0.001471		
17	-4'-0		229.88	6.2800		471'-5½		0.693	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	-4'-0			6	(See Notes)	12'-0	120	48.414	
						40'-3	0.001843		
18	-4'-0		229.88	6.3570		52'-3		13.096	2LtE(11'-4), BFP(-13.000), E(17'-7)
18	-4'-0			6	(See Notes)	13'-2	140	61.510	
						47'-3½	0.001471		
19	-4'-0		229.88	6.2800		60'-5		0.089	S, T(47'-3½)
			100.00					61.599	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,
						24'-7½	0.006550		
206	20'-0		26.51	2.1570		30'-7½		0.201	2T(12'-3½)
206	20'-0	8	38.20	2	(See Notes)	179'-7	120	22.801	Sprinkler,
						43'-1	0.034131	-0.000	
53	20'-0		64.71	2.1570		222'-8		7.600	3T(12'-3½), E(6'-2)
53	20'-0			2	(See Notes)	10'-0	120	30.401	
						12'-3½	0.014423	4.334	
52	10'-0		40.62	2.1570		22'-3½		0.322	PO(12'-3½)
52	10'-0			3		0'-6½	120	35.056	
							0.001629		
55	10'-0		37.07	3.2600		0'-6½		0.001	
55	10'-0			3		6'-0	120	35.057	
							0.001139		
56	10'-0		30.56	3.2600		6'-0		0.007	
56	10'-0			3		5'-2½	120	35.064	
							0.000750		
57	10'-0		24.37	3.2600		5'-2½		0.004	

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
57	10'-0			3		6'-9½	120	35.068	
34	10'-0		15.21	3.2600		6'-9½	0.000314	0.002	
34	10'-0			3		3'-2½	120	35.070	
92	10'-0		9.35	3.2600		3'-2½	0.000127	0.000	
92	10'-0			2	(See Notes)	57'-9	120	35.071	PO(12'-3½)
95	10'-0		9.35	2.1570		49'-2½ 107'-0	0.000952	0.000 0.102	2T(12'-3½), PO(12'-3½)
95	10'-0			3		3'-2½	120	35.172	
83	10'-0		9.35	3.2600		3'-2½	0.000127	0.000	
83	10'-0			3		6'-9½	120	35.173	
35	10'-0		12.30	3.2600		6'-9½	0.000212	0.001	
35	10'-0		9.16	3		5'-2½	120	35.174	Flow (q) from Route 5
81	10'-0		21.47	3.2600		5'-2½	0.000593	0.003	
81	10'-0			3		6'-0	120	35.177	
76	10'-0		25.02	3.2600		6'-0	0.000787	0.005	
76	10'-0			3		0'-6½	120	35.182	
36	10'-0		29.22	3.2600		0'-6½	0.001049	0.001	
36	10'-0		3.66	3		2'-1½	120	35.183	Flow (q) from Route 6
37	10'-0		32.88	3.2600		2'-1½	0.001305	0.003	
37	10'-0		31.25	3		0'-0	120	35.185	Flow (q) from Route 7
38	10'-0		64.13	3.2600		0'-0	0.004491	0.000	
38	10'-0			3		88'-10½	120	35.185	
39	10'-0		41.66	3.2600		88'-10½	0.002022	0.180	

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
39	10'-0		11.33	3	(See Notes)	27'-1½	120	35.365	Flow (q) from Route 25
						20'-2	0.003156		T(20'-2)
40	10'-0		53.00	3.2600		47'-3½		0.149	
40	10'-0		59.90	3		2'-6½	120	35.514	Flow (q) from Route 4
							0.012787	-0.000	
41	10'-0		112.90	3.2600		2'-6½		0.032	
41	10'-0		10.86 + 8.28	3		8'-0	120	35.547	Flow (q) from Route 28 and 34
							0.017084		
42	10'-0		132.04	3.2600		8'-0		0.137	
42	10'-0		9.88	3		1'-0	120	35.683	Flow (q) from Route 35
							0.019524		
43	10'-0		141.92	3.2600		1'-0		0.020	
43	10'-0		12.63	3		9'-0	120	35.703	Flow (q) from Route 3
							0.022860		
44	10'-0		154.55	3.2600		9'-0		0.206	
44	10'-0		12.16 + 14.76	3	(See Notes)	29'-9	120	35.909	Flow (q) from Route 8 and 17
						20'-2	0.030767		T(20'-2)
91	10'-0		181.47	3.2600		49'-10½		1.535	
								37.444	Total(Pt) Route 2
13	20'-0		27.98	2	(See Notes)	7'-6	120	30.618	• • • • • **Route 3** • • • • • Flow (q) from Route 1
						12'-3½	0.006720	4.335	
46	10'-0		26.89	2.1570		19'-9½		0.133	PO(12'-3½)
46	10'-0		11.37	3		0'-7	120	35.086	Flow (q) from Route 18
							0.001727		
67	10'-0		38.26	3.2600		0'-7		0.001	
67	10'-0			3		9'-0	120	35.087	
							0.000931		
68	10'-0		27.40	3.2600		9'-0		0.008	
68	10'-0			1½	(See Notes)	89'-0½	120	35.095	PO(9'-11)
						19'-9½	0.005580		
43	10'-0		12.63	1.6820		108'-10½		0.607	PO(9'-11)
								35.703	Total(Pt) Route 3

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		54.86	2	(See Notes)	10'-0	120	28.315	• • • • • **Route 4** • • • • •
						12'-3½	0.091537	4.333	Flow (q) from Route 1
119	10'-0		110.30	2.1570		22'-3½		2.041	PO(12'-3½)
119	10'-0			3		1'-0½	120	34.690	
							0.001005		
85	10'-0		28.55	3.2600		1'-0½		0.001	
85	10'-0			3		8'-0	120	34.691	
							0.000469		
86	10'-0		18.92	3.2600		8'-0		0.004	
86	10'-0			3		8'-0	120	34.695	
							0.000130		
87	10'-0		9.44	3.2600		8'-0		0.001	
87	10'-0			1½	(See Notes)	56'-4½	120	34.696	PO(9'-11)
						19'-9½	0.003253		
96	10'-0		9.44	1.6820		76'-2		0.248	PO(9'-11)
96	10'-0			3		8'-0	120	34.944	
							0.000130		
100	10'-0		9.44	3.2600		8'-0		0.001	
100	10'-0		9.48	3		8'-0	120	34.945	Flow (q) from Route 29
							0.000469		
123	10'-0		18.92	3.2600		8'-0		0.004	
123	10'-0		9.63	3	(See Notes)	3'-0½	120	34.949	Flow (q) from Route 30
						20'-2	0.001005	0.000	
124	10'-0		28.55	3.2600		23'-2½		0.023	T(20'-2)
124	10'-0		42.73	3	(See Notes)	0'-0	120	34.972	Flow (q) from Route 14
						20'-2	0.005461		
45	10'-0		71.28	3.2600		20'-2		0.110	T(20'-2)
45	10'-0			3	(See Notes)	89'-0½	120	35.082	
						20'-2	0.003959		
40	10'-0		59.90	3.2600		109'-2½		0.432	T(20'-2)
								35.514	Total(Pt) Route 4
57	10'-0			2	(See Notes)	66'-6½	120	35.068	• • • • • **Route 5** • • • • •
						49'-2½	0.000918	0.000	PO(12'-3½)
35	10'-0		9.16	2.1570		115'-9½		0.106	2T(12'-3½), PO(12'-3½)

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 (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.
								35.174	Total(Pt) Route 5
54	20'-0		24.09	2	(See Notes)	10'-0	120	30.845	• • • • • **Route 6** • • • • •
						12'-3½	0.000168	4.334	Flow (q) from Route 12
36	10'-0		3.66	2.1570		22'-3½		0.004	PO(12'-3½)
								35.183	Total(Pt) Route 6
119	10'-0		28.55	3	(See Notes)	2'-0	120	34.690	• • • • • **Route 7** • • • • •
						20'-2	0.007038		Flow (q) from Route 4
11	10'-0		81.76	3.2600		22'-2		0.156	T(20'-2)
11	10'-0			3	(See Notes)	0'-0	120	34.846	T(20'-2)
						20'-2	0.001341		
132	10'-0		33.37	3.2600		20'-2		0.027	
132	10'-0			3	(See Notes)	2'-8½	120	34.873	T(20'-2)
						20'-2	0.000098		
131	10'-0		8.12	3.2600		22'-10½		0.002	
131	10'-0			3		8'-0	120	34.875	
							0.000041		
130	10'-0		5.06	3.2600		8'-0		0.000	
130	10'-0			3		7'-0	120	34.876	
							0.000011		
136	10'-0		2.52	3.2600		7'-0		0.000	
136	10'-0			1½	(See Notes)	178'-3½	120	34.876	PO(9'-11)
						14'-10	0.000283		
129	10'-0		2.52	1.6820		193'-2		0.055	E(4'-11½)
129	10'-0		2.54	1½	(See Notes)	8'-0	120	34.930	Flow (q) from Route 24
						9'-11	0.001026		
128	10'-0		5.06	1.6820		17'-11		0.018	T(9'-11)
128	10'-0		3.06	1½	(See Notes)	18'-6	120	34.949	Flow (q) from Route 21
						9'-11	0.002461		
127	10'-0		8.12	1.6820		28'-4½		0.070	T(9'-11)
127	10'-0			1½	(See Notes)	13'-9	120	35.019	T(9'-11)
						19'-9½	0.000612		
135	10'-0		3.82	1.6820		33'-6½		0.021	PO(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.
135	10'-0		4.29	3	(See Notes)	2'-8½	120	35.039	Flow (q) from Route 13
133	10'-0		8.12	3.2600		20'-2 22'-10½	0.000098	0.002	T(20'-2)
133	10'-0		26.10	3	(See Notes)	1'-7	120	35.041	Flow (q) from Route 15
48	10'-0		34.22	3.2600		9'-5 10'-11½	0.001405	0.015	E(9'-5)
48	10'-0		3.55	3		7'-8½	120	35.057	Flow (q) from Route 20
49	10'-0		37.77	3.2600		7'-8½	0.001687	0.013	
49	10'-0		4.81	3		32'-2	120	35.070	Flow (q) from Route 31
50	10'-0		42.58	3.2600		32'-2	0.002105	0.068	
50	10'-0			3		10'-0	120	35.138	
51	10'-0		36.88	3.2600		10'-0	0.001614	0.016	
51	10'-0			3	(See Notes)	6'-5½	120	35.154	
37	10'-0		31.25	3.2600		20'-2 26'-7½	0.001188	0.000 0.032	T(20'-2)
								35.185	Total(Pt) Route 7
34	10'-0			1½	(See Notes)	56'-4½	120	35.070	• • • • • **Route 8** • • • • •
83	10'-0		5.86	1.6820		19'-9½ 76'-2	0.001348	0.000 0.103	PO(9'-11) PO(9'-11)
83	10'-0			1½	(See Notes)	49'-1½	120	35.173	PO(9'-11)
58	10'-0		2.91	1.6820		19'-9½ 68'-11	0.000369	-0.000 0.025	PO(9'-11)
58	10'-0			3		12'-0	120	35.198	
59	10'-0		2.91	3.2600		12'-0	0.000015	0.000	
59	10'-0		2.63	3		6'-0	120	35.198	Flow (q) from Route 9
60	10'-0		5.54	3.2600		6'-0	0.000048	0.000	
60	10'-0		2.31	3	(See Notes)	31'-9½	120	35.199	Flow (q) from Route 10
61	10'-0		7.85	3.2600		9'-5 41'-2½	0.000092	E(9'-5) 0.004	

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
61	10'-0		4.31	1½	(See Notes)	116'-0	120	35.203	PO(9'-11), Flow (q) from Route 19
						19'-9½	0.005199		
44	10'-0		12.16	1.6820		135'-10		0.706	PO(9'-11)
								35.909	Total(Pt) Route 8
56	10'-0			1½	(See Notes)	56'-4½	120	35.064	• • • • • **Route 9** • • • • • PO(9'-11)
						19'-9½	0.001487	0.000	
81	10'-0		6.18	1.6820		76'-2		0.113	PO(9'-11)
81	10'-0			1½	(See Notes)	49'-1½	120	35.177	PO(9'-11)
						19'-9½	0.000306	-0.000	
59	10'-0		2.63	1.6820		68'-11		0.021	PO(9'-11)
								35.198	Total(Pt) Route 9
55	10'-0			1½	(See Notes)	56'-4½	120	35.057	• • • • • **Route 10** • • • • • PO(9'-11)
						19'-9½	0.001639	0.000	
76	10'-0		6.51	1.6820		76'-2		0.125	PO(9'-11)
76	10'-0			1½	(See Notes)	49'-1½	120	35.182	PO(9'-11)
						19'-9½	0.000241	-0.000	
60	10'-0		2.31	1.6820		68'-11		0.017	PO(9'-11)
								35.199	Total(Pt) Route 10
54	20'-0		24.09	2	(See Notes)	119'-3	120	30.845	• • • • • **Route 11** • • • • • T(12'-3½), Flow (q) from Route 12
						30'-9	0.004044	-0.001	
88	20'-0		20.43	2.1570		150'-0		0.607	E(6'-2), T(12'-3½)
								31.450	Total(Pt) Route 11
53	20'-0			2	(See Notes)	56'-4½	120	30.401	• • • • • **Route 12** • • • • • T(12'-3½)
						24'-7½	0.005486	-0.000	
54	20'-0		24.09	2.1570		80'-11½		0.444	T(12'-3½)
								30.845	Total(Pt) Route 12
125	10'-0		1.77	3		7'-0	120	35.039	• • • • • **Route 13** • • • • • Flow (q) from Route 23
							0.000006		
134	10'-0		1.77	3.2600		7'-0		0.000	
134	10'-0		2.53	3		8'-0	120	35.039	Flow (q) from Route 22
							0.000030		
135	10'-0		4.29	3.2600		8'-0		0.000	
								35.039	Total(Pt) Route 13

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
11	10'-0		33.37	3		8'-3½	120	34.846	• • • • • **Route 14** • • • • • Flow (q) from Route 7
66	10'-0		48.38	3.2600		8'-3½	0.002667	0.022	
66	10'-0			3		8'-5	120	34.868	
64	10'-0		44.94	3.2600		8'-5	0.002326	0.020	
64	10'-0			3		39'-8	120	34.888	
124	10'-0		42.73	3.2600		39'-8	0.002119	0.000 0.084	
								34.972	Total(Pt) Route 14
72	10'-0		3.44 + 2.21	1½	(See Notes)	22'-5	120	34.913	• • • • • **Route 15** • • • • • Flow (q) from Route 26 and 27 PO(9'-11)
9	10'-0		5.65	1.6820		9'-11 32'-3½	0.001260	0.041	
9	10'-0			3	(See Notes)	8'-3½	120	34.953	
10	10'-0		0.85	3.2600		20'-2 28'-5½	0.000001	0.000	T(20'-2)
10	10'-0		25.26	3		103'-5½	120	34.953	Flow (q) from Route 16
133	10'-0		26.10	3.2600		103'-5½	0.000851	0.088	
								35.041	Total(Pt) Route 15
132	10'-0		8.12	3		100'-0½	120	34.873	• • • • • **Route 16** • • • • • Flow (q) from Route 7
10	10'-0		25.26	3.2600		100'-0½	0.000801	0.080	
								34.953	Total(Pt) Route 16
68	10'-0		12.63	3		9'-0	120	35.095	• • • • • **Route 17** • • • • • Flow (q) from Route 3
69	10'-0		14.76	3.2600		9'-0	0.000297	0.003	
69	10'-0			1½	(See Notes)	89'-0½	120	35.098	PO(9'-11)
44	10'-0		14.76	1.6820		19'-9½ 108'-10½	0.007445	0.810	PO(9'-11)
								35.909	Total(Pt) Route 17

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
45	10'-0			3	(See Notes)	1'-11	120	35.082	• • • • • **Route 18** • • • • •
						20'-2	0.000183	-0.000	T(20'-2)
46	10'-0		11.37	3.2600		22'-1		0.004	
								35.086	Total(Pt) Route 18
38	10'-0			3	(See Notes)	2'-6½	120	35.185	• • • • • **Route 19** • • • • •
						20'-2	0.000645	-0.000	T(20'-2)
70	10'-0		22.46	3.2600		22'-8		0.015	
70	10'-0			3		8'-0	120	35.200	
							0.000276		
62	10'-0		14.19	3.2600		8'-0		0.002	
62	10'-0			3		10'-0	120	35.202	
							0.000030		
61	10'-0		4.31	3.2600		10'-0		0.000	
								35.203	Total(Pt) Route 19
52	10'-0		37.07	3	(See Notes)	2'-1½	120	35.056	• • • • • **Route 20** • • • • •
						20'-2	0.000021		Flow (q) from Route 2
48	10'-0		3.55	3.2600		22'-3		0.000	T(20'-2)
								35.057	Total(Pt) Route 20
131	10'-0			1½	(See Notes)	171'-3½	120	34.875	• • • • • **Route 21** • • • • •
						9'-11	0.000405		PO(9'-11)
128	10'-0		3.06	1.6820		181'-2½		0.073	
								34.949	Total(Pt) Route 21
127	10'-0		3.82	1½	(See Notes)	8'-0	120	35.019	• • • • • **Route 22** • • • • •
						9'-11	0.000758		Flow (q) from Route 7
126	10'-0		4.29	1.6820		17'-11		0.014	T(9'-11)
126	10'-0			1½	(See Notes)	13'-9	120	35.032	
						9'-11	0.000284		
134	10'-0		2.53	1.6820		23'-7½		0.007	PO(9'-11)
								35.039	Total(Pt) Route 22
126	10'-0			1½	(See Notes)	20'-9	120	35.032	• • • • • **Route 23** • • • • •
						24'-9	0.000147		T(9'-11)
125	10'-0		1.77	1.6820		45'-6		0.007	E(4'-11½), PO(9'-11)
								35.039	Total(Pt) Route 23

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 (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.
130	10'-0			1½	(See Notes)	171'-3½	120	34.876	• • • • • **Route 24** • • • • •
						19'-9½			PO(9'-11)
129	10'-0		2.54	1.6820		191'-1	0.000286	0.055	T(9'-11)
								34.930	Total(Pt) Route 24
71	10'-0		5.70 + 5.63	1½	(See Notes)	6'-5½	120	35.290	• • • • • **Route 25** • • • • •
						9'-11		0.000	Flow (q) from Route 32 and 33
39	10'-0		11.33	1.6820		16'-4½	0.004564	0.075	PO(9'-11)
								35.365	Total(Pt) Route 25
66	10'-0			1½	(See Notes)	78'-2½	120	34.868	• • • • • **Route 26** • • • • •
						9'-11			PO(9'-11)
72	10'-0		3.44	1.6820		88'-1½	0.000503	0.044	
								34.913	Total(Pt) Route 26
64	10'-0			1½	(See Notes)	86'-7½	120	34.888	• • • • • **Route 27** • • • • •
						24'-9			PO(9'-11)
72	10'-0		2.21	1.6820		111'-4½	0.000222	0.025	E(4'-11½), T(9'-11)
								34.913	Total(Pt) Route 27
67	10'-0			1½	(See Notes)	89'-0½	120	35.087	• • • • • **Route 28** • • • • •
						19'-9½			PO(9'-11)
41	10'-0		10.86	1.6820		108'-10½	0.004222	0.460	PO(9'-11)
								35.547	Total(Pt) Route 28
86	10'-0			1½	(See Notes)	56'-4½	120	34.695	• • • • • **Route 29** • • • • •
						19'-9½			PO(9'-11)
100	10'-0		9.48	1.6820		76'-2	0.003280	0.250	PO(9'-11)
								34.945	Total(Pt) Route 29
85	10'-0			1½	(See Notes)	56'-4½	120	34.691	• • • • • **Route 30** • • • • •
						19'-9½			PO(9'-11)
123	10'-0		9.63	1.6820		76'-2	0.003379	0.257	PO(9'-11)
								34.949	Total(Pt) Route 30
9	10'-0			1½	(See Notes)	105'-0½	120	34.953	• • • • • **Route 31** • • • • •
						19'-9½			PO(9'-11)
49	10'-0		4.81	1.6820		124'-10	0.000934	0.117	PO(9'-11)
								35.070	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
50	10'-0			1½	(See Notes)	99'-5½	120	35.138	• • • • • **Route 32** • • • • • PO(9'-11)
						19'-9½	0.001281		
71	10'-0		5.70	1.6820		119'-3		0.153	T(9'-11)
								35.290	Total(Pt) Route 32
51	10'-0			1½	(See Notes)	89'-5½	120	35.154	• • • • • **Route 33** • • • • • PO(9'-11)
						19'-9½	0.001251		
71	10'-0		5.63	1.6820		109'-3		0.137	T(9'-11)
								35.290	Total(Pt) Route 33
70	10'-0			1½	(See Notes)	116'-0	120	35.200	• • • • • **Route 34** • • • • • PO(9'-11)
						19'-9½	0.002552		
41	10'-0		8.28	1.6820		135'-10		0.347	PO(9'-11)
								35.547	Total(Pt) Route 34
62	10'-0			1½	(See Notes)	116'-0	120	35.202	• • • • • **Route 35** • • • • • PO(9'-11)
						19'-9½	0.003542		
42	10'-0		9.88	1.6820		135'-10		0.481	PO(9'-11)
								35.683	Total(Pt) Route 35

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	Design Engineer: 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: 0.10gpm/ft²	Area of Application: 1500ft² (Actual 1998ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 100.00
Coverage Per Sprinkler: 118ft²	Number Of Sprinklers Calculated: 28 0
System Pressure Demand: 68.492	System Flow Demand: 513.09
Total Demand: 613.09 @ 68.492	Pressure Result: +21.829 (24.2%)

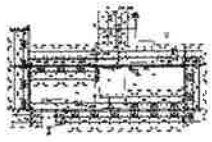
Supplies

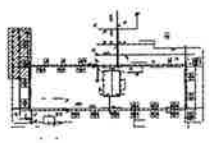
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

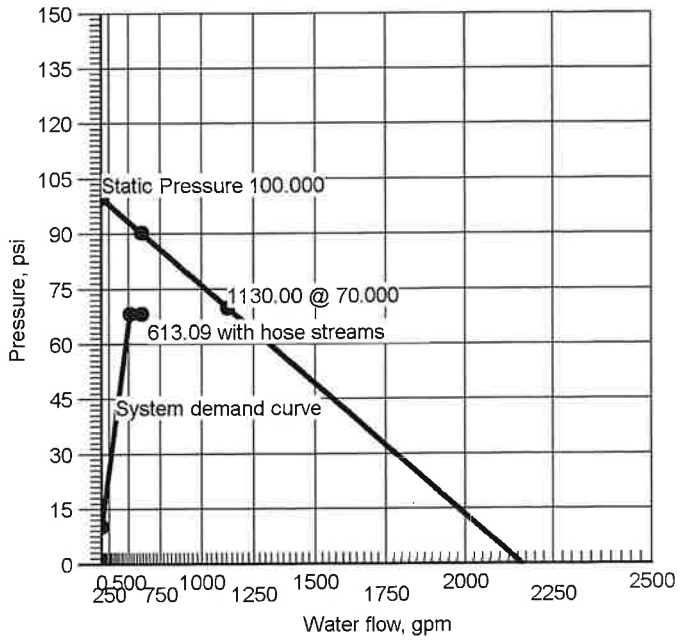
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	49.261	73.1	513.09

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: 2/20/2023

Design

Remote Area Number:	C
Occupancy Classification:	Light Hazard
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1998ft²)
Coverage per Sprinkler:	118ft²
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: 613.09 @ 68.492 (Safety Margin = 21.829)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/Other: N/A

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

Notes:

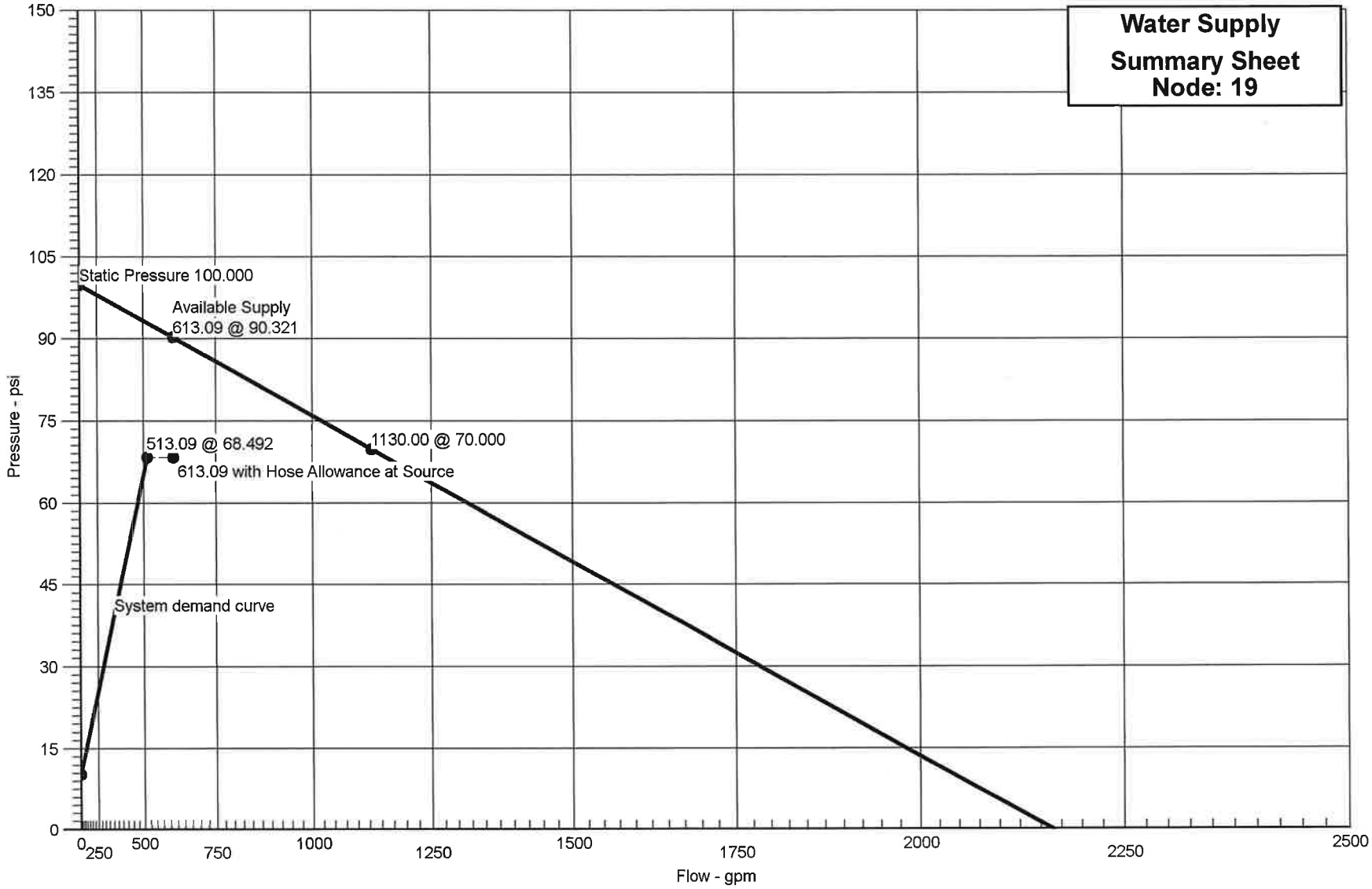
Automatic peaking results Left: N/A Right: 67.943

Hydraulic Graph

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

$N^{1.85}$

Date: 2/20/2023



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	9.143		
Sprinkler	209	17.46	11.75	5.6	9.721		
Sprinkler	210	17.48	11.75	5.6	9.744		
Sprinkler	211	17.56	11.75	5.6	9.831		
Sprinkler	212	17.72	11.75	5.6	10.016		
Sprinkler	213	18.00	11.75	5.6	10.334		
Sprinkler	214	17.99	11.75	5.6	10.322		
Sprinkler	215	18.01	11.75	5.6	10.341		
Sprinkler	216	18.08	11.75	5.6	10.427		
Sprinkler	217	18.25	11.75	5.6	10.623		
Sprinkler	218	18.54	11.75	5.6	10.958		
Sprinkler	219	18.97	11.75	5.6	11.470		
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	18.23	11.75	5.6	10.599		
Sprinkler	227	18.24	11.75	5.6	10.605		
Sprinkler	228	18.47	11.75	5.6	10.880		
Sprinkler	229	18.83	11.75	5.6	11.303		
Sprinkler	230	18.86	11.75	5.6	11.346		
Sprinkler	231	20.05	11.75	5.6	12.816		
Sprinkler	232	20.13	11.75	5.6	12.924		
Sprinkler	233	20.17	11.75	5.6	12.977		
Sprinkler	234	20.09	11.75	5.6	12.865		

⇨ 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	90.321	613.09	68.492

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	-4'-0	Supply	68.492	513.09	
207	18'-10	Sprinkler	7.000	14.82	
208	13'-4½	Sprinkler	9.143	16.93	
209	15'-1	Sprinkler	9.721	17.46	
210	15'-1	Sprinkler	9.744	17.48	
211	15'-1	Sprinkler	9.831	17.56	
212	15'-1	Sprinkler	10.016	17.72	
213	15'-1	Sprinkler	10.334	18.00	
214	10'-11	Sprinkler	10.322	17.99	
215	10'-11	Sprinkler	10.341	18.01	
216	10'-11	Sprinkler	10.427	18.08	
217	10'-11	Sprinkler	10.623	18.25	
218	10'-11	Sprinkler	10.958	18.54	
219	10'-11	Sprinkler	11.470	18.97	
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	10.599	18.23	
227	20'-0	Sprinkler	10.605	18.24	
228	10'-5½	Sprinkler	10.880	18.47	
229	15'-1	Sprinkler	11.303	18.83	
230	15'-1	Sprinkler	11.346	18.86	
231	10'-5½	Sprinkler	12.816	20.05	
232	10'-11	Sprinkler	12.924	20.13	
233	10'-11	Sprinkler	12.977	20.17	
234	10'-5½	Sprinkler	12.865	20.09	
9	10'-0		16.233		
10	10'-0		16.231		
11	10'-0		17.282		
12	20'-0		12.981		
13	20'-0		13.563		
14	10'-0		42.353		
15	1'-0	Gauge	49.261		
16	-4'-0		51.612		
17	-4'-0		54.674		
18	-4'-0		68.100		
34	10'-0		14.747		
35	10'-0		14.435		
36	10'-0		14.795		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
37	10'-0		14.906		
38	10'-0		14.906		
39	10'-0		16.862		
40	10'-0		18.395		
41	10'-0		18.536		
42	10'-0		19.135		
43	10'-0		19.225		
44	10'-0		20.134		
45	10'-0		17.823		
46	10'-0		17.835		
48	10'-0		15.145		
49	10'-0		15.140		
50	10'-0		15.088		
51	10'-0		15.055		
52	10'-0		14.914		
53	20'-0		10.659		
54	20'-0		10.715		
55	10'-0		14.907		
56	10'-0		14.830		
57	10'-0		14.774		
58	10'-0		14.557		
59	10'-0		14.588		
60	10'-0		14.621		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
61	10'-0		14.893		
62	10'-0		14.914		
64	10'-0		17.407		
66	10'-0		17.337		
67	10'-0		17.837		
68	10'-0		17.858		
69	10'-0		17.866		
70	10'-0		14.916		
71	10'-0		16.251		
72	10'-0		16.920		
73	10'-11		11.623		
75	10'-0		14.676		
76	10'-0		14.759		
77	10'-0		11.958		
78	10'-0		14.564		
79	10'-0		14.609		
80	15'-1		11.296		
81	10'-0		14.569		
82	10'-11		12.913		
83	10'-0		14.386		
84	10'-0		14.555		
85	10'-0		17.319		
86	10'-0		17.325		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
87	10'-0		17.327		
88	20'-0		15.497		
90	10'-0		26.946		
91	10'-0		26.962		
92	10'-0		14.739		
95	10'-0		14.352		
96	10'-0		17.772		
100	10'-0		17.774		
119	10'-0		17.317		
123	10'-0		17.781		
124	10'-0		17.823		
125	10'-0		15.331		
126	10'-0		15.393		
127	10'-0		15.508		
128	10'-0		16.225		
129	10'-0		16.417		
130	10'-0		16.988		
131	10'-0		16.991		
132	10'-0		17.014		
133	10'-0		15.306		
134	10'-0		15.331		
135	10'-0		15.329		
136	10'-0		16.987		

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.
207	18'-10	5.6	14.82	1	(See Notes)	8'-11	120	7.000	• • • • • Route 1 • • • • •
						7'-0	0.074703	3.435	Sprinkler,
73	10'-11		14.82	1.0490		15'-11		1.189	E(2'-0), PO(5'-0)
73	10'-11		110.21	2	(See Notes)	4'-6	120	11.623	Flow (q) from Route 5
						18'-5½	0.115411	0.401	
75	10'-0		125.03	2.1570		22'-11½		2.651	E(6'-2), PO(12'-3½)
75	10'-0		152.77	3		1'-3	120	14.676	Flow (q) from Route 3
							0.067636		
76	10'-0		277.80	3.2600		1'-3		0.083	
76	10'-0			3		0'-6½	120	14.759	
							0.067699		
36	10'-0		277.94	3.2600		0'-6½		0.036	
36	10'-0			3		2'-1½	120	14.795	
							0.052458		
37	10'-0		242.14	3.2600		2'-1½		0.111	
37	10'-0			3		0'-0	120	14.906	
							0.027213		
38	10'-0		169.82	3.2600		0'-0		0.000	
38	10'-0			3		88'-10½	120	14.906	
							0.022011		
39	10'-0		151.42	3.2600		88'-10½		1.957	
39	10'-0		35.27	3	(See Notes)	27'-1½	120	16.862	Flow (q) from Route 38
						20'-2	0.032426		
40	10'-0		186.70	3.2600		47'-3½		1.533	T(20'-2)
40	10'-0		63.63	3		2'-6½	120	18.395	Flow (q) from Route 13
							0.055786	-0.000	
41	10'-0		250.33	3.2600		2'-6½		0.141	
41	10'-0		29.42 + 13.63	3		8'-0	120	18.536	Flow (q) from Route 2 and 40
							0.074820		
42	10'-0		293.37	3.2600		8'-0		0.599	
42	10'-0		31.96	3		1'-0	120	19.135	Flow (q) from Route 46
							0.090593		
43	10'-0		325.33	3.2600		1'-0		0.091	

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		19.58	3		9'-0	120	19.225	Flow (q) from Route 31
44	10'-0		344.92	3.2600		9'-0	0.100939	0.908	
44	10'-0		25.75 + 35.93	3	(See Notes)	29'-9	120	20.134	Flow (q) from Route 32 and 47
91	10'-0		406.59	3.2600	(See Notes)	20'-2 49'-10½	0.136846	6.828	T(20'-2)
91	10'-0		106.49	3	(See Notes)	44'-11	120	26.962	Flow (q) from Route 6
14	10'-0		513.09	3.2600	(See Notes)	28'-2½ 73'-1½	0.210446	15.391	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	42.353	
15	1'-0		513.09	4.2600	(See Notes)	44'-9 52'-7	0.057185	3.902 3.006	f, CV(28'-11½), BV(15'-9½), BOR
15	1'-0			6	(See Notes)	5'-0	120	49.261	
16	-4'-0		513.09	6.3570	(See Notes)	17'-7 22'-7	0.008141	2.168 0.184	E(17'-7)
16	-4'-0			6	(See Notes)	358'-0	140	51.612	
17	-4'-0		513.09	6.2800	(See Notes)	113'-5½ 471'-5½	0.006495	3.062	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	-4'-0			6	(See Notes)	12'-0	120	54.674	
18	-4'-0		513.09	6.3570	(See Notes)	40'-3 52'-3	0.008141	13.425	2LtE(11'-4), BFP(-13.000), E(17'-7)
18	-4'-0			6	(See Notes)	13'-2	140	68.100	
19	-4'-0		513.09	6.2800	(See Notes)	47'-3½ 60'-5	0.006495	0.392	S, T(47'-3½)
			100.00					68.492	Hose Allowance At Source
19			613.09					Total(Pt)	Route 1
208	13'-4½	5.6	16.93	1	(See Notes)	10'-1½	120	9.143	••••• Route 2 ••••• Sprinkler,
77	10'-0		16.93	1.0490	(See Notes)	4'-0 14'-1½	0.095639	1.464 1.351	2E(2'-0)
77	10'-0		18.47	1	(See Notes)	1'-11½	120	11.958	Flow (q) from Route 8
78	10'-0		35.40	1.0490	(See Notes)	5'-0 6'-11½	0.374321	-0.000 2.605	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		28.20	3		5'-6½	120	14.564	Flow (q) from Route 10
59	10'-0		63.61	3.2600		5'-6½	0.004424	0.025	
59	10'-0		2.47	3		4'-5½	120	14.588	Flow (q) from Route 20
79	10'-0		66.08	3.2600		4'-5½	0.004747	0.021	
79	10'-0		20.09	3		1'-6½	120	14.609	Flow (q) from Route 11
60	10'-0		86.17	3.2600		1'-6½	0.007757	0.012	
60	10'-0			3	(See Notes)	31'-9½	120	14.621	
61	10'-0		78.91	3.2600		9'-5 41'-2½	0.006591	0.272	E(9'-5)
61	10'-0			3		10'-0	120	14.893	
62	10'-0		42.98	3.2600		10'-0	0.002142	0.021	
62	10'-0			3		8'-0	120	14.914	
70	10'-0		11.02	3.2600		8'-0	0.000173	0.001	
70	10'-0		18.40	1½	(See Notes)	116'-0	120	14.916	PO(9'-11), Flow (q) from Route 33
41	10'-0		29.42	1.6820		19'-9½ 135'-10	0.026657	3.620	PO(9'-11)
								18.536	Total(Pt) Route 2
209	15'-1	5.6	17.46	2	(See Notes)	7'-6	120	9.721	• • • • • **Route 3** • • • • • Sprinkler
210	15'-1		17.46	2.1570		7'-6	0.003024	0.023	
210	15'-1	5.6	17.48	2	(See Notes)	8'-0	120	9.744	Sprinkler
211	15'-1		34.94	2.1570		8'-0	0.010913	0.087	
211	15'-1	5.6	17.56	2	(See Notes)	8'-0	120	9.831	Sprinkler
212	15'-1		52.50	2.1570		8'-0	0.023178	0.185	
212	15'-1	5.6	17.72	2	(See Notes)	8'-0	120	10.016	Sprinkler
213	15'-1		70.22	2.1570		8'-0	0.039699	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	18.00	2	(See Notes)	3'-7	120	10.334	Sprinkler,
						12'-3½	0.060553		T(12'-3½)
80	15'-1		88.22	2.1570		15'-10½		0.962	
80	15'-1			2	(See Notes)	5'-1	120	11.296	
						12'-3½	0.053305	2.210	PO(12'-3½)
35	10'-0		82.35	2.1570		17'-5		0.928	
35	10'-0		82.60	3		5'-2½	120	14.435	Flow (q) from Route 4
							0.025786		
81	10'-0		164.95	3.2600		5'-2½		0.135	
81	10'-0			3		4'-9	120	14.569	
							0.022375		
75	10'-0		152.77	3.2600		4'-9		0.107	
								14.676	Total(Pt) Route 3
214	10'-11	5.6	17.99	2	(See Notes)	6'-0	120	10.322	• • • • • Route 4 • • • • • Sprinkler
							0.003197	-0.000	
215	10'-11		17.99	2.1570		6'-0		0.019	
215	10'-11	5.6	18.01	2	(See Notes)	7'-6	120	10.341	Sprinkler
							0.011533	-0.000	
216	10'-11		36.00	2.1570		7'-6		0.086	
216	10'-11	5.6	18.08	2	(See Notes)	8'-0	120	10.427	Sprinkler
							0.024488	-0.000	
217	10'-11		54.08	2.1570		8'-0		0.196	
217	10'-11	5.6	18.25	2	(See Notes)	8'-0	120	10.623	Sprinkler
							0.041937	-0.000	
218	10'-11		72.33	2.1570		8'-0		0.335	
218	10'-11	5.6	18.54	2	(See Notes)	8'-0	120	10.958	Sprinkler
							0.063959	-0.000	
219	10'-11		90.87	2.1570		8'-0		0.512	
219	10'-11	5.6	18.97	2	(See Notes)	3'-7	120	11.470	Sprinkler,
						12'-3½	0.090823	-0.000	T(12'-3½)
82	10'-11		109.84	2.1570		15'-10½		1.443	
82	10'-11			2	(See Notes)	0'-8½	120	12.913	
						12'-3½	0.079674	0.402	PO(12'-3½)
95	10'-0		102.33	2.1570		13'-0		1.036	

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.
95	10'-0			3		3'-2½	120	14.352	
83	10'-0		102.33	3.2600		3'-2½	0.010661	0.034	
83	10'-0			3		6'-9½	120	14.386	
35	10'-0		82.60	3.2600		6'-9½	0.007173	0.049	
								14.435	Total(Pt) Route 4
220	10'-11	5.6	18.07	2	(See Notes)	6'-0	120	10.412	• • • • • **Route 5** • • • • • Sprinkler
221	10'-11		18.07	2.1570		6'-0	0.003222	0.019	
221	10'-11	5.6	18.09	2	(See Notes)	7'-6	120	10.431	Sprinkler
222	10'-11		36.16	2.1570		7'-6	0.011626	0.087	
222	10'-11	5.6	18.16	2	(See Notes)	8'-0	120	10.518	Sprinkler
223	10'-11		54.32	2.1570		8'-0	0.024685	0.197	
223	10'-11	5.6	18.33	2	(See Notes)	8'-0	120	10.716	Sprinkler
224	10'-11		72.65	2.1570		8'-0	0.042274	0.338	
224	10'-11	5.6	18.62	2	(See Notes)	6'-0	120	11.054	Sprinkler
225	10'-11		91.27	2.1570		6'-0	0.064474	0.387	
225	10'-11	5.6	18.94	2	(See Notes)	2'-0	120	11.441	Sprinkler
73	10'-11		110.21	2.1570		2'-0	0.091391	0.183	
								11.623	Total(Pt) Route 5
226	20'-0	5.6	18.23	2	(See Notes)	44'-5½	120	10.599	• • • • • **Route 6** • • • • • Sprinkler,
53	20'-0		9.89	2.1570		12'-3½ 56'-9	0.001056	0.000 0.060	T(12'-3½)
53	20'-0		19.09	2	(See Notes)	214'-6½	120	10.659	
12	20'-0		28.98	2.1570		86'-2 300'-8	0.007719	0.001 2.321	T(12'-3½), Flow (q) from Route 9 2E(6'-2), 5T(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
12	20'-0			2	(See Notes)	60'-10½	120	12.981	T(12'-3½)
						30'-9	0.006372	-0.002	
13	20'-0		26.12	2.1570		91'-7½		0.584	E(6'-2), T(12'-3½)
13	20'-0		18.00	2	(See Notes)	90'-5½	120	13.563	T(12'-3½), Flow (q) from Route 14
						24'-7½	0.016804		
88	20'-0		44.12	2.1570		115'-1		1.934	T(12'-3½)
88	20'-0		62.37	2	(See Notes)	58'-4	120	15.497	Flow (q) from Route 7
						24'-7½	0.085775	4.335	
90	10'-0		106.49	2.1570		82'-11		7.114	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	26.946	
							0.011477		
91	10'-0		106.49	3.2600		1'-4½		0.016	
								26.962	Total(Pt) Route 6
226	20'-0	5.6	18.23	2	(See Notes)	7'-6	120	10.599	• • • • • Route 7 • • • • • Sprinkler
							0.000771	-0.000	
227	20'-0		8.34	2.1570		7'-6		0.006	
227	20'-0	5.6	18.24	2	(See Notes)	4'-5	120	10.605	Sprinkler,
						12'-3½	0.006580	-0.000	
54	20'-0		26.58	2.1570		16'-8½		0.110	T(12'-3½)
54	20'-0		35.79	2	(See Notes)	119'-3	120	10.715	T(12'-3½), Flow (q) from Route 16
						30'-9	0.031882	-0.001	
88	20'-0		62.37	2.1570		150'-0		4.782	E(6'-2), T(12'-3½)
								15.497	Total(Pt) Route 7
228	10'-5½	5.6	18.47	1	(See Notes)	0'-9½	120	10.880	• • • • • Route 8 • • • • • Sprinkler,
						7'-0	0.112337	0.202	
77	10'-0		18.47	1.0490		7'-9½		0.876	E(2'-0), T(5'-0)
								11.958	Total(Pt) Route 8
229	15'-1	5.6	18.83	2	(See Notes)	7'-6	120	11.303	• • • • • Route 9 • • • • • Sprinkler
							0.005746		
230	15'-1		24.70	2.1570		7'-6		0.043	
230	15'-1	5.6	18.86	2	(See Notes)	49'-6½	120	11.346	Sprinkler,
						24'-7½	0.016414	2.210	
57	10'-0		43.57	2.1570		74'-2		1.217	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		59.39	3		5'-2½	120	14.774	Flow (q) from Route 12
56	10'-0		102.95	3.2600		5'-2½	0.010781	0.056	
56	10'-0		9.70	3		6'-0	120	14.830	Flow (q) from Route 21
55	10'-0		112.66	3.2600		6'-0	0.012736	0.076	
55	10'-0		7.12	3		0'-6½	120	14.907	Flow (q) from Route 22
52	10'-0		119.78	3.2600		0'-6½	0.014265	0.008	
52	10'-0			2	(See Notes)	10'-0	120	14.914	PO(12'-3½)
53	20'-0		19.09	2.1570		12'-3½ 22'-3½	0.003566	-4.334 0.080	
								10.659	Total(Pt) Route 9
231	10'-5½	5.6	20.05	1	(See Notes)	2'-9	120	12.816	• • • • • **Route 10** • • • • • Sprinkler,
84	10'-0		20.05	1.0490		9'-0 11'-9	0.130711	0.202 1.537	2E(2'-0), PO(5'-0)
84	10'-0			3		3'-6½	120	14.555	
58	10'-0		20.05	3.2600		3'-6½	0.000523	0.002	
58	10'-0		8.16	3		6'-5½	120	14.557	Flow (q) from Route 25
78	10'-0		28.20	3.2600		6'-5½	0.000983	0.006	
								14.564	Total(Pt) Route 10
234	10'-5½	5.6	20.09	1	(See Notes)	2'-9	120	12.865	• • • • • **Route 11** • • • • • Sprinkler,
79	10'-0		20.09	1.0490		9'-0 11'-9	0.131168	0.202 1.542	2E(2'-0), PO(5'-0)
								14.609	Total(Pt) Route 11
232	10'-11	5.6	20.13	2	(See Notes)	7'-6	120	12.924	• • • • • **Route 12** • • • • • Sprinkler
233	10'-11		27.64	2.1570		7'-6	0.007073	-0.000 0.053	
233	10'-11	5.6	20.17	2	(See Notes)	45'-1½	120	12.977	Sprinkler,
92	10'-0		47.81	2.1570		24'-7½ 69'-9	0.019496	0.403 1.360	T(12'-3½), PO(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
92	10'-0			3		3'-2½	120	14.739	
							0.002609		
34	10'-0		47.81	3.2600		3'-2½		0.008	
34	10'-0		11.57	3		6'-9½	120	14.747	Flow (q) from Route 19
							0.003896		
57	10'-0		59.39	3.2600		6'-9½		0.026	
								14.774	Total(Pt) Route 12
45	10'-0		140.59	3	(See Notes)	89'-0½	120	17.823	• • • • • **Route 13** • • • • •
						40'-4	0.004426		T(20'-2), Flow (q) from Route 15
40	10'-0		63.63	3.2600		129'-4½		0.573	T(20'-2)
								18.395	Total(Pt) Route 13
45	10'-0		140.59	3		1'-11	120	17.823	• • • • • **Route 14** • • • • •
							0.006293	-0.000	Flow (q) from Route 15
46	10'-0		76.96	3.2600		1'-11		0.012	
46	10'-0			2	(See Notes)	7'-6	120	17.835	PO(12'-3½)
						12'-3½	0.003199	-4.335	
13	20'-0		18.00	2.1570		19'-9½		0.063	
								13.563	Total(Pt) Route 14
12	20'-0		26.12	2	(See Notes)	10'-0	120	12.981	• • • • • **Route 15** • • • • •
						12'-3½	0.000106	4.333	Flow (q) from Route 6
119	10'-0		2.85	2.1570		22'-3½		0.002	PO(12'-3½)
119	10'-0		36.33	3		1'-0½	120	17.317	Flow (q) from Route 17
							0.001805		
85	10'-0		39.18	3.2600		1'-0½		0.002	
85	10'-0			3		8'-0	120	17.319	
							0.000843		
86	10'-0		25.96	3.2600		8'-0		0.007	
86	10'-0			3		8'-0	120	17.325	
							0.000233		
87	10'-0		12.95	3.2600		8'-0		0.002	
87	10'-0			1½	(See Notes)	56'-4½	120	17.327	PO(9'-11)
						19'-9½	0.005843		
96	10'-0		12.95	1.6820		76'-2		0.445	PO(9'-11)

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.
96	10'-0			3		8'-0	120	17.772	
100	10'-0		12.95	3.2600		8'-0	0.000233	0.002	
100	10'-0		13.01	3		8'-0	120	17.774	Flow (q) from Route 41
123	10'-0		25.96	3.2600		8'-0	0.000843	0.007	
123	10'-0		13.22	3	(See Notes)	3'-0½	120	17.781	Flow (q) from Route 42
124	10'-0		39.18	3.2600		20'-2 23'-2½	0.001805	0.000 0.042	T(20'-2)
124	10'-0		101.41	3		0'-0	120	17.823	Flow (q) from Route 29
45	10'-0		140.59	3.2600		0'-0	0.019186	0.000	
								17.823	Total(Pt) Route 15
36	10'-0			2	(See Notes)	10'-0	120	14.795	• • • • • **Route 16** • • • • •
54	20'-0		35.79	2.1570		12'-3½ 22'-3½	0.011411	-4.334 0.255	PO(12'-3½)
								10.715	Total(Pt) Route 16
125	10'-0		6.70	1½	(See Notes)	20'-9	120	15.331	• • • • • **Route 17** • • • • •
126	10'-0		6.70	1.6820		14'-10 35'-7	0.001727	0.061	PO(9'-11), Flow (q) from Route 26 E(4'-11½)
126	10'-0		6.95	1½	(See Notes)	8'-0	120	15.393	Flow (q) from Route 27
127	10'-0		13.65	1.6820		9'-11 17'-11	0.006442	0.115	T(9'-11)
127	10'-0		14.92	1½	(See Notes)	18'-6	120	15.508	Flow (q) from Route 28
128	10'-0		28.57	1.6820		9'-11 28'-4½	0.025249	0.717	T(9'-11)
128	10'-0			1½	(See Notes)	8'-0	120	16.225	
129	10'-0		18.00	1.6820		9'-11 17'-11	0.010739	0.192	T(9'-11)
129	10'-0			1½	(See Notes)	171'-3½	120	16.417	
130	10'-0		9.28	1.6820		9'-11 181'-2½	0.003153	0.571	PO(9'-11)

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.
130	10'-0		8.72	3		8'-0	120	16.988	Flow (q) from Route 34
131	10'-0		18.00	3.2600		8'-0	0.000428	0.003	
131	10'-0		10.57	3	(See Notes)	2'-8½	120	16.991	Flow (q) from Route 36
132	10'-0		28.57	3.2600		20'-2 22'-10½	0.001006	0.023	T(20'-2)
132	10'-0		86.63	3	(See Notes)	0'-0	120	17.014	Flow (q) from Route 18
11	10'-0		115.19	3.2600		20'-2 20'-2	0.013271	0.268	T(20'-2)
11	10'-0			3	(See Notes)	2'-0	120	17.282	T(20'-2)
119	10'-0		36.33	3.2600		20'-2 22'-2	0.001569	0.035	
								17.317	Total(Pt) Route 17
52	10'-0		19.09	3	(See Notes)	2'-1½	120	14.914	• • • • • **Route 18** • • • • • Flow (q) from Route 9
48	10'-0		100.69	3.2600		20'-2 22'-3	0.010347	0.230	T(20'-2)
48	10'-0		20.93	3	(See Notes)	1'-7	120	15.145	Flow (q) from Route 30
133	10'-0		121.62	3.2600		9'-5 10'-11½	0.014675	0.161	E(9'-5)
133	10'-0			3		103'-5½	120	15.306	
10	10'-0		93.06	3.2600		103'-5½	0.008943	0.925	
10	10'-0			3		100'-0½	120	16.231	
132	10'-0		86.63	3.2600		100'-0½	0.007833	0.784	
								17.014	Total(Pt) Route 18
83	10'-0			1½	(See Notes)	56'-4½	120	14.386	• • • • • **Route 19** • • • • • PO(9'-11)
34	10'-0		11.57	1.6820		19'-9½ 76'-2	0.004746	-0.000 0.361	PO(9'-11)
								14.747	Total(Pt) Route 19
81	10'-0			1½	(See Notes)	49'-1½	120	14.569	• • • • • **Route 20** • • • • • PO(9'-11)
59	10'-0		2.47	1.6820		19'-9½ 68'-11	0.000273	-0.000 0.019	PO(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
								14.588	Total(Pt) Route 20
81	10'-0			1½	(See Notes)	56'-4½	120	14.569	• • • • • **Route 21** • • • • • PO(9'-11)
						19'-9½	0.003426	-0.000	
56	10'-0		9.70	1.6820		76'-2		0.261	PO(9'-11)
								14.830	Total(Pt) Route 21
60	10'-0			1½	(See Notes)	49'-1½	120	14.621	• • • • • **Route 22** • • • • • PO(9'-11)
						19'-9½	0.002003	0.000	
76	10'-0		7.26	1.6820		68'-11		0.138	PO(9'-11)
76	10'-0			1½	(See Notes)	56'-4½	120	14.759	PO(9'-11)
						19'-9½	0.001933	-0.000	
55	10'-0		7.12	1.6820		76'-2		0.147	PO(9'-11)
								14.907	Total(Pt) Route 22
80	15'-1			2	(See Notes)	4'-5	120	11.296	• • • • • **Route 23** • • • • • T(12'-3½)
						12'-3½	0.000403		
229	15'-1		5.88	2.1570		16'-8½		0.007	
								11.303	Total(Pt) Route 23
82	10'-11			2	(See Notes)	4'-5	120	12.913	• • • • • **Route 24** • • • • • T(12'-3½)
						12'-3½	0.000634	-0.000	
232	10'-11		7.51	2.1570		16'-8½		0.011	
								12.924	Total(Pt) Route 24
83	10'-0			1½	(See Notes)	49'-1½	120	14.386	• • • • • **Route 25** • • • • • PO(9'-11)
						19'-9½	0.002484	-0.000	
58	10'-0		8.16	1.6820		68'-11		0.171	PO(9'-11)
								14.557	Total(Pt) Route 25
134	10'-0			3		7'-0	120	15.331	• • • • • **Route 26** • • • • •
							0.000069		
125	10'-0		6.70	3.2600		7'-0		0.000	
								15.331	Total(Pt) Route 26
135	10'-0			3		8'-0	120	15.329	• • • • • **Route 27** • • • • •
							0.000257		
134	10'-0		13.65	3.2600		8'-0		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
134	10'-0			1½	(See Notes)	13'-9	120	15.331	PO(9'-11)
						19'-9½	0.001847		
126	10'-0		6.95	1.6820		33'-6½		0.062	T(9'-11)
								15.393	Total(Pt) Route 27
133	10'-0			3	(See Notes)	2'-8½	120	15.306	• • • • • **Route 28** • • • • •
						20'-2	0.001006		T(20'-2)
135	10'-0		28.57	3.2600		22'-10½		0.023	
135	10'-0			1½	(See Notes)	13'-9	120	15.329	PO(9'-11)
						9'-11	0.007587		
127	10'-0		14.92	1.6820		23'-7½		0.179	
								15.508	Total(Pt) Route 28
11	10'-0		36.33	3		8'-3½	120	17.282	• • • • • **Route 29** • • • • •
							0.006584		Flow (q) from Route 17
66	10'-0		78.87	3.2600		8'-3½		0.055	
66	10'-0		10.90	3		8'-5	120	17.337	Flow (q) from Route 35
							0.008367		
64	10'-0		89.77	3.2600		8'-5		0.070	
64	10'-0		11.64	3		39'-8	120	17.407	Flow (q) from Route 39
							0.010484	0.000	
124	10'-0		101.41	3.2600		39'-8		0.416	
								17.823	Total(Pt) Route 29
37	10'-0			3	(See Notes)	6'-5½	120	14.906	• • • • • **Route 30** • • • • •
						20'-2	0.005609	-0.000	T(20'-2)
51	10'-0		72.32	3.2600		26'-7½		0.149	
51	10'-0			3		10'-0	120	15.055	
							0.003282		
50	10'-0		54.13	3.2600		10'-0		0.033	
50	10'-0			3		32'-2	120	15.088	
							0.001627		
49	10'-0		37.04	3.2600		32'-2		0.052	
49	10'-0			3		7'-8½	120	15.140	
							0.000566		
48	10'-0		20.93	3.2600		7'-8½		0.004	

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
								15.145	Total(Pt) Route 30
46	10'-0		18.00	3		0'-7	120	17.835	••••• **Route 31** ••••• Flow (q) from Route 14
67	10'-0		58.96	3.2600		0'-7	0.003844	0.002	
67	10'-0			3		9'-0	120	17.837	
68	10'-0		45.33	3.2600		9'-0	0.002364	0.021	
68	10'-0			1½	(See Notes)	89'-0½	120	17.858	PO(9'-11)
43	10'-0		19.58	1.6820		19'-9½ 108'-10½	0.012556	1.367	PO(9'-11)
								19.225	Total(Pt) Route 31
68	10'-0		19.58	3		9'-0	120	17.858	••••• **Route 32** ••••• Flow (q) from Route 31
69	10'-0		25.75	3.2600		9'-0	0.000830	0.007	
69	10'-0			1½	(See Notes)	89'-0½	120	17.866	PO(9'-11)
44	10'-0		25.75	1.6820		19'-9½ 108'-10½	0.020833	2.268	PO(9'-11)
								20.134	Total(Pt) Route 32
38	10'-0			3	(See Notes)	2'-6½	120	14.906	••••• **Route 33** ••••• T(20'-2)
70	10'-0		18.40	3.2600		20'-2 22'-8	0.000446	-0.000 0.010	
								14.916	Total(Pt) Route 33
136	10'-0		8.72	3		7'-0	120	16.987	••••• **Route 34** ••••• Flow (q) from Route 37
130	10'-0		8.72	3.2600		7'-0	0.000112	0.001	
								16.988	Total(Pt) Route 34
10	10'-0			3	(See Notes)	8'-3½	120	16.231	••••• **Route 35** ••••• T(20'-2)
9	10'-0		6.43	3.2600		20'-2 28'-5½	0.000064	0.002	
9	10'-0		16.11	1½	(See Notes)	22'-5	120	16.233	PO(9'-11), Flow (q) from Route 43 T(9'-11)
72	10'-0		22.54	1.6820		19'-9½ 42'-2½	0.016292	0.688	

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.
72	10'-0			1½	(See Notes)	78'-2½	120	16.920	T(9'-11)
						19'-9½	0.004249		
66	10'-0		10.90	1.6820		98'-0		0.416	PO(9'-11)
								17.337	Total(Pt) Route 35
128	10'-0			1½	(See Notes)	171'-3½	120	16.225	• • • • • **Route 36** • • • • •
						19'-9½	0.004013		T(9'-11)
131	10'-0		10.57	1.6820		191'-1		0.767	PO(9'-11)
								16.991	Total(Pt) Route 36
129	10'-0			1½	(See Notes)	178'-3½	120	16.417	• • • • • **Route 37** • • • • •
						24'-9	0.002810		T(9'-11)
136	10'-0		8.72	1.6820		203'-0½		0.570	E(4'-11½), PO(9'-11)
								16.987	Total(Pt) Route 37
71	10'-0		17.09 + 18.19	1½	(See Notes)	6'-5½	120	16.251	• • • • • **Route 38** • • • • •
						9'-11	0.037298	0.000	Flow (q) from Route 44 and 45
39	10'-0		35.27	1.6820		16'-4½		0.611	PO(9'-11)
								16.862	Total(Pt) Route 38
72	10'-0		10.90	1½	(See Notes)	86'-7½	120	16.920	• • • • • **Route 39** • • • • •
						14'-10	0.004798		Flow (q) from Route 35
64	10'-0		11.64	1.6820		101'-5½		0.487	E(4'-11½), PO(9'-11)
								17.407	Total(Pt) Route 39
67	10'-0			1½	(See Notes)	89'-0½	120	17.837	• • • • • **Route 40** • • • • •
						19'-9½	0.006421		PO(9'-11)
41	10'-0		13.63	1.6820		108'-10½		0.699	PO(9'-11)
								18.536	Total(Pt) Route 40
86	10'-0			1½	(See Notes)	56'-4½	120	17.325	• • • • • **Route 41** • • • • •
						19'-9½	0.005892		PO(9'-11)
100	10'-0		13.01	1.6820		76'-2		0.449	PO(9'-11)
								17.774	Total(Pt) Route 41
85	10'-0			1½	(See Notes)	56'-4½	120	17.319	• • • • • **Route 42** • • • • •
						19'-9½	0.006069		PO(9'-11)
123	10'-0		13.22	1.6820		76'-2		0.462	PO(9'-11)
								17.781	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.
49	10'-0			1½	(See Notes)	105'-0½	120	15.140	• • • • • **Route 43** • • • • •
						19'-9½	0.008752		PO(9'-11)
9	10'-0		16.11	1.6820		124'-10		1.092	PO(9'-11)
								16.233	Total(Pt) Route 43
50	10'-0			1½	(See Notes)	99'-5½	120	15.088	• • • • • **Route 44** • • • • •
						19'-9½	0.009757		PO(9'-11)
71	10'-0		17.09	1.6820		119'-3		1.164	T(9'-11)
								16.251	Total(Pt) Route 44
51	10'-0			1½	(See Notes)	89'-5½	120	15.055	• • • • • **Route 45** • • • • •
						19'-9½	0.010951		PO(9'-11)
71	10'-0		18.19	1.6820		109'-3		1.196	T(9'-11)
								16.251	Total(Pt) Route 45
62	10'-0			1½	(See Notes)	116'-0	120	14.914	• • • • • **Route 46** • • • • •
						19'-9½	0.031075		PO(9'-11)
42	10'-0		31.96	1.6820		135'-10		4.220	PO(9'-11)
								19.135	Total(Pt) Route 46
61	10'-0			1½	(See Notes)	116'-0	120	14.893	• • • • • **Route 47** • • • • •
						19'-9½	0.038588		PO(9'-11)
44	10'-0		35.93	1.6820		135'-10		5.241	PO(9'-11)
								20.134	Total(Pt) Route 47

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	Design Engineer: 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: 0.10gpm/ft²	Area of Application: 1500ft² (Actual 1570ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 22.50 at 16.143	Hose Streams: 100.00
Coverage Per Sprinkler: 225ft²	Number Of Sprinklers Calculated: 16 0
System Pressure Demand: 67.753	System Flow Demand: 337.70
Total Demand: 437.70 @ 67.753	Pressure Result: +27.057 (28.5%)

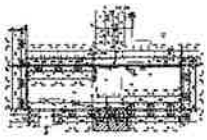
Supplies

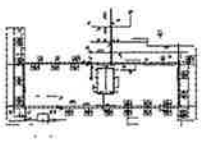
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
19	Water Supply	1130.00	100.00	100.000	70.000

Check Point Gauges

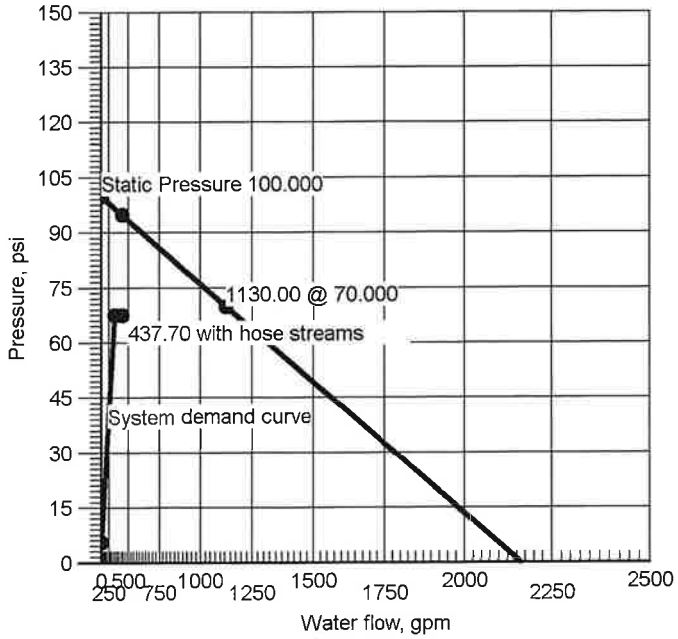
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	50.711	47.42	337.70

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: 2/20/2023

Design

Remote Area Number:	D
Occupancy Classification:	Light Hazard
Density	0.10gpm/ft²
Area of Application:	1500ft² (Actual 1570ft²)
Coverage per Sprinkler:	225ft²
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: 437.70 @ 67.753 (Safety Margin = 27.057)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/Other: N/A

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

Notes:

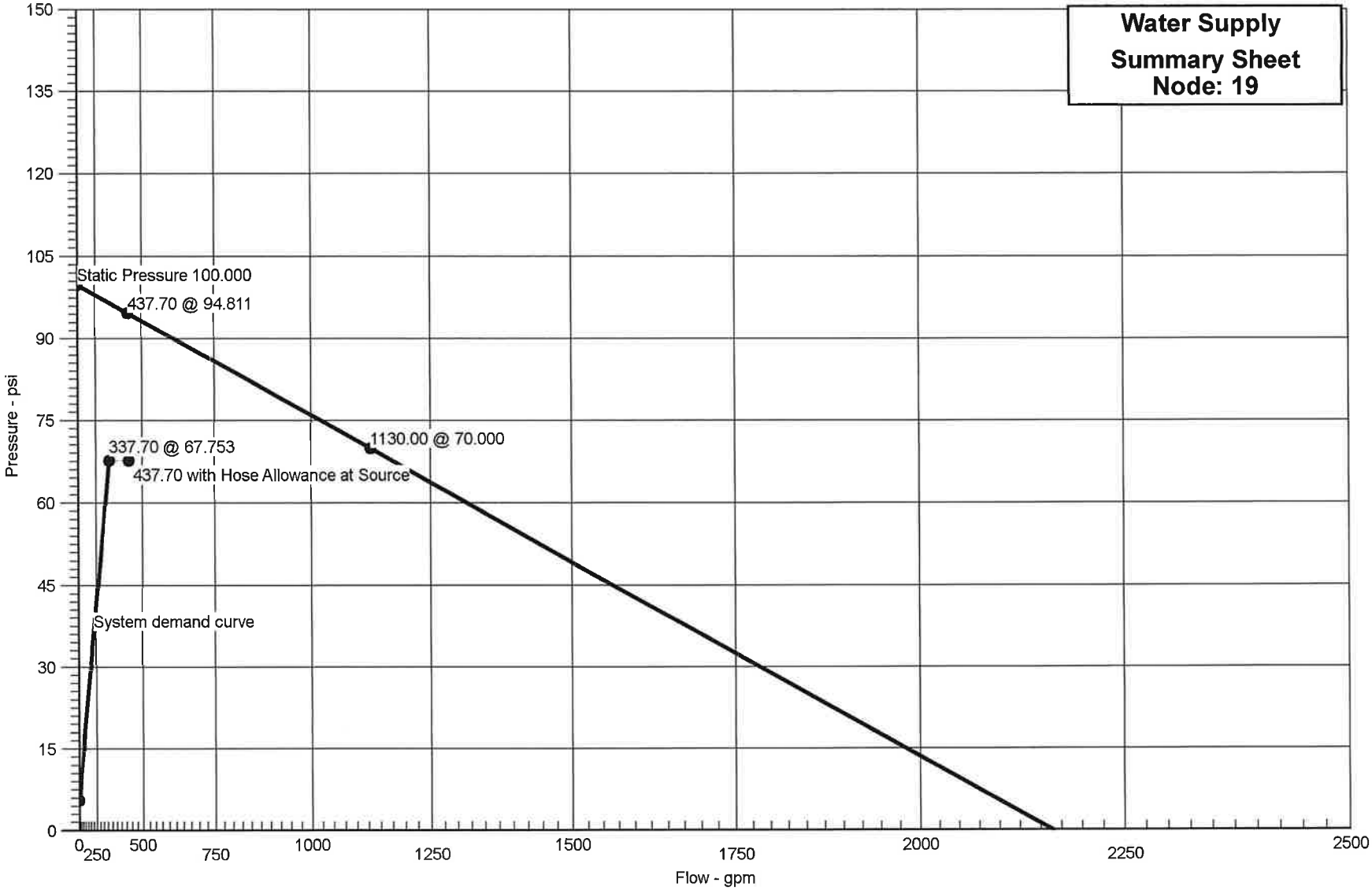
Automatic peaking results Left: N/A Right: 68.753

Hydraulic Graph

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

$N^{1.85}$

Date: 2/20/2023



Summary Of Outflowing Devices

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

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	401	18.47	14.82	5.6	10.874		
Sprinkler	402	18.52	14.82	5.6	10.936		
Sprinkler	403	18.55	14.82	5.6	10.974		
Sprinkler	404	18.56	14.82	5.6	10.980		
Sprinkler	405	18.66	14.82	5.6	11.108		
Sprinkler	406	18.85	14.82	5.6	11.331		
Sprinkler	407	19.10	14.82	5.6	11.631		
Sprinkler	408	19.81	14.82	5.6	12.511		
⇨ **Sprinkler**	**409**	**22.50**	**22.50**	**5.6**	**16.143**		
Sprinkler	410	22.50	22.50	5.6	16.150		
Sprinkler	411	22.68	22.50	5.6	16.404		
Sprinkler	412	23.23	22.50	5.6	17.209		
Sprinkler	413	23.91	14.82	5.6	18.235		
Sprinkler	414	23.92	14.82	5.6	18.246		
Sprinkler	415	23.99	14.82	5.6	18.348		
Sprinkler	416	24.45	14.82	5.6	19.064		

⇨ 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	94.811	437.70	67.753

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
19	-4'-0	Supply	67.753	337.70	
401	9'-0	Sprinkler	10.874	18.47	
402	9'-0	Sprinkler	10.936	18.52	
403	9'-0	Sprinkler	10.974	18.55	
404	9'-0	Sprinkler	10.980	18.56	
405	9'-0	Sprinkler	11.108	18.66	
406	9'-0	Sprinkler	11.331	18.85	
407	9'-0	Sprinkler	11.631	19.10	
408	9'-0	Sprinkler	12.511	19.81	
409	9'-0	Sprinkler	16.143	22.50	
410	9'-0	Sprinkler	16.150	22.50	
411	9'-0	Sprinkler	16.404	22.68	
412	9'-0	Sprinkler	17.209	23.23	
413	9'-0	Sprinkler	18.235	23.91	
414	9'-0	Sprinkler	18.246	23.92	
415	9'-0	Sprinkler	18.348	23.99	
416	9'-0	Sprinkler	19.064	24.45	
7	10'-0		11.842		
9	10'-0		32.399		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
10	10'-0		32.378		
11	10'-0		32.544		
12	20'-0		28.623		
13	20'-0		29.326		
14	10'-0		45.423		
15	1'-0	Gauge	50.711		
16	-4'-0		52.964		
17	-4'-0		54.376		
18	-4'-0		67.572		
34	10'-0		33.202		
35	10'-0		33.536		
36	10'-0		33.564		
37	10'-0		33.569		
38	10'-0		33.569		
39	10'-0		33.996		
40	10'-0		34.354		
41	10'-0		34.421		
42	10'-0		34.705		
43	10'-0		34.745		
44	10'-0		35.170		
45	10'-0		33.558		
46	10'-0		33.646		
47	10'-0		11.961		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
48	10'-0		33.143		
49	10'-0		33.250		
50	10'-0		33.435		
51	10'-0		33.479		
52	10'-0		33.158		
53	20'-0		28.867		
54	20'-0		29.256		
55	10'-0		33.161		
56	10'-0		33.183		
57	10'-0		33.195		
58	10'-0		33.596		
59	10'-0		33.597		
60	10'-0		33.598		
61	10'-0		33.607		
62	10'-0		33.606		
63	10'-0		12.279		
64	10'-0		32.707		
66	10'-0		32.622		
67	10'-0		33.648		
68	10'-0		33.663		
69	10'-0		33.668		
70	10'-0		33.601		
71	10'-0		33.813		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
72	10'-0		32.557		
74	10'-0		11.838		
76	10'-0		33.562		
81	10'-0		33.546		
83	10'-0		33.531		
85	10'-0		32.680		
86	10'-0		32.687		
87	10'-0		32.688		
88	20'-0		30.720		
89	10'-0		11.881		
90	10'-0		38.317		
91	10'-0		38.324		
92	10'-0		33.203		
93	10'-0		12.104		
94	10'-0		12.689		
95	10'-0		33.529		
96	10'-0		33.108		
97	10'-0		13.591		
98	10'-0		17.801		
99	10'-0		17.809		
100	10'-0		33.110		
119	10'-0		32.678		
120	10'-0		18.093		

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
121	10'-0		18.994		
122	10'-0		19.899		
123	10'-0		33.116		
124	10'-0		33.155		
125	10'-0		32.230		
126	10'-0		31.438		
127	10'-0		29.826		
128	10'-0		21.524		
129	10'-0		18.616		
130	10'-0		30.692		
131	10'-0		30.895		
132	10'-0		31.989		
133	10'-0		32.530		
134	10'-0		32.235		
135	10'-0		32.264		
136	10'-0		30.653		
137	10'-0		19.912		
138	10'-0		20.024		
139	10'-0		20.817		

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
409	9'-0	5.6	22.50	1	(See Notes)	3'-11	120	16.143	• • • • • Route 1 • • • • •
						9'-0	0.161813	-0.434	Sprinkler,
98	10'-0		22.50	1.0490		12'-11		2.091	2E(2'-0), PO(5'-0)
98	10'-0			1½	(See Notes)	65'-7½	120	17.801	
						4'-11½	0.011549		
129	10'-0		18.72	1.6820		70'-7		0.815	E(4'-11½)
129	10'-0		59.43	1½	(See Notes)	8'-0	120	18.616	Flow (q) from Route 5
						9'-11	0.162460		
128	10'-0		78.14	1.6820		17'-11		2.908	T(9'-11)
128	10'-0		29.24	1½	(See Notes)	18'-6	120	21.524	Flow (q) from Route 13
						9'-11	0.292508		
127	10'-0		107.39	1.6820		28'-4½		8.302	T(9'-11)
127	10'-0			1½	(See Notes)	13'-9	120	29.826	T(9'-11)
						19'-9½	0.072686		
135	10'-0		50.59	1.6820		33'-6½		2.437	PO(9'-11)
135	10'-0		56.79	3	(See Notes)	2'-8½	120	32.264	Flow (q) from Route 27
						20'-2	0.011656		
133	10'-0		107.39	3.2600		22'-10½		0.267	T(20'-2)
133	10'-0		35.10	3	(See Notes)	1'-7	120	32.530	Flow (q) from Route 30
						29'-7	0.019669		
48	10'-0		142.49	3.2600		31'-1½		0.612	E(9'-5), T(20'-2)
48	10'-0			3		2'-1½	120	33.143	
							0.007297		
52	10'-0		83.37	3.2600		2'-1½		0.015	
52	10'-0			2	(See Notes)	10'-0	120	33.158	PO(12'-3½)
						12'-3½	0.001956	-4.334	
53	20'-0		13.80	2.1570		22'-3½		0.044	
53	20'-0		8.60	2	(See Notes)	56'-4½	120	28.867	T(12'-3½), Flow (q) from Route 26
						24'-7½	0.004795	-0.000	
54	20'-0		22.40	2.1570		80'-11½		0.388	T(12'-3½)
54	20'-0		10.50	2	(See Notes)	119'-3	120	29.256	T(12'-3½), Flow (q) from Route 22
						30'-9	0.009764	-0.001	
88	20'-0		32.90	2.1570		150'-0		1.465	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		36.97	2	(See Notes)	58'-4	120	30.720	Flow (q) from Route 2
						24'-7½	0.039331	4.335	
90	10'-0		69.87	2.1570		82'-11		3.262	T(12'-3½), PO(12'-3½)
90	10'-0			3		1'-4½	120	38.317	
							0.005263		
91	10'-0		69.87	3.2600		1'-4½		0.007	
91	10'-0		267.83	3	(See Notes)	44'-11	120	38.324	Flow (q) from Route 17
						28'-2½	0.097067		
14	10'-0		337.70	3.2600		73'-1½		7.099	3E(9'-5)
14	10'-0			4	(See Notes)	7'-9½	120	45.423	
						44'-9	0.026377	3.902	
15	1'-0		337.70	4.2600		52'-7		1.387	f, CV(28'-11½), BV(15'-9½), BOR
15	1'-0			6	(See Notes)	5'-0	120	50.711	
						17'-7	0.003755	2.168	
16	-4'-0		337.70	6.3570		22'-7		0.085	E(17'-7)
16	-4'-0			6	(See Notes)	358'-0	140	52.964	
						113'-5½	0.002996		
17	-4'-0		337.70	6.2800		471'-5½		1.412	2E(22'-1), T(47'-3½), 2EE(11'-0½)
17	-4'-0			6	(See Notes)	12'-0	120	54.376	
						40'-3	0.003755		
18	-4'-0		337.70	6.3570		52'-3		13.196	2LtE(11'-4), BFP(-13.000), E(17'-7)
18	-4'-0			6	(See Notes)	13'-2	140	67.572	
						47'-3½	0.002996		
19	-4'-0		337.70	6.2800		60'-5		0.181	S, T(47'-3½)
			100.00					67.753	Hose Allowance At Source
19			437.70						Total(Pt) Route 1
410	9'-0	5.6	22.50	1	(See Notes)	3'-11	120	16.150	• • • • • **Route 2** • • • • •
						9'-0	0.161879	-0.434	Sprinkler,
99	10'-0		22.50	1.0490		12'-11		2.092	2E(2'-0), PO(5'-0)
99	10'-0		3.78	1½		13'-2	120	17.809	Flow (q) from Route 42
							0.021648		
120	10'-0		26.29	1.6820		13'-2		0.285	

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.
120	10'-0		22.68	1½		13'-2	120	18.093	Flow (q) from Route 3
121	10'-0		48.97	1.6820		13'-2	0.068428	0.901	
121	10'-0		23.23	1½	(See Notes)	73'-2	120	18.994	Flow (q) from Route 4
136	10'-0		72.20	1.6820		9'-11 83'-1	0.140337	11.659	PO(9'-11)
136	10'-0			3		7'-0	120	30.653	
130	10'-0		72.20	3.2600		7'-0	0.005592	0.039	
130	10'-0		91.09	3		8'-0	120	30.692	Flow (q) from Route 7
131	10'-0		163.29	3.2600		8'-0	0.025307	0.202	
131	10'-0		67.03	3	(See Notes)	2'-8½	120	30.895	Flow (q) from Route 15
132	10'-0		230.32	3.2600		20'-2 22'-10½	0.047817	1.094	T(20'-2)
132	10'-0			3	(See Notes)	0'-0	120	31.989	
11	10'-0		170.97	3.2600		20'-2 20'-2	0.027553	0.555	T(20'-2)
11	10'-0			3	(See Notes)	2'-0	120	32.544	T(20'-2)
119	10'-0		75.47	3.2600		20'-2 22'-2	0.006070	0.135	
119	10'-0			2	(See Notes)	10'-0	120	32.678	PO(12'-3½)
12	20'-0		37.52	2.1570		12'-3½ 22'-3½	0.012450	-4.333 0.278	
12	20'-0			2	(See Notes)	60'-10½	120	28.623	T(12'-3½)
13	20'-0		28.92	2.1570		30'-9 91'-7½	0.007689	-0.002 0.705	E(6'-2), T(12'-3½)
13	20'-0		8.05	2	(See Notes)	90'-5½	120	29.326	T(12'-3½), Flow (q) from Route 19
88	20'-0		36.97	2.1570		24'-7½ 115'-1	0.012114	1.394	T(12'-3½)
								30.720	Total(Pt) Route 2
411	9'-0	5.6	22.68	1	(See Notes)	3'-11	120	16.404	• • • • • **Route 3** • • • • •
120	10'-0		22.68	1.0490		9'-0 12'-11	0.164235	-0.434 2.122	Sprinkler, 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
								18.093	Total(Pt) Route 3
412	9'-0	5.6	23.23	1	(See Notes)	3'-11	120	17.209	• • • • • **Route 4** • • • • • Sprinkler, 2E(2'-0), PO(5'-0)
121	10'-0		23.23	1.0490		9'-0	0.171673	-0.434	
						12'-11		2.218	
								18.994	Total(Pt) Route 4
401	9'-0	5.6	18.47	1	(See Notes)	3'-6	120	10.874	• • • • • **Route 5** • • • • • Sprinkler, 2E(2'-0), PO(5'-0)
7	10'-0		18.47	1.0490		9'-0	0.112275	-0.434	
						12'-6		1.402	
7	10'-0		3.55	1½		7'-7	120	11.842	Flow (q) from Route 6
47	10'-0		22.02	1.6820		7'-7	0.015600	0.119	
47	10'-0		18.56	1½		6'-7	120	11.961	Flow (q) from Route 8
63	10'-0		40.58	1.6820		6'-7	0.048328	0.318	
63	10'-0		18.85	1½	(See Notes)	54'-10	120	12.279	Flow (q) from Route 10 T(9'-11)
129	10'-0		59.43	1.6820		64'-9	0.097894	6.337	
								18.616	Total(Pt) Route 5
402	9'-0	5.6	18.52	1	(See Notes)	2'-10	120	10.936	• • • • • **Route 6** • • • • • Sprinkler, 2E(2'-0), PO(5'-0)
74	10'-0		18.52	1.0490		9'-0	0.112866	-0.434	
						11'-10		1.336	
74	10'-0			1½		6'-7	120	11.838	
7	10'-0		3.55	1.6820		6'-7	0.000534	0.004	
								11.842	Total(Pt) Route 6
403	9'-0	5.6	18.55	1	(See Notes)	2'-10	120	10.974	• • • • • **Route 7** • • • • • Sprinkler, 2E(2'-0), PO(5'-0)
89	10'-0		18.55	1.0490		9'-0	0.113229	-0.434	
						11'-10		1.340	
89	10'-0		14.96	1½		6'-7	120	11.881	Flow (q) from Route 43
93	10'-0		33.52	1.6820		6'-7	0.033930	0.223	

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.
93	10'-0		18.66	1½		7'-7	120	12.104	Flow (q) from Route 9
94	10'-0		52.18	1.6820		7'-7	0.076959	0.585	
94	10'-0		19.10	1½		6'-7	120	12.689	Flow (q) from Route 11
97	10'-0		71.28	1.6820		6'-7	0.137041	0.902	
97	10'-0		19.81	1½	(See Notes)	69'-4½	120	13.591	Flow (q) from Route 12
130	10'-0		91.09	1.6820		9'-11 79'-3½	0.215708	17.102	PO(9'-11)
								30.692	Total(Pt) Route 7
404	9'-0	5.6	18.56	1	(See Notes)	3'-6	120	10.980	• • • • • **Route 8** • • • • • Sprinkler,
47	10'-0		18.56	1.0490		9'-0 12'-6	0.113286	-0.434 1.414	2E(2'-0), PO(5'-0)
								11.961	Total(Pt) Route 8
405	9'-0	5.6	18.66	1	(See Notes)	3'-6	120	11.108	• • • • • **Route 9** • • • • • Sprinkler,
93	10'-0		18.66	1.0490		9'-0 12'-6	0.114510	-0.434 1.429	2E(2'-0), PO(5'-0)
								12.104	Total(Pt) Route 9
406	9'-0	5.6	18.85	1	(See Notes)	2'-10	120	11.331	• • • • • **Route 10** • • • • • Sprinkler,
63	10'-0		18.85	1.0490		9'-0 11'-10	0.116636	-0.434 1.381	2E(2'-0), PO(5'-0)
								12.279	Total(Pt) Route 10
407	9'-0	5.6	19.10	1	(See Notes)	3'-6	120	11.631	• • • • • **Route 11** • • • • • Sprinkler,
94	10'-0		19.10	1.0490		9'-0 12'-6	0.119488	-0.434 1.492	2E(2'-0), PO(5'-0)
								12.689	Total(Pt) Route 11
408	9'-0	5.6	19.81	1	(See Notes)	2'-10	120	12.511	• • • • • **Route 12** • • • • • Sprinkler,
97	10'-0		19.81	1.0490		9'-0 11'-10	0.127827	-0.434 1.513	2E(2'-0), PO(5'-0)
								13.591	Total(Pt) Route 12
413	9'-0	5.6	23.91	1	(See Notes)	2'-7	120	18.235	• • • • • **Route 13** • • • • • Sprinkler,
122	10'-0		23.91	1.0490		9'-0 11'-7	0.181114	-0.434 2.098	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.
122	10'-0			1½		11'-8	120	19.899	
137	10'-0		5.32	1.6820		11'-8	0.001127	0.013	
137	10'-0		23.92	1½		61'-1½	120	19.912	Flow (q) from Route 14
128	10'-0		29.24	1.6820		61'-1½	0.026362	1.612	
								21.524	Total(Pt) Route 13
414	9'-0	5.6	23.92	1	(See Notes)	2'-7	120	18.246	• • • • • **Route 14** • • • • • Sprinkler,
137	10'-0		23.92	1.0490		9'-0	0.181223	-0.434	2E(2'-0), PO(5'-0)
						11'-7		2.099	
								19.912	Total(Pt) Route 14
415	9'-0	5.6	23.99	1	(See Notes)	2'-7	120	18.348	• • • • • **Route 15** • • • • • Sprinkler,
138	10'-0		23.99	1.0490		9'-0	0.182156	-0.434	2E(2'-0), PO(5'-0)
						11'-7		2.110	
138	10'-0		18.59	1½		15'-0	120	20.024	Flow (q) from Route 39
139	10'-0		42.58	1.6820		15'-0	0.052833	0.792	
139	10'-0		24.45	1½	(See Notes)	72'-6	120	20.817	Flow (q) from Route 16
131	10'-0		67.03	1.6820		9'-11	0.122318	10.078	PO(9'-11)
						82'-4½		30.895	Total(Pt) Route 15
416	9'-0	5.6	24.45	1	(See Notes)	2'-7	120	19.064	• • • • • **Route 16** • • • • • Sprinkler,
139	10'-0		24.45	1.0490		9'-0	0.188725	-0.434	2E(2'-0), PO(5'-0)
						11'-7		2.186	
								20.817	Total(Pt) Route 16
34	10'-0			3		3'-2½	120	33.202	• • • • • **Route 17** • • • • •
92	10'-0		17.54	3.2600		3'-2½	0.000408	0.001	
92	10'-0			2	(See Notes)	57'-9	120	33.203	PO(12'-3½)
95	10'-0		17.54	2.1570		49'-2½	0.003049	0.000	
						107'-0		0.326	2T(12'-3½), PO(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
95	10'-0			3		3'-2½	120	33.529	
83	10'-0		17.54	3.2600		3'-2½	0.000408	0.001	
83	10'-0			3		6'-9½	120	33.531	
35	10'-0		23.67	3.2600		6'-9½	0.000711	0.005	
35	10'-0		17.20	3		5'-2½	120	33.536	Flow (q) from Route 21
81	10'-0		40.87	3.2600		5'-2½	0.001951	0.010	
81	10'-0			3		6'-0	120	33.546	
76	10'-0		48.23	3.2600		6'-0	0.002651	0.016	
76	10'-0			3		0'-6½	120	33.562	
36	10'-0		56.96	3.2600		0'-6½	0.003606	0.002	
36	10'-0			3		2'-1½	120	33.564	
37	10'-0		46.46	3.2600		2'-1½	0.002474	0.005	
37	10'-0		54.78	3		0'-0	120	33.569	Flow (q) from Route 33
38	10'-0		101.24	3.2600		0'-0	0.010451	0.000	
38	10'-0			3		88'-10½	120	33.569	
39	10'-0		66.55	3.2600		88'-10½	0.004810	0.428	
39	10'-0		18.42	3	(See Notes)	27'-1½	120	33.996	Flow (q) from Route 34
40	10'-0		84.97	3.2600		20'-2 47'-3½	0.007559	0.357	T(20'-2)
40	10'-0		83.31	3		2'-6½	120	34.354	Flow (q) from Route 18
41	10'-0		168.28	3.2600		2'-6½	0.026758	-0.000 0.068	
41	10'-0		14.39 + 13.18	3		8'-0	120	34.421	Flow (q) from Route 45 and 49
42	10'-0		195.85	3.2600		8'-0	0.035428	0.283	

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.
42	10'-0		15.44	3		1'-0	120	34.705	Flow (q) from Route 50
43	10'-0		211.29	3.2600		1'-0	0.040767	0.041	
43	10'-0		17.26	3		9'-0	120	34.745	Flow (q) from Route 36
44	10'-0		228.55	3.2600		9'-0	0.047141	0.424	
44	10'-0		18.68 + 20.60	3	(See Notes)	29'-9	120	35.170	Flow (q) from Route 20 and 37
						20'-2			T(20'-2)
91	10'-0		267.83	3.2600		49'-10½	0.063217	3.154	
								38.324	Total(Pt) Route 17
45	10'-0		143.61	3	(See Notes)	89'-0½	120	33.558	• • • • • **Route 18** • • • • • Flow (q) from Route 23
						20'-2			T(20'-2)
40	10'-0		83.31	3.2600		109'-2½	0.007287	0.796	
								34.354	Total(Pt) Route 18
45	10'-0		143.61	3		1'-11	120	33.558	• • • • • **Route 19** • • • • • T(20'-2), Flow (q) from Route 23
						20'-2		-0.000	
46	10'-0		60.31	3.2600		22'-1	0.004008	0.089	
46	10'-0			2	(See Notes)	7'-6	120	33.646	PO(12'-3½)
						12'-3½		-4.335	
13	20'-0		8.05	2.1570		19'-9½	0.000723	0.014	
								29.326	Total(Pt) Route 19
52	10'-0		13.80	3		0'-6½	120	33.158	• • • • • **Route 20** • • • • • Flow (q) from Route 1
55	10'-0		69.57	3.2600		0'-6½	0.005221	0.003	
55	10'-0			3		6'-0	120	33.161	
56	10'-0		57.33	3.2600		6'-0	0.003650	0.022	
56	10'-0			3		5'-2½	120	33.183	
57	10'-0		45.73	3.2600		5'-2½	0.002402	0.013	
57	10'-0			3		6'-9½	120	33.195	
34	10'-0		28.53	3.2600		6'-9½	0.001004	0.007	

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.
34	10'-0			1½	(See Notes)	56'-4½	120	33.202	PO(9'-11)
						19'-9½	0.004317	0.000	
83	10'-0		11.00	1.6820		76'-2		0.329	PO(9'-11)
83	10'-0			1½	(See Notes)	49'-1½	120	33.531	PO(9'-11)
						19'-9½	0.000953	-0.000	
58	10'-0		4.86	1.6820		68'-11		0.066	PO(9'-11)
58	10'-0			3		12'-0	120	33.596	
							0.000038		
59	10'-0		4.86	3.2600		12'-0		0.000	
59	10'-0		4.25	3		6'-0	120	33.597	Flow (q) from Route 24
							0.000121		
60	10'-0		9.11	3.2600		6'-0		0.001	
60	10'-0		3.51	3	(See Notes)	31'-9½	120	33.598	Flow (q) from Route 25
						9'-5	0.000222		
61	10'-0		12.62	3.2600		41'-2½		0.009	E(9'-5)
61	10'-0		6.07	1½	(See Notes)	116'-0	120	33.607	PO(9'-11), Flow (q) from Route 38
						19'-9½	0.011508		
44	10'-0		18.68	1.6820		135'-10		1.563	PO(9'-11)
								35.170	Total(Pt) Route 20
57	10'-0			2	(See Notes)	66'-6½	120	33.195	• • • • • **Route 21** • • • • •
						49'-2½	0.002940	0.000	PO(12'-3½)
35	10'-0		17.20	2.1570		115'-9½		0.340	2T(12'-3½), PO(12'-3½)
								33.536	Total(Pt) Route 21
36	10'-0			2	(See Notes)	10'-0	120	33.564	• • • • • **Route 22** • • • • •
						12'-3½	0.001180	-4.334	PO(12'-3½)
54	20'-0		10.50	2.1570		22'-3½		0.026	
								29.256	Total(Pt) Route 22
100	10'-0		12.55 + 12.60	3		8'-0	120	33.110	• • • • • **Route 23** • • • • •
							0.000795		Flow (q) from Route 31 and 32
123	10'-0		25.15	3.2600		8'-0		0.006	
123	10'-0		12.81	3	(See Notes)	3'-0½	120	33.116	Flow (q) from Route 46
						20'-2	0.001702	0.000	
124	10'-0		37.95	3.2600		23'-2½		0.039	T(20'-2)

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.
124	10'-0		105.66	3	(See Notes)	0'-0	120	33.155	Flow (q) from Route 28
						20'-2	0.019957		
45	10'-0		143.61	3.2600		20'-2		0.402	T(20'-2)
								33.558	Total(Pt) Route 23
56	10'-0			1½	(See Notes)	56'-4½	120	33.183	• • • • • **Route 24** • • • • •
						19'-9½	0.004768	0.000	PO(9'-11)
81	10'-0		11.60	1.6820		76'-2		0.363	PO(9'-11)
81	10'-0			1½	(See Notes)	49'-1½	120	33.546	
						19'-9½	0.000742	-0.000	PO(9'-11)
59	10'-0		4.25	1.6820		68'-11		0.051	PO(9'-11)
								33.597	Total(Pt) Route 24
55	10'-0			1½	(See Notes)	56'-4½	120	33.161	• • • • • **Route 25** • • • • •
						19'-9½	0.005264	0.000	PO(9'-11)
76	10'-0		12.24	1.6820		76'-2		0.401	PO(9'-11)
76	10'-0			1½	(See Notes)	49'-1½	120	33.562	
						19'-9½	0.000522	-0.000	PO(9'-11)
60	10'-0		3.51	1.6820		68'-11		0.036	PO(9'-11)
								33.598	Total(Pt) Route 25
12	20'-0			2	(See Notes)	214'-6½	120	28.623	• • • • • **Route 26** • • • • •
						86'-2	0.000816	-0.001	T(12'-3½)
53	20'-0		8.60	2.1570		300'-8		0.245	2E(6'-2), 5T(12'-3½)
								28.867	Total(Pt) Route 26
125	10'-0		23.38	3		7'-0	120	32.230	• • • • • **Route 27** • • • • •
							0.000694		Flow (q) from Route 41
134	10'-0		23.38	3.2600		7'-0		0.005	
134	10'-0		33.41	3		8'-0	120	32.235	Flow (q) from Route 40
							0.003587		
135	10'-0		56.79	3.2600		8'-0		0.029	
								32.264	Total(Pt) Route 27
11	10'-0		75.47	3		8'-3½	120	32.544	• • • • • **Route 28** • • • • •
							0.009381		Flow (q) from Route 2
66	10'-0		95.50	3.2600		8'-3½		0.078	

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.
66	10'-0		4.00	3		8'-5	120	32.622	Flow (q) from Route 29
64	10'-0		99.49	3.2600		8'-5	0.010121	0.085	
64	10'-0		6.17	3		39'-8	120	32.707	Flow (q) from Route 44
124	10'-0		105.66	3.2600		39'-8	0.011312	0.449	
								33.155	Total(Pt) Route 28
132	10'-0		170.97	3		100'-0½	120	31.989	• • • • • **Route 29** • • • • • Flow (q) from Route 2
10	10'-0		59.35	3.2600		100'-0½	0.003892	0.389	
10	10'-0			3	(See Notes)	8'-3½	120	32.378	T(20'-2)
9	10'-0		24.25	3.2600		20'-2 28'-5½	0.000743	0.021	
9	10'-0			1½	(See Notes)	22'-5	120	32.399	PO(9'-11)
72	10'-0		10.17	1.6820		19'-9½ 42'-2½	0.003734	0.158	T(9'-11)
72	10'-0			1½	(See Notes)	78'-2½	120	32.557	T(9'-11)
66	10'-0		4.00	1.6820		19'-9½ 98'-0	0.000664	0.065	PO(9'-11)
								32.622	Total(Pt) Route 29
10	10'-0		24.25	3		103'-5½	120	32.378	• • • • • **Route 30** • • • • • Flow (q) from Route 29
133	10'-0		35.10	3.2600		103'-5½	0.001473	0.152	
								32.530	Total(Pt) Route 30
86	10'-0			3		8'-0	120	32.687	• • • • • **Route 31** • • • • •
87	10'-0		12.55	3.2600		8'-0	0.000220	0.002	
87	10'-0			1½	(See Notes)	56'-4½	120	32.688	PO(9'-11)
96	10'-0		12.55	1.6820		19'-9½ 76'-2	0.005509	0.420	PO(9'-11)
96	10'-0			3		8'-0	120	33.108	
100	10'-0		12.55	3.2600		8'-0	0.000220	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.
								33.110	Total(Pt) Route 31
119	10'-0		37.52	3		1'-0½	120	32.678	• • • • • **Route 32** • • • • •
85	10'-0		37.95	3.2600		1'-0½	0.001702	0.002	Flow (q) from Route 2
85	10'-0			3		8'-0	120	32.680	
86	10'-0		25.15	3.2600		8'-0	0.000795	0.006	
86	10'-0			1½	(See Notes)	56'-4½	120	32.687	PO(9'-11)
100	10'-0		12.60	1.6820		19'-9½ 76'-2	0.005555	0.423	PO(9'-11)
								33.110	Total(Pt) Route 32
50	10'-0			3		10'-0	120	33.435	• • • • • **Route 33** • • • • •
51	10'-0		63.90	3.2600		10'-0	0.004461	0.045	
51	10'-0			3	(See Notes)	6'-5½	120	33.479	
37	10'-0		54.78	3.2600		20'-2 26'-7½	0.003355	0.000 0.089	T(20'-2)
								33.569	Total(Pt) Route 33
49	10'-0		59.12 + 14.08	3		32'-2	120	33.250	• • • • • **Route 34** • • • • •
50	10'-0		73.20	3.2600		32'-2	0.005736	0.184	Flow (q) from Route 35 and 47
50	10'-0			1½	(See Notes)	99'-5½	120	33.435	PO(9'-11)
71	10'-0		9.30	1.6820		19'-9½ 119'-3	0.003169	0.378	T(9'-11)
71	10'-0		9.12	1½	(See Notes)	6'-5½	120	33.813	Flow (q) from Route 48
39	10'-0		18.42	1.6820		9'-11 16'-4½	0.011211	0.000 0.184	PO(9'-11)
								33.996	Total(Pt) Route 34
48	10'-0			3	(See Notes)	7'-8½	120	33.143	• • • • • **Route 35** • • • • •
49	10'-0		59.12	3.2600		20'-2 27'-10½	0.003864	0.108	T(20'-2)
								33.250	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.
46	10'-0		8.05	3		0'-7	120	33.646	• • • • • **Route 36** • • • • • Flow (q) from Route 19
67	10'-0		52.25	3.2600		0'-7	0.003074	0.002	
67	10'-0			3		9'-0	120	33.648	
68	10'-0		37.86	3.2600		9'-0	0.001694	0.015	
68	10'-0			1½	(See Notes)	89'-0½	120	33.663	PO(9'-11)
43	10'-0		17.26	1.6820		19'-9½ 108'-10½	0.009939	1.082	PO(9'-11)
								34.745	Total(Pt) Route 36
68	10'-0		17.26	3		9'-0	120	33.663	• • • • • **Route 37** • • • • • Flow (q) from Route 36
69	10'-0		20.60	3.2600		9'-0	0.000550	0.005	
69	10'-0			1½	(See Notes)	89'-0½	120	33.668	PO(9'-11)
44	10'-0		20.60	1.6820		19'-9½ 108'-10½	0.013791	1.501	PO(9'-11)
								35.170	Total(Pt) Route 37
38	10'-0			3	(See Notes)	2'-6½	120	33.569	• • • • • **Route 38** • • • • • T(20'-2)
70	10'-0		34.69	3.2600		20'-2 22'-8	0.001441	-0.000 0.033	
70	10'-0			3		8'-0	120	33.601	
62	10'-0		21.50	3.2600		8'-0	0.000595	0.005	
62	10'-0			3		10'-0	120	33.606	
61	10'-0		6.07	3.2600		10'-0	0.000057	0.001	
								33.607	Total(Pt) Route 38
122	10'-0		5.32	1½		11'-0	120	19.899	• • • • • **Route 39** • • • • • Flow (q) from Route 13
138	10'-0		18.59	1.6820		11'-0	0.011406	0.125	
								20.024	Total(Pt) Route 39

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
127	10'-0		50.59	1½	(See Notes)	8'-0	120	29.826	• • • • • **Route 40** • • • • •
						9'-11	0.090018		Flow (q) from Route 1
126	10'-0		56.79	1.6820		17'-11		1.611	T(9'-11)
126	10'-0			1½	(See Notes)	13'-9	120	31.438	
						9'-11	0.033741		
134	10'-0		33.41	1.6820		23'-7½		0.797	PO(9'-11)
								32.235	Total(Pt) Route 40
126	10'-0			1½	(See Notes)	20'-9	120	31.438	• • • • • **Route 41** • • • • •
						24'-9	0.017426		T(9'-11)
125	10'-0		23.38	1.6820		45'-6		0.793	E(4'-11½), PO(9'-11)
								32.230	Total(Pt) Route 41
98	10'-0		18.72	1½		13'-2	120	17.801	• • • • • **Route 42** • • • • •
							0.000600		Flow (q) from Route 1
99	10'-0		3.78	1.6820		13'-2		0.008	
								17.809	Total(Pt) Route 42
74	10'-0		3.55	1½		5'-6½	120	11.838	• • • • • **Route 43** • • • • •
							0.007634		Flow (q) from Route 6
89	10'-0		14.96	1.6820		5'-6½		0.042	
								11.881	Total(Pt) Route 43
72	10'-0		4.00	1½	(See Notes)	86'-7½	120	32.557	• • • • • **Route 44** • • • • •
						14'-10	0.001482		Flow (q) from Route 29
64	10'-0		6.17	1.6820		101'-5½		0.150	E(4'-11½), PO(9'-11)
								32.707	Total(Pt) Route 44
67	10'-0			1½	(See Notes)	89'-0½	120	33.648	• • • • • **Route 45** • • • • •
						19'-9½	0.007101		PO(9'-11)
41	10'-0		14.39	1.6820		108'-10½		0.773	PO(9'-11)
								34.421	Total(Pt) Route 45
85	10'-0			1½	(See Notes)	56'-4½	120	32.680	• • • • • **Route 46** • • • • •
						19'-9½	0.005722		PO(9'-11)
123	10'-0		12.81	1.6820		76'-2		0.436	PO(9'-11)
								33.116	Total(Pt) Route 46

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.
9	10'-0			1½	(See Notes)	105'-0½	120	32.399	• • • • • **Route 47** • • • • •
						19'-9½	0.006820		PO(9'-11)
49	10'-0		14.08	1.6820		124'-10		0.851	PO(9'-11)
								33.250	Total(Pt) Route 47
51	10'-0			1½	(See Notes)	89'-5½	120	33.479	• • • • • **Route 48** • • • • •
						19'-9½	0.003051		PO(9'-11)
71	10'-0		9.12	1.6820		109'-3		0.333	T(9'-11)
								33.813	Total(Pt) Route 48
70	10'-0			1½	(See Notes)	116'-0	120	33.601	• • • • • **Route 49** • • • • •
						19'-9½	0.006036		PO(9'-11)
41	10'-0		13.18	1.6820		135'-10		0.820	PO(9'-11)
								34.421	Total(Pt) Route 49
62	10'-0			1½	(See Notes)	116'-0	120	33.606	• • • • • **Route 50** • • • • •
						19'-9½	0.008088		PO(9'-11)
42	10'-0		15.44	1.6820		135'-10		1.098	PO(9'-11)
								34.705	Total(Pt) Route 50

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.

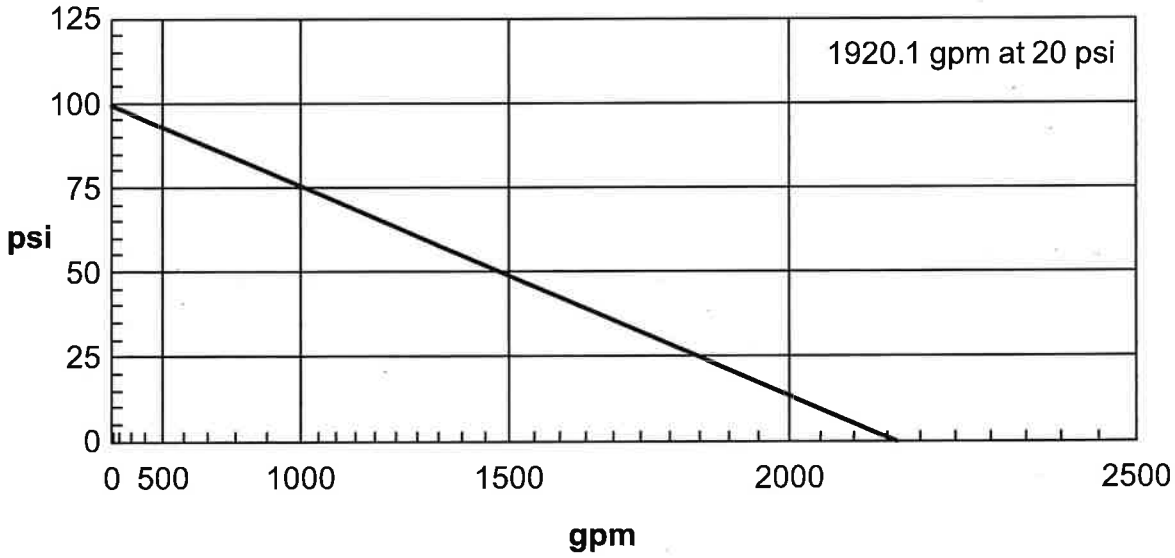
Read Hydrant

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	

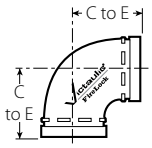
Contractor

Submitted By	
Date	

Engineer

Spec Section	
Paragraph	
Approved	
Date	

Dimensions:



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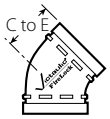

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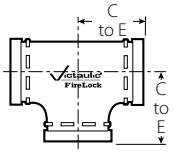

NO. 002

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

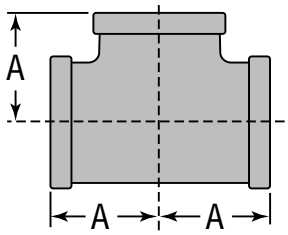

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FIGURE 3205 - STRAIGHT TEE

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

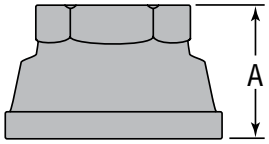
Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

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



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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

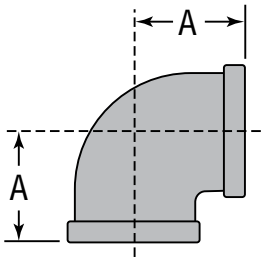

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FIGURE 3201 - 90° ELBOW

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:	

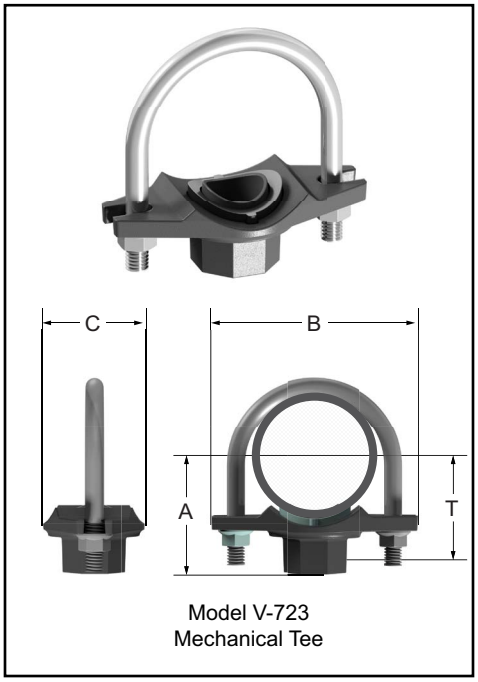
TECHNICAL DATA

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.

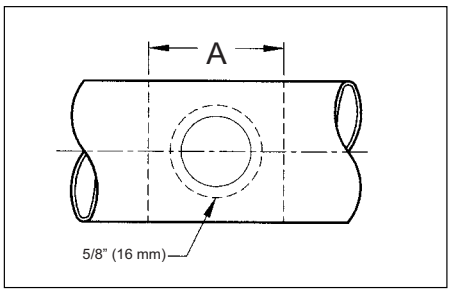


Table 2: Hole Sizes for Mechanical Tees Model V-723

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.			

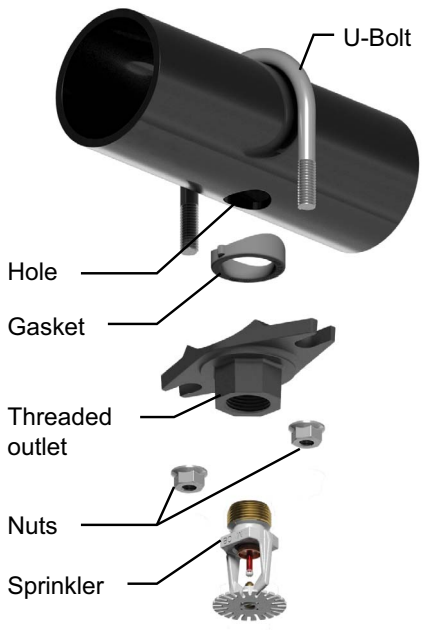


Figure 1: V-723 Saddle-Let Installation

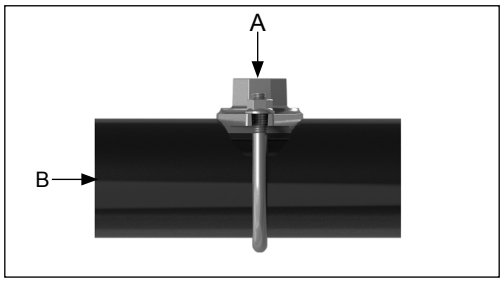
VGS®	TECHNICAL DATA	HOLE CUT SYSTEM MODEL V-723 SADDLE LET MECHANICAL TEE

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.

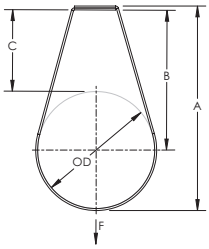
Thread - Coarse				
		Class 4.6		Class 8.8
		Plain	Zinc	Plain
Diameter	Thread Size	Part No.	Part No.	Part No.
M2	0.4	-	0162065	-
M3	0.5	-	0162068	-
M4	0.7	47556	0162070	-
M5	0.8	47570	0162071	-
M6	1.0	47571	0162072	47870
M8	1.25	47572	0162073	47872
M10	1.5	47573	0162075	47873
M12	1.75	47574	0162078	47874
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

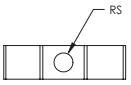
Thread - Coarse				
		Class 4.6		Class 8.8
		Plain	Zinc	Plain
Diameter	Thread Size	Part No.	Part No.	Part No.
M27	3.0	47581	0162089	47881
M30	3.5	47582	0162090	47882
M33	3.5	47733	-	47883
M36	4.0	47583	-	47884
M39	4.0	47734	-	47885
M42	4.5	47735	-	47886
M48	5.0	47737	-	-

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)



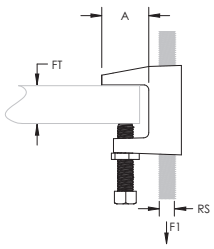


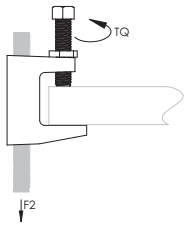
Material: Stainless Steel 304 (EN 1.4301)

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

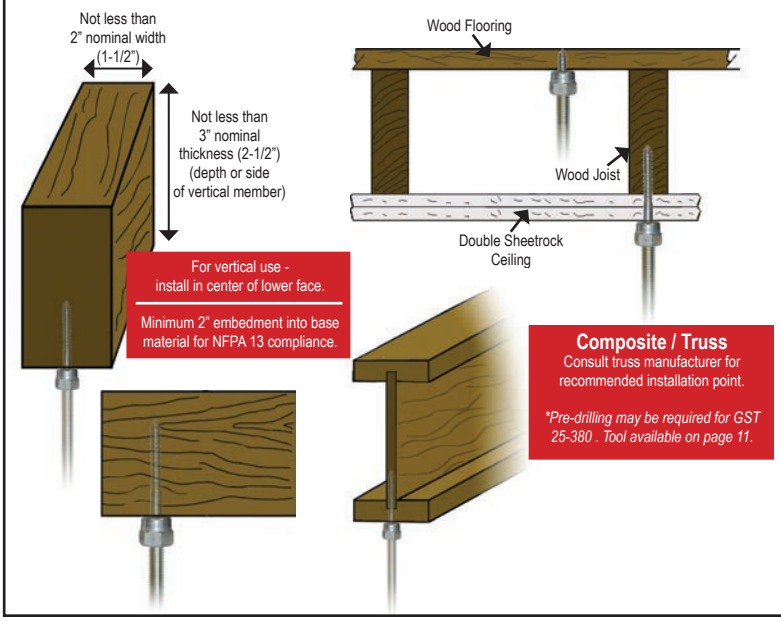
Part Number	Rod Size RS	Flange Thickness FT	A	Torque TQ	Static Load 1 F1	Static Load 2 F2	Certifications	Standard Packaging Quantity
Finish: Plain								
3000037PL	3/8"	13/16" Max	1 1/8"	5 ft lb	500 lb	250 lb	cULus, FM	100 pc
3000050PL	1/2"	13/16" Max	1 1/8"	8 ft lb	950 lb	760 lb	cULus, FM	50 pc
3000062PL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

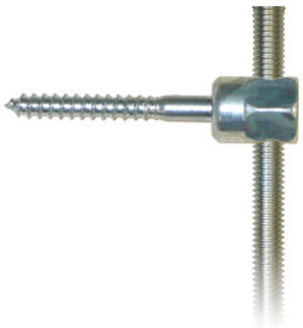
#14 SW Red Nut Driver Part # 8114910

MANUFACTURED U.S.A.

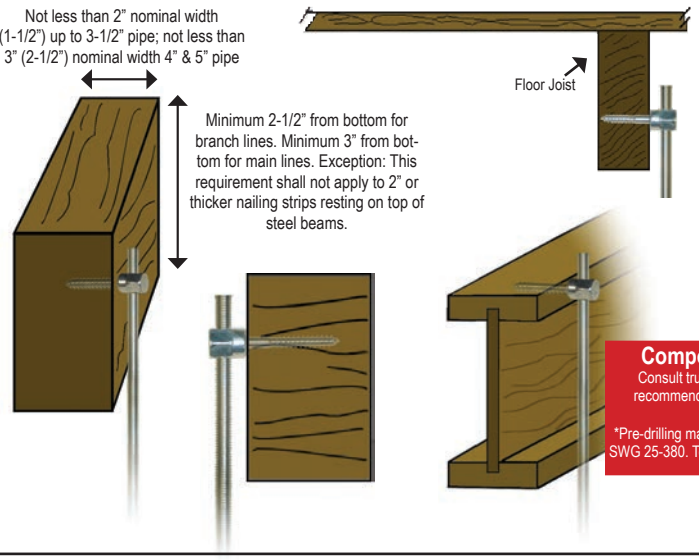
RoHS Compliant

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.

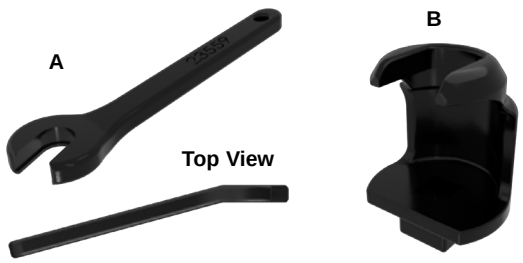


Figure 1: Sprinkler Wrenches

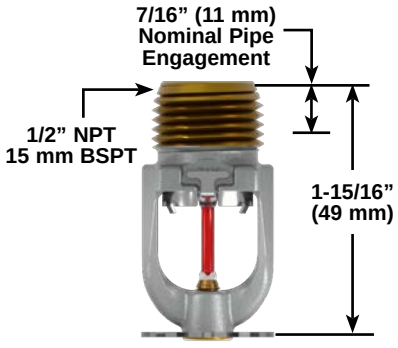


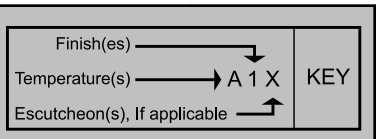
Figure 2: Sprinkler Dimensions

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.

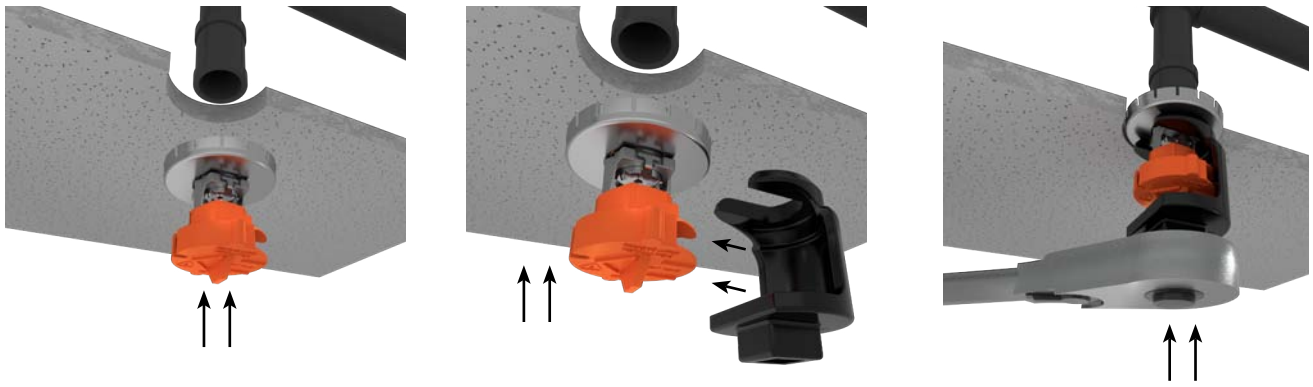


Figure 3: Recessed Installation (with Recessed Socket Wrench)
****A 1/2" ratchet is required (not available from Viking).**

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.

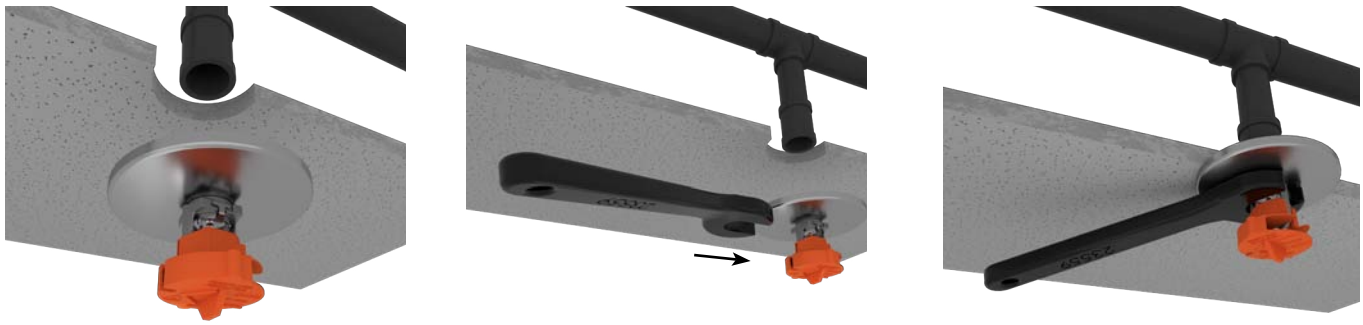


Figure 4: Installation (with Standard Wrench)

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

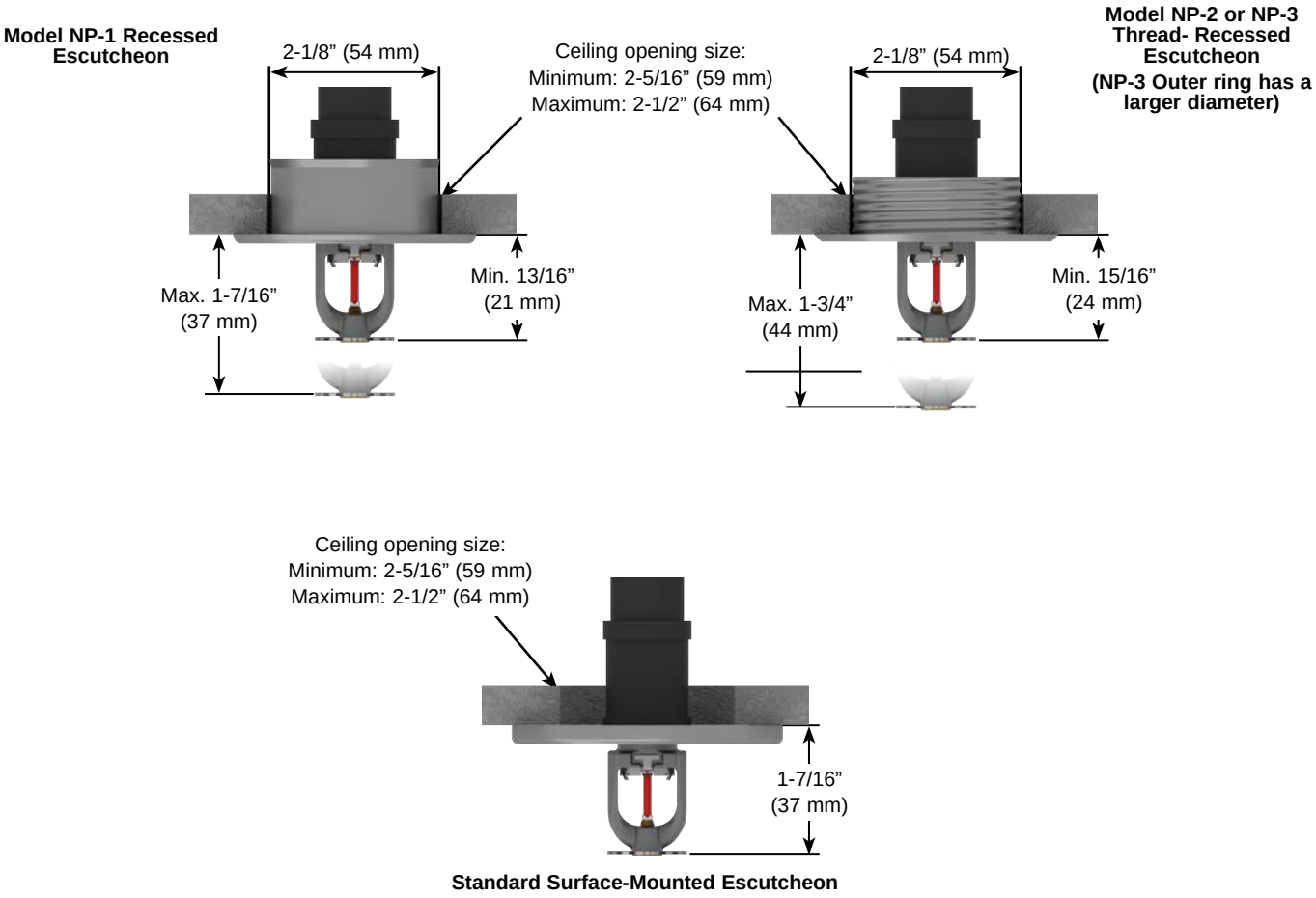


Figure 5: Installation Dimensions with Viking Escutcheons

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.

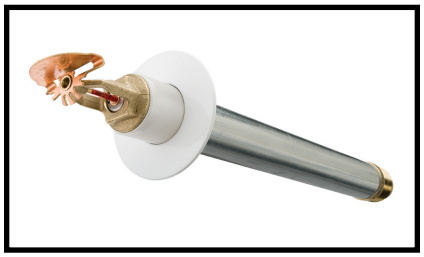
The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

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.

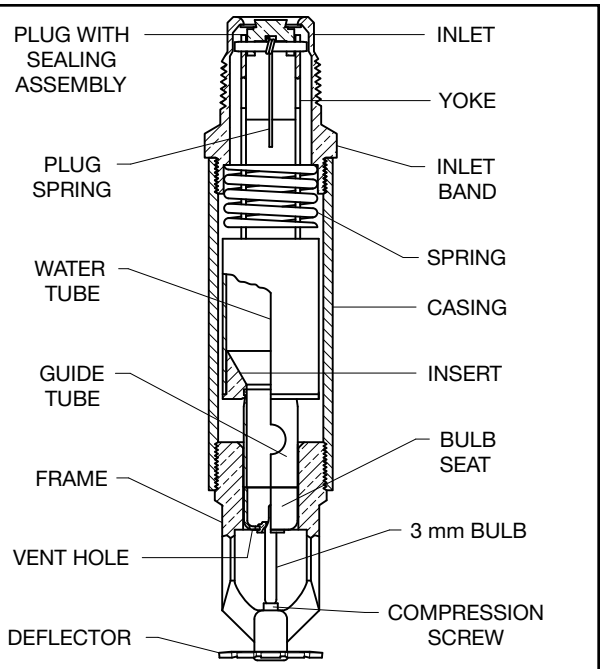


FIGURE 1
SERIES DS-1, 3/4 IN. NPT, DRY-TYPE SPRINKLER ASSEMBLY

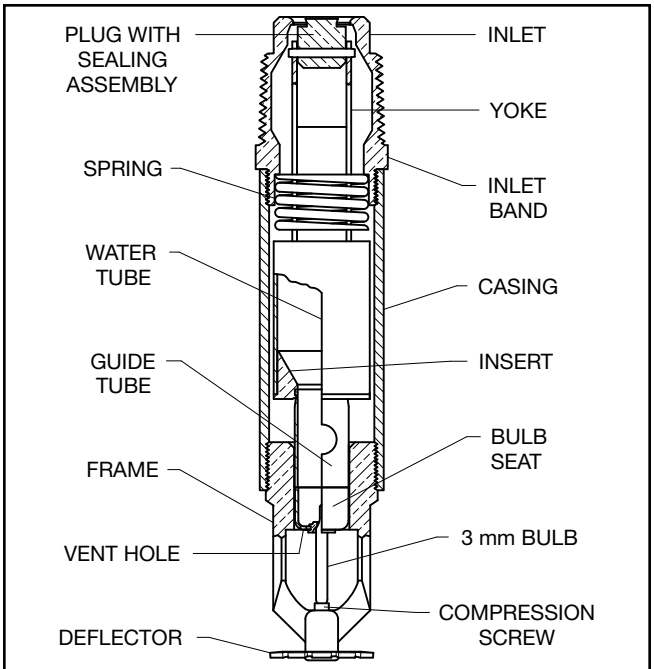


FIGURE 2
SERIES DS-1, 1 IN. NPT AND ISO 7-R 1 DRY-TYPE SPRINKLER ASSEMBLY

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

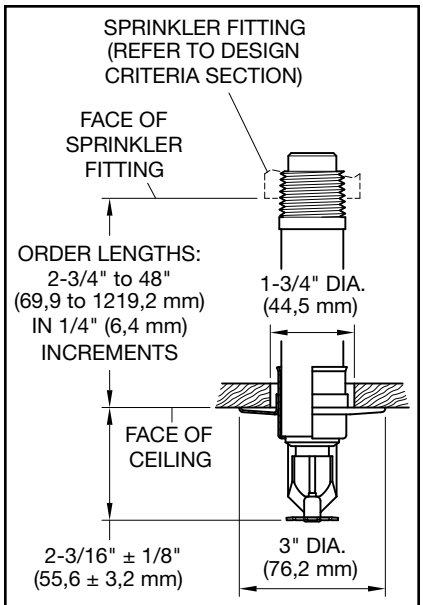


FIGURE 3
PENDENT TY3235 AND TY3935 WITH STANDARD ESCUTCHEON

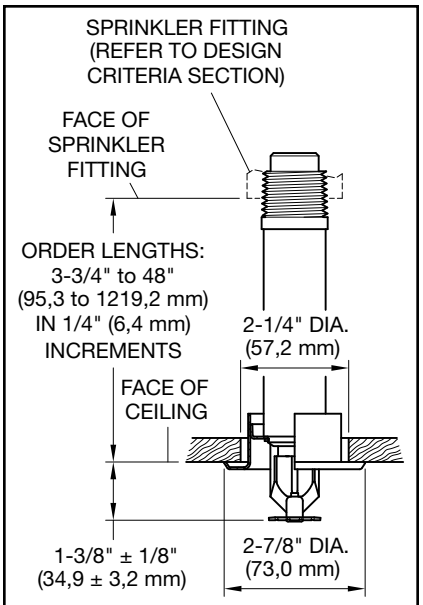


FIGURE 4
PENDENT TY3235 AND TY3935 WITH RECESSED ESCUTCHEON

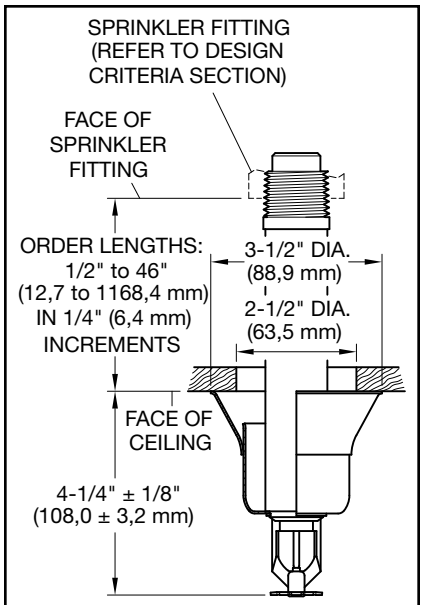


FIGURE 5
PENDENT TY3235 AND TY3935 WITH DEEP ESCUTCHEON

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.

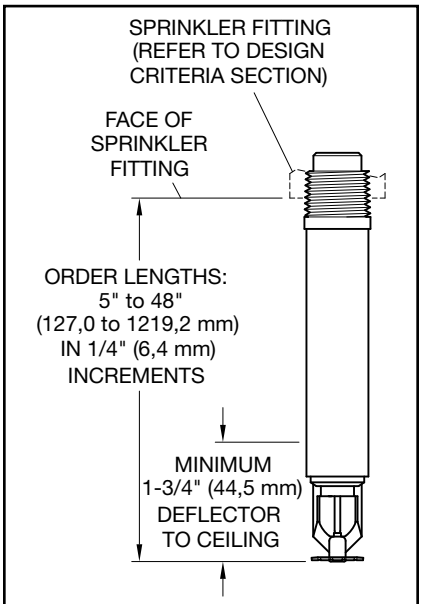


FIGURE 6
PENDENT TY3235 AND TY3935 WITHOUT ESCUTCHEON

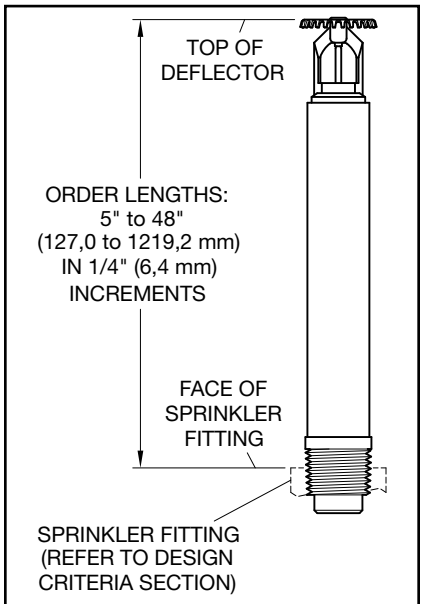


FIGURE 7
UPRIGHT TY3135 WITHOUT ESCUTCHEON, 1 IN. NPT ONLY

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.

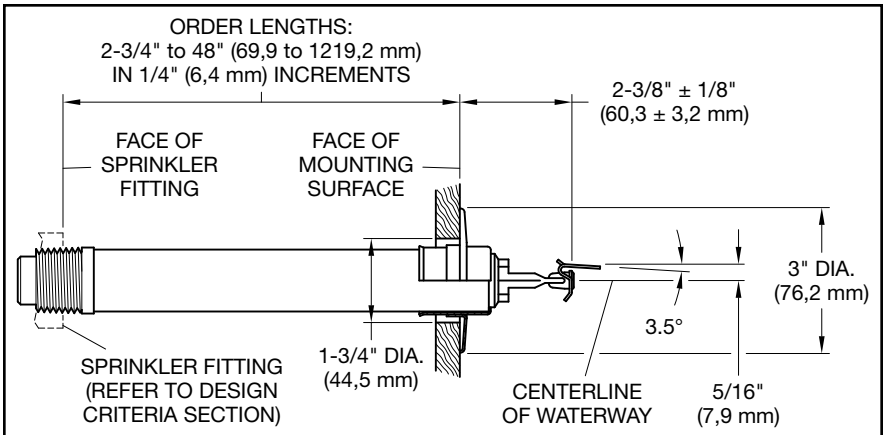


FIGURE 8
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH STANDARD ESCUTCHEON

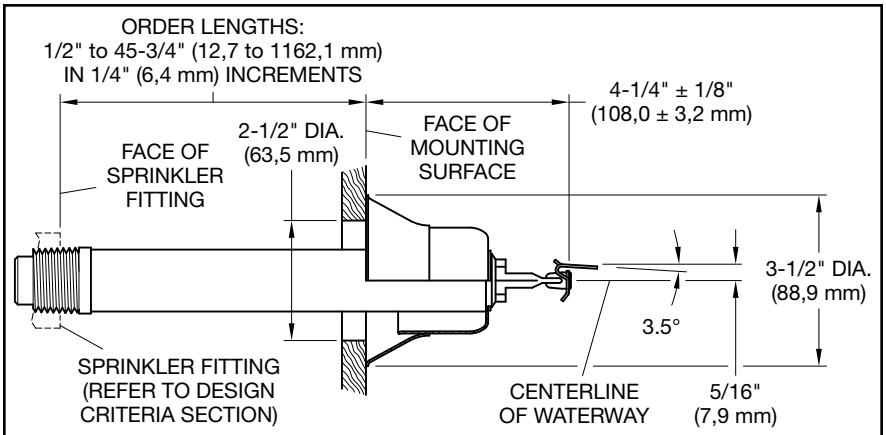


FIGURE 9
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH DEEP ESCUTCHEON

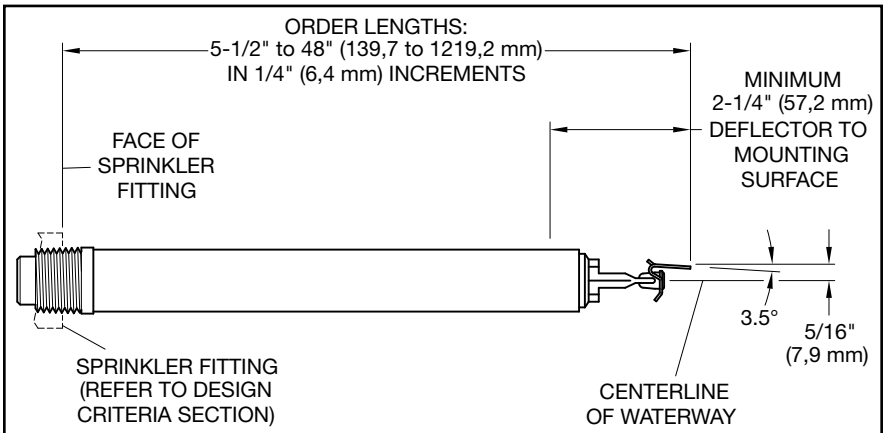


FIGURE 10
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITHOUT ESCUTCHEON

- 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

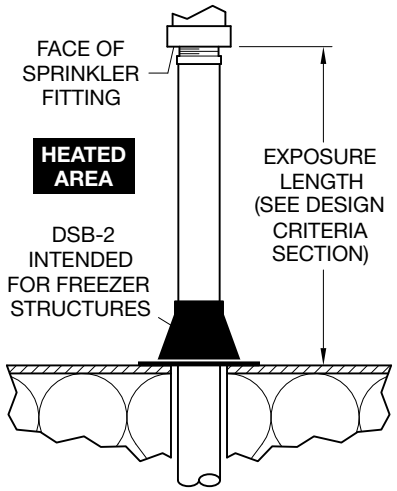


FIGURE 11
EXPOSURE LENGTH

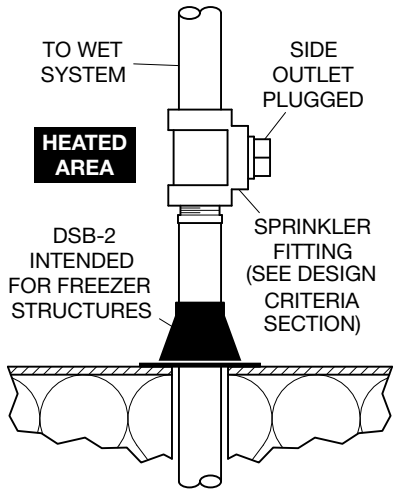


FIGURE 12
SPRINKLER FITTING UNHEATED AREA

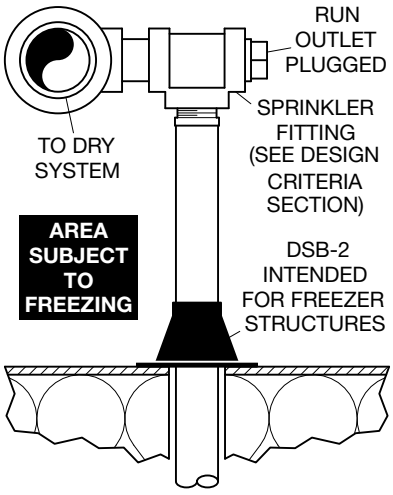


FIGURE 13
SPRINKLER FITTING HEATED AREA

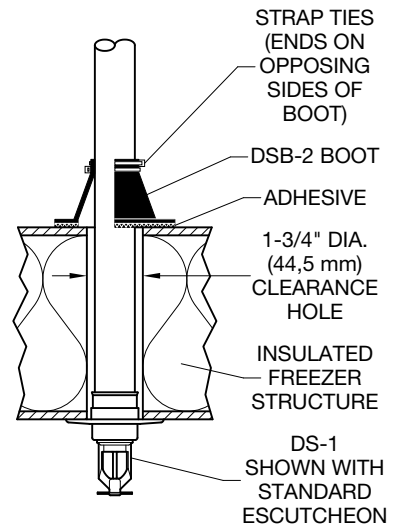


FIGURE 14
MODEL DSB-2 DRY SPRINKLER BOOT WITH PENDENT SERIES DS-1 DRY-TYPE SPRINKLER

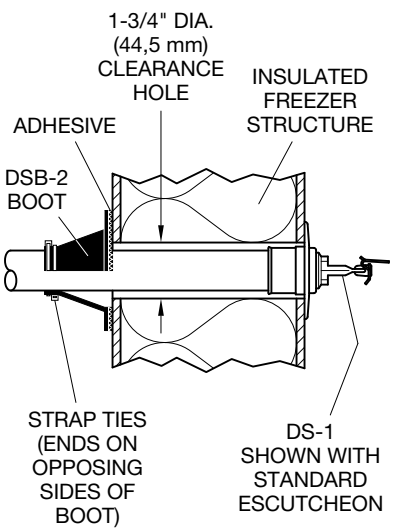


FIGURE 15
MODEL DSB-2 DRY SPRINKLER BOOT WITH SIDEWALL SERIES DS-1 DRY-TYPE SPRINKLER

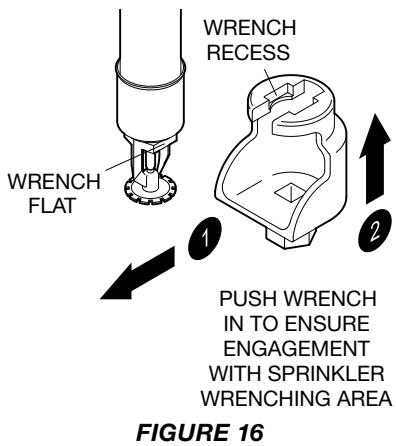


FIGURE 16
W-TYPE 7 SPRINKLER WRENCH

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

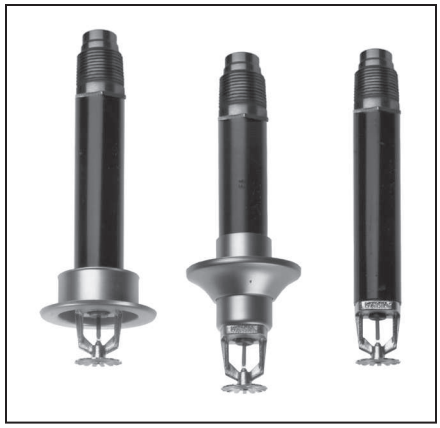
VIKING®

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

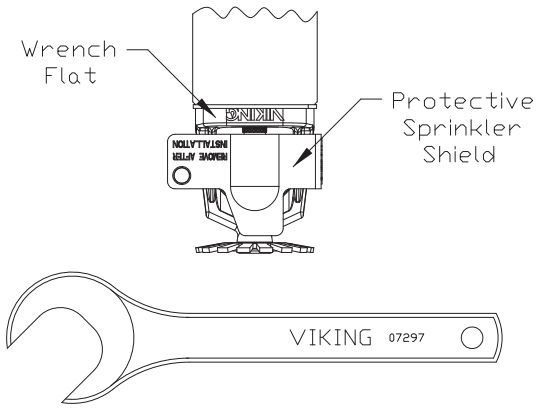


Figure 1: Standard Sprinkler Wrench 07297W/B

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.

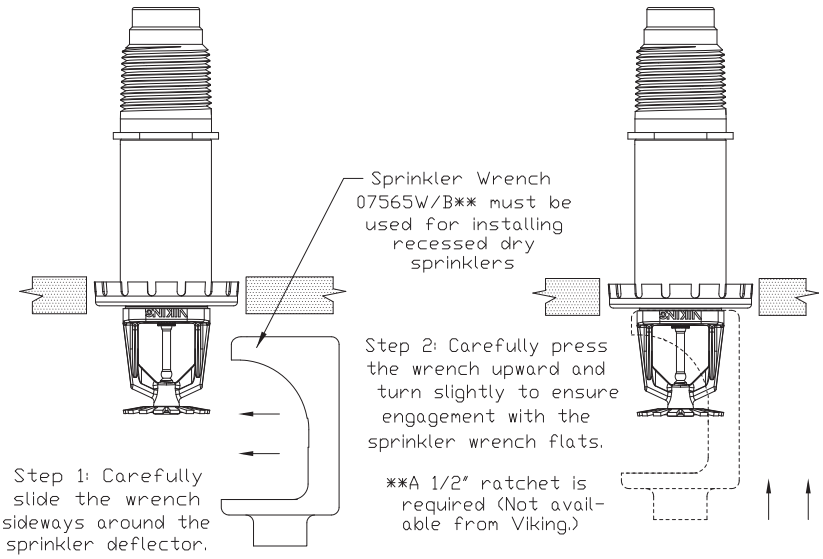


Figure 2: Wrench 07565W/B for Adjustable Recessed Dry Pendent Sprinklers

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.

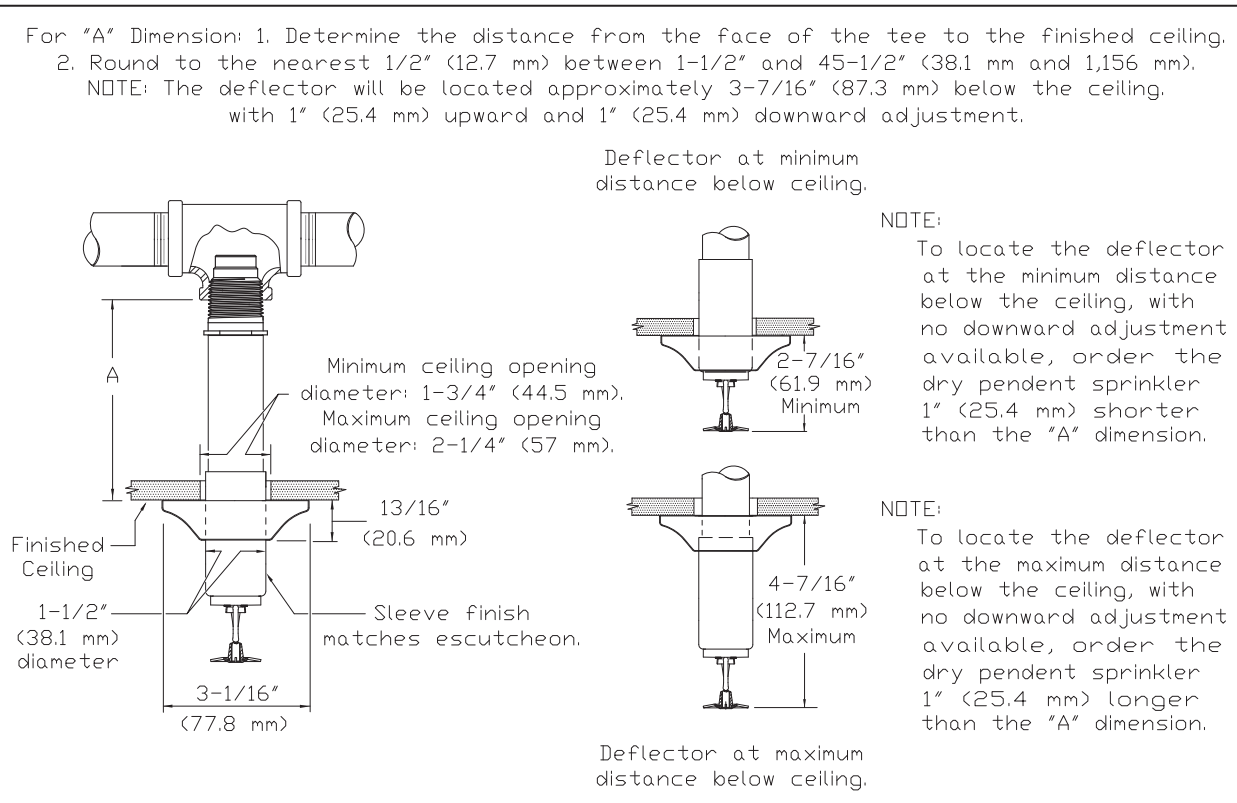


Figure 3: Adjustable Standard Dry Pendent Sprinkler

VIKING®

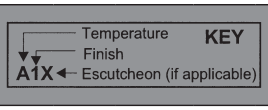
TECHNICAL DATA

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.

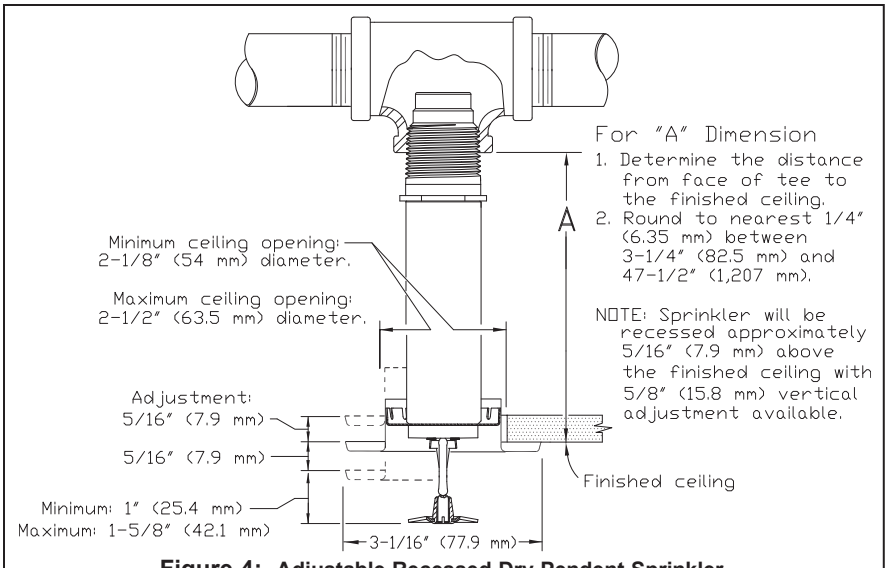


Figure 4: Adjustable Recessed Dry Pendent Sprinkler

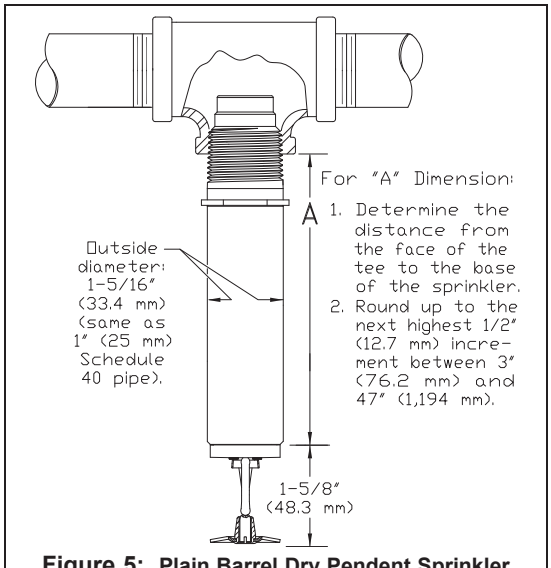
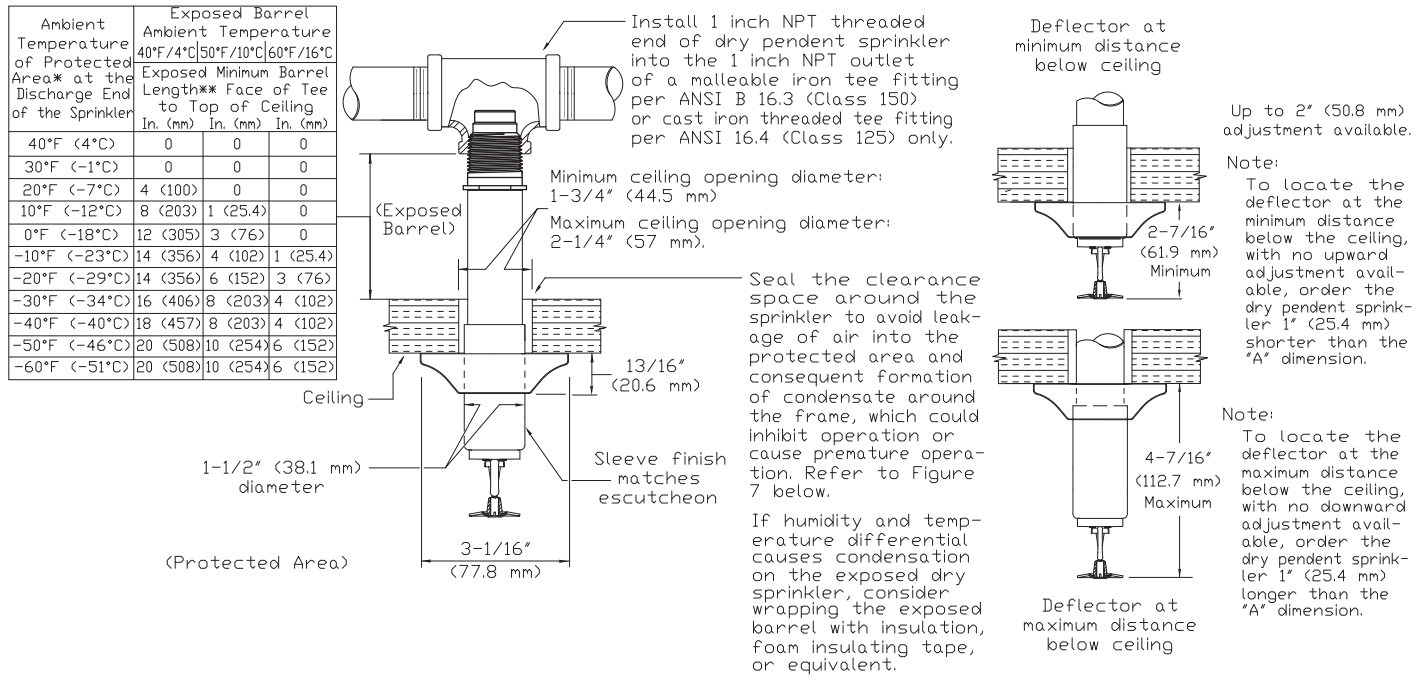


Figure 5: Plain Barrel Dry Pendent Sprinkler

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)**

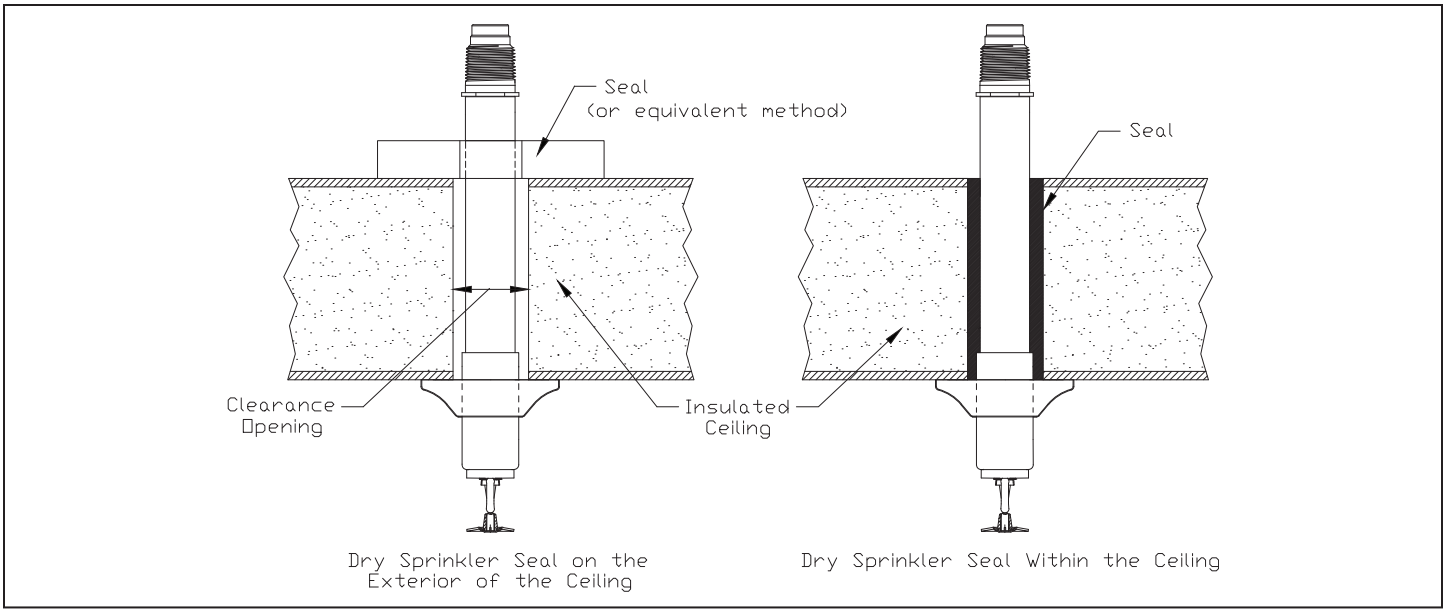


Figure 7: **Dry Sprinkler Seal (Adjustable Standard Dry Pendent Sprinkler is Shown)**

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:

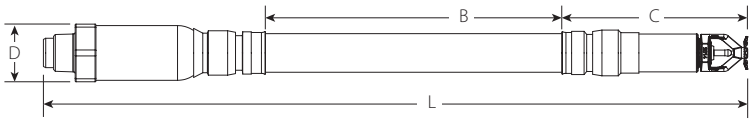
☐ **Standard:** VC-250

☐ White painted RAL 9010

4.0 DIMENSIONS

Product Details and Optional Components

Style VS1 Dry Sprinkler

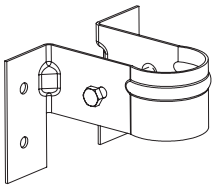


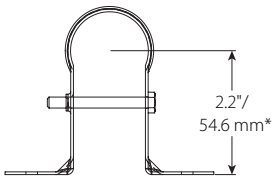
Sprinkler Length inches mm	Overall Length (pendent) L inches mm	Live Length B inches mm	Outlet End Length C inches mm	Maximum OD D inches mm
38 965	39.2 995	25.1 638	6.5 165	2.2 56
50 1270	51.2 1300	37.1 943	6.5 165	2.2 56
58 1475	59.2 1505	45.1 1145	6.5 165	2.2 56

NOTE

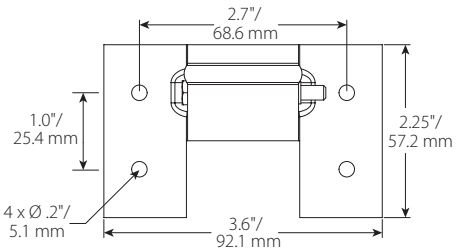
- Add ½" to Overall Length and Outlet End Length for increased length of sidewall deflector

Style VB1 Bracket





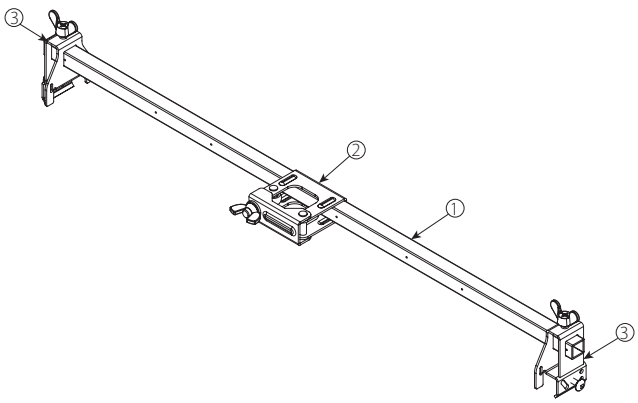
*Note: Theoretical center point of sprinkler in bracket.



4.0 DIMENSIONS (CONTINUED)

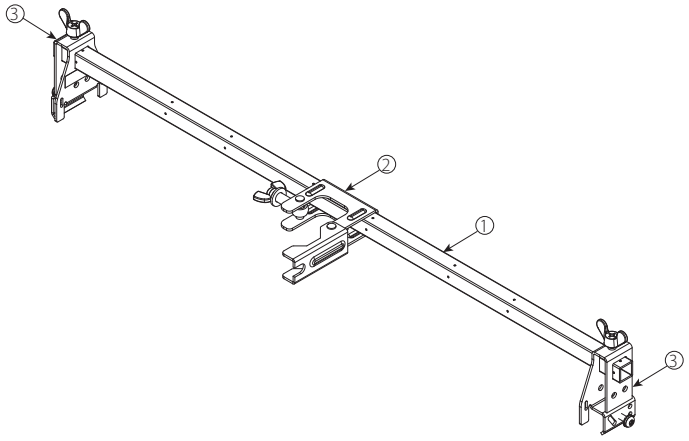
Style VB2 Bracket
Recessed Pendent, Suspended Ceilings

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



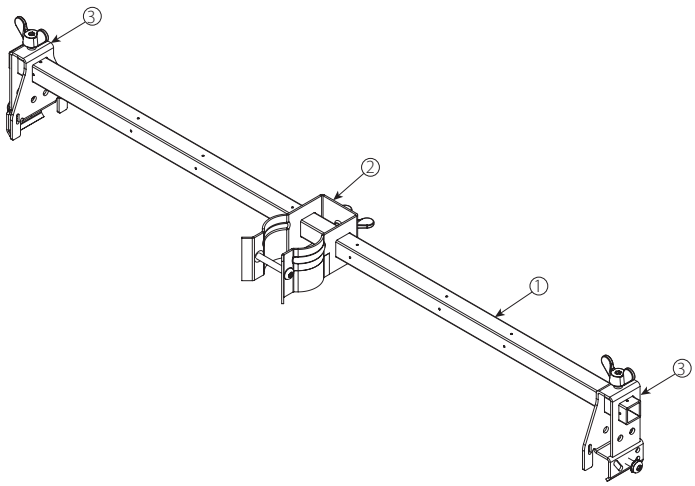
Style VB3 Bracket
Concealed Pendent, Suspended Ceilings

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



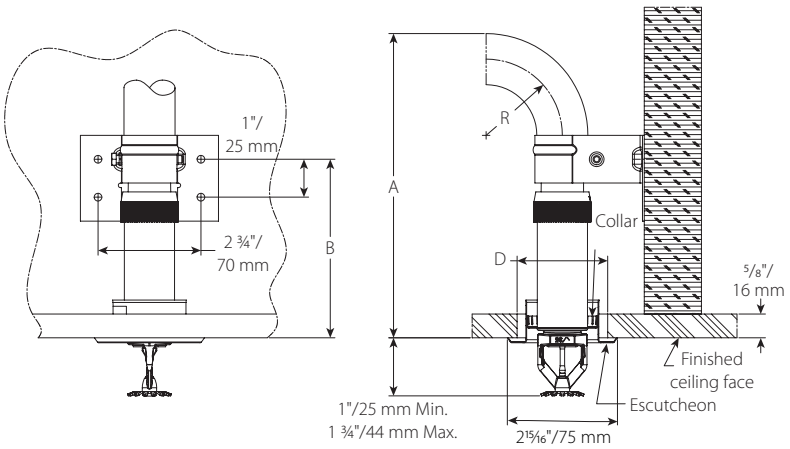
4.1 DIMENSIONS

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:



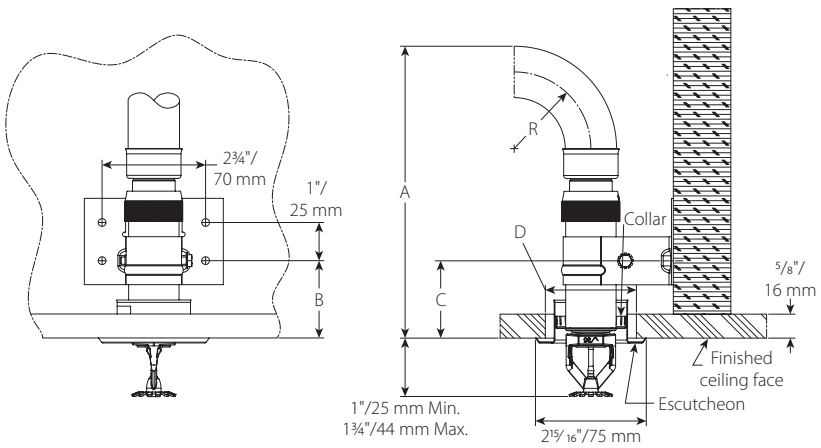
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7 ⅝ 193	12 ⅝ 320
"B" Mounting Screw Hole Location	4 ¾ 119	
Ceiling Hole Diameter "D"	2 – 2 ⅜ 50 – 60	

NOTE

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

4.2 DIMENSIONS

Recessed Pendent Alternative Bracket Location



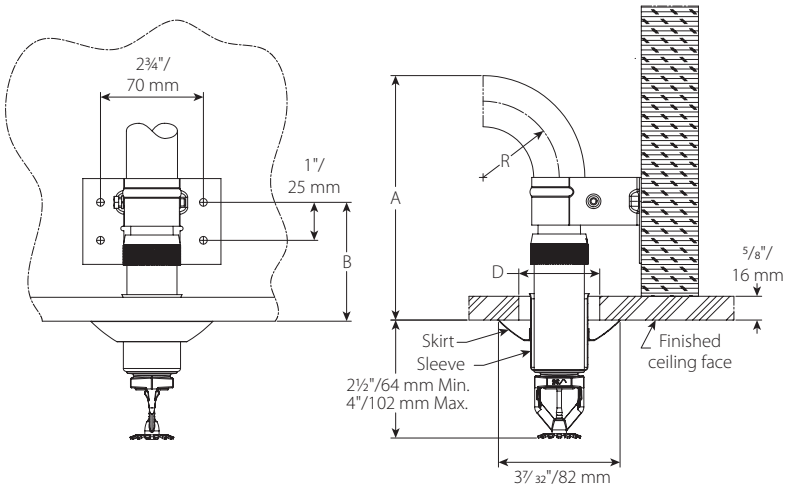
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7⅝ 193	12⅝ 320
"B" Mounting Screw Hole Location	2 50	
Ceiling Hole Diameter "D"	2 – 2⅜ 50 – 60	

NOTE

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

4.3 DIMENSIONS

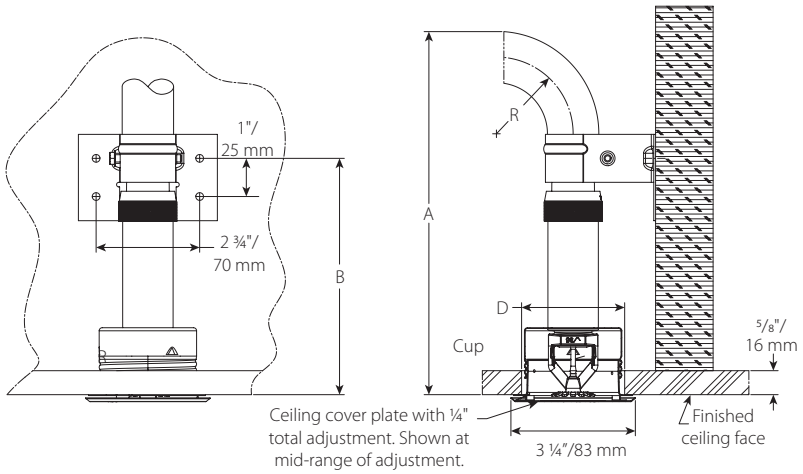
Sleeve and Skirt Pendent



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

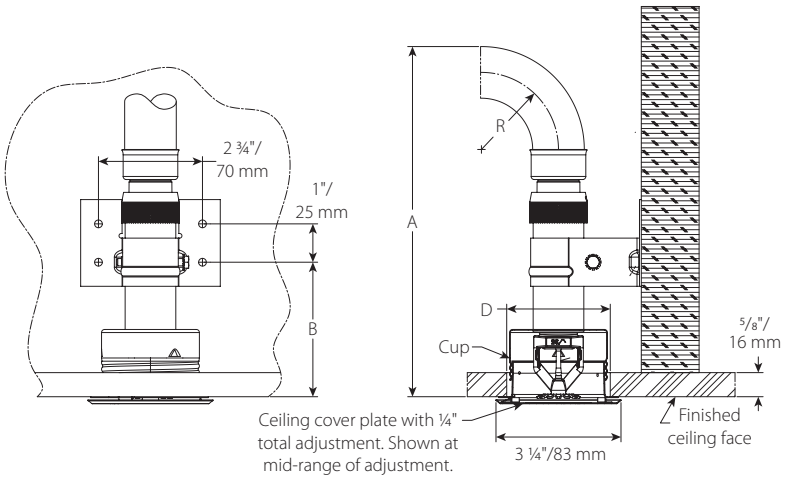
Concealed Pendent



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

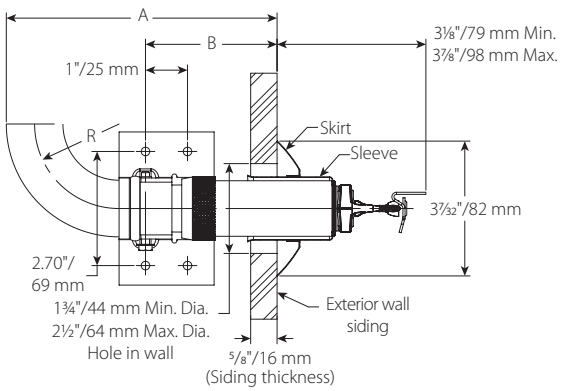
Concealed Pendent Alternative Bracket Location



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

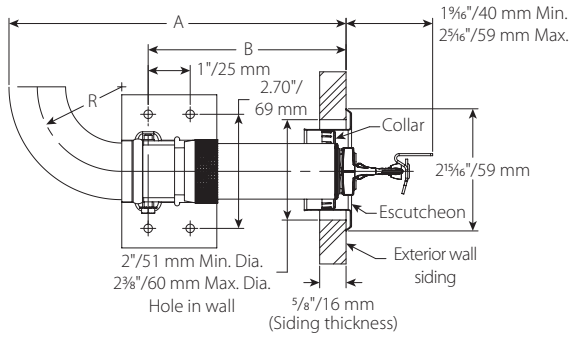
Sleeve and Skirt Sidewall



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

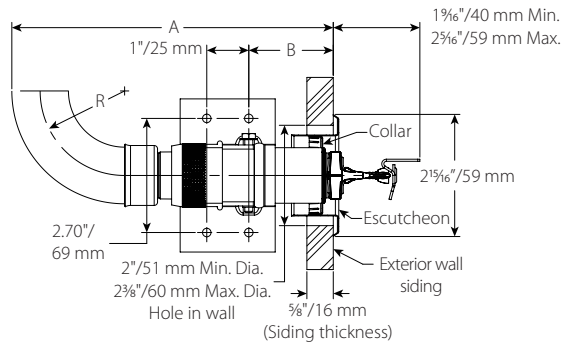
Recessed Sidewall



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

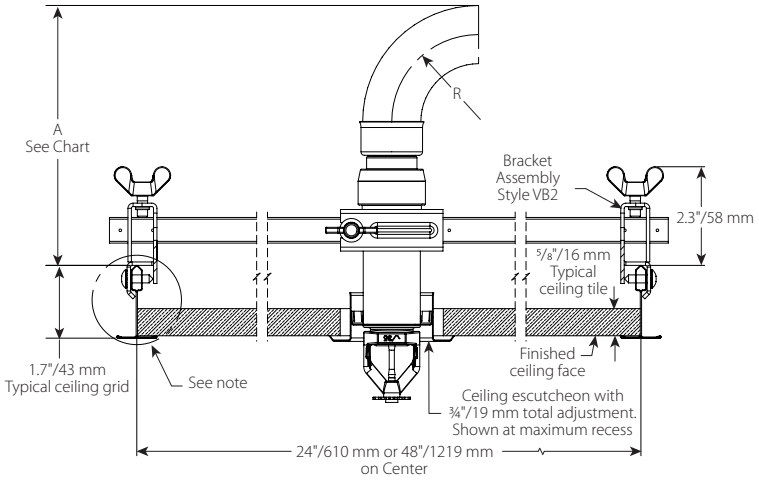
Recessed Sidewall Alternative Bracket Location



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

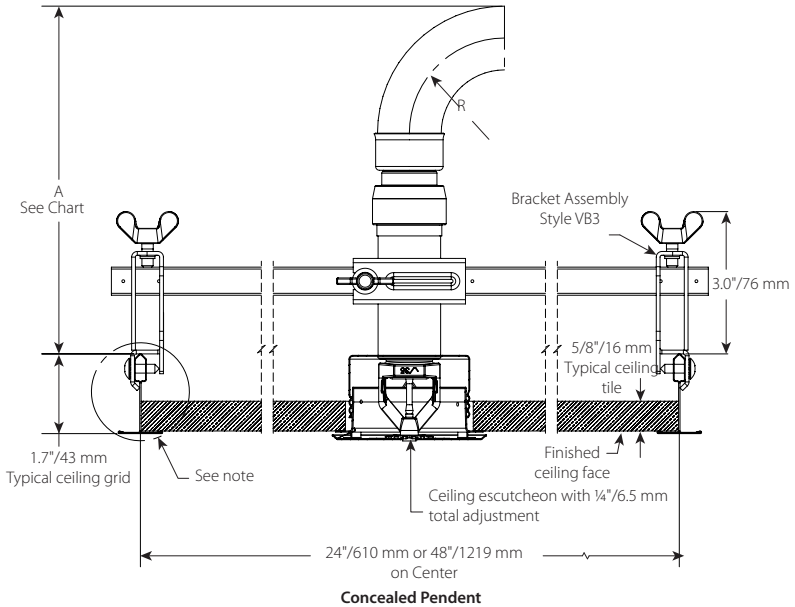
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	6½ 163	11½ 290

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

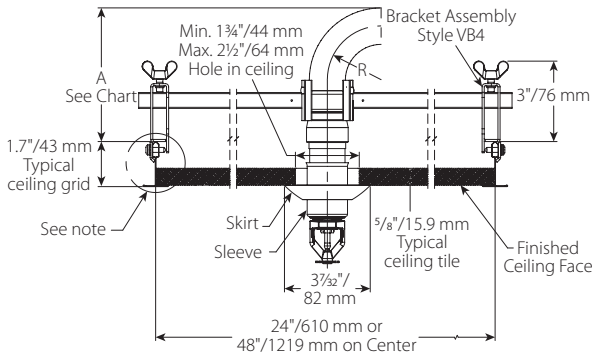
Clearance Chart		
Dimension	inches mm	
"R" Minimum Bend Radius	2 50	7 175
"A" Minimum Required Installation Space	7⅝ 193	12⅝ 320

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

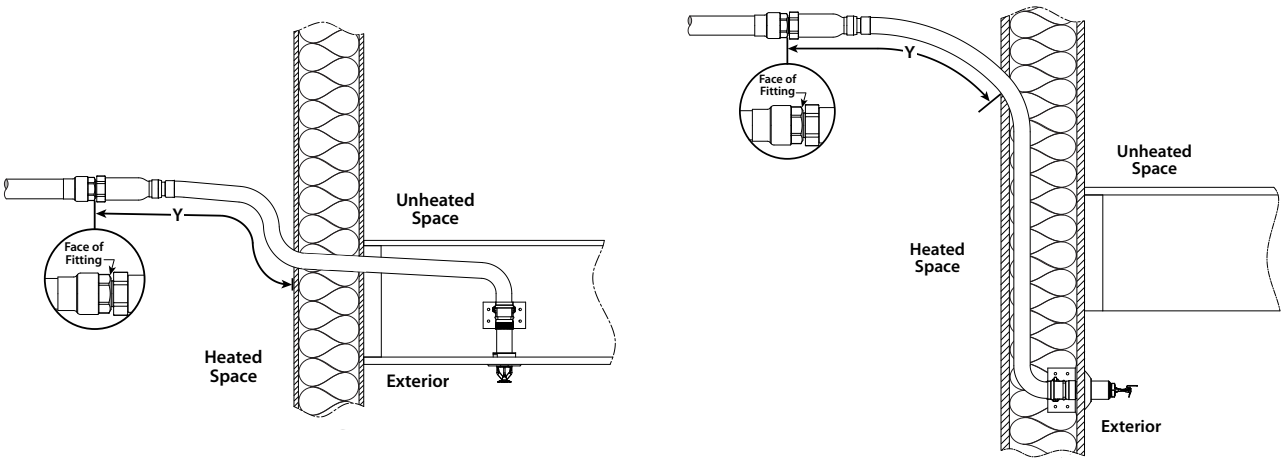
Clearance Chart		
Bend Radius		
	inches mm	inches mm
"R" Minimum Bend Radius	2 51	7 178
"A" Minimum Required Installation Space	5 127	10 254

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.**

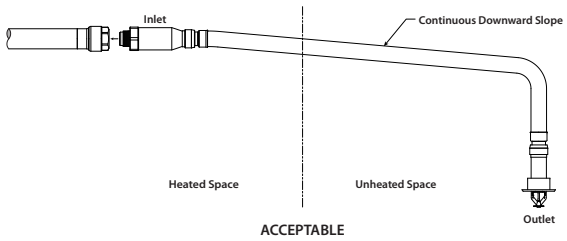
Failure to follow these instructions could cause product failure, resulting in serious personal injury and/or property damage.

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.

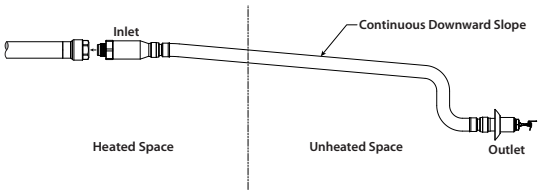
6.0 NOTIFICATIONS (CONTINUED)

Important Installation Notes:

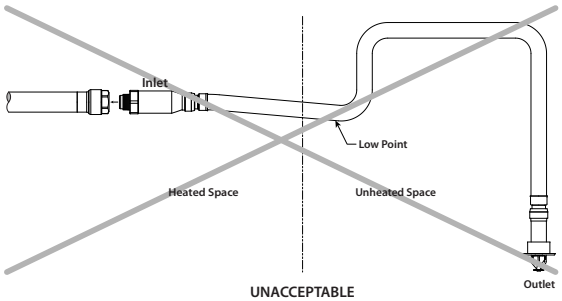
1. Shall be installed only in accordance with NFPA 13 Standard for the the Installation of Sprinkler Systems and applicable FM Data Sheets.
2. Install and tighten swivel hex nut at inlet of sprinkler fitting only.
3. Do not remove deflector or inlet end of sprinkler.



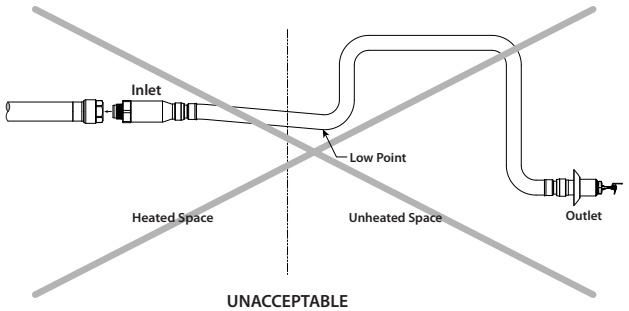
ACCEPTABLE



ACCEPTABLE



UNACCEPTABLE



UNACCEPTABLE

6.0 NOTIFICATIONS (CONTINUED)

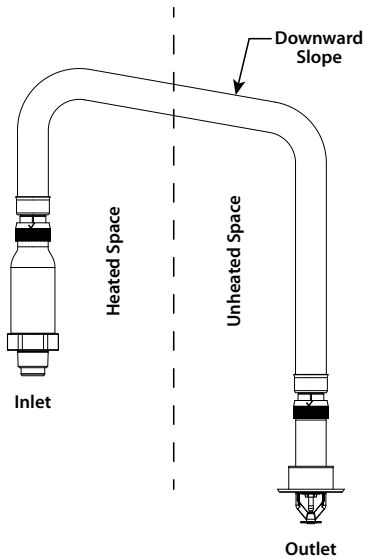
FOR DRY SYSTEMS ONLY:

- 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.



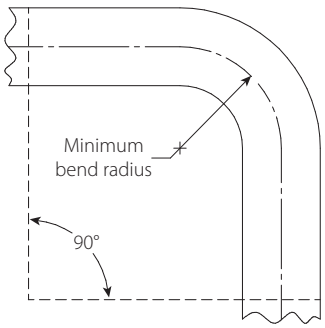
FOR WET SYSTEMS ONLY:

- **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.

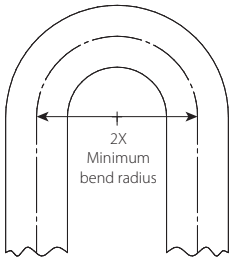
In a heated space, if a portion of the Style VS1 Dry Sprinkler extends into an unheated space, it shall be installed with a continuous downward slope along the entire length from the inside wall to the outlet end of the dry sprinkler. No localized low points shall be present along the length of the sprinkler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

7.0 REFERENCE MATERIALS

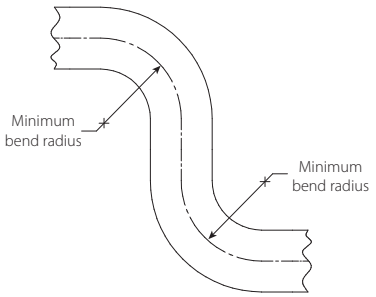
ONE BEND

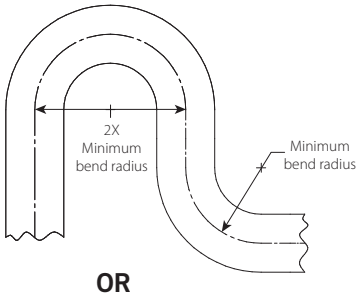


TWO BENDS



OR





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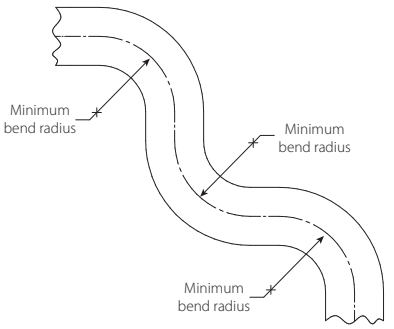


NOTE

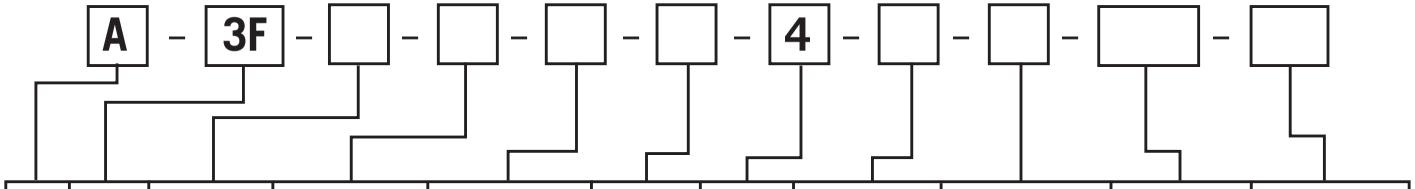
For out-of-plane (three-dimensional) bends, care must be taken to avoid imparting torsional stress on the sprinkler.

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

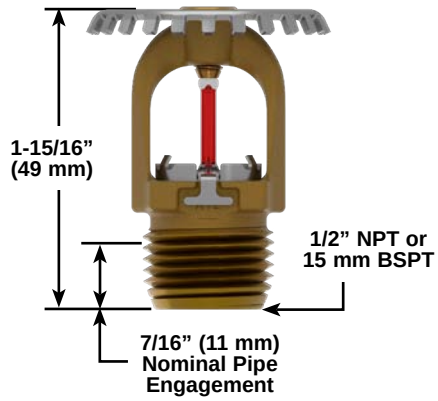


Figure 2: Sprinkler Dimensions

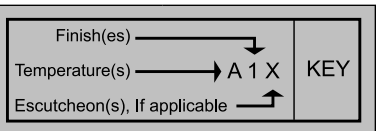
TECHNICAL DATA

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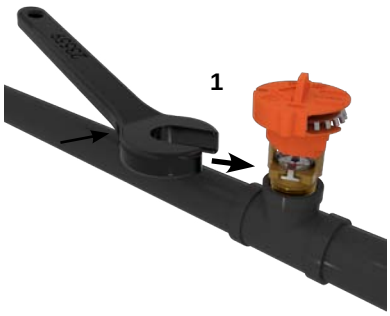
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

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.

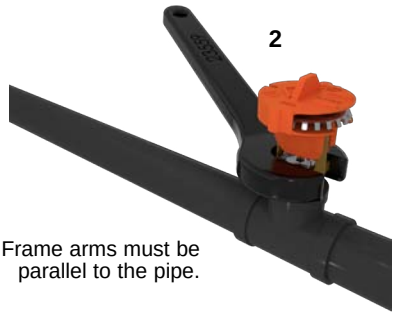


Figure 3: Installation

MODEL V-BB SPECIFIC APPLICATION ATTIC SPRINKLER

TECHNICAL DATA

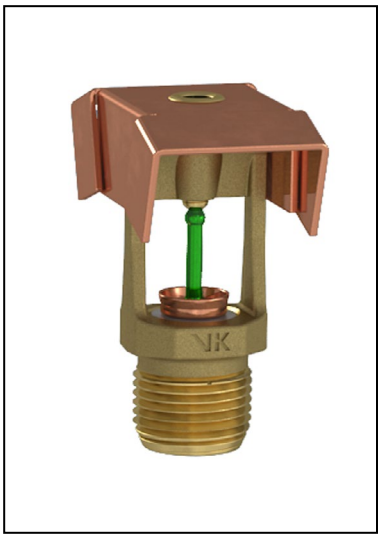
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com.

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
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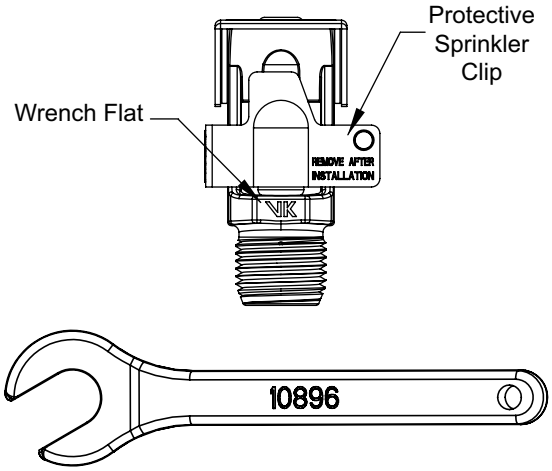

Figure 1:
Standard Sprinkler Wrench 10896W/B

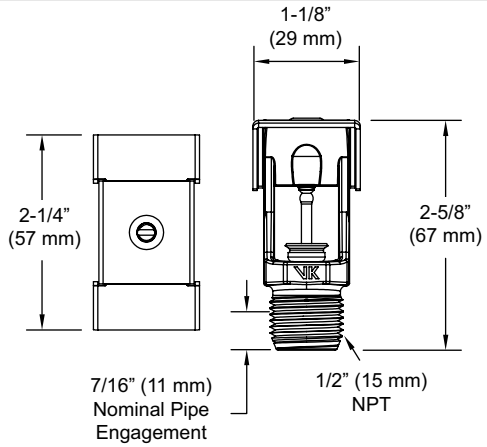

Figure 2a:
Sprinkler Dimensions - 5.6K

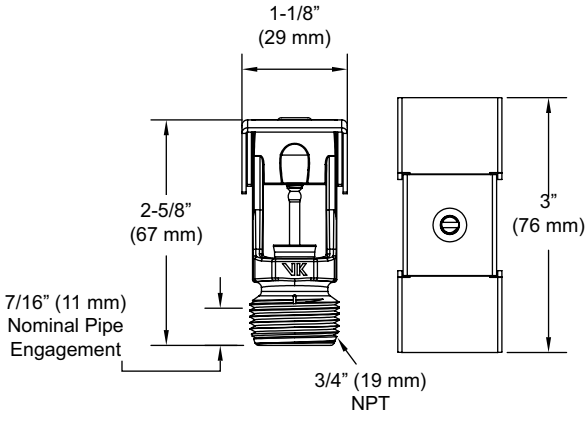

Figure 2b:
Sprinkler Dimensions - 8.0K

TECHNICAL DATA

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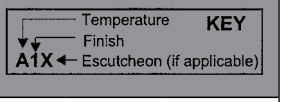
Approval Chart 1

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.

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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.

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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.

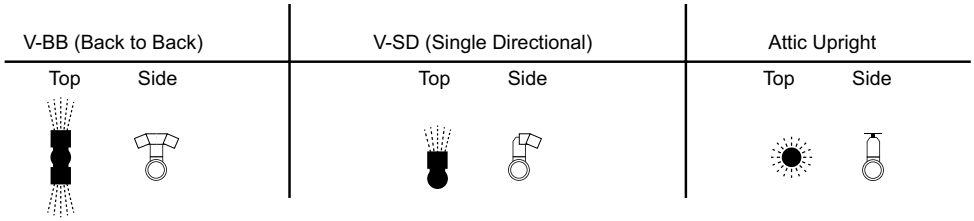

Figure 3: Sprinkler Type Legend

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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.

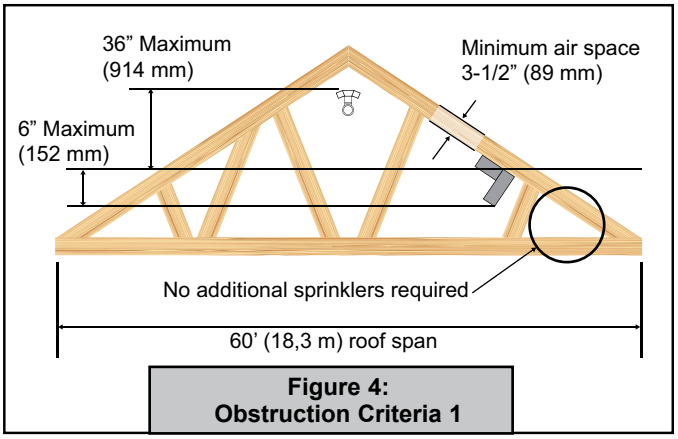

Figure 4:
Obstruction Criteria 1

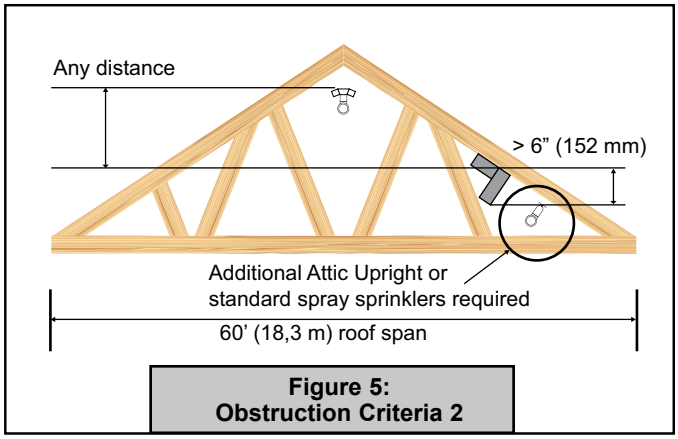

Figure 5:
Obstruction Criteria 2

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.

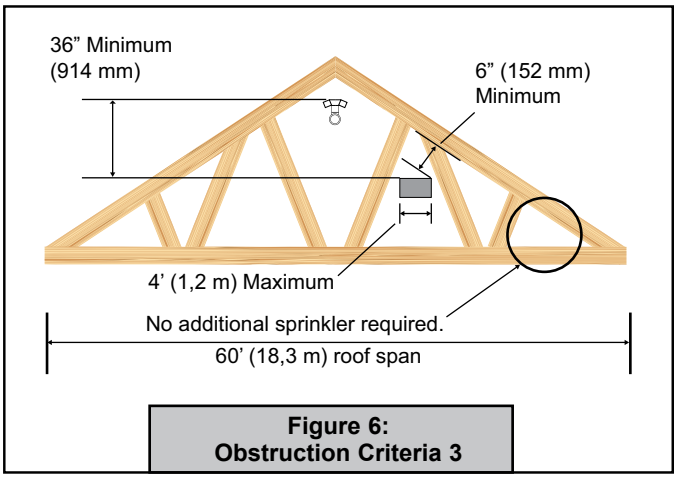

Figure 6:
Obstruction Criteria 3

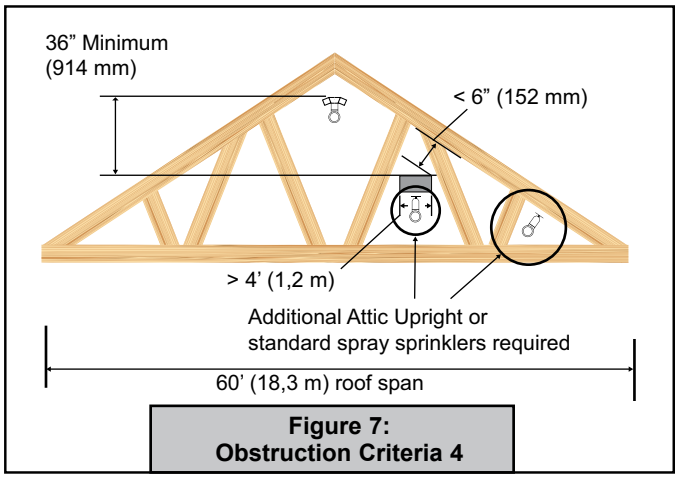

Figure 7:
Obstruction Criteria 4

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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

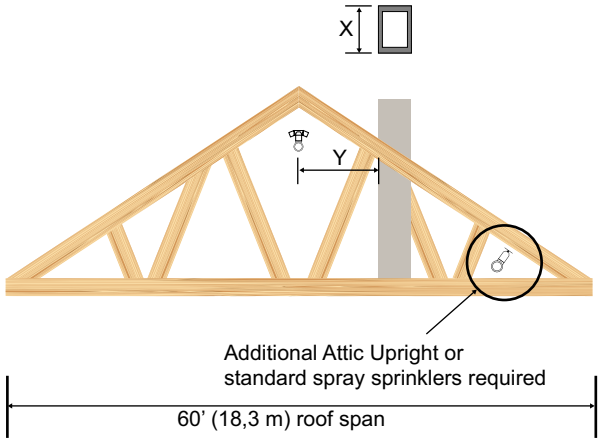

Figure 8:
Obstruction Criteria 5

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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.

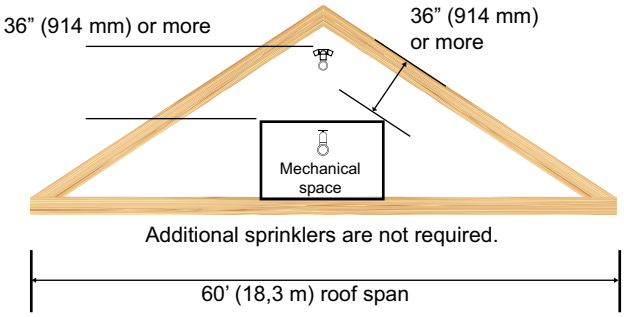

Figure 9:
Obstruction Criteria 6

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.

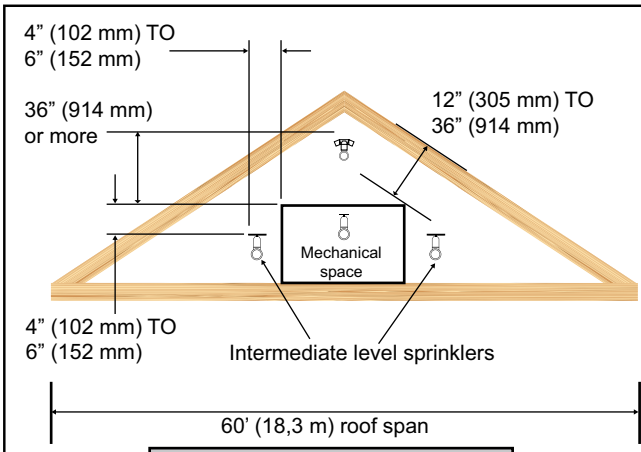

Figure 10:
Obstruction Criteria 7

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.

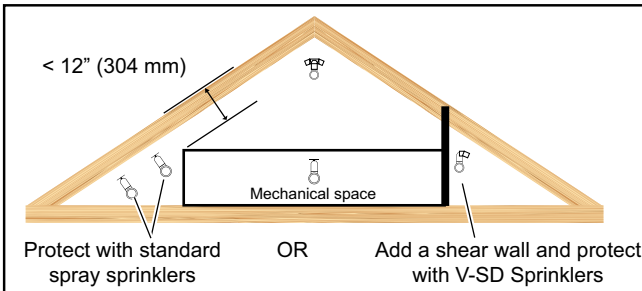

Figure 11:
Obstruction Criteria 8

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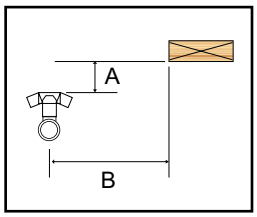
If a V-BB Sprinkler can be installed below or between stiffeners and 16 to 22” (404 to 559 mm) distance to peak can be maintained, as well as A and B clearances to the stiffeners, no additional sprinklers are required.

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



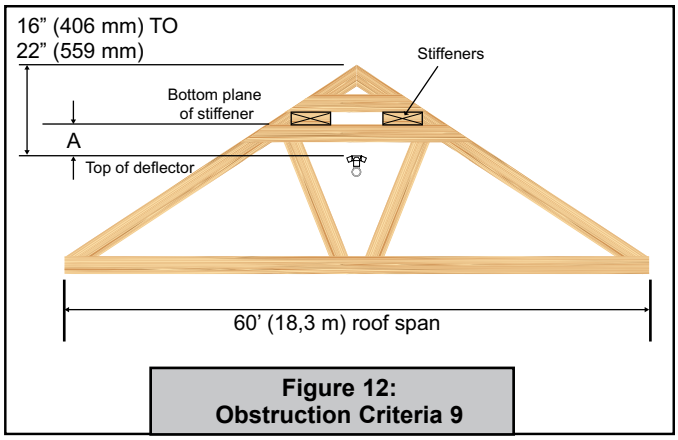


Figure 12:
Obstruction Criteria 9

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.

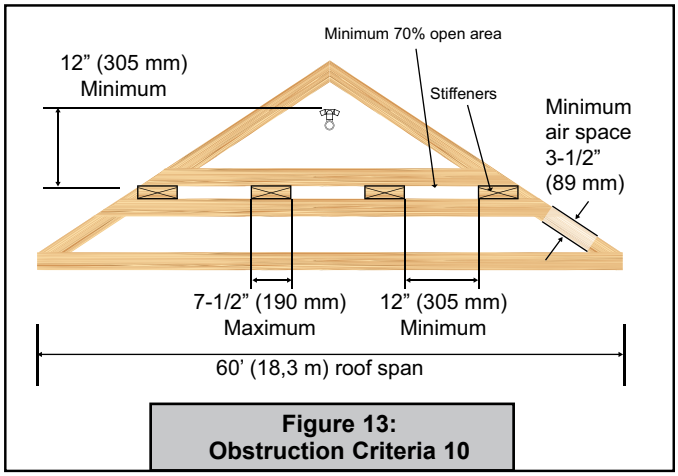


Figure 13:
Obstruction Criteria 10

Otherwise, additional sprinklers are required as shown.

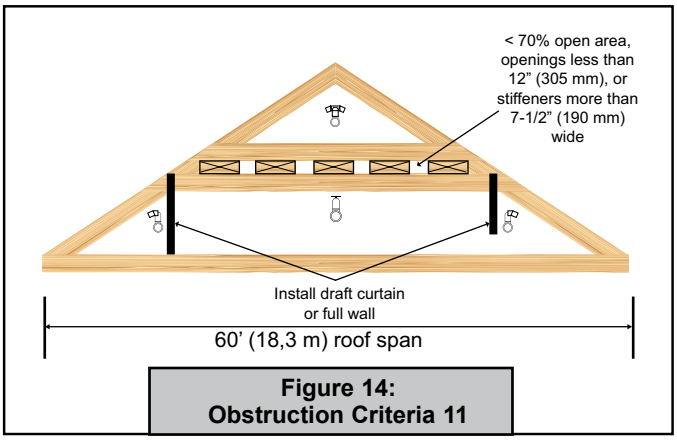


Figure 14:
Obstruction Criteria 11

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

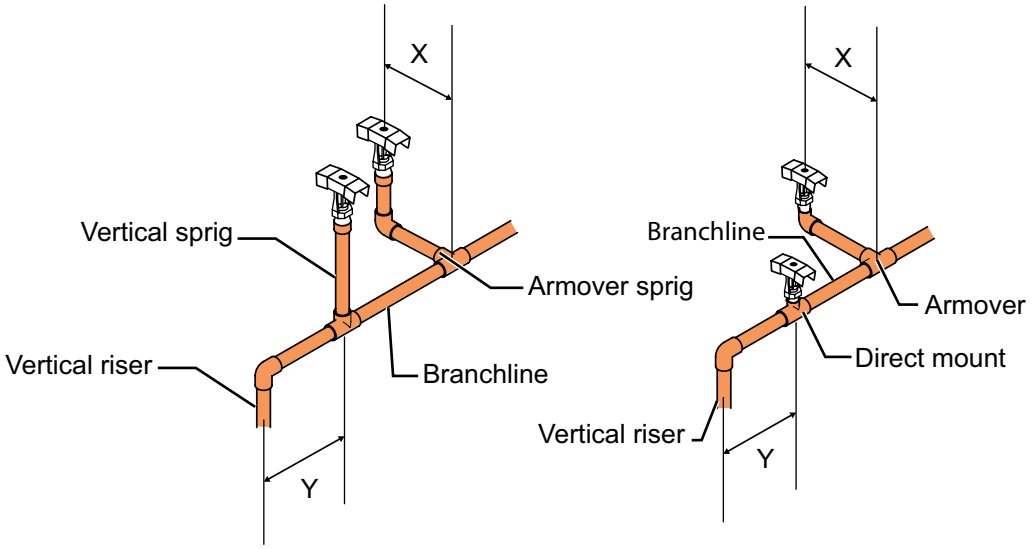
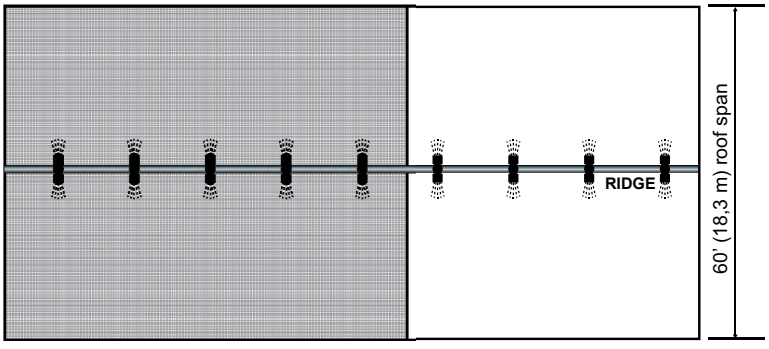


Figure 15:
Exposed CPVC with V-BB Sprinklers

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

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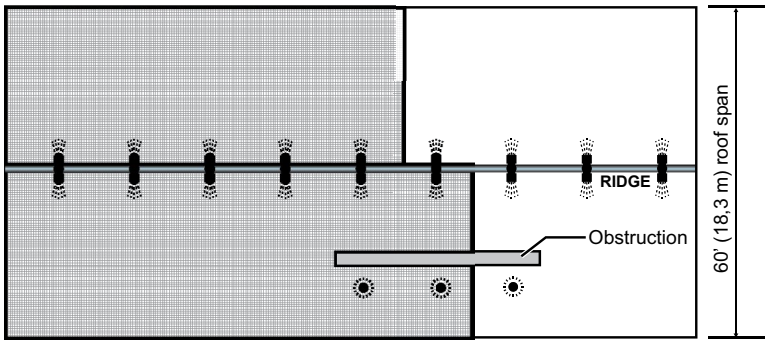
Wet Sytems: Calculate the most demanding 5 V-BB sprinklers and add up to 2 of the most demanding Attic Upright or Standard Spray Sprinklers.

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

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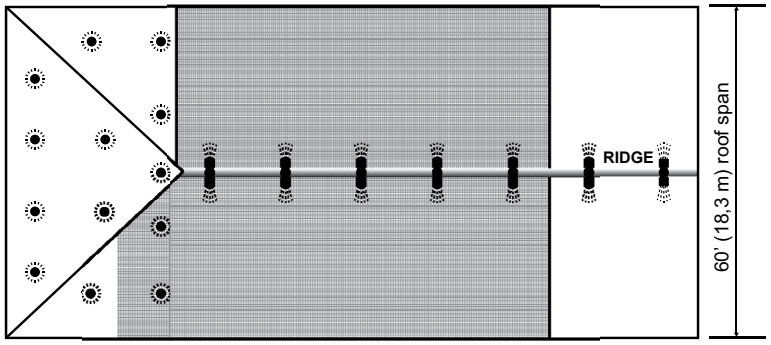
Wet Sytems: Calculate the most demanding 5 V-BB sprinklers plus the 2 most demanding Attic Upright Sprinklers, and then calculate the most demanding area up to 1500 ft² (137m²) having Attic Upright sprinklers. Use the most demanding calculation.

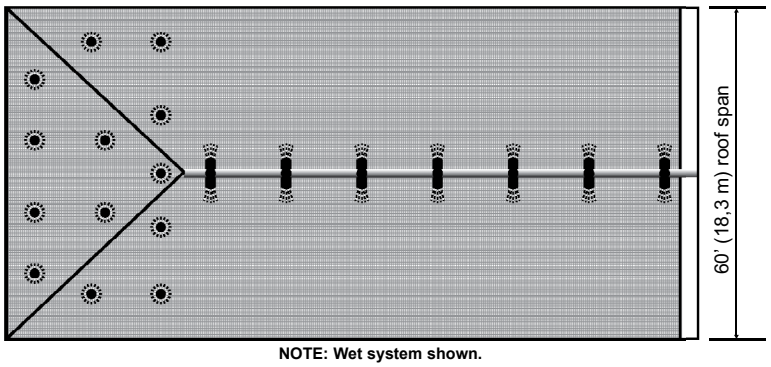
Wet Sytems: Calculate the most demanding 5 V-BB Sprinklers and add up to 2 of the most demanding Standard Spray Sprinklers, then calculate the most demanding remote design area (including ALL sprinkler types) per NFPA 13. For example, area reduction for quick response and 30% increase for sloped ceilings.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

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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.

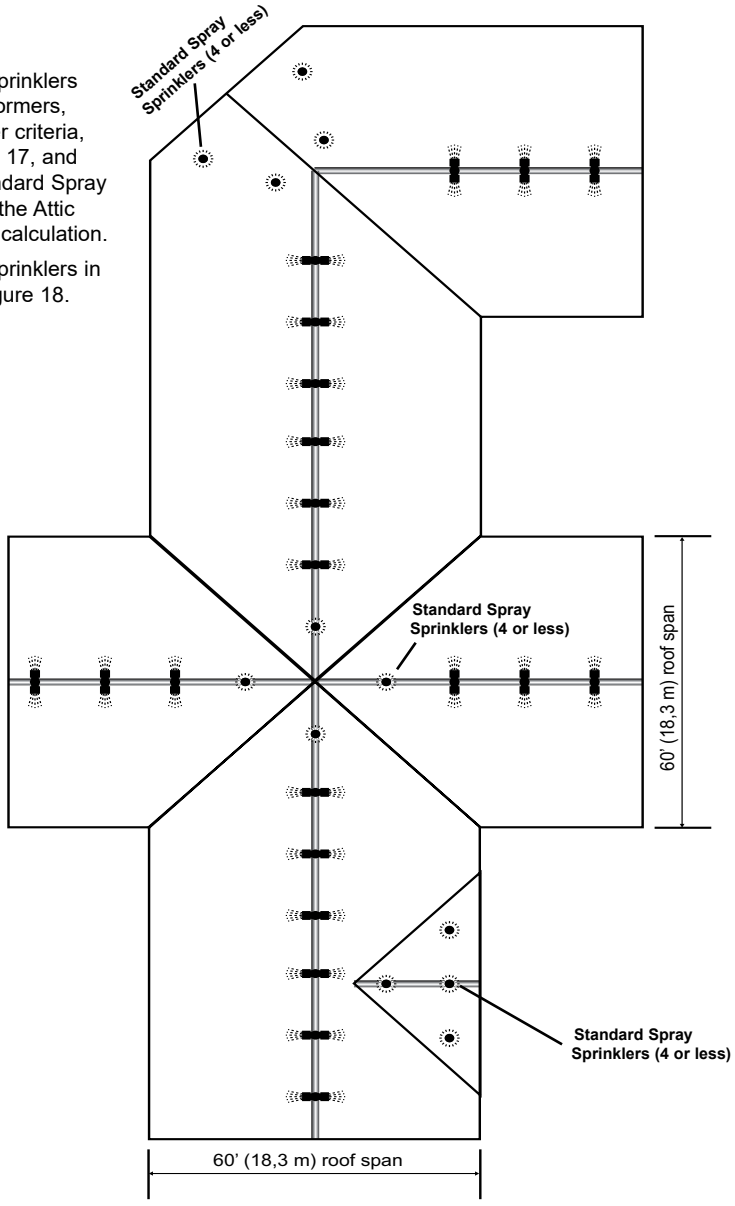

Figure 19:
V-BB Sprinklers and Attic Upright or Standard Spray Sprinklers in a Dormer, at a Hip or at an Ell

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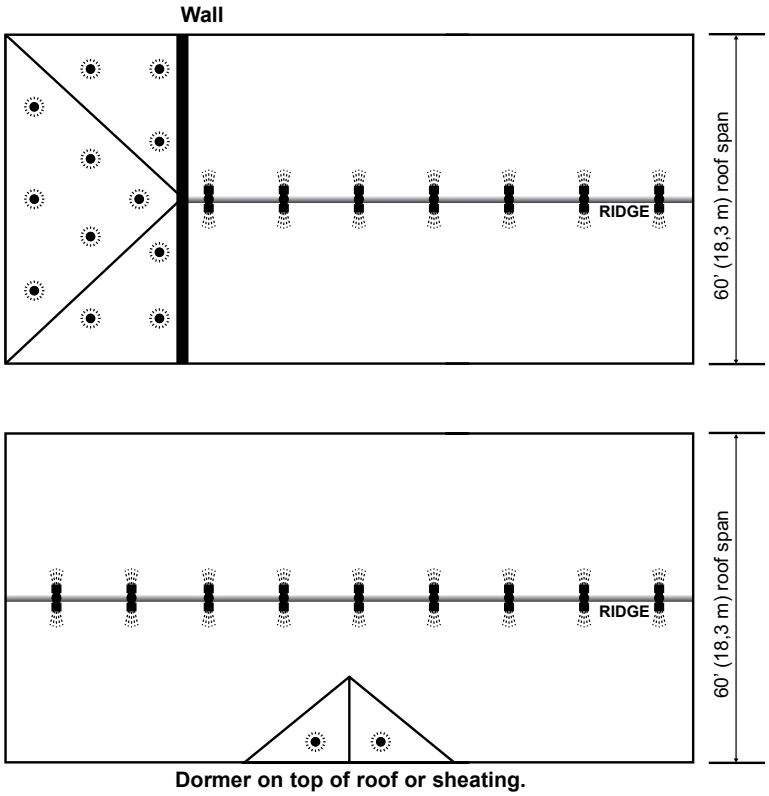
Calculate the V-BB demand as described in Figures 16 and 17, then calculate the Attic Upright or Standard Spray Sprinklers per NFPA 13. use the most demanding calculation.



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
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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:

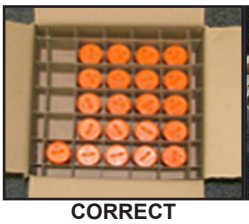
  1/2" NPT: 14 ft-lbs. (19.0 N-m)

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

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

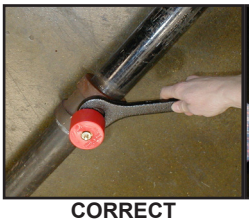
CORRECT
(Original container used)

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

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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!

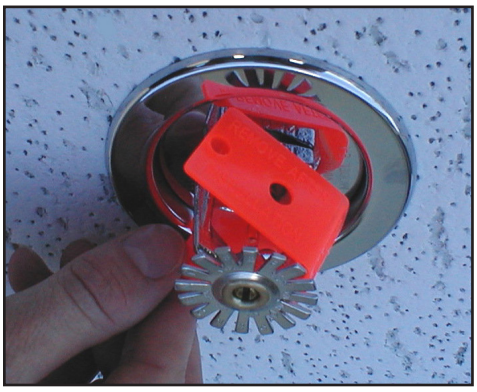

Figure 1: Sprinkler shield being removed from a pendent sprinkler.

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

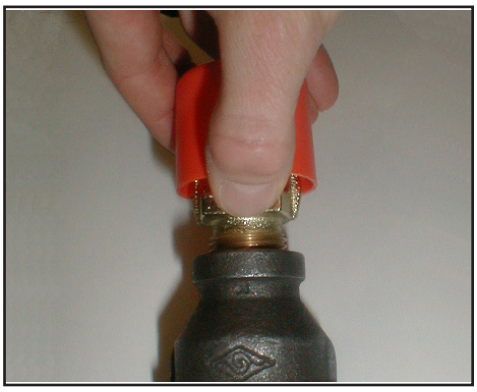

Figure 3: Sprinkler cap being removed from and upright sprinkler.

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

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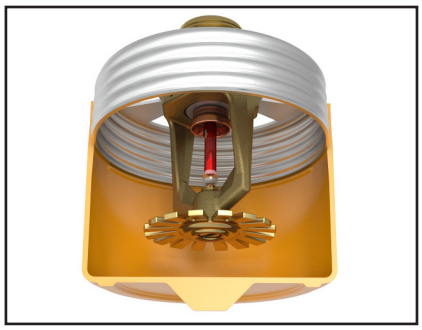
⚠CAUTION CONCEALED COVER ASSEMBLIES ARE FRAGILE!
TO ASSURE SATISFACTORY PERFORMANCE OF THE PRODUCT, HANDLE WITH CARE.



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.

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BULLETIN

CARE AND HANDLING OF SPRINKLERS

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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

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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.

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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.

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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.

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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.

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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.

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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
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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.

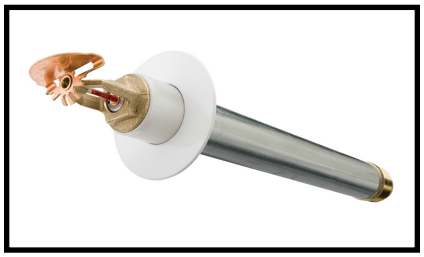
The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

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.

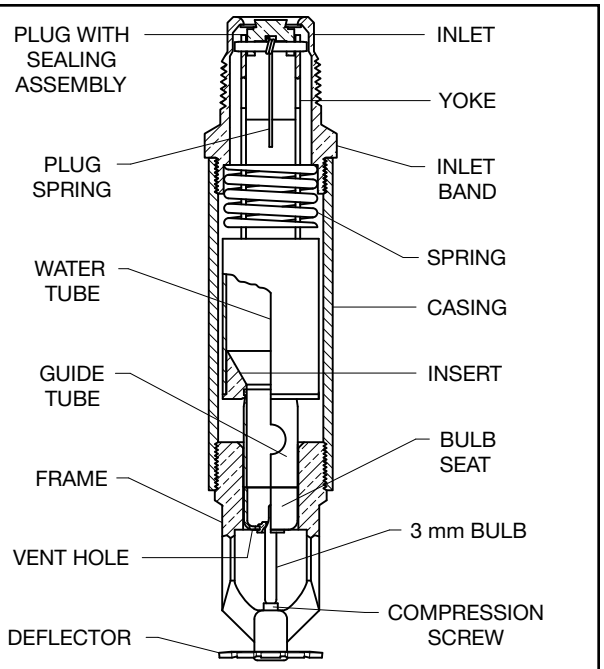


FIGURE 1
SERIES DS-1, 3/4 IN. NPT, DRY-TYPE SPRINKLER ASSEMBLY

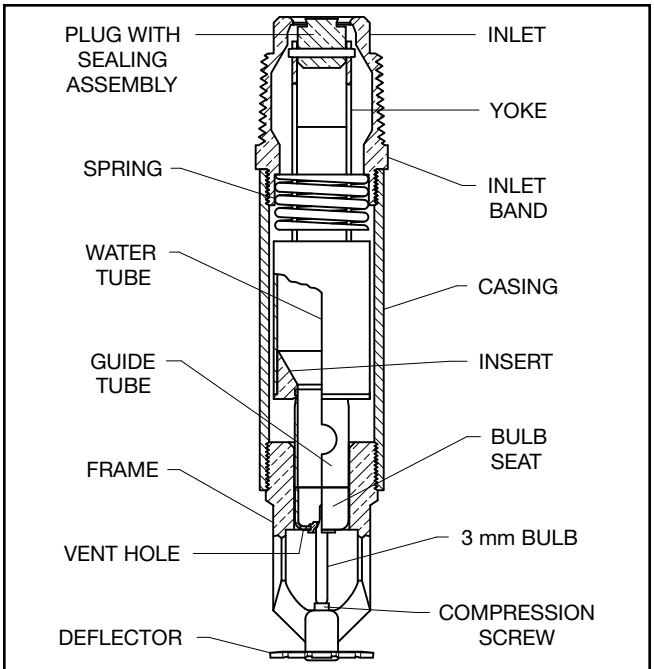


FIGURE 2
SERIES DS-1, 1 IN. NPT AND ISO 7-R 1 DRY-TYPE SPRINKLER ASSEMBLY

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

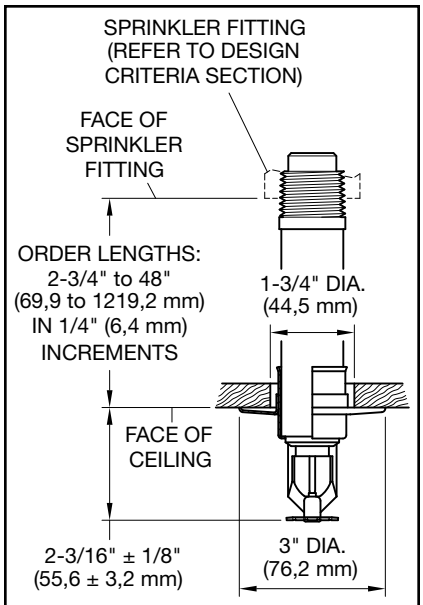


FIGURE 3
PENDENT TY3235 AND TY3935 WITH STANDARD ESCUTCHEON

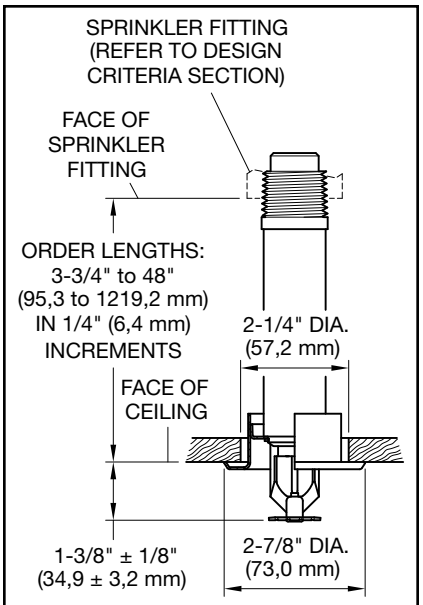


FIGURE 4
PENDENT TY3235 AND TY3935 WITH RECESSED ESCUTCHEON

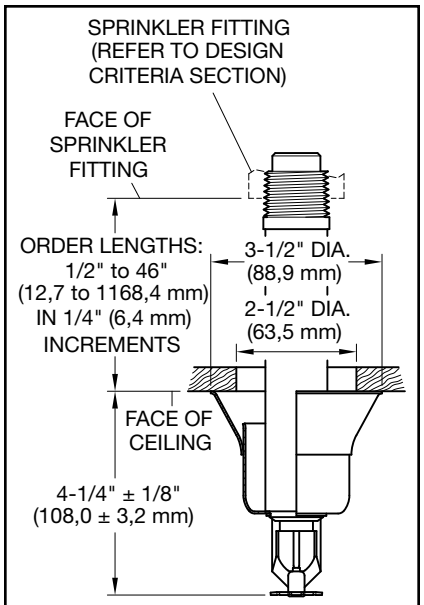


FIGURE 5
PENDENT TY3235 AND TY3935 WITH DEEP ESCUTCHEON

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.

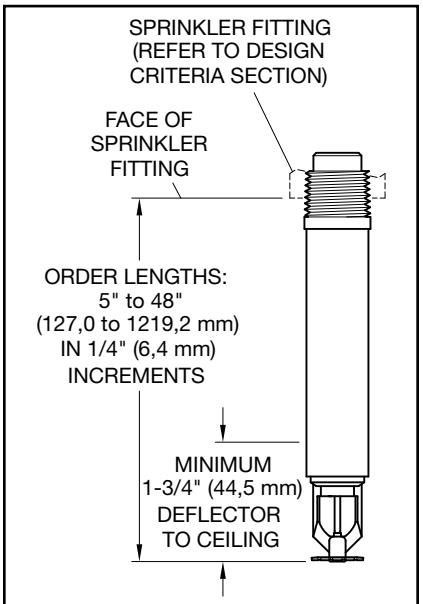


FIGURE 6
PENDENT TY3235 AND TY3935 WITHOUT ESCUTCHEON

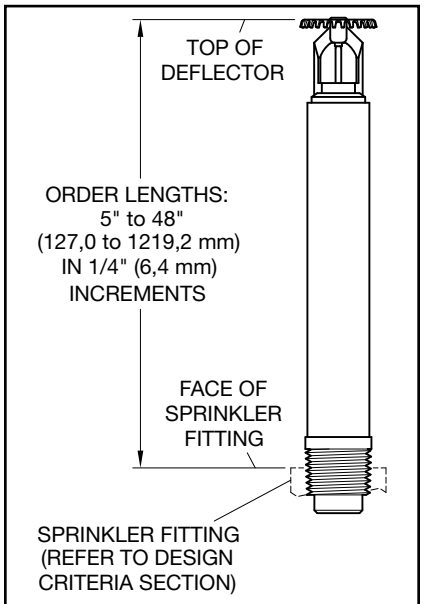


FIGURE 7
UPRIGHT TY3135 WITHOUT ESCUTCHEON, 1 IN. NPT ONLY

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.

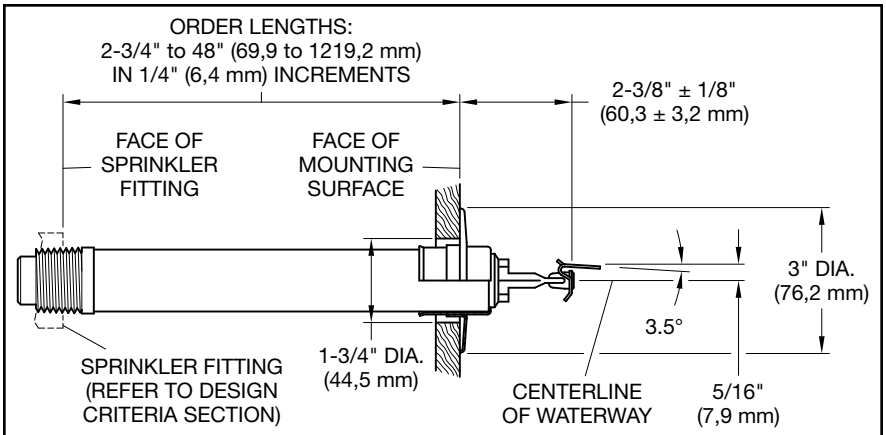


FIGURE 8
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH STANDARD ESCUTCHEON

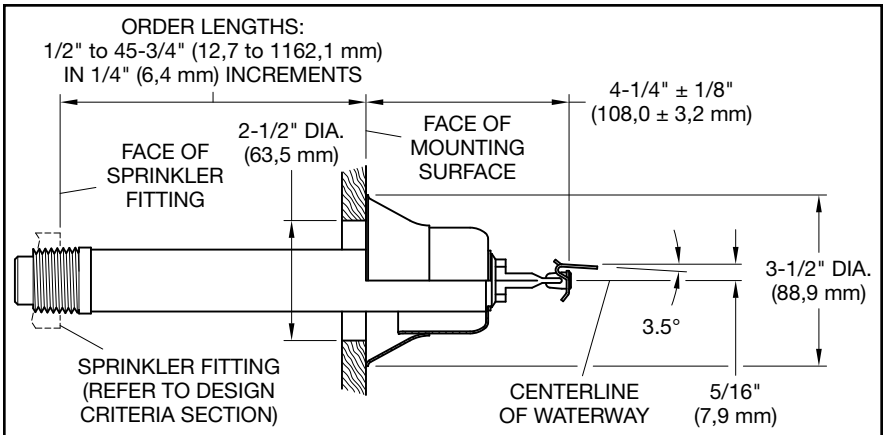


FIGURE 9
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH DEEP ESCUTCHEON

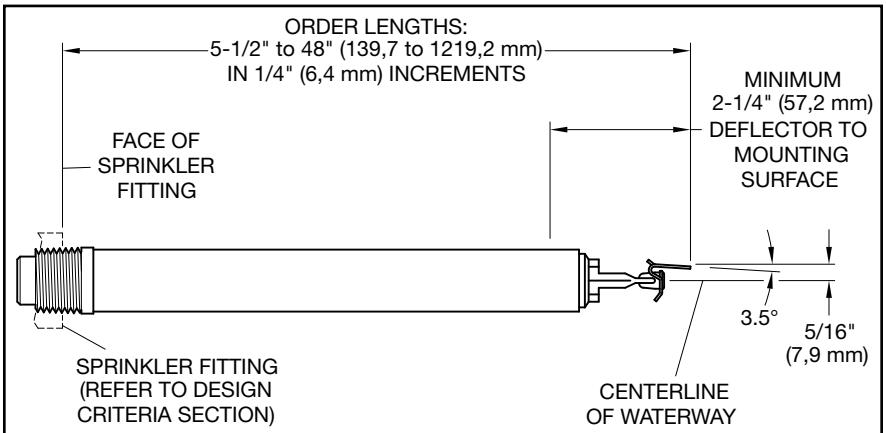


FIGURE 10
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITHOUT ESCUTCHEON

- 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

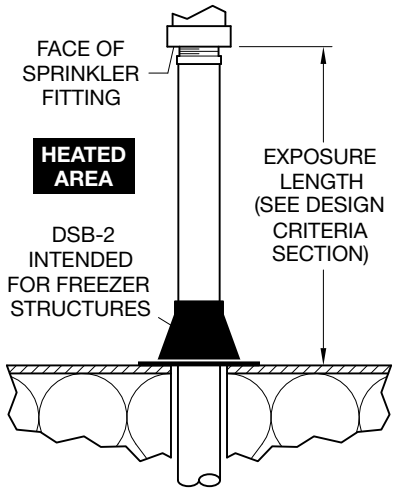


FIGURE 11
EXPOSURE LENGTH

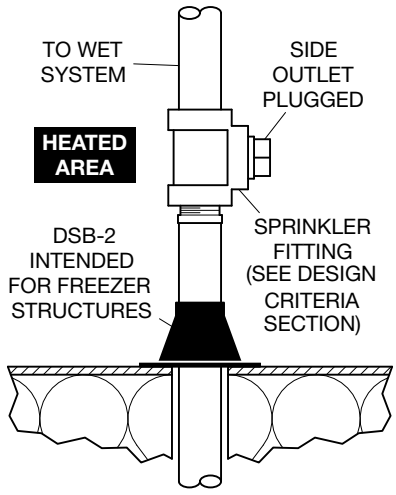


FIGURE 12
SPRINKLER FITTING UNHEATED AREA

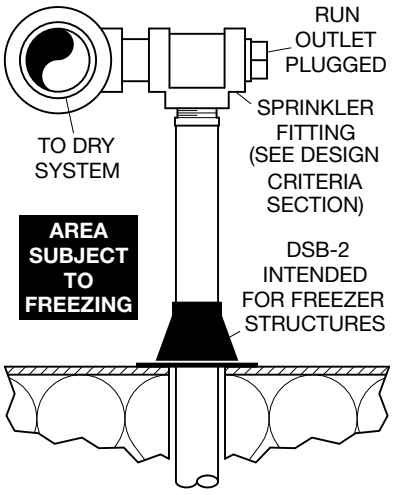


FIGURE 13
SPRINKLER FITTING HEATED AREA

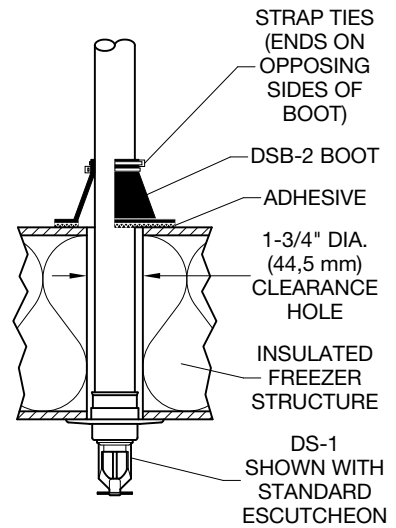


FIGURE 14
MODEL DSB-2 DRY SPRINKLER BOOT WITH PENDENT SERIES DS-1 DRY-TYPE SPRINKLER

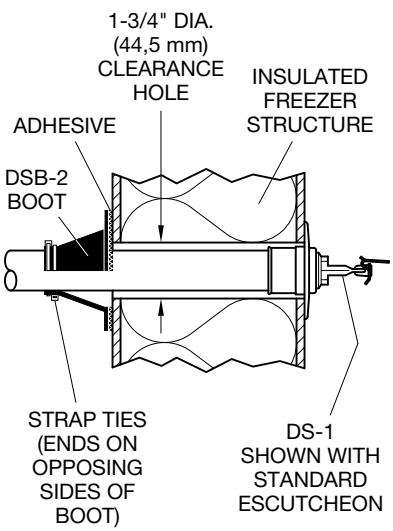


FIGURE 15
MODEL DSB-2 DRY SPRINKLER BOOT WITH SIDEWALL SERIES DS-1 DRY-TYPE SPRINKLER

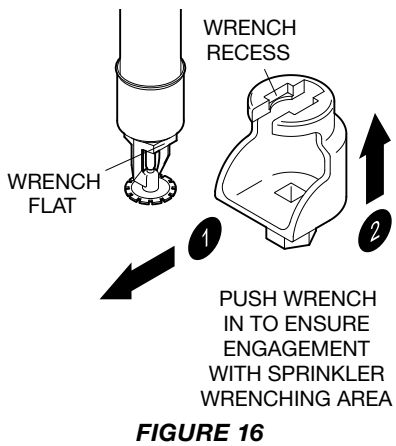


FIGURE 16
W-TYPE 7 SPRINKLER WRENCH

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

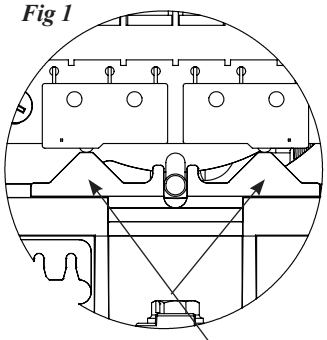


Fig 2

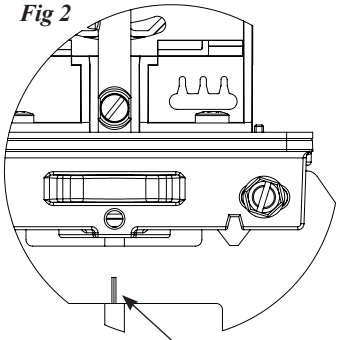


Fig 3

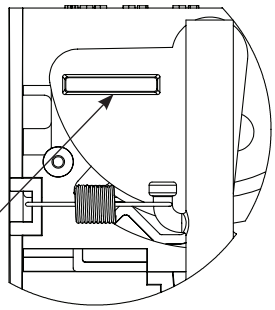


Fig 4

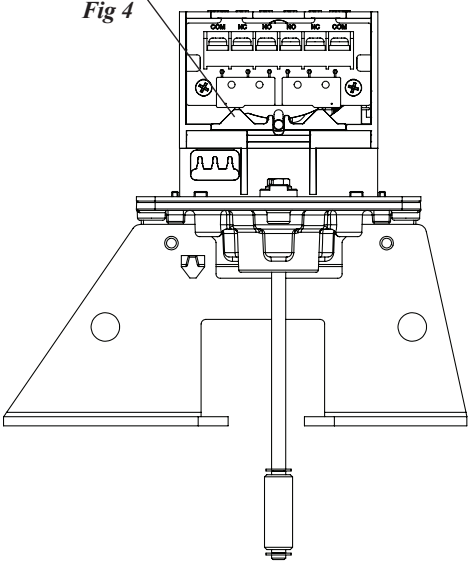


Fig 5

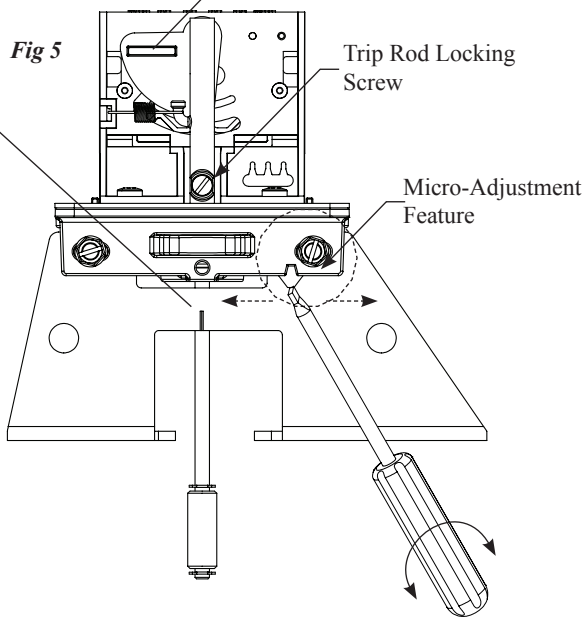
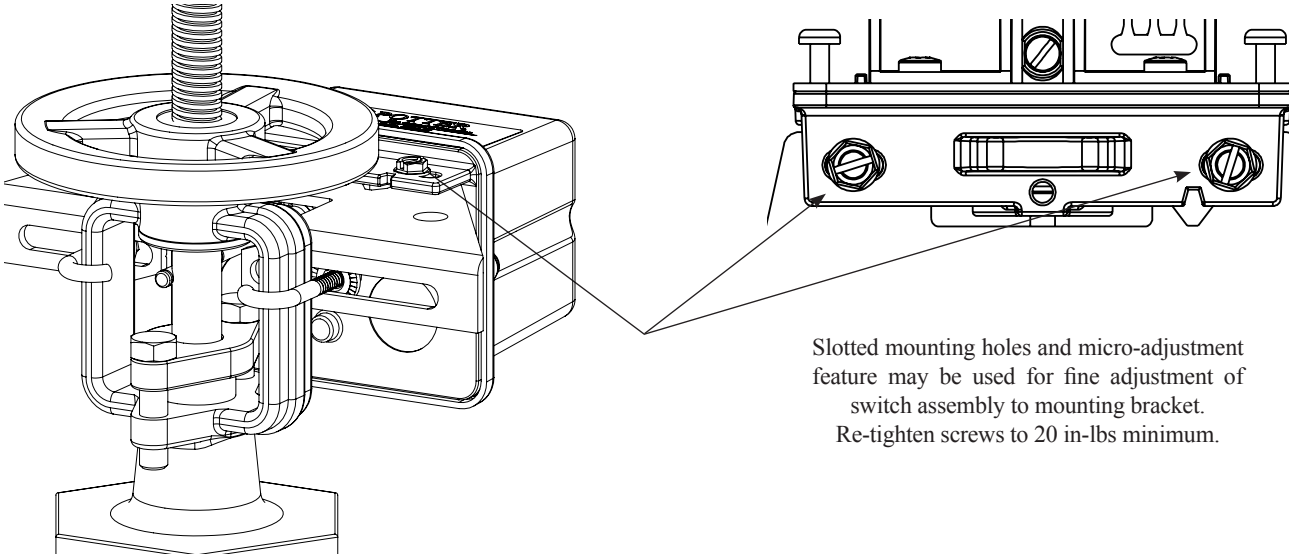


Fig 6

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.

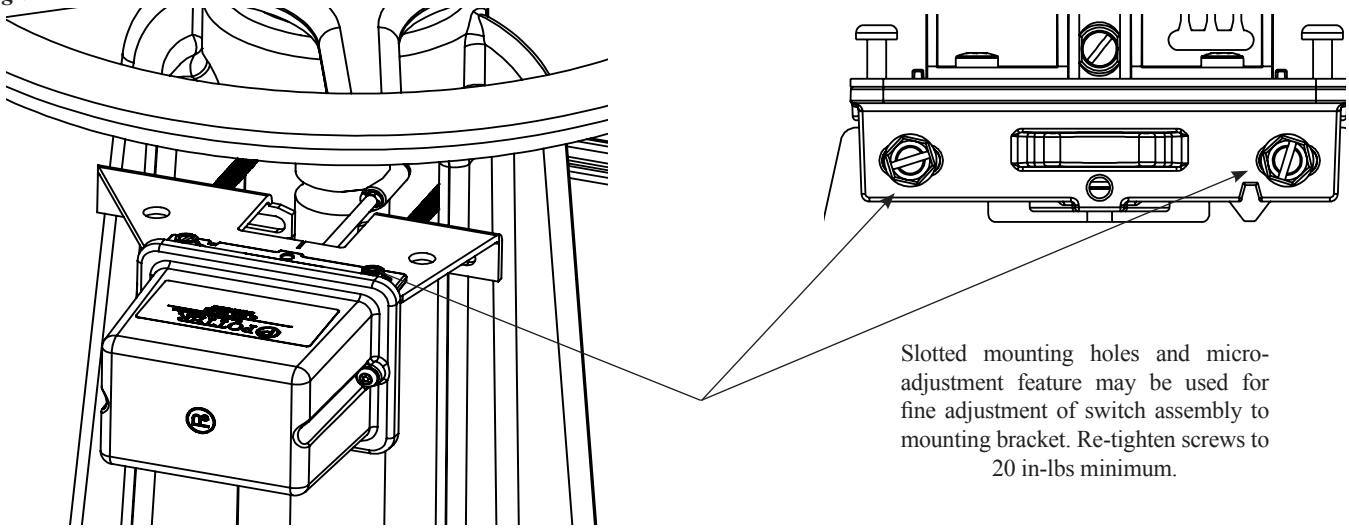
   NOTE: A groove depth of up to approximately 3/16” can make it easier to install the OSYSU so that it does not restore as it rolls over by the threads of the valve stem.
7. Mount the OSYSU on the valve yoke with the spring loaded trip rod of the OSYSU pulled against the valve stem and centered in the 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.

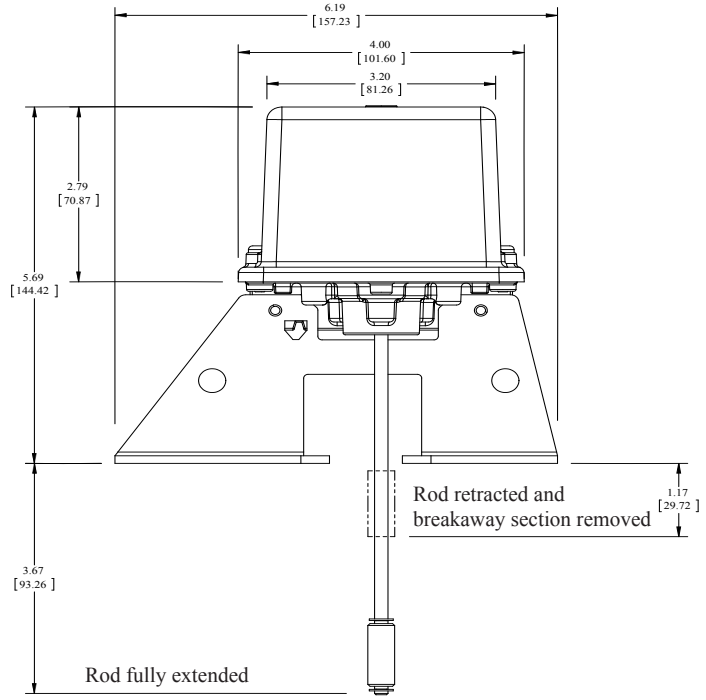
   NOTE: A groove depth of up to approximately 3/16" can make it easier to install the OSYSU so that it does not restore as it rolls over by the threads of the valve stem.
6. Mount the OSYSU on the valve yoke with the spring loaded trip rod of the OSYSU pulled against the valve stem and centered in the 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.

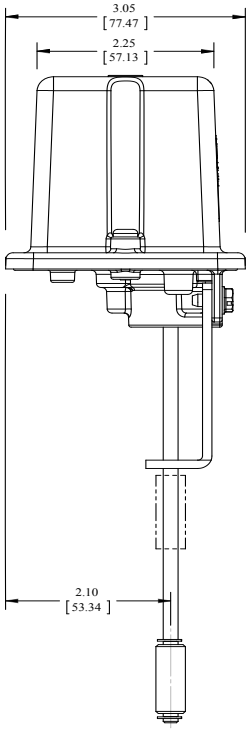
⚠ CAUTION

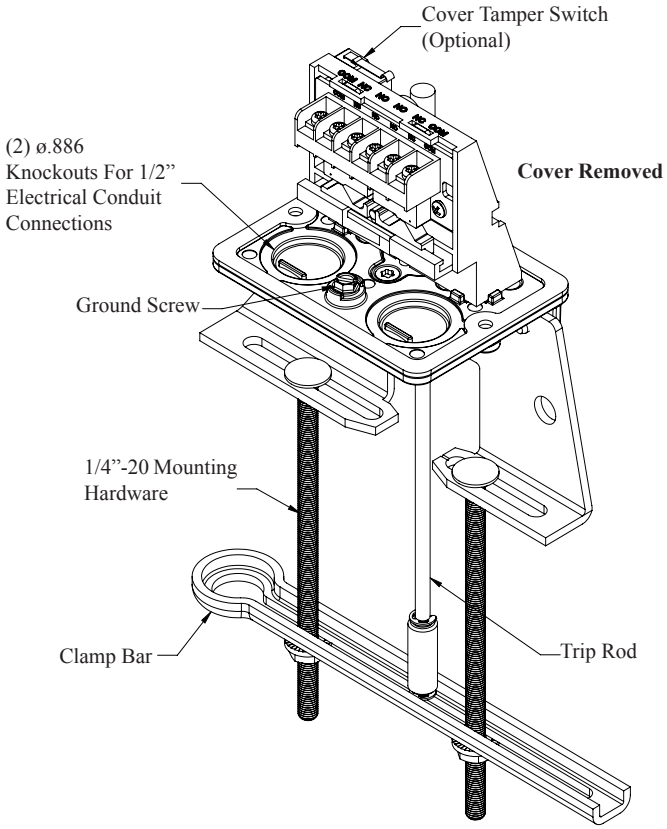
Close the valve fully to determine that the stem threads do not activate the switch. The switch being activated by the stem threads could result in a ***false valve open*** indication.

Dimensions

Fig 8



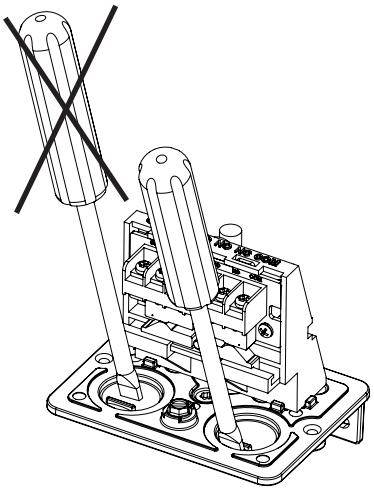




Knockout Removal

Fig 9

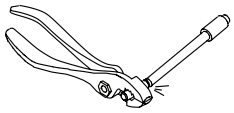
To remove knockouts: Place screwdriver at inside edge of knockouts, not in the center.



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.

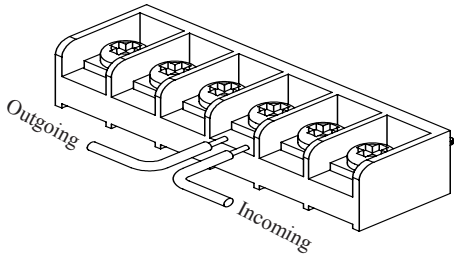
Breaking Excessive Rod Length

Fig 10



Switch Terminal Connections Clamping Plate Terminal

Fig 11



⚠ WARNING

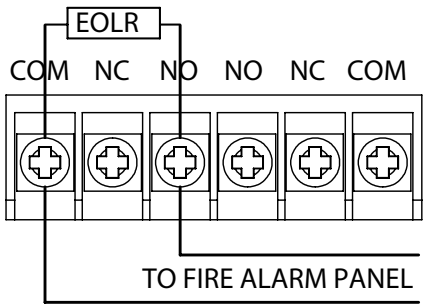
An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal. Failure to sever the wire may render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

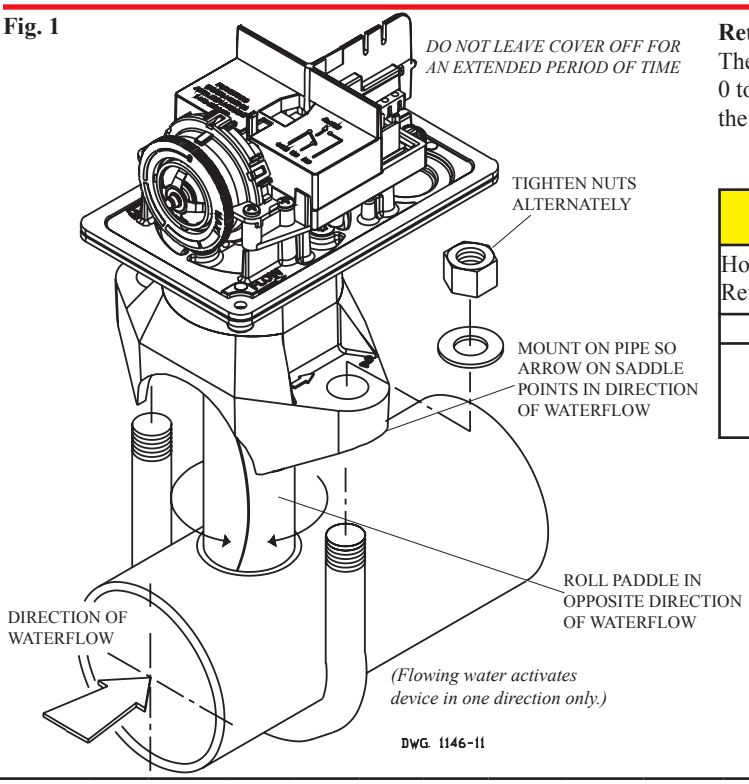
NOTE: Do not leave cover off for an extended period of time.

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

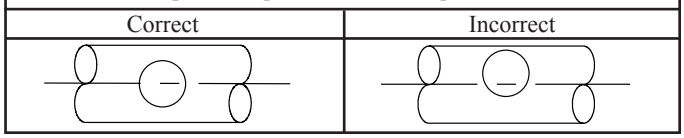


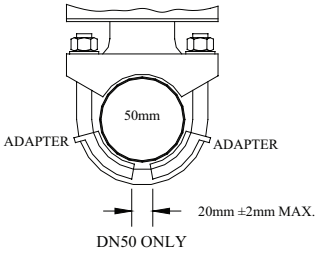
Retard Adjustment

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

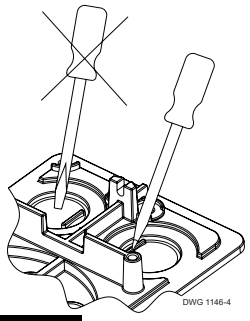
DWG# 1146-1F

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.

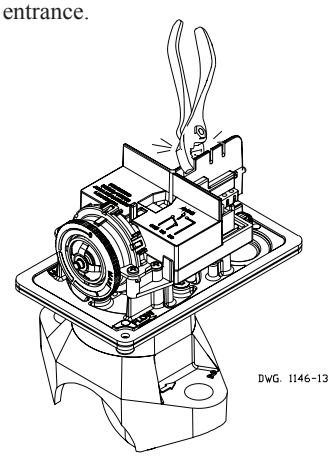
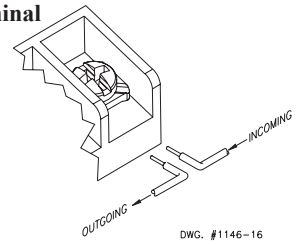


Fig. 4 Switch Terminal Connections Clamping Plate Terminal

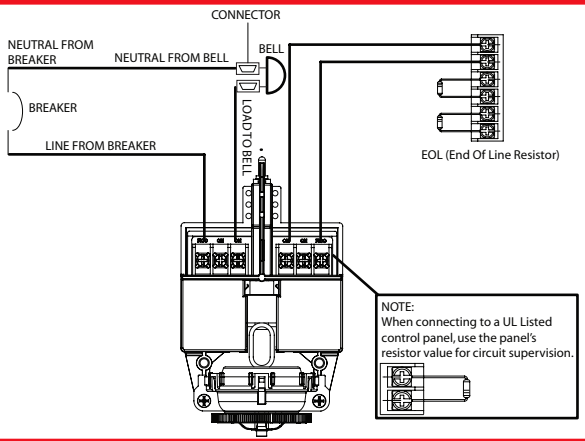


⚠ WARNING

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

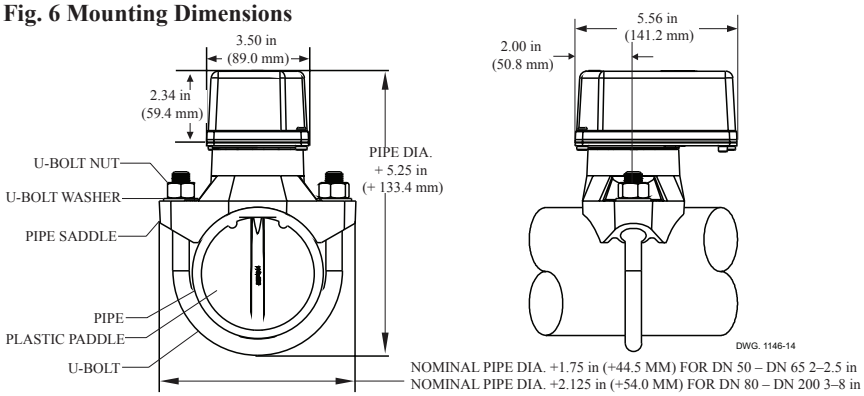
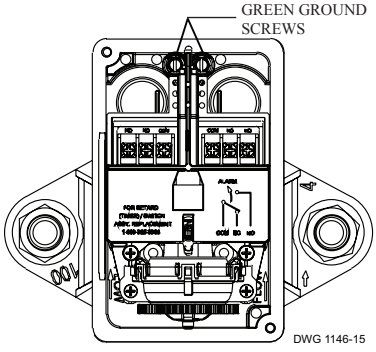


Fig. 7



Maintenance

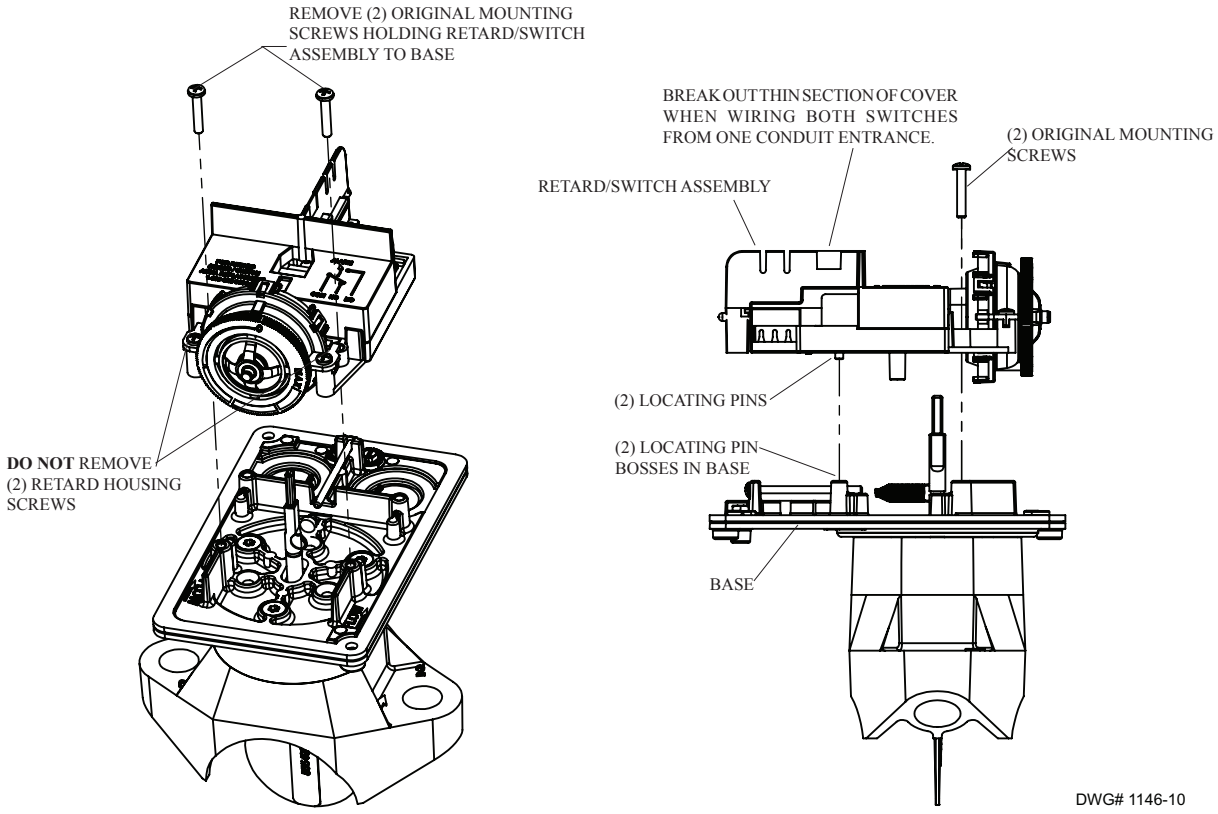
Inspect detectors monthly. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard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

VALVES

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:

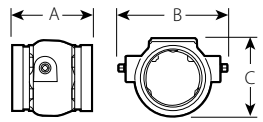
☐ Series 717H: Carbon Steel Zinc Plated
☐ Series 717: Carbon Steel Zinc Plated

Optional Pressure Taps:

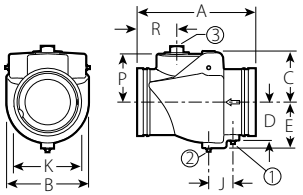
☐ Series 717H: Available on all sizes
☐ Series 717: Available on sizes 4 – 12"/DN100 – DN300

4.0 DIMENSIONS

Series 717

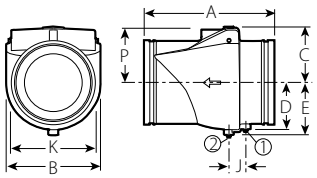


Typical 2 ½ – 3"/65 – 80 mm



① ½" NPT Upstream Drain
② ½" NPT Downstream Drain
③ 2" NPT (Drain Optional)

Typical 4 – 8"/100 – 200 mm



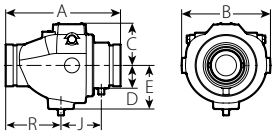
① ½" NPT Upstream Drain
② ½" NPT Downstream Drain

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

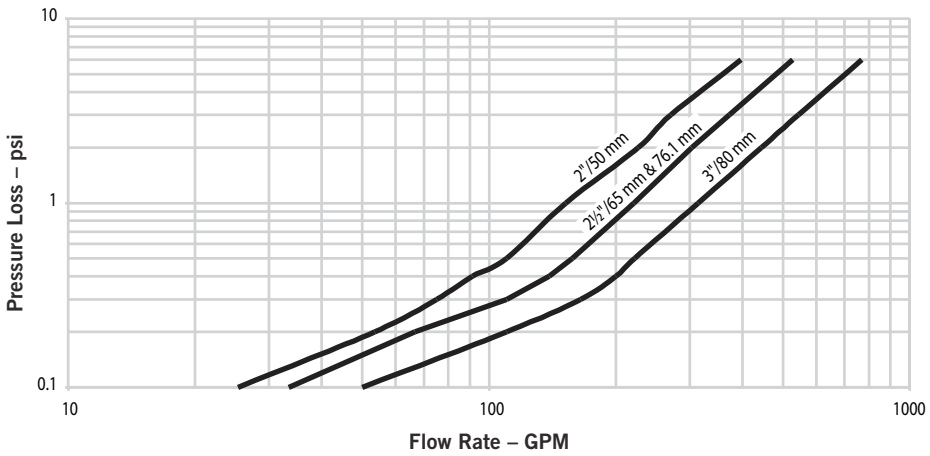
Size	Dimensions									Weight
Nominal inches mm	**E to E** **A** inches mm	**B** inches mm	**C** inches mm	**D** inches mm	**E** inches mm	**J** inches mm	**K** inches mm	**P** inches mm	**R** inches mm	**Approximate (Each)** lb kg
2 50	8.66 219.8	6.46 164.1	3.23 82.1	1.48 37.5	3.02 76.7	2.80 71.0	–	–	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

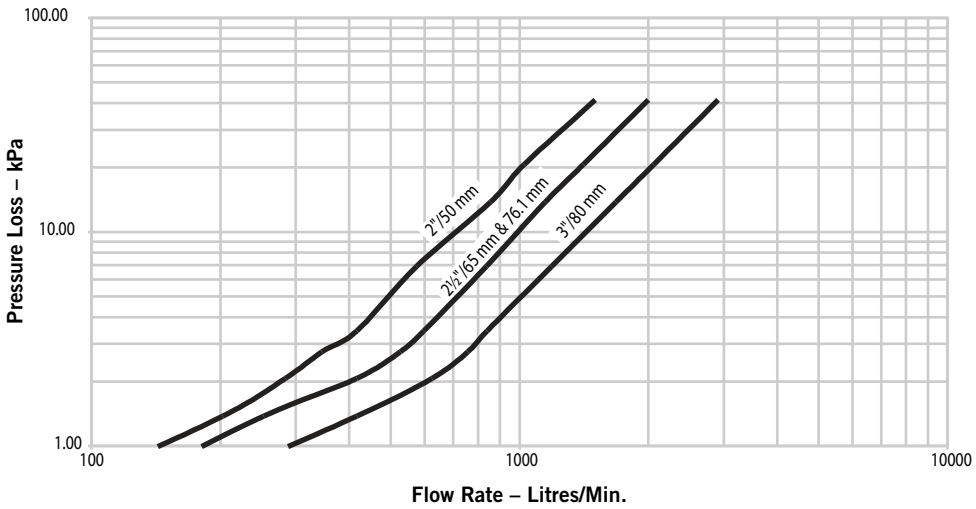
Flow Characteristics

The charts below express the flow of water at 60°F/16°C through valve.

S717H / 717HR



S717H / 717HR

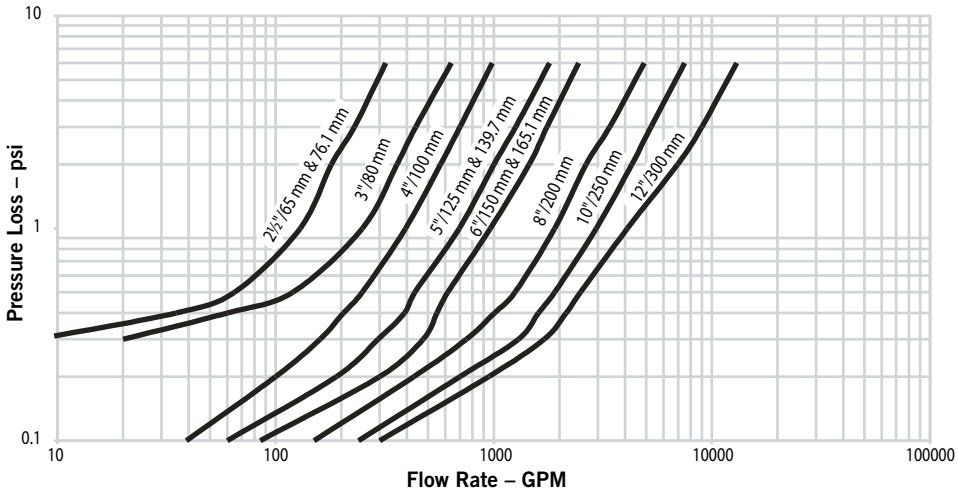


5.1 PERFORMANCE

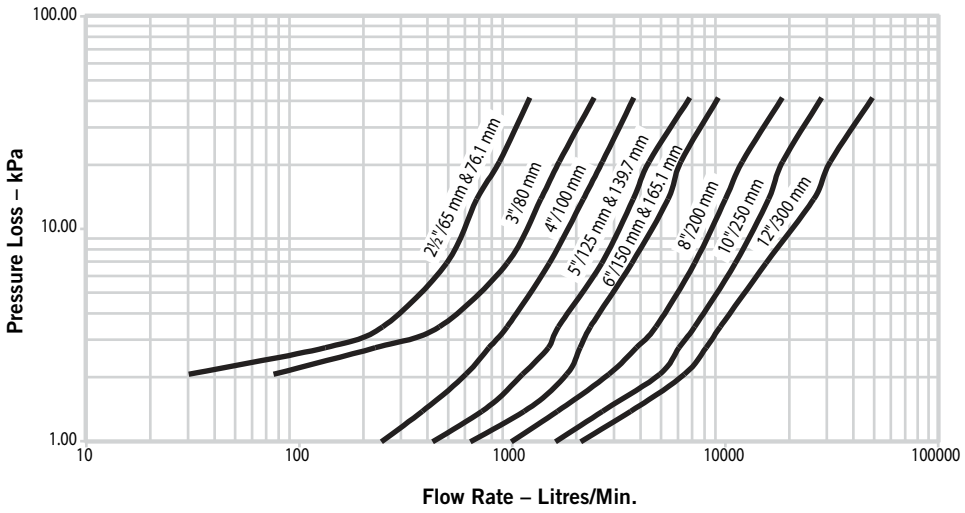
Flow Characteristics

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.

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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.

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⚠ 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

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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)

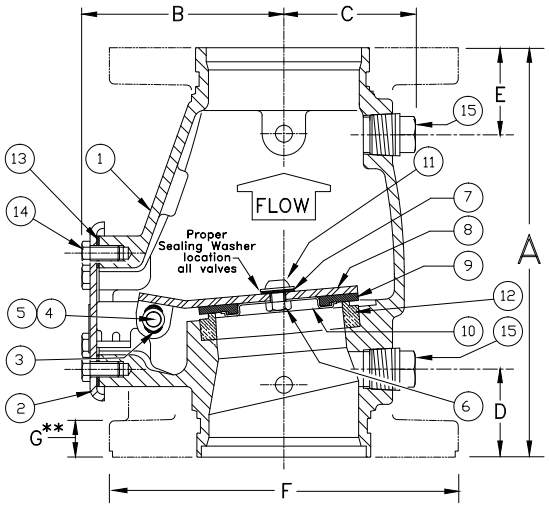
Table 3 - Trim Package Part Numbers

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

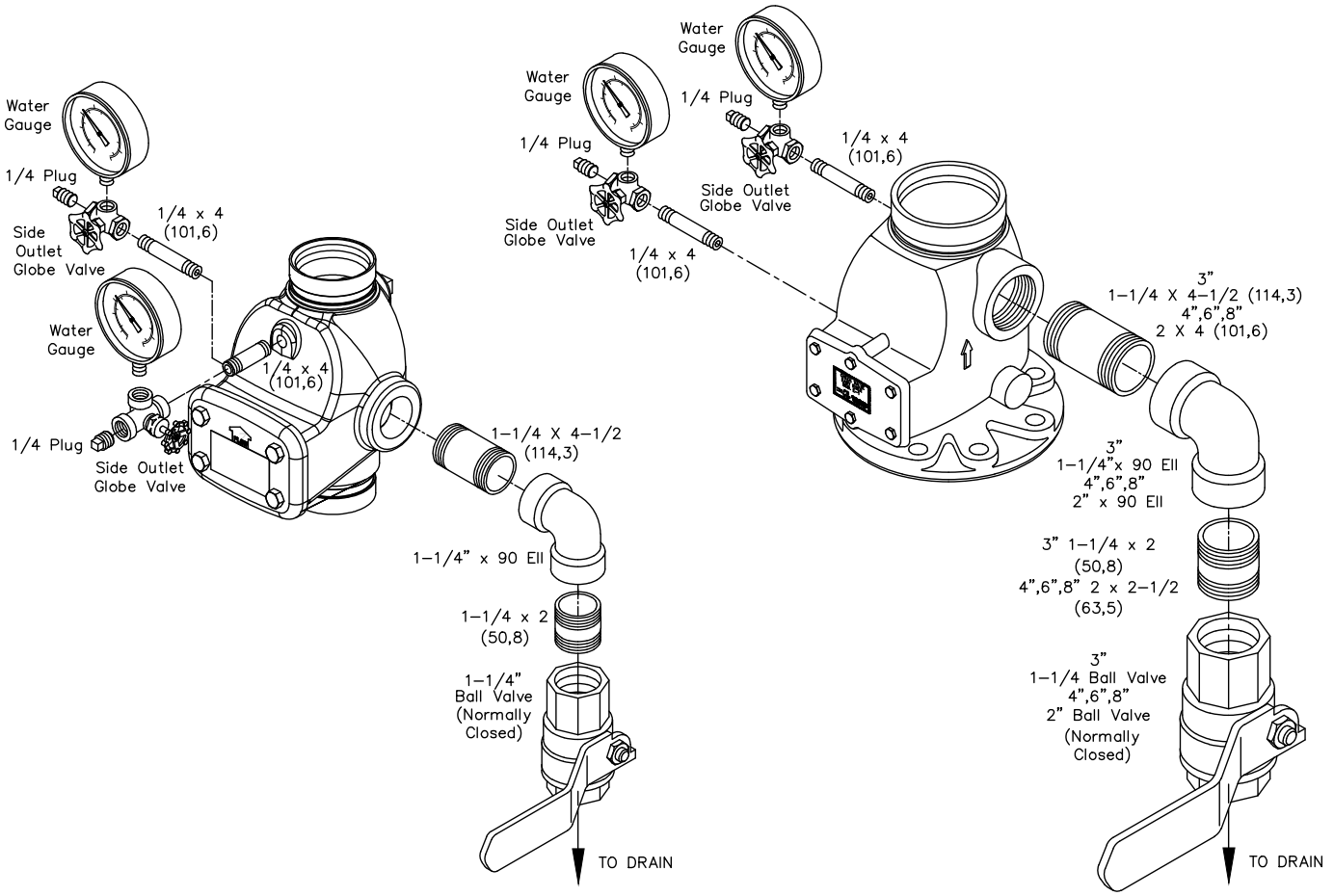


Figure 2

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

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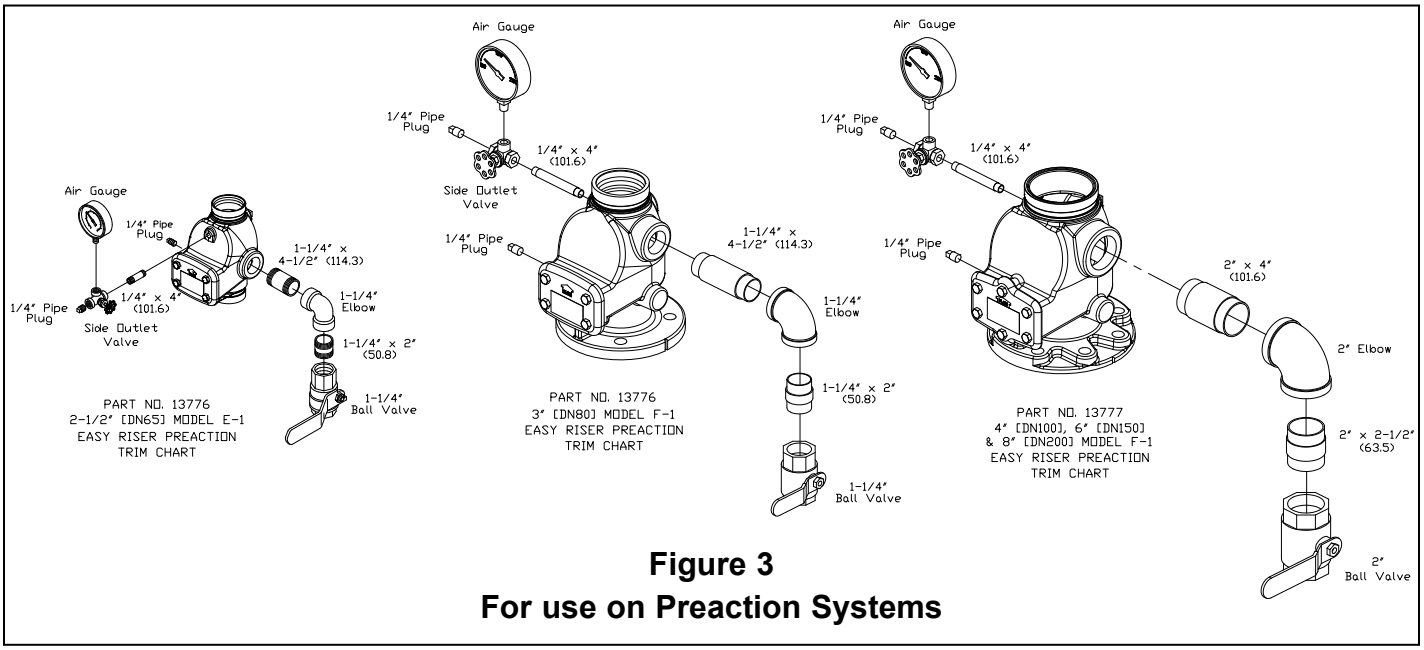
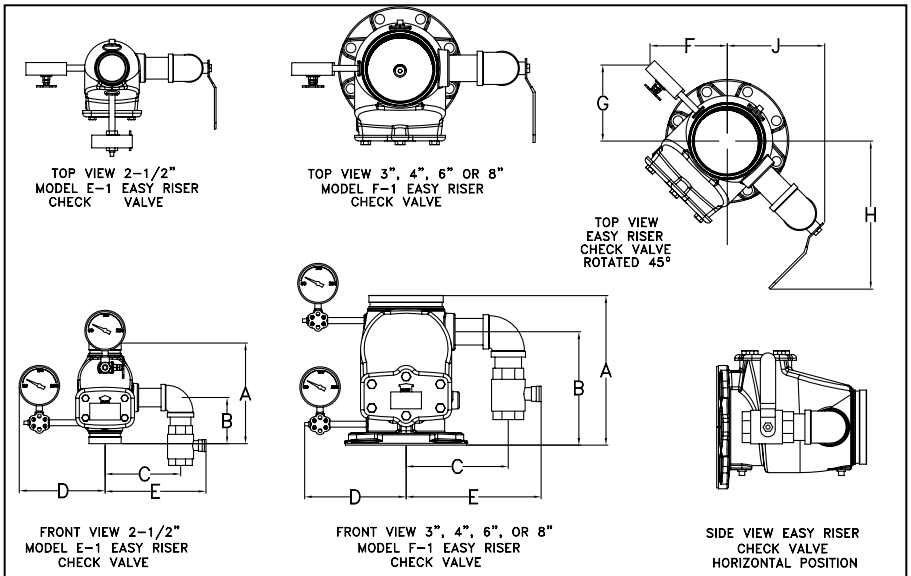


Figure 3
For use on Preaction Systems



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

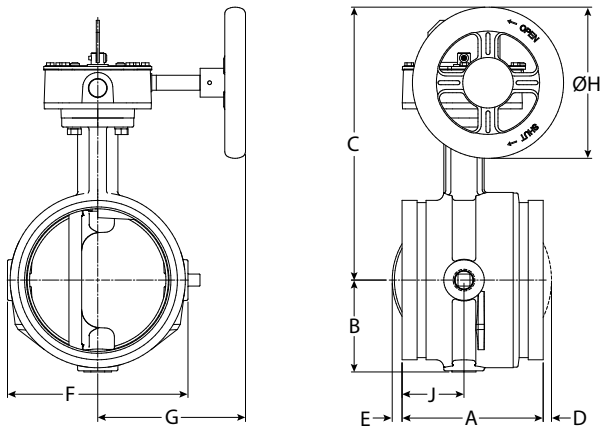
Stem Retaining Ring: Carbon steel

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

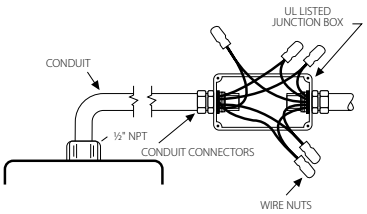
   For connection to the supervisory circuit of a UL Listed alarm control panel

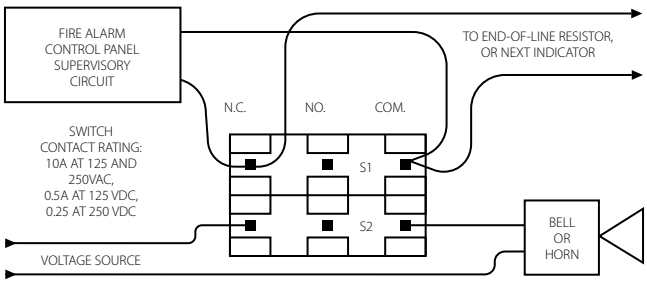
   Switch #2 = S2

   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

