Hydraulic Calculations by HydraCALC

Crawford Sprinkler Company
2725 S. Saunders St.
Raleigh, NC 27603
919-828-9346

1/26/21

Job Name	:	WATER TREATMENT 110
Drawing	:	
Location	:	800 EDWARDS BROTHERS DR.
Remote Area	:	1
Contract	:	J21 3010
Data File	:	KRIGEN WATER TREATMENT.wxtmp

Hydraulic Design Information Sheet

Name - KIRGEN PHARMACEUTICALS - WATER TREATMENT Date - 1/25/21
Location - 800 EDWARDS BROTHERS DR.
Building - System No. - 1
Contractor - CSCO Contract No. - J21 3010
Calculated By - RVS Drawing No. - FP1
Construction: ( ) Combustible ( ) Non-Combustible Ceiling Height - 16'-4"
Occupancy - WATER TREATMENT

SYSTEM DESIGN

(X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. ( ) 1 (X) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other
Specific Ruling Made By Date

Area of Sprinkler Operation - 1057.5	System Type	Sprinkler/Nozzle
Density - .20	(X) Wet	Make VIKING
Area Per Sprinkler - 256	( ) Dry	Model VK572
Elevation at Highest Outlet - 16.333	( ) Deluge	Size 3/4"
Hose Allowance - Inside -	( ) Preaction	K-Factor 14.0
Rack Sprinkler Allowance -	( ) Other	Temp.Rat.155
Hose Allowance - Outside - 250		

Note

Calculation Summary — Flow Required - ; C-Factor Used: 120 — Press Required - ; Overhead 140 ; Underground

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 9/10/19		Cap. -
Time of Test -	Rated Cap.-	Elev.-
Static Press - 88	@ Press -	
Residual Press - 58	Elev. -	Well
Flow - 1186		Proof Flow
Elevation - 0		

Location - 800 EDWARDS BROTHERS DR.

Source of Information - LILLINGTON FIRE DEPT.

COMMODITY STORAGE

Commodity Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled % Palletized % Rack

( ) Single Row ( ) Conven. Pallet ( ) Auto. Storage ( ) Encap.
( ) Double Row ( ) Slave Pallet ( ) Solid Shelf ( ) Non
( ) Mult. Row ( ) Open Shelf

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

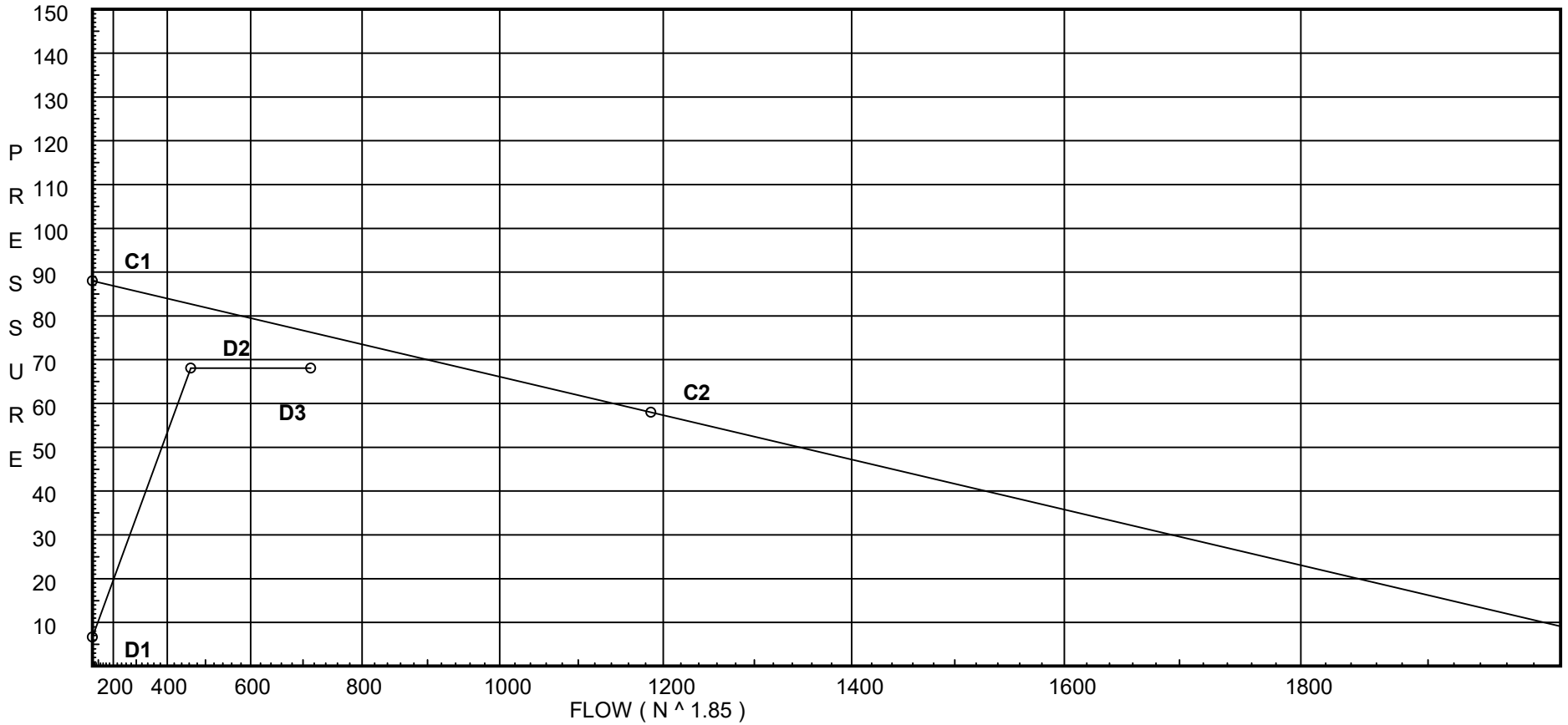
Horizontal Barriers Provided:

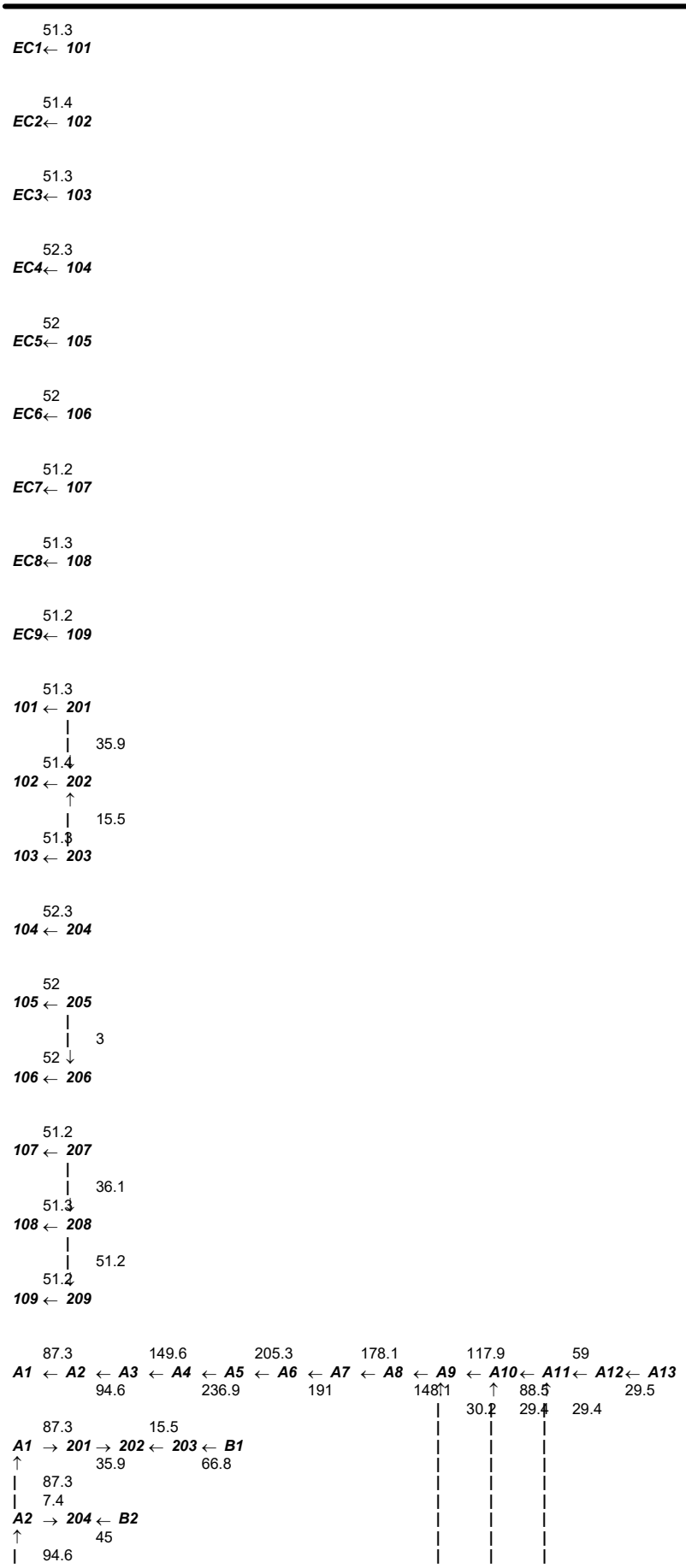
Water Supply Curve

Crawford Sprinkler Company
WATER TREATMENT 110

City Water Supply:
- C1 - Static Pressure : 88
- C2 - Residual Pressure: 58
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 6.641
- D2 - System Flow : 464.013
- D2 - System Pressure : 68.054
- Hose (Demand) : 250
- D3 - System Demand : 714.013
- Safety Margin : 8.213

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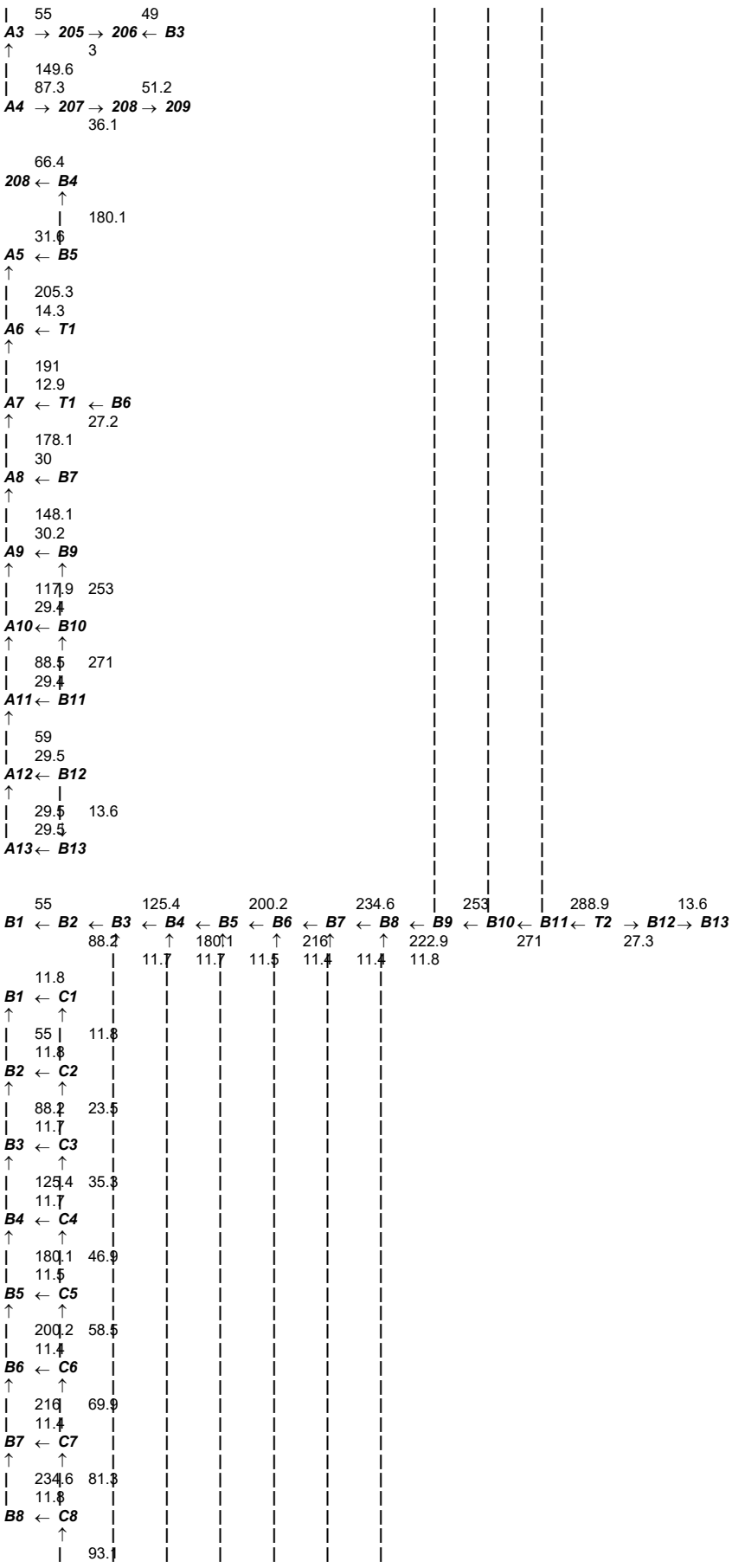
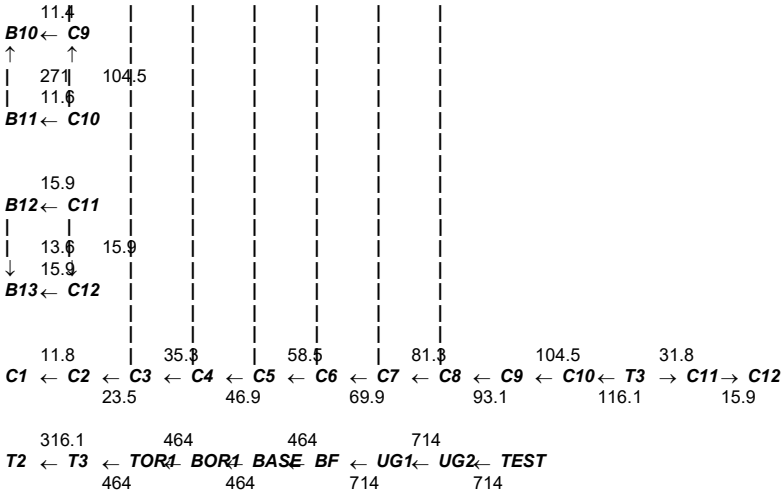
EC1 ← 101
51.4
EC2 ← 102
51.3
EC3 ← 103
52.3
EC4 ← 104
52
EC5 ← 105
52
EC6 ← 106
51.2
EC7 ← 107
51.3
EC8 ← 108
51.2
EC9 ← 109
51.3
101 ← 201
35.9
51.4
102 ← 202
15.5
51.3
103 ← 203
52.3
104 ← 204
52
105 ← 205
3
52
106 ← 206
51.2
107 ← 207
36.1
51.3
108 ← 208
51.2
51.2
109 ← 209
87.3
A1 ← A2
94.6
149.6
A2 ← A3
A4
236.9
205.3
A5
A6
191
178.1
A7
A8
148
117.9
A9
A10
30.2
59
A11
A12
88.5
29.4
29.5
A13
29.4
87.3
A1 → 201
35.9
15.5
202 ← 203 ← B1
66.8
87.3
7.4
A2 → 204 ← B2
45
94.6


55
49
A3 → 205 → 206 ← B3
3
149.6
87.3
51.2
A4 → 207 → 208 → 209
36.1
66.4
208 ← B4
180.1
31.6
A5 ← B5
205.3
14.3
A6 ← T1
191
12.9
A7 ← T1 ← B6
27.2
178.1
30
A8 ← B7
148.1
30.2
A9 ← B9
117.9
253
29.4
A10 ← B10
88.5
271
29.4
A11 ← B11
59
29.5
A12 ← B12
29.5
13.6
29.5
A13 ← B13
55
125.4
200.2
234.6
253
288.9
13.6
B1 ← B2 ← B3 ← B4 ← B5 ← B6 ← B7 ← B8 ← B9 ← B10 ← B11 ← T2 → B12 → B13
88.2
180.1
216
222.9
271
27.3
11.7
11.7
11.5
11.4
11.4
11.8
11.8
B1 ← C1
55
11.8
11.8
B2 ← C2
88.2
23.5
11.7
B3 ← C3
125.4
35.3
11.7
B4 ← C4
180.1
46.9
11.5
B5 ← C5
200.2
58.5
11.4
B6 ← C6
216
69.9
11.4
B7 ← C7
234.6
81.3
11.8
B8 ← C8
93.1


11.4
B10 ← C9
271
104.5
11.6
B11 ← C10
15.9
B12 ← C11
13.6
15.9
15.9
B13 ← C12
11.8
35.3
58.5
81.3
104.5
31.8
C1 ← C2 ← C3 ← C4 ← C5 ← C6 ← C7 ← C8 ← C9 ← C10 ← T3 → C11 → C12
23.5
46.9
69.9
93.1
116.1
15.9
316.1
464
464
714
T2 ← T3 ← TOR1 ← BOR1 ← BASE ← BF ← UG1 ← UG2 ← TEST
464
464
714
714

Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29							
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	88.0	58	1186.0	76.267	714.01	68.054

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
EC1	16.333	14	13.45	51.35	0.2	256
EC2	16.333	14	13.5	51.43	0.2	256
EC3	16.333	14	13.4	51.25	0.2	256
EC4	16.333	14	13.98	52.35	0.2	256
EC5	16.333	14	13.77	51.96	0.2	256
EC6	16.333	14	13.77	51.96	0.2	256
EC7	16.333	14	13.37	51.2	0.2	256
EC8	16.333	14	13.42	51.28	0.2	256
EC9	16.333	14	13.4	51.24	0.2	256
101	24.5		34.86			
102	24.5		34.61			
103	24.5		34.72			
104	24.5		36.29			
105	24.5		35.73			
106	24.5		35.73			
107	24.5		35.02			
108	24.5		34.76			
109	24.5		34.34			
A1	23.0		47.66			
A2	23.0		47.68			
A3	23.0		47.71			
A4	23.0		47.77			
A5	23.0		47.9			
A6	23.0		47.94			
A7	23.0		48.0			
A8	23.0		48.08			
A9	23.0		48.14			
A10	23.0		48.18			
A11	23.0		48.2			
A12	23.0		48.21			
201	24.5		45.19			
202	24.5		44.96			
203	24.5		45.01			
204	24.5		46.99			
205	24.5		46.28			
206	24.5		46.28			
207	24.5		45.29			
208	24.5		45.06			
T1	23.0		48.31			
A13	23.0		48.21			
B1	22.0		49.91			
B2	22.0		49.91			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
B3	22.0		49.92		
B4	22.0		49.92		
B5	22.0		49.93		
B6	22.0		49.95		
B7	22.0		49.96		
B8	22.0		49.98		
B9	22.0		49.98		
B10	22.0		50.01		
B11	22.0		50.03		
T2	22.0		50.05		
B12	22.0		50.05		
B13	22.0		50.05		
C1	21.0		50.58		
C2	21.0		50.58		
C3	21.0		50.59		
C4	21.0		50.59		
C5	21.0		50.6		
C6	21.0		50.61		
C7	21.0		50.62		
C8	21.0		50.64		
C9	21.0		50.66		
C10	21.0		50.69		
T3	21.0		50.92		
C11	21.0		50.9		
TOR1	21.0		51.04		
BOR1	1.0		60.27		
BASE	-1.0		61.22		
BF	-1.0		67.94	250.0	
UG1	-1.0		68.26		
UG2	-1.0		68.61		
TEST	1.0		68.05		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
EC1	16.333	14.00	51.35	1	2E	4.0	29.500	120	13.453	
to							4.000		-3.537	
101	24.500		51.35	1.049			33.500	0.7447	24.947	Vel = 19.06
			0.0							
101			51.35						34.863	K Factor = 8.70
EC2	16.333	14.00	51.43	1	2E	4.0	29.000	120	13.496	
to							4.000		-3.537	
102	24.500		51.43	1.049			33.000	0.7469	24.647	Vel = 19.09
			0.0							
102			51.43						34.606	K Factor = 8.74
EC3	16.333	14.00	51.25	1	2E	4.0	29.500	120	13.401	
to							4.000		-3.537	
103	24.500		51.25	1.049			33.500	0.7420	24.857	Vel = 19.03
			0.0							
103			51.25						34.721	K Factor = 8.70
EC4	16.333	14.00	52.35	1	2E	4.0	29.500	120	13.980	
to							4.000		-3.537	
104	24.500		52.35	1.049			33.500	0.7716	25.850	Vel = 19.43
			0.0							
104			52.35						36.293	K Factor = 8.69
EC5	16.333	14.00	51.96	1	2E	4.0	29.500	120	13.773	
to							4.000		-3.537	
105	24.500		51.96	1.049			33.500	0.7611	25.496	Vel = 19.29
			0.0							
105			51.96						35.732	K Factor = 8.69
EC6	16.333	14.00	51.96	1	2E	4.0	29.500	120	13.773	
to							4.000		-3.537	
106	24.500		51.96	1.049			33.500	0.7610	25.494	Vel = 19.29
			0.0							
106			51.96						35.730	K Factor = 8.69
EC7	16.333	14.00	51.20	1	2E	4.0	30.000	120	13.375	
to							4.000		-3.537	
107	24.500		51.2	1.049			34.000	0.7406	25.182	Vel = 19.01
			0.0							
107			51.20						35.020	K Factor = 8.65
EC8	16.333	14.00	51.28	1	2E	4.0	29.500	120	13.416	
to							4.000		-3.537	
108	24.500		51.28	1.049			33.500	0.7428	24.883	Vel = 19.04
			0.0							
108			51.28						34.762	K Factor = 8.70
EC9	16.333	14.00	51.24	1	2E	4.0	29.000	120	13.397	
to							4.000		-3.537	
109	24.500		51.24	1.049			33.000	0.7418	24.480	Vel = 19.02
			0.0							
109			51.24						34.340	K Factor = 8.74
101	24.500		51.35	0.75	T	2.401	0.167	120	34.863	
to							2.401		0.0	
201	24.500		51.35	0.742			2.568	4.0202	10.324	Vel = 38.10

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
201			51.35						45.187	K Factor = 7.64
102	24.500		51.43	0.75	T	2.401	0.167	120	34.606	
to							2.401		0.0	
202	24.500		51.43	0.742			2.568	4.0323	10.355	Vel = 38.16
			0.0							
202			51.43						44.961	K Factor = 7.67
103	24.500		51.25	0.75	T	2.401	0.167	120	34.721	
to							2.401		0.0	
203	24.500		51.25	0.742			2.568	4.0062	10.288	Vel = 38.03
			0.0							
203			51.25						45.009	K Factor = 7.64
104	24.500		52.35	0.75	T	2.401	0.167	120	36.293	
to							2.401		0.0	
204	24.500		52.35	0.742			2.568	4.1663	10.699	Vel = 38.84
			0.0							
204			52.35						46.992	K Factor = 7.64
105	24.500		51.96	0.75	T	2.401	0.167	120	35.732	
to							2.401		0.0	
205	24.500		51.96	0.742			2.568	4.1090	10.552	Vel = 38.55
			0.0							
205			51.96						46.284	K Factor = 7.64
106	24.500		51.96	0.75	T	2.401	0.167	120	35.730	
to							2.401		0.0	
206	24.500		51.96	0.742			2.568	4.1086	10.551	Vel = 38.55
			0.0							
206			51.96						46.281	K Factor = 7.64
107	24.500		51.20	0.75	T	2.401	0.167	120	35.020	
to							2.401		0.0	
207	24.500		51.2	0.742			2.568	3.9992	10.270	Vel = 37.99
			0.0							
207			51.20						45.290	K Factor = 7.61
108	24.500		51.28	0.75	T	2.401	0.167	120	34.762	
to							2.401		0.0	
208	24.500		51.28	0.742			2.568	4.0105	10.299	Vel = 38.05
			0.0							
208			51.28						45.061	K Factor = 7.64
109	24.500		51.24	0.75	T	2.401	0.167	120	34.340	
to							2.401		10.611	
209	0		51.24	0.742			2.568	4.0047	10.284	Vel = 38.02
			0.0							
209			51.24						55.235	K Factor = 6.89
A1	23		87.26	4			10.000	120	47.663	
to									0.0	
A2	23		87.26	4.26			10.000	0.0021	0.021	Vel = 1.96
A2	23		7.38	4			10.000	120	47.684	
to									0.0	
A3	23		94.64	4.26			10.000	0.0025	0.025	Vel = 2.13

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
A3	23		54.96	4			10.000	120	47.709	
to									0.0	
A4	23		149.6	4.26			10.000	0.0059	0.059	Vel = 3.37
A4	23		87.34	4			10.000	120	47.768	
to									0.0	
A5	23		236.94	4.26			10.000	0.0137	0.137	Vel = 5.33
A5	23		-31.63	4			3.500	120	47.905	
to									0.0	
A6	23		205.31	4.26			3.500	0.0106	0.037	Vel = 4.62
A6	23		-14.26	4			6.500	120	47.942	
to									0.0	
A7	23		191.05	4.26			6.500	0.0091	0.059	Vel = 4.30
A7	23		-12.95	4			10.000	120	48.001	
to									0.0	
A8	23		178.1	4.26			10.000	0.0081	0.081	Vel = 4.01
A8	23		-30.03	4			10.000	120	48.082	
to									0.0	
A9	23		148.07	4.26			10.000	0.0058	0.058	Vel = 3.33
A9	23		-30.16	4			10.000	120	48.140	
to									0.0	
A10	23		117.91	4.26			10.000	0.0037	0.037	Vel = 2.65
A10	23		-29.42	4			10.000	120	48.177	
to									0.0	
A11	23		88.49	4.26			10.000	0.0022	0.022	Vel = 1.99
A11	23		-29.44	4			10.000	120	48.199	
to									0.0	
A12	23		59.05	4.26			10.000	0.0011	0.011	Vel = 1.33
A12	23		-29.54	4			10.000	120	48.210	
to									0.0	
A13	23		29.51	4.26			10.000	0.0003	0.003	Vel = 0.66
			0.0							
A13			29.51						48.213	K Factor = 4.25
A1	23		-87.26	2	E	5.0	10.000	120	47.663	
to					T	10.0	15.000		-0.650	
201	24.500		-87.26	2.067			25.000	-0.0730	-1.826	Vel = 8.34
201	24.500		51.35	2			16.000	120	45.187	
to									0.0	
202	24.500		-35.91	2.067			16.000	-0.0141	-0.226	Vel = 3.43
202	24.500		51.43	2			16.000	120	44.961	
to									0.0	
203	24.500		15.52	2.067			16.000	0.0030	0.048	Vel = 1.48
203	24.500		51.25	2	2T	20.0	65.833	120	45.009	
to							20.000		1.083	
B1	22		66.77	2.067			85.833	0.0445	3.820	Vel = 6.38
			0.0							
B1			66.77						49.912	K Factor = 9.45
A2	23		-7.38	2	E	5.0	42.000	120	47.684	
to					T	10.0	15.000		-0.650	
204	24.500		-7.38	2.067			57.000	-0.0007	-0.042	Vel = 0.71

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
204	24.500		52.35	2	2T	20.0	65.833	120	46.992	
to							20.000		1.083	
B2	22		44.97	2.067			85.833	0.0214	1.838	Vel = 4.30
			0.0							
B2			44.97						49.913	K Factor = 6.37
A3	23		-54.96	2	E	5.0	10.000	120	47.709	
to					T	10.0	15.000		-0.650	
205	24.500		-54.96	2.067			25.000	-0.0310	-0.775	Vel = 5.25
205	24.500		51.96	2			16.000	120	46.284	
to									0.0	
206	24.500		-3.0	2.067			16.000	-0.0002	-0.003	Vel = 0.29
206	24.500		51.95	2	2T	20.0	81.833	120	46.281	
to							20.000		1.083	
B3	22		48.95	2.067			101.833	0.0251	2.552	Vel = 4.68
			0.0							
B3			48.95						49.916	K Factor = 6.93
A4	23		-87.34	2	E	5.0	10.000	120	47.768	
to					T	10.0	15.000		-0.650	
207	24.500		-87.34	2.067			25.000	-0.0731	-1.828	Vel = 8.35
207	24.500		51.20	2			16.000	120	45.290	
to									0.0	
208	24.500		-36.14	2.067			16.000	-0.0143	-0.229	Vel = 3.46
208	24.500		-15.10	2			16.000	120	45.061	
to									10.611	
209	0		-51.24	2.067			16.000	-0.0273	-0.437	Vel = 4.90
			0.0							
209			-51.24						55.235	K Factor = -6.89
208	24.500		66.38	2	2T	20.0	65.833	120	45.061	
to							20.000		1.083	
B4	22		66.38	2.067			85.833	0.0440	3.778	Vel = 6.35
			0.0							
B4			66.38						49.922	K Factor = 9.39
A5	23		31.63	2	E	5.0	107.833	120	47.905	
to					3T	30.0	35.000		0.433	
B5	22		31.63	2.067			142.833	0.0112	1.596	Vel = 3.02
			0.0							
B5			31.63						49.934	K Factor = 4.48
A6	23		14.26	2	E	5.0	107.833	120	47.942	
to					3T	30.0	35.000		0.0	
T1	23		14.26	2.067			142.833	0.0026	0.365	Vel = 1.36
			0.0							
T1			14.26						48.307	K Factor = 2.05
A7	23		12.95	2	E	5.0	107.833	120	48.001	
to					3T	30.0	35.000		0.0	
T1	23		12.95	2.067			142.833	0.0021	0.306	Vel = 1.24
T1	23		14.26	2	E	5.0	107.833	120	48.307	
to					3T	30.0	35.000		0.433	
B6	22		27.21	2.067			142.833	0.0085	1.208	Vel = 2.60

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
B6			27.21						49.948	K Factor = 3.85
A8	23		30.03	2	E	5.0	107.833	120	48.082	
to					3T	30.0	35.000		0.433	
B7	22		30.03	2.067			142.833	0.0102	1.450	Vel = 2.87
			0.0							
B7			30.03						49.965	K Factor = 4.25
A9	23		30.17	2	2E	10.0	107.833	120	48.140	
to					2T	20.0	30.000		0.433	
B9	22		30.17	2.067			137.833	0.0102	1.410	Vel = 2.88
			0.0							
B9			30.17						49.983	K Factor = 4.27
A10	23		29.41	2	E	5.0	107.833	120	48.177	
to					3T	30.0	35.000		0.433	
B10	22		29.41	2.067			142.833	0.0098	1.395	Vel = 2.81
			0.0							
B10			29.41						50.005	K Factor = 4.16
A11	23		29.45	2	E	5.0	107.833	120	48.199	
to					3T	30.0	35.000		0.433	
B11	22		29.45	2.067			142.833	0.0098	1.398	Vel = 2.82
			0.0							
B11			29.45						50.030	K Factor = 4.16
A12	23		29.54	2	E	5.0	107.833	120	48.210	
to					3T	30.0	35.000		0.433	
B12	22		29.54	2.067			142.833	0.0098	1.406	Vel = 2.82
			0.0							
B12			29.54						50.049	K Factor = 4.18
A13	23		29.51	2	E	5.0	107.833	120	48.213	
to					3T	30.0	35.000		0.433	
B13	22		29.51	2.067			142.833	0.0098	1.403	Vel = 2.82
			0.0							
B13			29.51						50.049	K Factor = 4.17
B1	22		54.99	6			10.000	120	49.912	
to									0.0	
B2	22		54.99	6.357			10.000	0.0001	0.001	Vel = 0.56
B2	22		33.21	6			10.000	120	49.913	
to									0.0	
B3	22		88.2	6.357			10.000	0.0003	0.003	Vel = 0.89
B3	22		37.22	6			10.000	120	49.916	
to									0.0	
B4	22		125.42	6.357			10.000	0.0006	0.006	Vel = 1.27
B4	22		54.71	6			10.000	120	49.922	
to									0.0	
B5	22		180.13	6.357			10.000	0.0012	0.012	Vel = 1.82
B5	22		20.09	6			10.000	120	49.934	
to									0.0	
B6	22		200.22	6.357			10.000	0.0014	0.014	Vel = 2.02

Node1 / to / Node2	Elev1 / Elev2	K / Fact	Qa / Qt	Nom / Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact / Pf/Ft	Pt / Pe / Pf	******* Notes ******
B6	22		15.78	6			10.000	120	49.948	
to									0.0	
B7	22		216.0	6.357			10.000	0.0017	0.017	Vel = 2.18
B7	22		18.65	6			6.750	120	49.965	
to									0.0	
B8	22		234.65	6.357			6.750	0.0019	0.013	Vel = 2.37
B8	22		-11.78	6			3.250	120	49.978	
to									0.0	
B9	22		222.87	6.357			3.250	0.0015	0.005	Vel = 2.25
B9	22		30.17	6			10.000	120	49.983	
to									0.0	
B10	22		253.04	6.357			10.000	0.0022	0.022	Vel = 2.56
B10	22		17.96	6			10.000	120	50.005	
to									0.0	
B11	22		271.0	6.357			10.000	0.0025	0.025	Vel = 2.74
B11	22		17.86	6			6.750	120	50.030	
to									0.0	
T2	22		288.86	6.357			6.750	0.0028	0.019	Vel = 2.92
T2	22		-316.14	6			3.250	120	50.049	
to									0.0	
B12	22		-27.28	6.357			3.250	0	0.0	Vel = 0.28
B12	22		13.65	6			10.000	120	50.049	
to									0.0	
B13	22		-13.63	6.357			10.000	0	0.0	Vel = 0.14
			0.0							
B13			-13.63						50.049	K Factor = -1.93
B1	22		11.78	2	E	5.0	97.333	120	49.912	
to					3T	30.0	35.000		0.433	
C1	21		11.78	2.067			132.333	0.0018	0.238	Vel = 1.13
			0.0							
C1			11.78						50.583	K Factor = 1.66
B2	22		11.76	2	E	5.0	97.333	120	49.913	
to					3T	30.0	35.000		0.433	
C2	21		11.76	2.067			132.333	0.0018	0.237	Vel = 1.12
			0.0							
C2			11.76						50.583	K Factor = 1.65
B3	22		11.73	2	E	5.0	97.333	120	49.916	
to					3T	30.0	35.000		0.433	
C3	21		11.73	2.067			132.333	0.0018	0.236	Vel = 1.12
			0.0							
C3			11.73						50.585	K Factor = 1.65
B4	22		11.67	2	E	5.0	97.333	120	49.922	
to					3T	30.0	35.000		0.433	
C4	21		11.67	2.067			132.333	0.0018	0.234	Vel = 1.12
			0.0							
C4			11.67						50.589	K Factor = 1.64
B5	22		11.54	2	E	5.0	97.333	120	49.934	
to					3T	30.0	35.000		0.433	
C5	21		11.54	2.067			132.333	0.0017	0.229	Vel = 1.10

Node1 / to / Node2	Elev1 / Elev2	K Fact	Qa / Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt / Pe / Pf	******* Notes ******
			0.0							
C5			11.54						50.596	K Factor = 1.62
B6	22		11.43	2	E	5.0	97.333	120	49.948	
to					3T	30.0	35.000		0.433	
C6	21		11.43	2.067			132.333	0.0017	0.225	Vel = 1.09
			0.0							
C6			11.43						50.606	K Factor = 1.61
B7	22		11.37	2	E	5.0	97.333	120	49.965	
to					3T	30.0	35.000		0.433	
C7	21		11.37	2.067			132.333	0.0017	0.223	Vel = 1.09
			0.0							
C7			11.37						50.621	K Factor = 1.60
B8	22		11.78	2	2E	10.0	97.333	120	49.978	
to					2T	20.0	30.000		0.433	
C8	21		11.78	2.067			127.333	0.0018	0.229	Vel = 1.13
			0.0							
C8			11.78						50.640	K Factor = 1.66
B10	22		11.45	2	E	5.0	97.333	120	50.005	
to					3T	30.0	35.000		0.433	
C9	21		11.45	2.067			132.333	0.0017	0.226	Vel = 1.09
			0.0							
C9			11.45						50.664	K Factor = 1.61
B11	22		11.59	2	E	5.0	97.333	120	50.030	
to					3T	30.0	35.000		0.433	
C10	21		11.59	2.067			132.333	0.0017	0.231	Vel = 1.11
			0.0							
C10			11.59						50.694	K Factor = 1.63
B12	22		15.89	2	E	5.0	97.333	120	50.049	
to					3T	30.0	35.000		0.433	
C11	21		15.89	2.067			132.333	0.0031	0.414	Vel = 1.52
			0.0							
C11			15.89						50.896	K Factor = 2.23
B13	22		15.88	2	E	5.0	97.333	120	50.049	
to					3T	30.0	35.000		9.528	
C12	0		15.88	2.067			132.333	0.0031	0.413	Vel = 1.52
			0.0							
C12			15.88						59.990	K Factor = 2.05
C1	21		11.78	4			10.000	120	50.583	
to									0.0	
C2	21		11.78	4.26			10.000	0	0.0	Vel = 0.27
C2	21		11.76	4			10.000	120	50.583	
to									0.0	
C3	21		23.54	4.26			10.000	0.0002	0.002	Vel = 0.53
C3	21		11.73	4			10.000	120	50.585	
to									0.0	
C4	21		35.27	4.26			10.000	0.0004	0.004	Vel = 0.79
C4	21		11.67	4			10.000	120	50.589	
to									0.0	
C5	21		46.94	4.26			10.000	0.0007	0.007	Vel = 1.06

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
C5	21		11.54	4			10.000	120	50.596	
to									0.0	
C6	21		58.48	4.26			10.000	0.0010	0.010	Vel = 1.32
C6	21		11.44	4			10.000	120	50.606	
to									0.0	
C7	21		69.92	4.26			10.000	0.0015	0.015	Vel = 1.57
C7	21		11.37	4			10.000	120	50.621	
to									0.0	
C8	21		81.29	4.26			10.000	0.0019	0.019	Vel = 1.83
C8	21		11.78	4			10.000	120	50.640	
to									0.0	
C9	21		93.07	4.26			10.000	0.0024	0.024	Vel = 2.09
C9	21		11.45	4			10.000	120	50.664	
to									0.0	
C10	21		104.52	4.26			10.000	0.0030	0.030	Vel = 2.35
C10	21		11.59	4	2T	52.668	7.750	120	50.694	
to							52.668		0.0	
T3	21		116.11	4.26			60.418	0.0037	0.221	Vel = 2.61
T3	21		-147.88	4	2T	52.668	4.250	120	50.915	
to							52.668		0.0	
C11	21		-31.77	4.26			56.918	-0.0003	-0.019	Vel = 0.72
C11	21		15.89	4			10.000	120	50.896	
to									9.095	
C12	0		-15.88	4.26			10.000	-0.0001	-0.001	Vel = 0.36
			0.0							
C12			-15.88						59.990	K Factor = -2.05
T2	22		316.13	6	T	37.72	92.500	120	50.049	
to							37.720		0.433	
T3	21		316.13	6.357			130.220	0.0033	0.433	Vel = 3.20
T3	21		147.88	6	E	17.603	1.500	120	50.915	
to							17.603		0.0	
TOR1	21		464.01	6.357			19.103	0.0068	0.129	Vel = 4.69
TOR1	21		0.0	6	A	33.948	19.500	120	51.044	
to					B	12.573	64.124		8.662	
BOR1	1		464.01	6.357	E	17.603	83.624	0.0068	0.565	Vel = 4.69
BOR1	1		0.0	8	T	55.354	4.000	140	60.271	
to							55.354		0.866	
BASE	-1		464.01	8.27			59.354	0.0014	0.084	Vel = 2.77
BASE	-1		0.0	8	2E	56.936	455.000	140	61.221	
to							56.936		6.000	* * Fixed Loss = 6
BF	-1		464.01	8.27			511.936	0.0014	0.723	Vel = 2.77
BF	-1	H250	250.00	8	G	6.326	38.000	140	67.944	
to					T	55.354	61.680		0.0	
UG1	-1		714.01	8.27			99.680	0.0031	0.312	Vel = 4.26
UG1	-1		0.0	8			113.000	140	68.256	
to									0.0	
UG2	-1		714.01	8.27			113.000	0.0031	0.354	Vel = 4.26
UG2	-1		0.0	8	E	28.468	15.000	140	68.610	
to					T	55.354	83.822		-0.866	
TEST	1		714.01	8.27			98.822	0.0031	0.310	Vel = 4.26

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
			0.0									
TEST			714.01						68.054	K Factor =	86.55	

Hydraulic Calculations by HydraCALC

Crawford Sprinkler Company
2725 S. Saunders St.
Raleigh, NC 27603
919-828-9346

Job Name	:	OFFICE TREE
Drawing	:	
Location	:	800 EDWARDS BROTHERS DR.
Remote Area	:	2
Contract	:	J21 3010
Data File	:	KRIGEN OFFICE TREE.wxtmp

Hydraulic Design Information Sheet

Name - KIRGEN PHARMACEUTICALS - OFFICE TREE Date - 1/25/21
Location - 800 EDWARDS BROTHERS DR.
Building - System No. - 2
Contractor - CSCO Contract No. - J21 3010
Calculated By - RVS Drawing No. - FP1
Construction: ( ) Combustible ( ) Non-Combustible Ceiling Height - 10'-0"
Occupancy - OFFICE

SYSTEM DESIGN

(X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other
Specific Ruling Made By Date

Area of Sprinkler Operation - 900	System Type	Sprinkler/Nozzle
Density - .10	(X) Wet	Make VIKING
Area Per Sprinkler - 256	( ) Dry	Model VK534
Elevation at Highest Outlet -	( ) Deluge	Size 3/4"
Hose Allowance - Inside -	( ) Preaction	K-Factor 11.2
Rack Sprinkler Allowance -	( ) Other	Temp.Rat.155
Hose Allowance - Outside - 100		

Note

Calculation Summary

Flow Required - Press Required -
C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 9/10/19		Cap. -
Time of Test -	Rated Cap.-	Elev.-
Static Press - 88	@ Press -	
Residual Press - 58	Elev. -	Well
Flow - 1186		Proof Flow
Elevation - 0		

Location - 800 EDWARDS BROTHERS DR.

Source of Information - LILLINGTON FIRE DEPT.

STORAGE

Commodity Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled % Palletized % Rack

( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage	( ) Encap.
( ) Double Row	( ) Slave Pallet	( ) Solid Shelf	( ) Non
( ) Mult. Row		( ) Open Shelf	

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

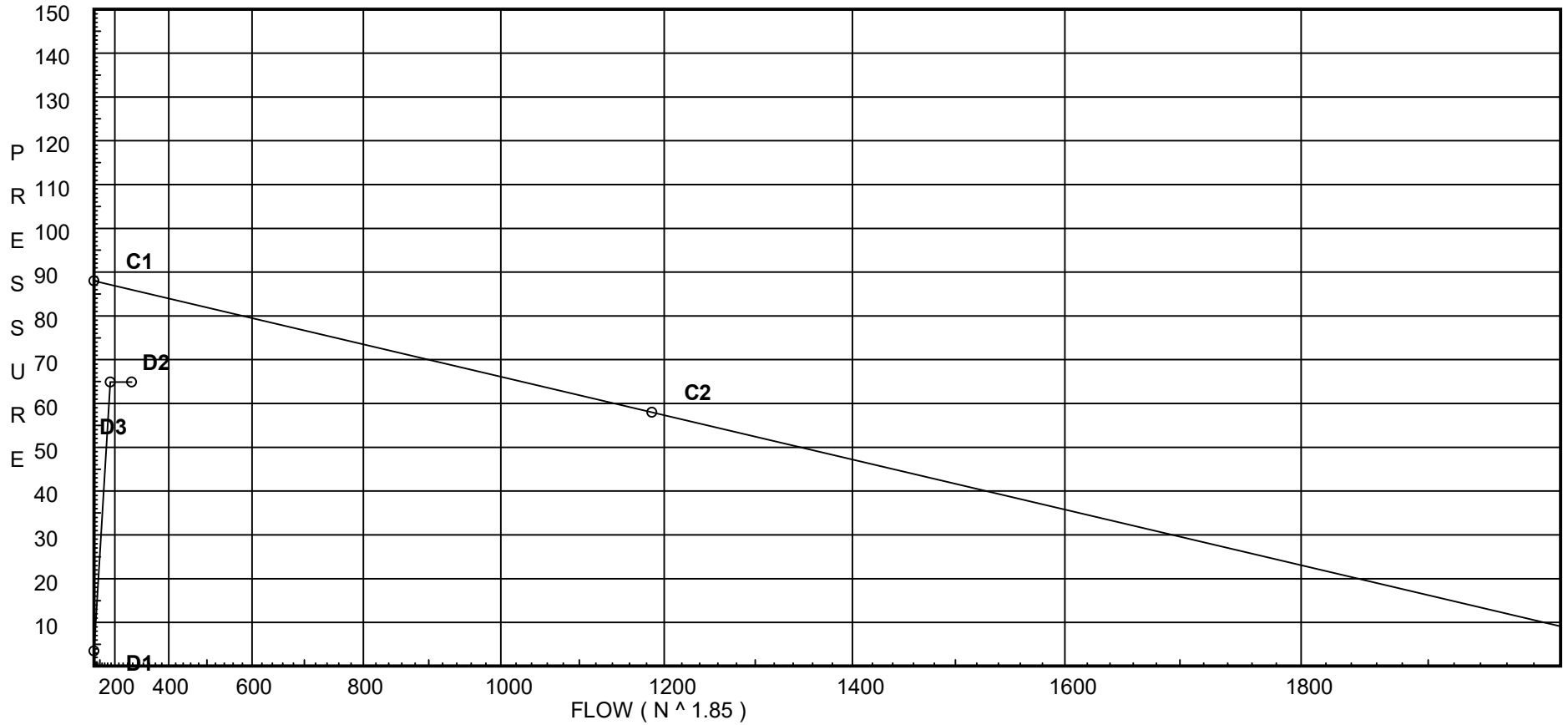
Horizontal Barriers Provided:

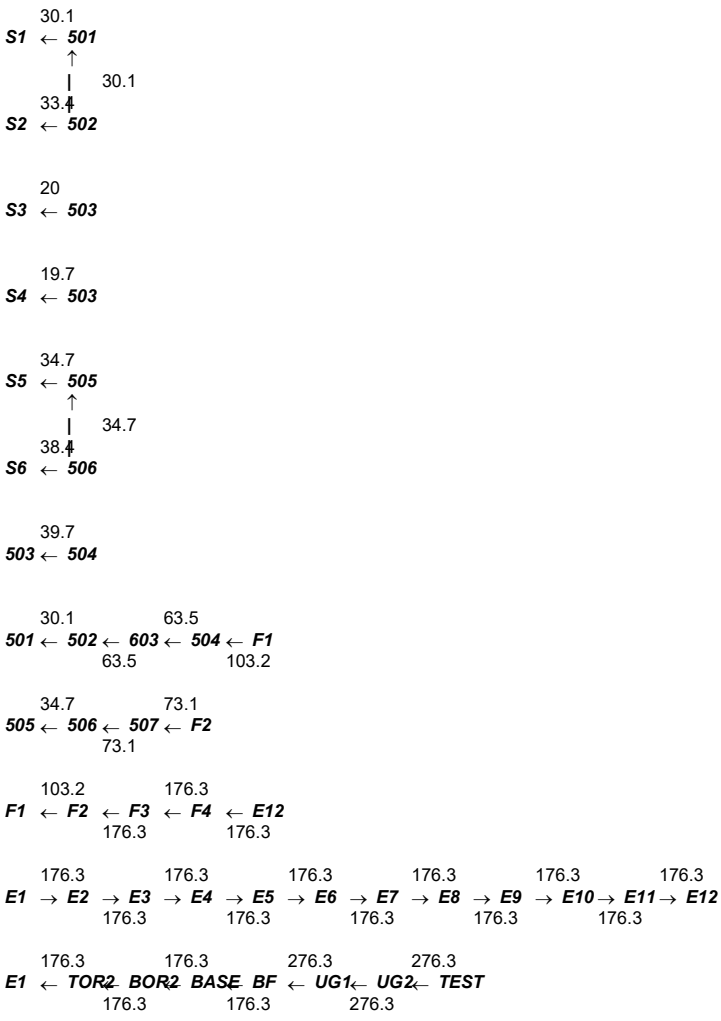
Water Supply Curve

Crawford Sprinkler Company
OFFICE TREE

City Water Supply:
- C1 - Static Pressure : 88
- C2 - Residual Pressure: 58
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 3.465
- D2 - System Flow : 176.331
- D2 - System Pressure : 64.919
- Hose (Demand) : 100
- D3 - System Demand : 276.331
- Safety Margin : 21.055




30.1
S1 ← 501
30.1
33.4
S2 ← 502
20
S3 ← 503
19.7
S4 ← 503
34.7
S5 ← 505
34.7
38.4
S6 ← 506
39.7
503 ← 504
30.1 63.5
501 ← 502 ← 603 ← 504 ← F1
63.5 103.2
34.7 73.1
505 ← 506 ← 507 ← F2
73.1
103.2 176.3
F1 ← F2 ← F3 ← F4 ← E12
176.3 176.3
176.3 176.3 176.3 176.3 176.3 176.3
E1 → E2 → E3 → E4 → E5 → E6 → E7 → E8 → E9 → E10 → E11 → E12
176.3 176.3 176.3 176.3 176.3
176.3 176.3 276.3 276.3
E1 ← TOR2 ← BOR2 ← BASE ← BF ← UG1 ← UG2 ← TEST
176.3 176.3 276.3

Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29							
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	88.0	58	1186.0	85.974	276.33	64.919

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
S1	9.0	11.2	7.2	30.05	0.1	256
S2	9.0	11.2	8.92	33.45	0.1	256
S3	9.0	5.6	12.79	20.03	0.1	131
S4	9.0	5.6	12.38	19.7	0.1	138
S5	9.0	11.2	9.58	34.67	0.1	256
S6	9.0	11.2	11.78	38.43	0.1	256
503	10.183		13.54			
501	10.183		8.9			
502	10.183		11.66			
603	10.183		14.56			
504	10.183		15.93			
505	10.183		12.13			
506	10.183		15.73			
507	10.183		19.49			
F1	10.183		25.19			
F2	10.183		26.16			
F3	21.0		37.44			
F4	21.0		44.71			
E1	21.0		48.63			
E2	21.0		47.75			
E3	21.0		47.45			
E4	21.0		47.16			
E5	21.0		46.87			
E6	21.0		46.58			
E7	21.0		46.29			
E8	21.0		46.0			
E9	21.0		45.7			
E10	21.0		45.41			
E11	21.0		45.12			
TOR2	2.5		57.53			
BOR2	1.0		58.63			
BASE	-1.0		59.5			
BF	-1.0		65.62	100.0		
UG1	-1.0		65.67			
UG2	-1.0		65.73			
TEST	1.0		64.92			

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
S1	9	11.20	30.05	1	2E	4.0	4.000	120	7.200	
to							4.000		-0.512	
501	10.183		30.05	1.049			8.000	0.2764	2.211	Vel = 11.16
			0.0							
501			30.05						8.899	K Factor = 10.07
S2	9	11.20	33.45	1	2E	4.0	5.667	120	8.918	
to							4.000		-0.512	
502	10.183		33.45	1.049			9.667	0.3369	3.257	Vel = 12.42
			0.0							
502			33.45						11.663	K Factor = 9.79
S3	9	5.60	20.03	1	2E	4.0	5.667	120	12.791	
to							4.000		-0.512	
503	10.183		20.03	1.049			9.667	0.1304	1.261	Vel = 7.44
			0.0							
503			20.03						13.540	K Factor = 5.44
S4	9	5.60	19.70	1	E	2.0	6.250	120	12.376	
to					T	5.0	7.000		-0.512	
503	10.183		19.7	1.049			13.250	0.1265	1.676	Vel = 7.31
			0.0							
503			19.70						13.540	K Factor = 5.35
S5	9	11.20	34.67	1	2E	4.0	4.500	120	9.581	
to							4.000		-0.512	
505	10.183		34.67	1.049			8.500	0.3600	3.060	Vel = 12.87
			0.0							
505			34.67						12.129	K Factor = 9.96
S6	9	11.20	38.43	1	2E	4.0	6.250	120	11.776	
to							4.000		-0.512	
506	10.183		38.43	1.049			10.250	0.4357	4.466	Vel = 14.27
			0.0							
506			38.43						15.730	K Factor = 9.69
503	10.183		39.73	1	T	5.0	0.167	120	13.540	
to							5.000		0.0	
504	10.183		39.73	1.049			5.167	0.4633	2.394	Vel = 14.75
			0.0							
504			39.73						15.934	K Factor = 9.95
501	10.183		30.05	1			10.000	120	8.899	
to									0.0	
502	10.183		30.05	1.049			10.000	0.2764	2.764	Vel = 11.16
502	10.183		33.45	1.25			10.000	120	11.663	
to									0.0	
603	10.183		63.5	1.38			10.000	0.2901	2.901	Vel = 13.62
603	10.183		0.0	1.5			10.000	120	14.564	
to									0.0	
504	10.183		63.5	1.61			10.000	0.1370	1.370	Vel = 10.01
504	10.183		39.73	1.5	T	8.0	19.500	120	15.934	
to							8.000		0.0	
F1	10.183		103.23	1.61			27.500	0.3364	9.252	Vel = 16.27

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
F1			103.23						25.186	K Factor = 20.57
505	10.183		34.67	1			10.000	120	12.129	
to									0.0	
506	10.183		34.67	1.049			10.000	0.3601	3.601	Vel = 12.87
506	10.183		38.43	1.25			10.000	120	15.730	
to									0.0	
507	10.183		73.1	1.38			10.000	0.3764	3.764	Vel = 15.68
507	10.183		0.0	1.5	T	8.0	29.500	120	19.494	
to							8.000		0.0	
F2	10.183		73.1	1.61			37.500	0.1777	6.664	Vel = 11.52
			0.0							
F2			73.10						26.158	K Factor = 14.29
F1	10.183		103.23	2			12.000	120	25.186	
to									0.0	
F2	10.183		103.23	2.157			12.000	0.0810	0.972	Vel = 9.06
F2	10.183		73.10	2	E	6.153	54.750	120	26.158	
to					T	12.307	18.460		-4.685	
F3	21		176.33	2.157			73.210	0.2180	15.962	Vel = 15.48
F3	21		0.0	2.5	T	16.474	72.000	120	37.435	
to							16.474		0.0	
F4	21		176.33	2.635			88.474	0.0823	7.278	Vel = 10.37
F4	21		0.0	3			4.000	120	44.713	
to									9.095	
E12	0		176.33	3.26			4.000	0.0290	0.116	Vel = 6.78
			0.0							
E12			176.33						53.924	K Factor = 24.01
E1	21		-176.33	3	2E	18.815	11.500	120	48.631	
to							18.815		0.0	
E2	21		-176.33	3.26			30.315	-0.0292	-0.884	Vel = 6.78
E2	21		0.0	3			10.000	120	47.747	
to									0.0	
E3	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
E3	21		0.0	3			10.000	120	47.455	
to									0.0	
E4	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
E4	21		0.0	3			10.000	120	47.163	
to									0.0	
E5	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
E5	21		0.0	3			10.000	120	46.871	
to									0.0	
E6	21		-176.33	3.26			10.000	-0.0291	-0.291	Vel = 6.78
E6	21		0.0	3			10.000	120	46.580	
to									0.0	
E7	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
E7	21		0.0	3			10.000	120	46.288	
to									0.0	
E8	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
E8	21		0.0	3			10.000	120	45.996	
to									0.0	
E9	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
E9	21		0.0	3			10.000	120	45.704	
to									0.0	
E10	21		-176.33	3.26			10.000	-0.0291	-0.291	Vel = 6.78
E10	21		0.0	3			10.000	120	45.413	
to									0.0	
E11	21		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
E11	21		0.0	3			10.000	120	45.121	
to									9.095	
E12	0		-176.33	3.26			10.000	-0.0292	-0.292	Vel = 6.78
			0.0							
E12			-176.33						53.924	K Factor = -24.01
E1	21		176.33	3	E	9.408	21.000	120	48.631	
to							9.408		8.012	
TOR2	2.500		176.33	3.26			30.408	0.0292	0.887	Vel = 6.78
TOR2	2.500		0.0	4	A	22.384	18.500	120	57.530	
to					B	15.8	38.184		0.650	
BOR2	1		176.33	4.26			56.684	0.0079	0.450	Vel = 3.97
BOR2	1		0.0	8			1.500	140	58.630	
to									0.866	
BASE	-1		176.33	8.27			1.500	0	0.0	Vel = 1.05
BASE	-1		0.0	8	2E	56.936	455.000	140	59.496	
to							56.936		6.000	* * Fixed Loss = 6
BF	-1		176.33	8.27			511.936	0.0002	0.121	Vel = 1.05
BF	-1	H100	100.00	8	G	6.326	38.000	140	65.617	
to					T	55.354	61.680		0.0	
UG1	-1		276.33	8.27			99.680	0.0005	0.054	Vel = 1.65
UG1	-1		0.0	8			113.000	140	65.671	
to									0.0	
UG2	-1		276.33	8.27			113.000	0.0005	0.061	Vel = 1.65
UG2	-1		0.0	8	E	28.468	15.000	140	65.732	
to					T	55.354	83.822		-0.866	
TEST	1		276.33	8.27			98.822	0.0005	0.053	Vel = 1.65
			0.0							
TEST			276.33						64.919	K Factor = 34.30

Hydraulic Calculations by HydraCALC

Crawford Sprinkler Company
2725 S. Saunders St.
Raleigh, NC 27603
919-828-9346

Job Name	:	CHEMICAL LAB 067
Drawing	:	
Location	:	800 EDWARDS BROTHERS DR.
Remote Area	:	2
Contract	:	J21 3010
Data File	:	KRIGEN CHEMICAL LAB 067.wxtmp

Hydraulic Design Information Sheet

Name - KIRGEN PHARMACEUTICALS - CHEMICAL LAB 067 Date - 1/25/21
Location - 800 EDWARDS BROTHERS DR.
Building - System No. - 2
Contractor - CSCO Contract No. - J21 3010
Calculated By - RVS Drawing No. - FP1
Construction: ( ) Combustible ( ) Non-Combustible Ceiling Height - 10'-0"
Occupancy - LAB

SYSTEM DESIGN

(X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. (X) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other
Specific Ruling Made By Date

Area of Sprinkler Operation - 1500	System Type	Sprinkler/Nozzle
Density - .15	(X) Wet	Make VIKING
Area Per Sprinkler - 130	( ) Dry	Model VK3021
Elevation at Highest Outlet -	( ) Deluge	Size 1/2"
Hose Allowance - Inside -	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance -	( ) Other	Temp.Rat.155
Hose Allowance - Outside - 250		

Note

Calculation Summary

Flow Required - Press Required -
C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 9/10/19		Cap. -
Time of Test -	Rated Cap.-	Elev.-
Static Press - 88	@ Press -	
Residual Press - 58	Elev. -	Well
Flow - 1186		Proof Flow
Elevation - 0		

Location - 800 EDWARDS BROTHERS DR.

Source of Information - LILLINGTON FIRE DEPT.

COMMODITY STORAGE

Commodity Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled % Palletized % Rack

( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage	( ) Encap.
( ) Double Row	( ) Slave Pallet	( ) Solid Shelf	( ) Non
( ) Mult. Row		( ) Open Shelf	

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

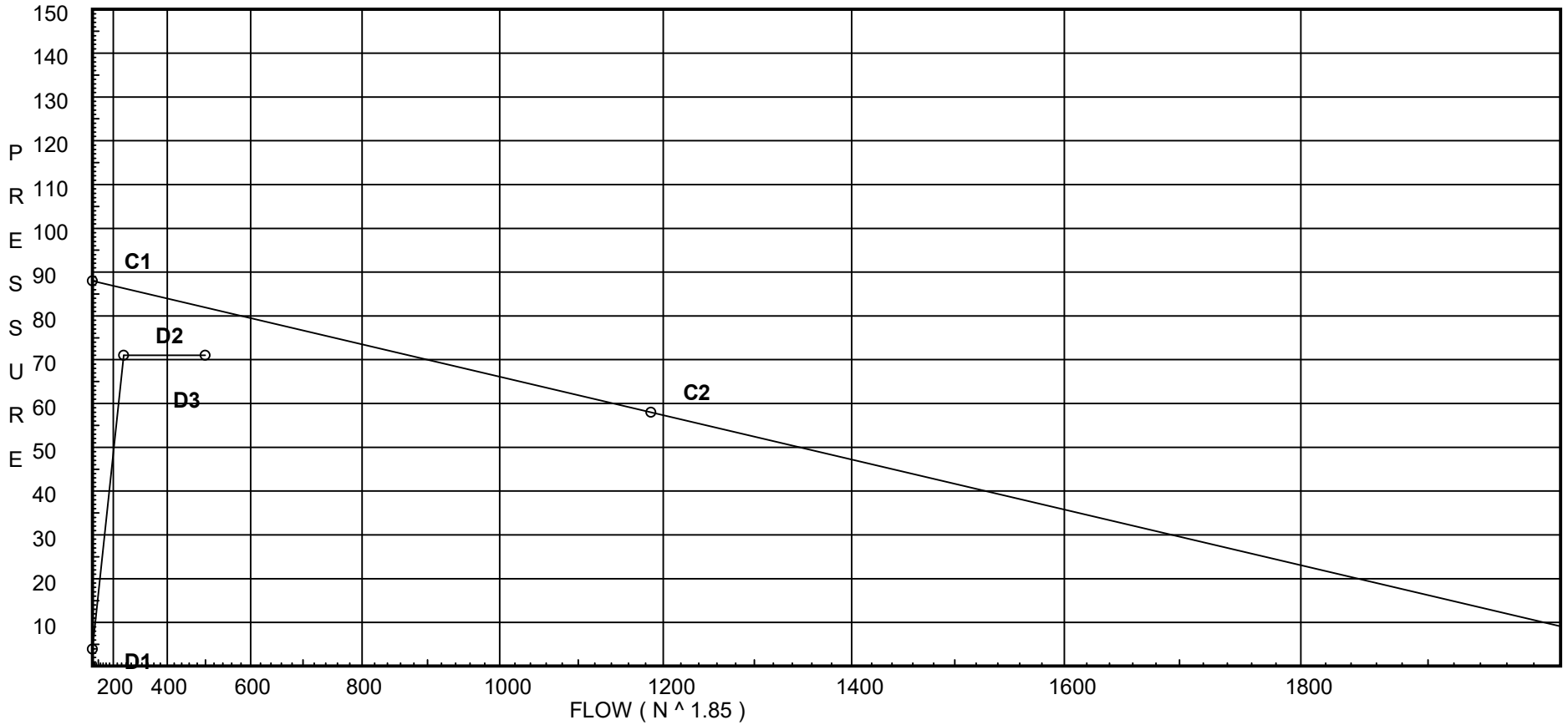
Water Supply Curve

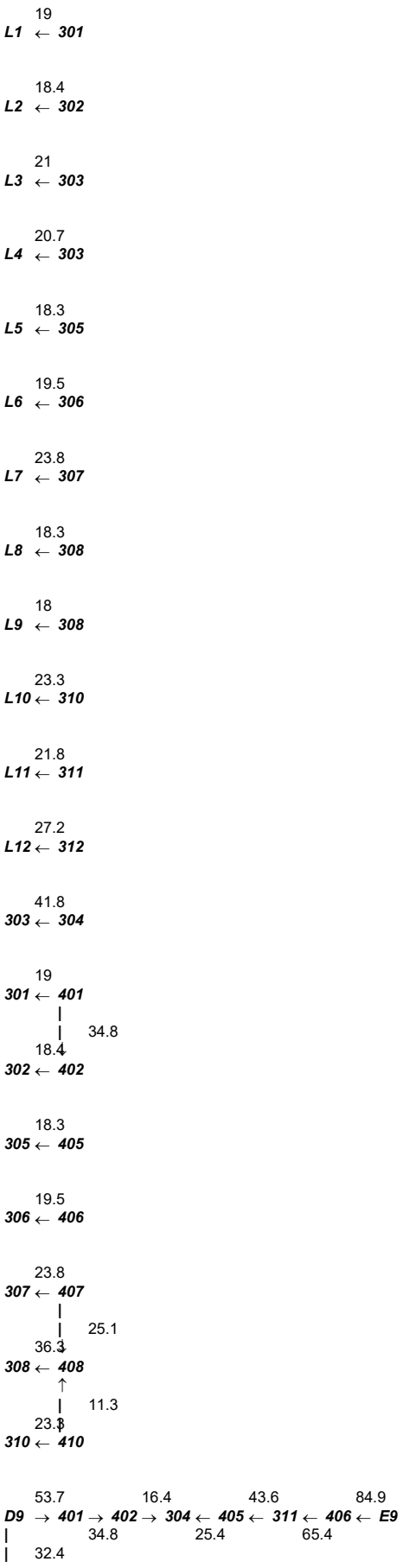
Crawford Sprinkler Company
CHEMICAL LAB 067

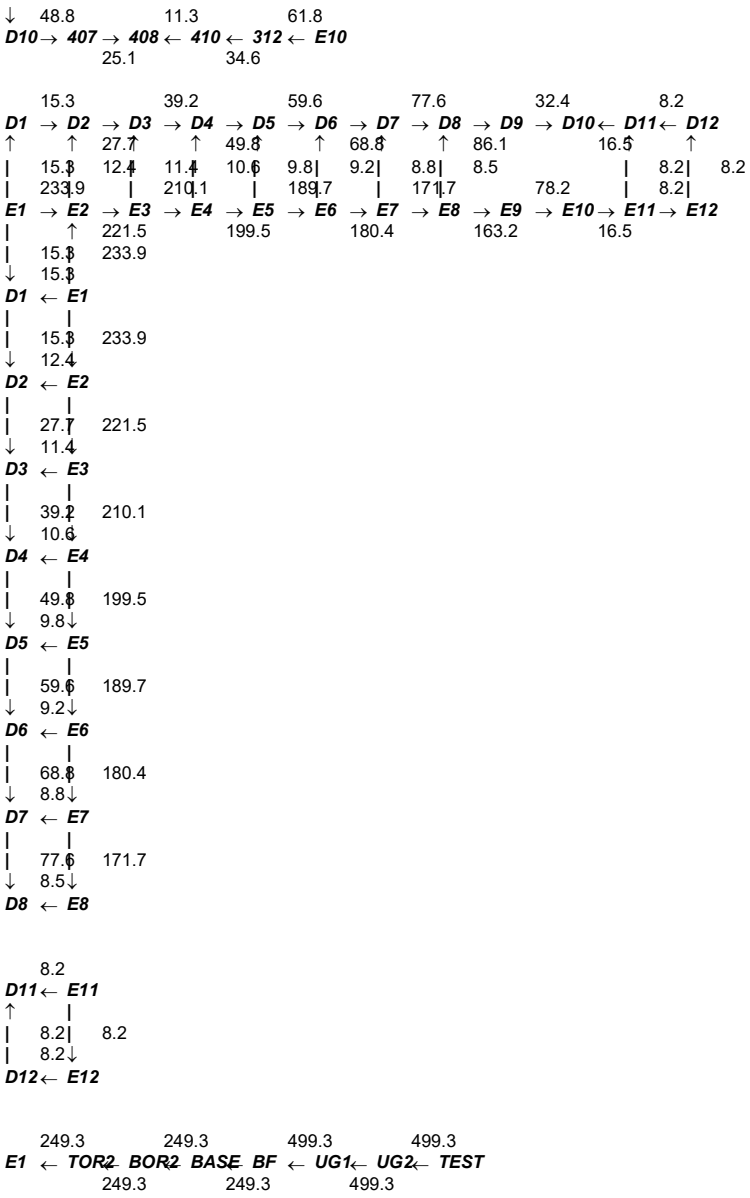
Date 1/25/2021

City Water Supply:
- C1 - Static Pressure : 88
- C2 - Residual Pressure: 58
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 3.898
- D2 - System Flow : 249.254
- D2 - System Pressure : 70.988
- Hose (Demand) : 250
- D3 - System Demand : 499.254
- Safety Margin : 10.960




19
L1 ← 301
18.4
L2 ← 302
21
L3 ← 303
20.7
L4 ← 303
18.3
L5 ← 305
19.5
L6 ← 306
23.8
L7 ← 307
18.3
L8 ← 308
18
L9 ← 308
23.3
L10 ← 310
21.8
L11 ← 311
27.2
L12 ← 312
41.8
303 ← 304
19
301 ← 401
34.8
18.4
302 ← 402
18.3
305 ← 405
19.5
306 ← 406
23.8
307 ← 407
25.1
36.3
308 ← 408
11.3
23.3
310 ← 410
53.7
16.4
43.6
84.9
D9 → 401 → 402 → 304 ← 405 ← 311 ← 406 ← E9
34.8
25.4
65.4
32.4


48.8
11.3
61.8
D10 407 408 410 312 E10
25.1
34.6
15.3
39.2
59.6
77.6
32.4
8.2
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12
27.7
49.8
68.8
86.1
16.5
15.3
12.4
11.4
10.6
9.8
9.2
8.8
8.5
8.2
8.2
233.9
210.1
189.7
171.7
78.2
8.2
E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12
221.5
199.5
180.4
163.2
16.5
15.3
233.9
15.3
D1 E1
15.3
233.9
12.4
D2 E2
27.7
221.5
11.4
D3 E3
39.2
210.1
10.6
D4 E4
49.8
199.5
9.8
D5 E5
59.6
189.7
9.2
D6 E6
68.8
180.4
8.8
D7 E7
77.6
171.7
8.5
D8 E8
8.2
D11 E11
8.2
8.2
D12 E12
249.3
249.3
499.3
499.3
E1 TOR2 BOR2 BASE BF UG1 UG2 TEST
249.3
249.3
499.3

Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29							
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	88.0	58	1186.0	81.947	499.25	70.988

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
L1	10.0	5.6	11.46	18.96	0.15	88
L2	10.0	5.6	10.75	18.36	0.15	91
L3	10.0	5.6	14.11	21.03	0.15	130
L4	10.0	5.6	13.69	20.72	0.15	130
L5	10.0	5.6	10.66	18.28	0.15	79
L6	10.0	5.6	12.13	19.5	0.15	130
L7	10.0	5.6	18.04	23.79	0.15	130
L8	10.0	5.6	10.71	18.33	0.15	97
L9	10.0	5.6	10.36	18.02	0.15	98
L10	10.0	5.6	17.3	23.29	0.15	130
L11	10.0	5.6	15.13	21.79	0.15	130
L12	10.0	5.6	23.56	27.18	0.15	130
303	24.5		13.04			
301	24.5		9.49			
302	24.5		8.58			
305	24.5		8.84			
306	24.5		10.63			
307	24.5		18.31			
308	24.5		8.64			
310	24.5		18.1			
D9	23.0		46.84			
401	24.5		14.47			
402	24.5		13.28			
304	24.5		13.12			
405	24.5		13.49			
311	24.5		14.8			
406	24.5		15.87			
D10	23.0		46.8			
407	24.5		25.89			
408	24.5		25.24			
410	24.5		25.39			
312	24.5		26.24			
D1	23.0		47.65			
D2	23.0		47.65			
D3	23.0		47.62			
D4	23.0		47.57			
D5	23.0		47.49			
D6	23.0		47.38			
D7	23.0		47.23			
D8	23.0		47.05			
D11	23.0		46.81			
E1	21.0		53.06			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
E2	21.0		51.57		
E3	21.0		51.12		
E4	21.0		50.72		
E5	21.0		50.35		
E6	21.0		50.02		
E7	21.0		49.71		
E8	21.0		49.43		
E9	21.0		49.18		
E10	21.0		49.12		
E11	21.0		49.11		
D12	23.0		46.81		
TOR2	2.5		62.75		
BOR2	1.0		64.25		
BASE	-1.0		65.12		
BF	-1.0		71.35	250.0	
UG1	-1.0		71.51		
UG2	-1.0		71.69		
TEST	1.0		70.99		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
L1	10	5.60	18.96	1	2E	4.0	32.500	120	11.463	
to							4.000		-6.280	
301	24.500		18.96	1.049			36.500	0.1179	4.303	Vel = 7.04
			0.0							
301			18.96						9.486	K Factor = 6.16
L2	10	5.60	18.36	1	2E	4.0	33.000	120	10.752	
to							4.000		-6.280	
302	24.500		18.36	1.049			37.000	0.1111	4.111	Vel = 6.82
			0.0							
302			18.36						8.583	K Factor = 6.27
L3	10	5.60	21.03	1	2E	4.0	32.500	120	14.105	
to							4.000		-6.280	
303	24.500		21.03	1.049			36.500	0.1428	5.213	Vel = 7.81
			0.0							
303			21.03						13.038	K Factor = 5.82
L4	10	5.60	20.72	1	E	2.0	33.500	120	13.691	
to					T	5.0	7.000		-6.280	
303	24.500		20.72	1.049			40.500	0.1389	5.627	Vel = 7.69
			0.0							
303			20.72						13.038	K Factor = 5.74
L5	10	5.60	18.28	1	2E	4.0	36.500	120	10.656	
to							4.000		-6.280	
305	24.500		18.28	1.049			40.500	0.1102	4.463	Vel = 6.79
			0.0							
305			18.28						8.839	K Factor = 6.15
L6	10	5.60	19.50	1	2E	4.0	34.500	120	12.125	
to							4.000		-6.280	
306	24.500		19.5	1.049			38.500	0.1242	4.781	Vel = 7.24
			0.0							
306			19.50						10.626	K Factor = 5.98
L7	10	5.60	23.79	1	2E	4.0	32.500	120	18.044	
to							4.000		-6.280	
307	24.500		23.79	1.049			36.500	0.1793	6.546	Vel = 8.83
			0.0							
307			23.79						18.310	K Factor = 5.56
L8	10	5.60	18.33	1	2E	4.0	34.000	120	10.710	
to							4.000		-6.280	
308	24.500		18.33	1.049			38.000	0.1107	4.207	Vel = 6.80
			0.0							
308			18.33						8.637	K Factor = 6.24
L9	10	5.60	18.02	1	E	2.0	35.500	120	10.356	
to					T	5.0	7.000		-6.280	
308	24.500		18.02	1.049			42.500	0.1073	4.561	Vel = 6.69
			0.0							
308			18.02						8.637	K Factor = 6.13
L10	10	5.60	23.29	1	2E	4.0	37.000	120	17.303	
to							4.000		-6.280	
310	24.500		23.29	1.049			41.000	0.1726	7.075	Vel = 8.65

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
310			23.29						18.098	K Factor = 5.47
L11	10	5.60	21.79	1	E	2.0	32.000	120	15.134	
to					T	5.0	7.000		-6.280	
311	24.500		21.79	1.049			39.000	0.1525	5.946	Vel = 8.09
			0.0							
311			21.79						14.800	K Factor = 5.66
L12	10	5.60	27.18	1	E	2.0	32.000	120	23.562	
to					T	5.0	7.000		-6.280	
312	24.500		27.18	1.049			39.000	0.2296	8.954	Vel = 10.09
			0.0							
312			27.18						26.236	K Factor = 5.31
303	24.500		41.75	1			0.167	120	13.038	
to									0.0	
304	24.500		41.75	1.049			0.167	0.5090	0.085	Vel = 15.50
			0.0							
304			41.75						13.123	K Factor = 11.52
301	24.500		18.96	0.5	T	1.59	0.167	120	9.486	
to							1.590		0.0	
401	24.500		18.96	0.546			1.757	2.8344	4.980	Vel = 25.98
			0.0							
401			18.96						14.466	K Factor = 4.98
302	24.500		18.36	0.5	T	1.59	0.167	120	8.583	
to							1.590		0.0	
402	24.500		18.36	0.546			1.757	2.6716	4.694	Vel = 25.16
			0.0							
402			18.36						13.277	K Factor = 5.04
305	24.500		18.28	0.5	T	1.59	0.167	120	8.839	
to							1.590		0.0	
405	24.500		18.28	0.546			1.757	2.6500	4.656	Vel = 25.05
			0.0							
405			18.28						13.495	K Factor = 4.98
306	24.500		19.50	0.5	T	1.59	0.167	120	10.626	
to							1.590		0.0	
406	24.500		19.5	0.546			1.757	2.9863	5.247	Vel = 26.72
			0.0							
406			19.50						15.873	K Factor = 4.89
307	24.500		23.79	0.5	T	1.59	0.167	120	18.310	
to							1.590		0.0	
407	24.500		23.79	0.546			1.757	4.3130	7.578	Vel = 32.60
			0.0							
407			23.79						25.888	K Factor = 4.68
308	24.500		36.35	0.5	T	1.59	0.167	120	8.637	
to							1.590		0.0	
408	24.500		36.35	0.546			1.757	9.4491	16.602	Vel = 49.81
			0.0							
408			36.35						25.239	K Factor = 7.24

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
310	24.500		23.29	0.5	T	1.59	0.167	120	18.098	
to							1.590		0.0	
410	24.500		23.29	0.546			1.757	4.1491	7.290	Vel = 31.91
			0.0							
410			23.29						25.388	K Factor = 4.62
D9	23		-53.72	1.25	9E	27.0	116.000	120	46.835	
to					T	6.0	33.000		-0.650	
401	24.500		-53.72	1.38			149.000	-0.2129	-31.719	Vel = 11.52
401	24.500		18.96	1.25			12.500	120	14.466	
to									0.0	
402	24.500		-34.76	1.38			12.500	-0.0951	-1.189	Vel = 7.46
402	24.500		18.37	1.25			6.500	120	13.277	
to									0.0	
304	24.500		-16.39	1.38			6.500	-0.0237	-0.154	Vel = 3.52
304	24.500		41.75	1.25			7.000	120	13.123	
to									0.0	
405	24.500		25.36	1.38			7.000	0.0531	0.372	Vel = 5.44
405	24.500		18.28	1.25			9.000	120	13.495	
to									0.0	
311	24.500		43.64	1.38			9.000	0.1450	1.305	Vel = 9.36
311	24.500		21.79	1.25			3.500	120	14.800	
to									0.0	
406	24.500		65.43	1.38			3.500	0.3066	1.073	Vel = 14.03
406	24.500		19.50	1.25	E	3.0	55.000	120	15.873	
to					T	6.0	9.000		1.516	
E9	21		84.93	1.38			64.000	0.4968	31.793	Vel = 18.22
			0.0							
E9			84.93						49.182	K Factor = 12.11
D10	23		-48.84	1.25	E	3.0	104.500	120	46.799	
to					T	6.0	9.000		-0.650	
407	24.500		-48.84	1.38			113.500	-0.1785	-20.261	Vel = 10.48
407	24.500		23.79	1.25			12.500	120	25.888	
to									0.0	
408	24.500		-25.05	1.38			12.500	-0.0519	-0.649	Vel = 5.37
408	24.500		36.34	1.25			12.500	120	25.239	
to									0.0	
410	24.500		11.29	1.38			12.500	0.0119	0.149	Vel = 2.42
410	24.500		23.30	1.25			9.000	120	25.388	
to									0.0	
312	24.500		34.59	1.38			9.000	0.0942	0.848	Vel = 7.42
312	24.500		27.18	1.25	E	3.0	68.500	120	26.236	
to					T	6.0	9.000		1.516	
E10	21		61.77	1.38			77.500	0.2757	21.365	Vel = 13.25
			0.0							
E10			61.77						49.117	K Factor = 8.81
D1	23		-15.34	2.5			10.000	120	47.654	
to									0.0	
D2	23		-15.34	2.635			10.000	-0.0009	-0.009	Vel = 0.90

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
D2	23		-12.39	2.5			10.000	120	47.645			
to									0.0			
D3	23		-27.73	2.635			10.000	-0.0027	-0.027	Vel = 1.63		
D3	23		-11.44	2.5			10.000	120	47.618			
to									0.0			
D4	23		-39.17	2.635			10.000	-0.0050	-0.050	Vel = 2.30		
D4	23		-10.58	2.5			10.000	120	47.568			
to									0.0			
D5	23		-49.75	2.635			10.000	-0.0080	-0.080	Vel = 2.93		
D5	23		-9.85	2.5			10.000	120	47.488			
to									0.0			
D6	23		-59.6	2.635			10.000	-0.0110	-0.110	Vel = 3.51		
D6	23		-9.23	2.5			10.000	120	47.378			
to									0.0			
D7	23		-68.83	2.635			10.000	-0.0144	-0.144	Vel = 4.05		
D7	23		-8.77	2.5			10.000	120	47.234			
to									0.0			
D8	23		-77.6	2.635			10.000	-0.0181	-0.181	Vel = 4.57		
D8	23		-8.48	2.5			10.000	120	47.053			
to									0.0			
D9	23		-86.08	2.635			10.000	-0.0218	-0.218	Vel = 5.06		
D9	23		53.72	2.5			10.000	120	46.835			
to									0.0			
D10	23		-32.36	2.635			10.000	-0.0036	-0.036	Vel = 1.90		
D10	23		48.84	2.5			10.000	120	46.799			
to									0.0			
D11	23		16.48	2.635			10.000	0.0011	0.011	Vel = 0.97		
D11	23		-8.25	2.5			10.000	120	46.810			
to									0.0			
D12	23		8.23	2.635			10.000	0.0002	0.002	Vel = 0.48		
			0.0									
D12			8.23						46.812	K Factor = 1.20		
E1	21		-233.91	3	2E	18.815	11.500	120	53.057			
to							18.815		0.0			
E2	21		-233.91	3.26			30.315	-0.0492	-1.491	Vel = 8.99		
E2	21		12.39	3			10.000	120	51.566			
to									0.0			
E3	21		-221.52	3.26			10.000	-0.0445	-0.445	Vel = 8.51		
E3	21		11.44	3			10.000	120	51.121			
to									0.0			
E4	21		-210.08	3.26			10.000	-0.0404	-0.404	Vel = 8.07		
E4	21		10.58	3			10.000	120	50.717			
to									0.0			
E5	21		-199.5	3.26			10.000	-0.0366	-0.366	Vel = 7.67		
E5	21		9.84	3			10.000	120	50.351			
to									0.0			
E6	21		-189.66	3.26			10.000	-0.0334	-0.334	Vel = 7.29		
E6	21		9.24	3			10.000	120	50.017			
to									0.0			
E7	21		-180.42	3.26			10.000	-0.0305	-0.305	Vel = 6.93		

Node1 / to / Node2	Elev1 / Elev2	K / Fact	Qa / Qt	Nom / Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact / Pf/Ft	Pt / Pe / Pf	******* Notes ******
E7	21		8.77	3			10.000	120	49.712	
to									0.0	
E8	21		-171.65	3.26			10.000	-0.0277	-0.277	Vel = 6.60
E8	21		8.48	3			10.000	120	49.435	
to									0.0	
E9	21		-163.17	3.26			10.000	-0.0253	-0.253	Vel = 6.27
E9	21		84.92	3			10.000	120	49.182	
to									0.0	
E10	21		-78.25	3.26			10.000	-0.0065	-0.065	Vel = 3.01
E10	21		61.77	3			10.000	120	49.117	
to									0.0	
E11	21		-16.48	3.26			10.000	-0.0003	-0.003	Vel = 0.63
E11	21		8.25	3			10.000	120	49.114	
to									9.095	
E12	0		-8.23	3.26			10.000	-0.0001	-0.001	Vel = 0.32
			0.0							
E12			-8.23						58.208	K Factor = -1.08
D1	23		15.34	1.25	2E	6.0	198.500	120	47.654	
to					2T	12.0	18.000		0.866	
E1	21		15.34	1.38			216.500	0.0210	4.537	Vel = 3.29
			0.0							
E1			15.34						53.057	K Factor = 2.11
D2	23		12.39	1.25	2E	6.0	198.500	120	47.645	
to					2T	12.0	18.000		0.866	
E2	21		12.39	1.38			216.500	0.0141	3.055	Vel = 2.66
			0.0							
E2			12.39						51.566	K Factor = 1.73
D3	23		11.44	1.25	2E	6.0	198.500	120	47.618	
to					2T	12.0	18.000		0.866	
E3	21		11.44	1.38			216.500	0.0122	2.637	Vel = 2.45
			0.0							
E3			11.44						51.121	K Factor = 1.60
D4	23		10.59	1.25	2E	6.0	198.500	120	47.568	
to					2T	12.0	18.000		0.866	
E4	21		10.59	1.38			216.500	0.0105	2.283	Vel = 2.27
			0.0							
E4			10.59						50.717	K Factor = 1.49
D5	23		9.84	1.25	2E	6.0	198.500	120	47.488	
to					2T	12.0	18.000		0.866	
E5	21		9.84	1.38			216.500	0.0092	1.997	Vel = 2.11
			0.0							
E5			9.84						50.351	K Factor = 1.39
D6	23		9.23	1.25	2E	6.0	198.500	120	47.378	
to					2T	12.0	18.000		0.866	
E6	21		9.23	1.38			216.500	0.0082	1.773	Vel = 1.98
			0.0							
E6			9.23						50.017	K Factor = 1.31

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
D7	23		8.77	1.25	2E	6.0	198.500	120	47.234	
to					2T	12.0	18.000		0.866	
E7	21		8.77	1.38			216.500	0.0074	1.612	Vel = 1.88
			0.0							
E7			8.77						49.712	K Factor = 1.24
D8	23		8.48	1.25	2E	6.0	198.500	120	47.053	
to					2T	12.0	18.000		0.866	
E8	21		8.48	1.38			216.500	0.0070	1.516	Vel = 1.82
			0.0							
E8			8.48						49.435	K Factor = 1.21
D11	23		8.24	1.25	2E	6.0	198.500	120	46.810	
to					2T	12.0	18.000		0.866	
E11	21		8.24	1.38			216.500	0.0066	1.438	Vel = 1.77
			0.0							
E11			8.24						49.114	K Factor = 1.18
D12	23		8.23	1.25	2E	6.0	198.500	120	46.812	
to					2T	12.0	18.000		9.961	
E12	0		8.23	1.38			216.500	0.0066	1.435	Vel = 1.77
			0.0							
E12			8.23						58.208	K Factor = 1.08
E1	21		249.25	3	E	9.408	21.000	120	53.057	
to							9.408		8.012	
TOR2	2.500		249.25	3.26			30.408	0.0554	1.684	Vel = 9.58
TOR2	2.500		0.0	4	A	22.384	18.500	120	62.753	
to					B	15.8	38.184		0.650	
BOR2	1		249.25	4.26			56.684	0.0150	0.852	Vel = 5.61
BOR2	1		0.0	8			1.500	140	64.255	
to									0.866	
BASE	-1		249.25	8.27			1.500	0.0007	0.001	Vel = 1.49
BASE	-1		0.0	8	2E	56.936	455.000	140	65.122	
to							56.936		6.000	* * Fixed Loss = 6
BF	-1		249.25	8.27			511.936	0.0004	0.228	Vel = 1.49
BF	-1	H250	250.00	8	G	6.326	38.000	140	71.350	
to					T	55.354	61.680		0.0	
UG1	-1		499.25	8.27			99.680	0.0016	0.162	Vel = 2.98
UG1	-1		0.0	8			113.000	140	71.512	
to									0.0	
UG2	-1		499.25	8.27			113.000	0.0016	0.182	Vel = 2.98
UG2	-1		0.0	8	E	28.468	15.000	140	71.694	
to					T	55.354	83.822		-0.866	
TEST	1		499.25	8.27			98.822	0.0016	0.160	Vel = 2.98
			0.0							
TEST			499.25						70.988	K Factor = 59.26

TO: CONTACT PERSON: DREW PATEL, PROJECT MANAGER, KRIGEN PHARMACEUTICALS
TEL: 919-961-3751

SPRINKLER DESIGN DATA

Project Name:	KRIGEN PHARMACEUTICALS	System:	WET
Project Street Address:	800 EDWARDS BROTHERS DRIVE, LILLINGTON, NC 27546	Sys. Sq. Ft.:	30,000
Suite: N/A	Floor#: 1	Ceiling Height:	VARIES
Designed By: REGIONAL FIRE SERVICES OF NC	Phone: 919-212-2722	Total Bldg. Hgt.:	27'-0"
Occupancy: FACTORY, PACKAGING	Hazard: ORDINARY, LIGHT		

DESIGN SUMMARY

	System #1	System #2	System #3
Design Method	CALCS, DENSITY/AREA	CALCS, DENSITY/AREA	CALCS, DENSITY/AREA
Design Area #	1	2	3
Location	WATER GENERATION AREA 110	PASSAGE AREA 58	PACKAGING MATERIAL AREA 21
Type of System	WET	WET	WET
Hazard Class	ORD. GR-2	LIGHT	ORD. GR-1
Criteria From	NFPA-13	NFPA-13	NFPA-13
Design Area (sq.ft.)	1500	900	1500
Sprinkler Spacing(sq.ft.)	256	256 MAX.	256
Density	.2	.1	.15
K-factor	11.2	11.2	11.2
Hose Allowance	250	100	250
# Design Sprinklers	10	11	10
Special Application Spk.	N/A	N/A	N/A
Requirement @ BOR			
G.P.M. Req'd	516.98	278.29	395.73
P.S.I. Req'd	60.03	36.75	46.48
Requirement @ TEST			
GPM Required	766.98	378.29	645.73
PSI Required	66.43	41.99	52.21
Safety factor @ Test	8.18	42.39	26.04
Dry Sys. Vol. (gal)	N/A	N/A	N/A

WATER SUPPLY INFORMATION

Tested by	LILLINGTON FIRE DEPARTMENT	Date/Time	9/10/2019	Pressure Hydrant	-
Hydrant Elevation	-	Flow Hydrant # 1	-	Flow Hydrant #2	-
Static (PSI)	88	Residiual (PSI)	58	Flow (gpm)	1186

Copy of Water Test Data Included with Calculation

Fire Pump Data

Flow test information provided from previously submitted contractor drawings.

MICROMATIC® STANDARD RESPONSE UPRIGHT SPRINKLER VK100 (K5.6)

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 Viking Micromatic® Standard Response Upright VK100 Sprinkler is a small, thermosensitive, glass-bulb spray sprinkler available in several different 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 atmospheres and are listed/approved as corrosion resistant as indicated in the Approval Charts.

Viking standard response sprinklers may be ordered and/or used as open sprinklers (glass bulb and pip cap assembly removed) on deluge systems. Refer to Ordering Instructions.

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

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Classes 2001, 2002, 2015, 2017, 2043

NOTE: Other International approval certificates are available upon request.

Refer to Approval Charts and Design Criteria for listing and 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) wwp
Factory tested hydrostatically to 500 psi (34.5 bar)
Thread size: 1/2” NPT, 15 mm BSP
Nominal K-Factor: 5.6 U.S. (80.6 metric**)
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-3/8” (60 mm)

† cULus Listing, FM Approval, and NFPA 13 installs require a minimum of 7 psi (0.5 bar). The minimum operating pressure for LPCB and CE Approvals ONLY is 5 psi (0.35 bar).

** 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:

Frame Casting: Brass UNS-C84400 or QM Brass
Deflector: Brass UNS-C23000 or Copper UNS-C19500
Bulb: Glass, nominal 5 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Screw: Brass UNS-C36000
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
For Polyester Coated Sprinklers: Belleville Spring-Exposed
For ENT coated Sprinklers: Belleville Spring - Exposed, Screw and Pipcap - ENT plated.

††Not for FM Approval.

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

Order Micromatic® Standard Response Upright VK100 by first adding 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, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, Wax Coated = C, Wax Over Polyester = V-/W, ENT = JN

Temperature Suffix: 135 °F (57 °C) = A, 155 °F (68 °C) = B, 175 °F (79 °C) = D, 200 °F (93 °C) = E, 212 °F (100 °C) = M, 286 °F (141 °C) = G, 360 °F (182 °C) = H, 500 °F (260 °C) = L.

For example, sprinkler VK100 with a 1/2” thread, Brass finish and a 155 °F (68 °C) temperature rating = Part No. 12986AB

Available Finishes And Temperature Ratings: Refer to Table 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

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:

A. Standard Wrench: Part No. 21475M/B (available since 2017).
B. Standard Wrench for Wax Coated Sprinklers: Part No. 10896W/B (available since 2000)
C. Socket Wrench for Wax Coated Sprinklers: Part No. 13577W/B* (available since 2006)

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

Sprinkler Cabinets:

A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION

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 pip cap and sealing spring 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

The Viking Micromatic® Standard Response Upright Sprinkler VK100 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.

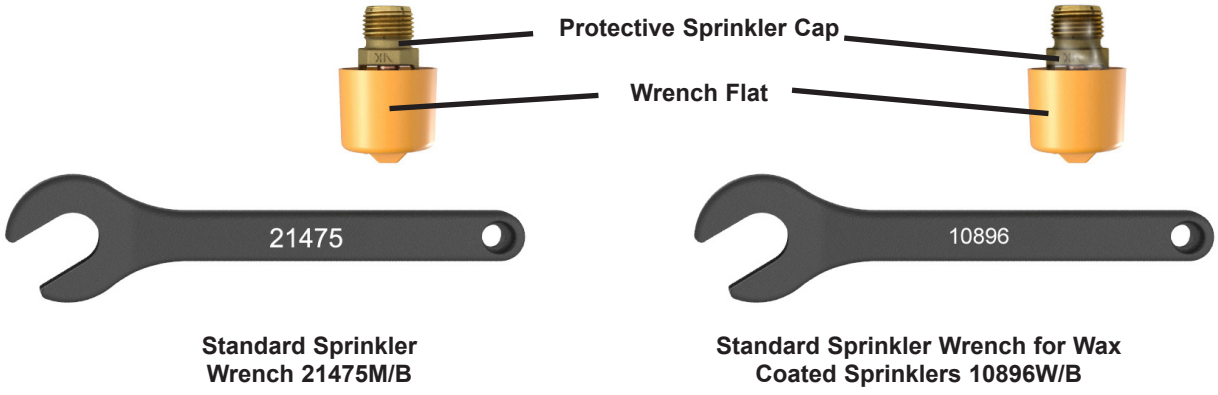


Figure 1:
Standard Sprinkler Wrenches

VIKING®

TECHNICAL DATA

MICROMATIC® STANDARD RESPONSE UPRIGHT SPRINKLER VK100 (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: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating[1]	Maximum Ambient Ceiling Temperature[2]	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue
Extra High	360 °F (182 °C)	300 °F (149 °C)	Mauve
Ultra High[3]	500 °F (260 °C)	465 °F (240 °C)	Black

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

Corrosion-Resistant Coatings[4]: White Polyester, Black Polyester, and Black PTFE in all temperature ratings. ENT in all temperature ratings except 135 °F (57 °C). Wax-Coated Brass and Wax over Polyester[5] for sprinklers with the following temperature ratings:
155 °F (68 °C) Lt. Brown Wax 175 °F (79 °C) Brown Wax 200 °F (93 °C) Brown Wax 286 °F (141 °C) Dk. Brown Wax[5]

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] Sprinklers of Ultra-High temperature rating are intended for use inside ovens, dryers, or similar enclosures with normal operating temperatures above 300 °F (149 °C). Where the ambient temperature around the Ultra-High temperature rated sprinkler is significantly reduced below 300 °F (149 °C), response time may be severely retarded.

[4] The corrosion-resistant 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. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and ENT coatings. For ENT coated automatic sprinklers, the waterway is coated.

[5] Wax melting point is 170 °F (76 °C) for 286 °F (141 °C) temperature rated sprinklers.

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TECHNICAL DATA

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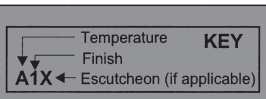
Approval Chart 1 (UL)

Micromatic® Standard Response Upright Sprinkler VK100
Maximum 175 PSI (12 bar) WWP



Sprinkler Base Part Number[1]	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals[3] (Refer also to UL Design Criteria.)			
		NPT	BSP	U.S.	metric[2]	Inches	mm	cULus[4]	VdS	LPCB	CE
Standard Orifice											
12986	VK100	1/2”	15 mm	5.6	80.6	2-1/4”	57	A1, B3, C4, D2, E5	--	--	--
12993	VK100	--	15 mm	5.6	80.6	2-1/4”	57	A1, B3, C4, D2, E5	--	--	--
NOTICE - Product Below - Limited Availability (Contact Local Viking Office)											
10138	VK100	1/2”	15 mm	5.6	80.6	2-1/4”	57	A1, B3, C4, D2, E5	--	--	--
10193	VK100	--	15 mm	5.6	80.6	2-1/4”	57	A1, B3, C4, D2, E5	--	--	--

Approved Temperature Ratings

A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), 286 °F (141 °C), and 360 °F (182 °C)

B - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)

C - 286 °F (141 °C)

D - 500 °F (260 °C)[7]

E - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), 286 °F (141 °C), 360 °F (182 °C), and 500 °F (260 °C)[7]

Approved Finishes

1 - Brass, Chrome, White Polyester[5,6], and Black Polyester[5,6]

2 - Brass and Chrome

3 - Wax-Coated Brass and Wax Over Polyester[5]

4 - High Temperature 200 °F (93 °C) Wax Coating (corrosion resistant); maximum ambient temperature allowed at ceiling = 150 °F (65 °C)

5 - ENT[5]

Footnotes

[1] Base part number is shown. For complete part number, refer to Viking’s current price schedule.

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

[3] This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.

[4] Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.

[5] cULus Listed as corrosion resistant.

[6] Other colors are available on request with the same Listings and Approvals as the standard colors.

[7] Sprinklers of Ultra-High temperature rating are intended for use inside ovens, dryers, or similar enclosures with normal operating temperatures above 300 °F (149 °C). Where the ambient temperature around the Ultra-High temperature rated sprinkler is significantly reduced below 300 °F (149 °C), the response time of the Ultra-High temperature rated sprinkler may be severely retarded.

DESIGN CRITERIA - UL

(Also refer to Approval Chart 1.)

cULus Listing Requirements:

The Viking Micromatic® Standard Response Upright Sprinkler VK100 is 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, Ordinary, and Extra Hazard occupancies.
- The sprinkler installation rules contained in NFPA 13 for standard spray upright sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Bulletin Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

VIKING®

TECHNICAL DATA

MICROMATIC® STANDARD RESPONSE UPRIGHT SPRINKLER VK100 (K5.6)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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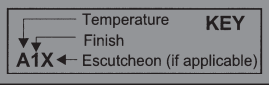
Approval Chart 2 (FM)

Micromatic® Standard Response Upright Sprinkler VK100
Maximum 175 PSI (12 bar) WWP



Sprinkler Base Part Number[1]	SIN	Thread Size		Nominal K-Factor		Overall Length		FM Approvals[3] (Refer also to Design Criteria below.)
		NPT	BSP	U.S.	metric[2]	Inches	mm	
Standard Orifice								
12986	VK100	1/2”	15 mm	5.6	80.6	2-1/4”	57	A1, B2, C3, D1, E4, F6
12993	VK100	--	15 mm	5.6	80.6	2-1/4”	57	A1, D1, E4, F6, G5
NOTICE - Product Below - Limited Availability (Contact Local Viking Office)								
10138	VK100	1/2”	15 mm	5.6	80.6	2-1/4”	57	A1, B2, C3, D1, E4, F6
10193	VK100	--	15 mm	5.6	80.6	2-1/4”	57	A1, G5, D1, E4, F6

Approved Temperature Ratings

A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), 212 °F (100 °C), 286 °F (141 °C), and 360 °F (182 °C)
B - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 212 °F (100 °C)
C - 286 °F (141 °C)
D - 500 °F (260 °C)[5]
E - 155 °F (68 °C)
F - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), 286 °F (141 °C), 360 °F (182 °C), and 500 °F (260 °C)[5]
G - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)

Approved Finishes

1 - Brass, Chrome, White Polyester[4], and Black Polyester[4]

2 - Wax-Coated Brass (corrosion resistant)

3 - High Temperature 200 °F (93 °C) Wax Coating (corrosion resistant); maximum ambient temperature allowed at ceiling = 150 °F (65 °C)

4 - Wax-Coated Brass and Wax Over Polyester[5]

5 - White Polyester and Wax-Coated Brass (corrosion resistant)

6- ENT[6]

Footnotes

[1] Base part number is shown. For complete part number, refer to Viking’s current price schedule.

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

[3] This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.

[4] Other colors are available on request with the same Approvals as the standard colors.

[5] Sprinklers of Ultra-High temperature rating are intended for use inside ovens, dryers, or similar enclosures with normal operating temperatures above 300 °F (149 °C). Where the ambient temperature around the Ultra-High temperature rated sprinkler is significantly reduced below 300 °F (149 °C), the response time of the Ultra-High temperature rated sprinkler may be severely retarded.

[6] FM approved as corrosion resistant.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2.)

FM Approval Requirements:

The Viking Micromatic® Standard Response Upright Sprinkler VK100 is is FM Approved as standard 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 cULus and/or NFPA criteria.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Bulletin Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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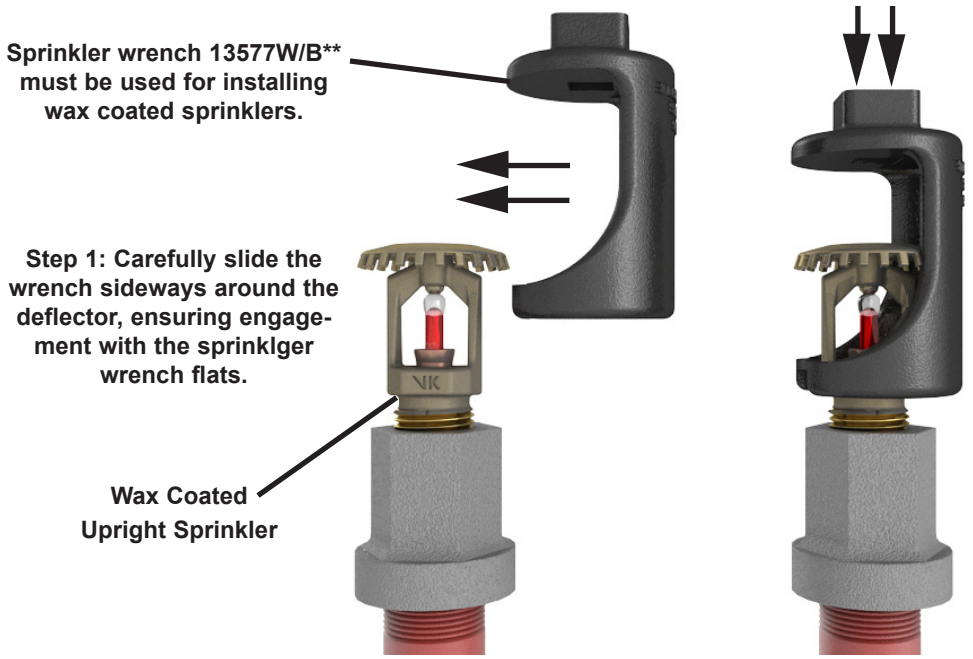

** A 1/2" ratchet is required (not available from Viking)

Step 2: Carefully press the wrench downward and ensure engagement with the sprinkler wrench flats.

Figure 2: Socket Wrench 13577W/B for Wax Coated Sprinklers

MICROMATIC® STANDARD RESPONSE HORIZONTAL SIDEWALL SPRINKLER VK104 (K5.6)

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
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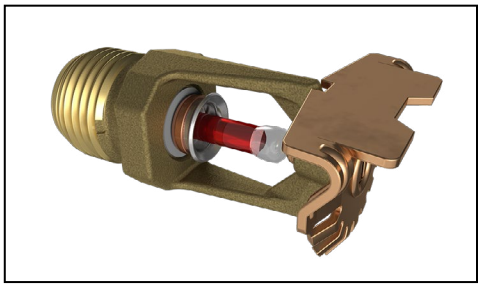
1. DESCRIPTION

The Micromatic® Viking Standard Response Horizontal Sidewall Sprinkler VK104 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, the ENT and Polyester coatings have been investigated for installation in corrosive environments and are listed/approved as indicated in the Approval Chart(s).



Horizontal Sidewall
For Light Hazard Occupancies Only

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

2. LISTINGS AND APPROVALS*

cULus Listed: Category VNIV

FM Approved: Class Series 2000

LPCB Approved

CE Certified: Standard EN 12259-1, EC-certificate of constancy of performance 0832-CPR-S0021, EC-Certificate of Conformmity 0832-CPD-2001

China Approval: Approved according to China GB standard.

NOTE: Other international approval certificates are available upon reqeust.

* Refer to the approval charts and design criteria for Listing and approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: 7 psi (0.5 bar)
Rated to 175 psi (12 bar) water working pressure
Factory tested hydrostatically to 500 psi (34.5 bar)
Nominal K-Factor: 5.6 U.S. (80.6 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: 2-1/2” (64 mm)

Material Standards:
Frame Casting: Brass UNS-C84400 or QM Brass
Deflector: Copper UNS-C19500
Bulb: Glass, nominal 5 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
Screw: Brass UNS-C36000
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400.
For ENT Coated Sprinklers: Belleville Spring-Exposed, Screw and Pip Cap-ENT Coated
For Polyester Coated Sprinklers: Belleville Spring-Exposed

Ordering Information: Refer to Table 1.

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 pip cap and sealing spring 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

The Micromatic® Viking Standard Response Horizontal Sidewall Sprinkler VK104 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.

VIKING®

TECHNICAL DATA

MICROMATIC® STANDARD RESPONSE HORIZONTAL SIDEWALL SPRINKLER VK104 (K5.6)

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TABLE 1: ORDERING INFORMATION

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

Sprinkler Base Part No.	Size		1: Finishes		2: Temperature Ratings				
	NPT Inch	BSPT mm	Description	Suffix[1]	Nominal Rating	Bulb Color	Hazard Classification	Max. Ambient Ceiling Temperature[2]	Suffix
12995	1/2	--	Brass	A	135 °F (57 °C)	Orange	Ordinary	100 °F (38 °C)	A
12988	--	15	Chrome	F	155 °F (68 °C)	Red	Ordinary	100 °F (38 °C)	B
20230	--	15	White Polyester [3,4]	M-/W	175 °F (79 °C)	Yellow	Intermediate	150 °F (65 °C)	D
			Black Polyester [3,4]	M-/B	200 °F (93 °C)	Green	Intermediate	150 °F (65 °C)	E
			Wax	C	286 °F (141 °C)	Blue	High	225 °F (107 °C)	G
			Wax over Polyester	V-/W	360 °F (182 °C)	Mauve	Extra High	300 °F (149 °C)	H
			ENT[3,4,6,7]	JN					

Example: 12995MB/W = VK104 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.

Corrosion Resistant Coatings[4]

- White Polyester and Black Polyester in all temperature ratings.
- Wax-Coated Brass and Wax over Polyester[3,4] for sprinklers with the following temperature ratings:
  155 °F (68 °C) Lt. Brown Wax | 175 °F (79 °C) Brown Wax | 200 °F (93 °C) Brown Wax | 286 °F (141 °C) Dk. Brown Wax[5]

Accessories

Sprinkler Wrenches (see Figure 1):

A. Standard Wrench: Part No. 21475M/B
B. Standard Wrench for Wax Coated Sprinklers: Part No. 10896W/B
C. Socket Wrench for Recessed Pendent Sprinklers: Part No. 13655W/B (A 1/2" ratchet is required, not available from Viking)
D. Socket Wrench for Wax Coated Sprinklers: Part No. 13577W/B (A 1/2" ratchet is required, not available from Viking)

Sprinkler Cabinet:

A. Up to 6 sprinklers: Part number 01724A (available since 1971).
B. 6-12 Sprinklers: Part number 01725A (available since 1971).

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. The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Chart(s). 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 coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and ENT coatings. For ENT coated automatic sprinklers, the waterway is coated.
5. Wax melting point is 170 °F (76 °C) for 286 °F (141 °C) temperature rated sprinklers. For more information regarding wax coatings, refer to Bulletin Form No. F_010201.
6. FM Approved as corrosion resistant.
7. Not available in 135 °F (57 °C)

TECHNICAL DATA

MICROMATIC® STANDARD RESPONSE HORIZONTAL SIDEWALL SPRINKLER VK104 (K5.6)

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Figure 1: Sprinkler Wrenches

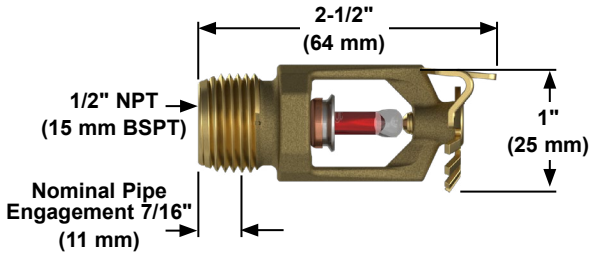

Figure 2: Sprinkler Dimensions

Step 1: Carefully slide the wrench sideways around the deflector, ensuring engagement with the sprinkler wrench flats.

Step 2: Carefully press the wrench onto the sprinkler wrench flats.

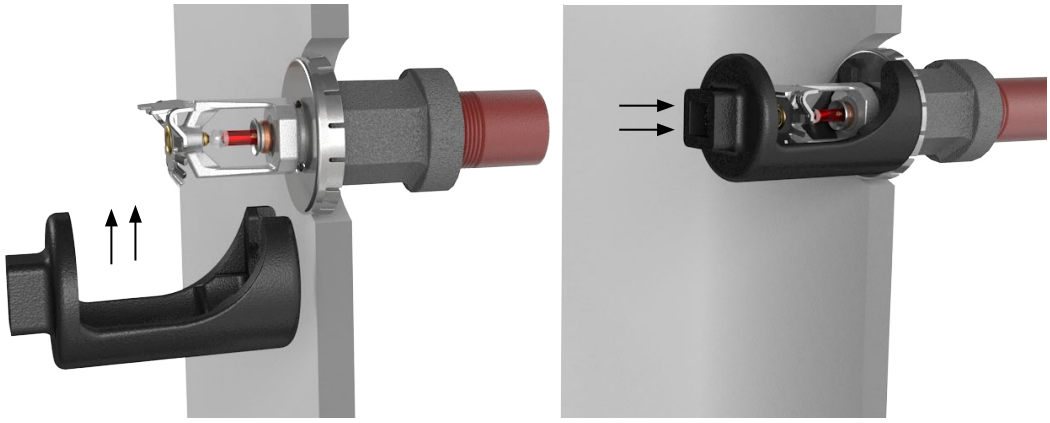

Figure 3: Recessed Sprinkler Installation

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

TECHNICAL DATA

MICROMATIC® STANDARD RESPONSE HORIZONTAL SIDEWALL SPRINKLER VK104 (K5.6)

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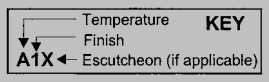
Approval Chart 1 (UL)

Micromatic® Viking Standard Response Horizontal Sidewall Sprinkler VK104
For Light Hazard Occupancies Only
Maximum 175 PSI (12 Bar) WWP



Sprinkler Base Part Number[1]	SIN	Thread Size		Nominal K-factor		Overall Length		Listings and Approvals[3] (Refer also to UL Design Criteria.)				
		NPT	BSPT	U.S.	metric[2]	Inches	mm	cULus[4]	LPCB	MED	CE[8]	China Approval
12995	VK104	1/2"	--	5.6	80.6	2-1/2"	64	A1Z, B1X, B2X, C4Z, E4Y	A1Z, B2Z	C1[9]	C1Z[8]	--
12988	VK104	--	15 mm	5.6	80.6	2-1/2"	64	A1Z, B1X, B2X, C4Z, E4Y	A1Z, B2Z	C1[9]	C1Z[8]	--
20230[10]	VK104	--	15 mm	5.6	80.6	2-1/2"	64	D3	--	--	--	D3
NOTICE - Product Below - No longer offered.												
10224	VK104	1/2"	--	5.6	80.6	2-1/2"	64	B2W, B1W, A1X	A1Z	C1[9]	C1Y[8]	C1Z[9]
10171	VK104	--	15 mm	5.6	80.6	2-1/2"	64	B2W, B1W, A1X	A1Z	C1[9]	C1Y[8]	C1Z[9]

Approved Temperature Rating Codes

A = 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), 286 °F (141 °C), and 360 °F (182 °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), 286 °F (141 °C), and 360 °F (182 °C)
D = 155 °F (68 °C)
E = 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)

Approved Finish Codes

1 = Brass, Chrome, White Polyester[6,7], and Black Polyester[6,7]
2 = Wax-Coated Brass and Wax Over Polyester (corrosion resistant)
3 = Chrome
4 = ENT[6]

Approved Escutcheon Codes

W = Standard surface-mounted escutcheons or recessed with the Viking Model E-1, E-2, E-3, or Model G-1 Recessed Escutcheons
X = Standard surface-mounted escutcheons or recessed with the Viking Model E-1, E-2, or E-3 Recessed Escutcheons
Y = Installed with surface-mounted escutcheons or recessed with the Viking Model E-1 Recessed Escutcheons
Z = Installed with surface-mounted escutcheons only

Footnotes

1. Base part number shown. For complete part number, 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. Listings and Approvals are limited to Light Hazard Occupancies where allowed by the installation standards being applied.
5. Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.
6. cULus Listed as corrosion-resistant.
7. Other colors are available on request with the same Listings and Approvals as the standard colors.
8. Certified, Standard EN 12259-1, EC-certificate of conformity 0832-CPD-0021 and 0832-CPD-2003.
9. MED Certified, Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008.
10. Approved according to China GB standard.

DESIGN CRITERIA - UL

(Also refer to Approval Chart 1 above.)

cULus Listing Requirements:

The Micromatic® Viking Standard Response Horizontal Sidewall Sprinkler VK104 is cULus Listed as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13 for sidewall standard spray sprinklers.

- For use in Light Hazard occupancies only where allowed by the installation standards being applied.
- Locate the deflector 4" to 12" (102 mm to 305 mm) below the ceiling.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 6 ft. (1.8 m).
- Align the top of the deflector parallel with the ceiling.
- Locate no less than 4" (102 mm) from end walls.
- Maximum distance from end walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for sidewall standard spray sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Bulletin Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

VIKING®

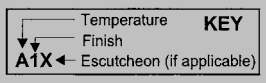
TECHNICAL DATA

MICROMATIC® STANDARD RESPONSE HORIZONTAL SIDEWALL SPRINKLER VK104 (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 1 (FM)

Micromatic® Viking Standard Response Horizontal Sidewall Sprinkler VK104
Maximum 175 PSI (12 Bar) WWP



Sprinkler Base Part Number[1]	SIN	Thread Size		Nominal K-factor		Overall Length		FM Approvals[3] (Refer also to UL Design Criteria.)
		NPT	BSPT	U.S.	metric[2]	Inches	mm	
12995	VK104	1/2”	--	5.6	80.6	2-1/2”	64	A1Y, B1X, C2Y, D2W
12988	VK104	--	15 mm	5.6	80.6	2-1/2”	64	A1Y, B1X, C2Y, D2W
20230[6]	VK104	--	15 mm	5.6	80.6	2-1/2”	64	E3
NOTICE - Product Below - No longer offered.								
10224	VK104	1/2”	--	5.6	80.6	2-1/2”	64	A1Y, B1X
10171	VK104	--	15 mm	5.6	80.6	2-1/2”	64	A1Y, B1X

Approved Temperature Rating Codes

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), 200 °F (93 °C)
E = 155 °F (68 °C)

Approved Finish Code	Approved Escutcheon Codes
1 = Brass and Chrome 2 = ENT[5] 3 = Chrome	X = Standard surface-mounted escutcheons or recessed with the Viking Model E-1, E-2, E-3, or G-1 Recessed Escutcheons Y = Standard surface-mounted escutcheons only W = Standard surface-mounted escutcheons or recessed with the Viking Model E-1 Recessed Escutcheons

Footnotes

1. Base part number shown. For complete part number, 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. Listings and Approvals are limited to Light Hazard Occupancies where allowed by the installation standards being applied.
5. FM Approved as corrosion resistant.
6. Approved according to China GB standard.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

FM Approval Requirements:

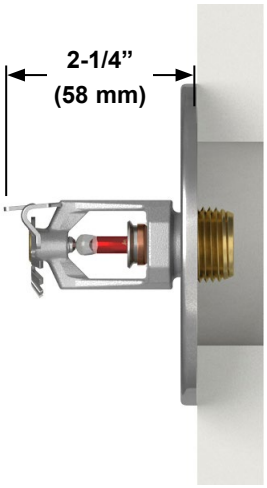
The Micromatic® Viking Standard Response Horizontal Sidewall Sprinkler VK104 is FM Approved as standard response sidewall **Non-Storage** sprinklers, as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data 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.

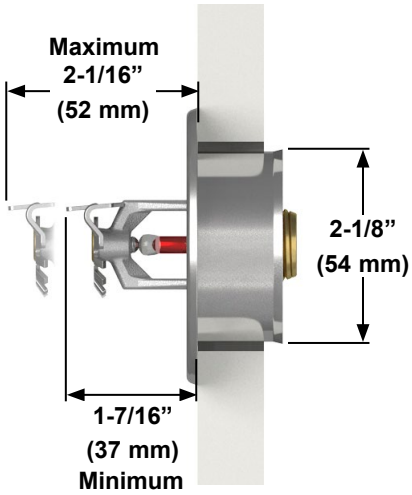
IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Bulletin Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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

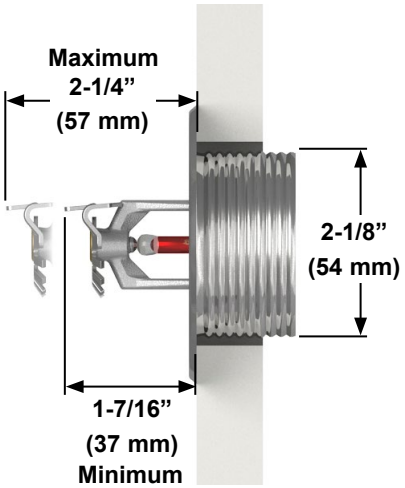
Wall Opening Size:
Maximum - 2-1/2" (64 mm)
Minimum - 2-5/16" (57 mm)



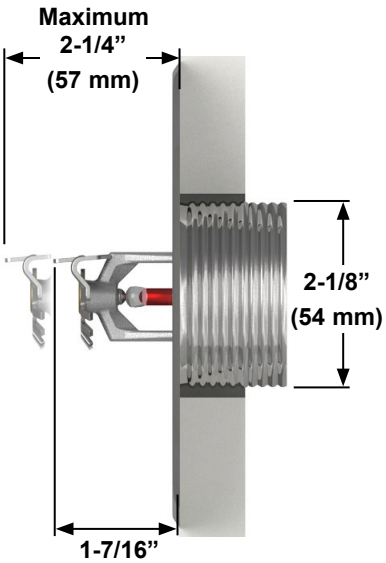
Surface-Mounted Escutcheon



Model E-1 Recessed Escutcheon



Model E-2 Recessed Escutcheon



Model E-3 Recessed Escutcheon

Figure 4: Installation Dimensions with Escutcheons

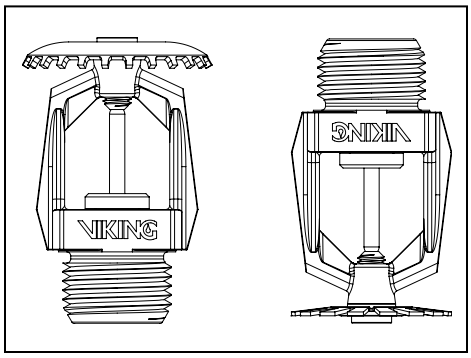
MICROFAST® QUICK RESPONSE STAINLESS STEEL SPRINKLERS VK338 AND VK339

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

Viking Microfast® Quick Response Stainless Steel Sprinklers are small, corrosion-resistant, thermosensitive, glass-bulb spray sprinklers. The design consists of a solid stainless steel frame and deflector, with a nominal 3 mm glass-bulb operating element. These sprinklers can withstand many harsh corrosive environments that may cause regular brass sprinklers to deteriorate.



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

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Class 2042

CE: Standard EN12259-1, DOP_VK339_14-2-20

Refer to the Approval Charts and Design Criteria for listing and approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Available since 2007.
Minimum Operating Pressure: 7 psi (0.5 bar)
Maximum Working Pressure: 175 psi (12 bar)
Factory tested hydrostatically to 500 psi (34.5 bar)
Thread size: 1/2” (15 mm) NPT
Nominal K-Factor: 5.6 U.S. (80.6 metric†)
† Metric K-factor measurement shown 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: 2-3/16” (55 mm)

Material Standards:
Frame Casting: Stainless Steel UNS-J92800
Deflector: Stainless Steel UNS-N08367
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, PTFE coated on both sides and coated with PTFE Tape
Screw: Stainless Steel UNS-S31603
Pip Cap: Monel UNS-N04400

Ordering Information: (Also refer to the current Viking price list.)
Order Microfast® Quick Response Stainless Steel Sprinklers by first adding the appropriate suffix for the temperature rating to the sprinkler base part number.
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 VK338 with a 155 °F (68 °C) temperature rating = Part No. 14692B

Available Finishes And Temperature Ratings:

Refer to Table 1.

Accessories: (Also refer to the Viking website.)

Sprinkler Wrench:
Standard Wrench: Part No. 21475M/B (available since 2017).

Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

MICROFAST® QUICK RESPONSE STAINLESS STEEL SPRINKLERS VK338 AND VK339

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.

5. OPERATION

During fire conditions, 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 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

The Viking Microfast® Quick Response Stainless Steel 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.

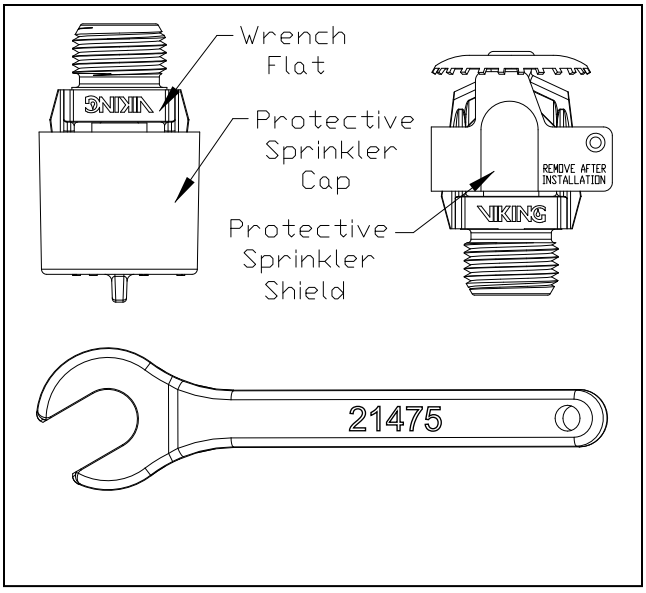


TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

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

Footnotes

[1] The sprinkler temperature rating is stamped on the deflector.

1. [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.

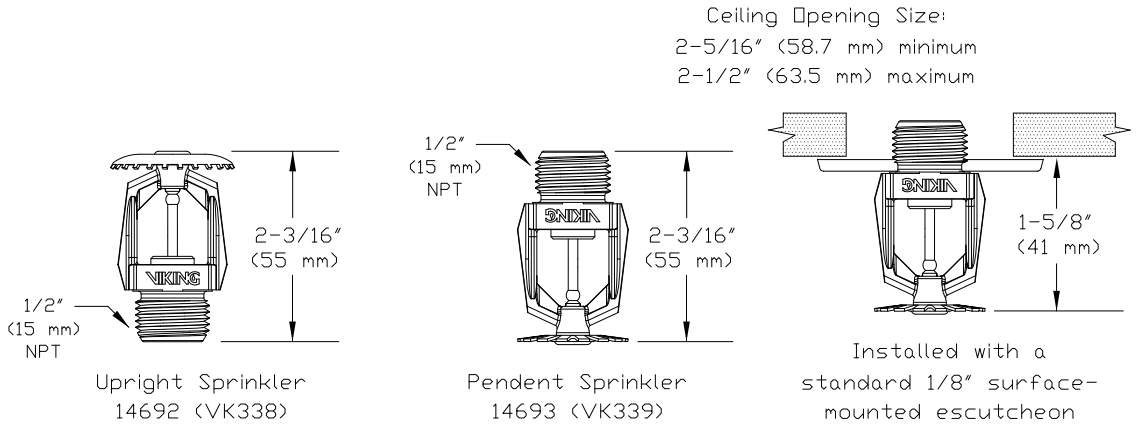


Figure 2: Sprinkler Dimensions

VIKING®	TECHNICAL DATA	MICROFAST® QUICK RESPONSE STAINLESS STEEL SPRINKLERS VK338 AND VK339

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
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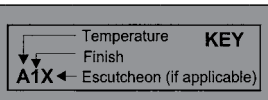
Approval Chart 1 - UL

Microfast® Quick Response Stainless Steel Sprinklers
Maximum 175 PSI (12 bar) WWP



Sprinkler Base Part Number[1]	Style	SIN	Thread Size		Nominal K-Factor		Order Length Increment		Listings and Approvals[3] (Refer also to Design Criteria - UL.)						
			NPT	BSP	U.S.	metric[2]	Inches	mm	cULus[4]	FM	NYC	VdS	LPCB	CE[5]	
14692	Upright	VK338	1/2”	15 mm	5.6	80.6	2-3/16”	55	A1	--	--	--	--	--	--
14693	Pendent	VK339	1/2”	15 mm	5.6	80.6	2-3/16”	55	A1X	--	--	--	--	A1	--

Approved Temperature Ratings	Approved Finish	Approved Escutcheons
A - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C)	1 - Stainless Steel	X - Standard surface-mounted escutcheons

Footnotes

1. Base part number is shown. For complete part number, refer to Viking’s current price schedule.
2. Metric K-factor shown is for use when pressure is measured in bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3. This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.
4. Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.
5. CE: Standard EN12259-1, Declaration of Performance DOP_VK339_14-2-20.

NOTE: The stainless steel sprinklers have passed the standard corrosion test required by the listed approving agencies. These tests cannot and do not represent all possible corrosive environments. Prior to installation, consult the end-user to verify that the sprinkler components are compatible with or suitable for the proposed environment.

DESIGN CRITERIA - UL

(Also refer to the Approval Chart 1 - UL)

cULus Listing Requirements:

Microfast® Stainless Steel Quick Response Sprinklers are cULus Listed as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13 for standard spray upright and pendent sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 6 ft. (1.8 m) unless baffles are installed in accordance with NFPA 13.
- Locate no less than 4” (102 mm) from walls.
- Maximum distance from walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for standard spray upright and pendent sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 or 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®

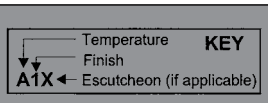
TECHNICAL DATA

MICROFAST® QUICK RESPONSE STAINLESS STEEL SPRINKLERS VK338 AND VK339

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 2 - FM

Microfast® Quick Response Stainless Steel Sprinklers
Maximum 175 PSI (12 bar) WWP



Sprinkler Base Part Number[1]	Style	SIN	Thread Size		Nominal K-Factor		Order Length Increment		FM Approvals[3] (Refer also to Design Criteria - FM.)
			NPT	BSP	U.S.	metric[2]	Inches	mm	
14692	Upright	VK338	1/2”	15 mm	5.6	80.6	2-3/16”	55	A1
14693	Pendent	VK339	1/2”	15 mm	5.6	80.6	2-3/16”	55	A1X

Approved Temperature Ratings	Approved Finishes	Approved Escutcheons
A - 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)	1 - Stainless Steel	X - Standard surface-mounted escutcheons

Footnotes

1. Base part number is shown. For complete part number, refer to Viking’s current price schedule.
2. Metric K-factor shown is for use when pressure is measured in bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
3. This chart shows the FM Approvals available at the time of printing. Check with the manufacturer for any additional approvals.

NOTE: The stainless steel sprinklers have passed the standard corrosion test required by the approving agencies. These tests cannot and do not represent all possible corrosive environments. Prior to installation, consult the end-user to verify that the sprinkler components are compatible with or suitable for the proposed environment.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 - FM)

FM Approval Requirements:

Microfast® Stainless Steel Sprinklers VK338 and VK339 are FM Approved as **Special Protection** upright and pendent sprinklers for corrosive environments, and as quick response **Non-Storage** upright and pendent sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

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

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 or 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

STANDARD RESPONSE ELO UPRIGHT SPRINKLER VK530
(STORAGE-DENSITY/AREA)

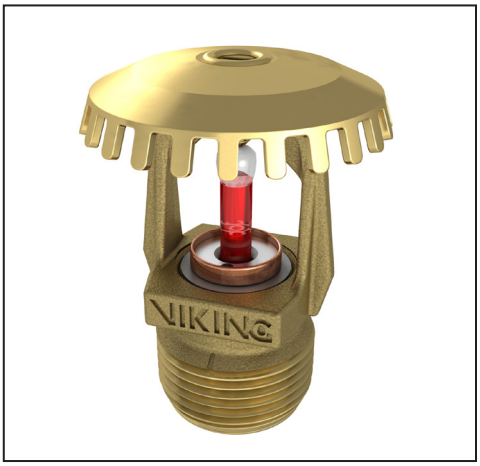
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page.

1. DESCRIPTION

The Viking Standard Response ELO Upright Sprinkler VK530 is a thermosensitive glass bulb spray sprinkler available in several different finishes and temperature ratings to meet design requirements. The special Polyester, PTFE, 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/approved as indicated in the Approval Charts.

The extra-large orifice provides greater flows at lower pressures than standard orifice or large orifice sprinklers. This feature allows reduced pipe sizing for hydraulically calculated sprinkler systems, which require high densities of water. Viking Standard Response Extra-Large Orifice Sprinklers may eliminate the need for a fire pump or reduce the size of the pump if it is required. On existing systems, replacing large orifice sprinklers with extra-large orifice sprinklers may provide the higher densities required to allow an increase in the hazard classification of an occupancy.

Viking standard response sprinklers may be ordered and/or used as open sprinklers (glass bulb and pip cap assembly removed) on deluge systems. Refer to Ordering Instructions below.



NOTE: As of May 2018 all logos have been removed from the wrench boss.

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

2. LISTINGS AND APPROVALS

c UL us **cULus Listed:** Category VNIV

FM APPROVED **FM Approved:** Class 2009

Refer to Approval Chart 1 and Design Criteria on page 3 for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 4 for FM Approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Available since 1992.
Maximum Working Pressure: 175 psi (12 bar).
Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 3/4” NPT or 20 mm BSP
Nominal K-Factor: 11.2 U.S. (161.3 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: 2-5/16” (58.7 mm)

Material Standards:

Sprinkler Frame: Brass UNS-C84400
Deflector: Brass UNS-C26000
Bulb: Glass, nominal 5 mm diameter
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: Brass UNS-C36000
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
For PTFE Coated Sprinklers: Belleville Spring-Exposed, Screw-Nickel Plated, Pip Cap-PTFE Coated
For Polyester Coated Sprinklers: Belleville Spring-Exposed
For ENT Coated Sprinklers: Belleville Spring-Exposed, Screw and Pipcap-ENT plated

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.

Ordering Information: (Also refer to the current Viking price list.)
Order Standard Response Extra-Large Orifice Upright Sprinkler VK530 by first adding 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, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, Black PTFE = N, Wax Coated = C, ENT = JN
Temperature Suffix (°F/°C): 155°/68° = B, 175°/79° = D, 200°/93° = E, 286°/141° = G, OPEN = Z (PTFE only).
For example, sprinkler VK530 with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 09679AB
Available Finishes And Temperature Ratings: Refer to Table 1

Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 05118CW/B (available since 1981).

Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION
Refer to appropriate NFPA Installation Standards.

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 and sealing spring 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 Standard Response Extra-Large Orifice Upright Sprinkler VK530 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.

TECHNICAL DATA

STANDARD RESPONSE ELO UPRIGHT SPRINKLER VK530 (STORAGE-DENSITY/AREA)

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

Corrosion-Resistant Coatings[3]: White Polyester, Black Polyester, and Black PTFE in all temperature ratings. ENT in all temperature ratings except 135°F (57°C). Wax-Coated Brass for sprinklers with the following temperature ratings:

155 °F (68 °C) Lt. Brown Wax 175 °F (79 °C) Brown Wax 200 °F (93 °C) Brown Wax 286 °F (141 °C) Dk. Brown Wax[4]

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 and corrosion proofing 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. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester, ENT, and PTFE coatings. For PTFE coated open sprinklers only, the waterway is coated. For all ENT coated sprinklers, the waterway is coated.

[4] Wax melting point is 170 °F (76 °C) for 286 °F (141 °C) temperature rated sprinklers.

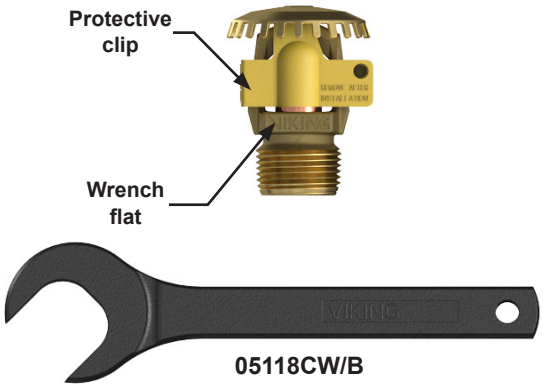

Figure 1: Sprinkler VK530 and Wrench

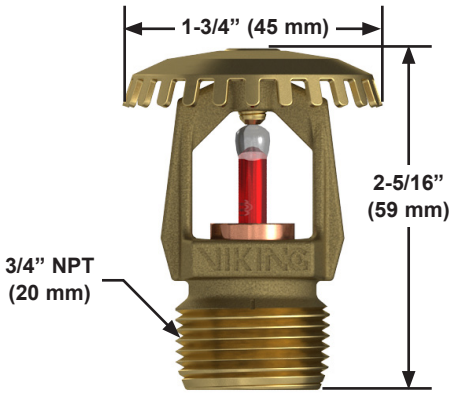

Figure 2: Sprinkler VK530 Dimensions

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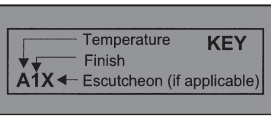
Approval Chart 1 (UL)

Standard Response Extra-Large Orifice Upright Sprinkler VK530
Maximum 175 PSI (12 Bar) WWP



Base Part Number[1]	SIN	Sprinkler Style	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals[3] (Refer also to Design Criteria below.)	
			NPT	BSP	U.S.	metric[2]	Inches	mm	cULus[4]	NYC
09679	VK530	Upright	3/4”	--	11.2	161.3	2-5/16	58.7	A3, B1, C2, B4	See Footnote 6.
14819	VK530	Upright	--	20 mm	11.2	161.3	2-5/16	58.7	A3, B1, C2, B4	--

Approved Temperature Ratings

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

Approved Finishes

1 - Brass, Chrome, White Polyester[5], Black Polyester[5], and Black PTFE[5]
2 - Wax-Coated Brass (corrosion resistant)
3 - Brass with 200 °F (93 °C) Wax Coating (corrosion resistant); Maximum ambient ceiling temperature = 150 °F (65 °C).
4 - ENT[5]

Footnotes

[1] Base part number shown. For complete part number, 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 U.S. and Canada.

[5] cULus Listed as corrosion-resistant.

[6] Meets New York City requirements, effective July 1, 2008.

DESIGN CRITERIA - UL

(Also refer to Approval Chart 1 above.)

cULus Listing Requirements:

Standard Response Extra-Large Orifice Upright Sprinkler VK530 is cULus Listed for installation in accordance with the latest edition of NFPA 13 for standard spray upright sprinklers:

- Designed for use in hazard occupancies up to and including Extra-Hazard Group II with a minimum operating pressure of 7 psi (0.5 bar).
- Sprinkler VK530 is also cULus Listed for use in High-Piled Storage Occupancies as defined in NFPA 13 with a minimum operating pressure of 7 psi (0.5 bar).
- The sprinkler installation and obstruction rules contained in NFPA 13 for standard spray upright sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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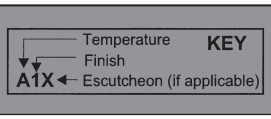
Approval Chart 2 (FM)

Standard Response Extra-Large Orifice Upright Sprinkler VK530
Maximum 175 PSI (12 Bar) WWP



Base Part Number[1]	SIN	Sprinkler Style	Thread Size		Nominal K-Factor		Overall Length		FM Approvals[3] (Refer also to Design Criteria below.)
			NPT	BSP	U.S.	metric[2]	Inches	mm	
09679	VK530	Upright	3/4”	--	11.2	161.3	2-5/16	58.7	A1, A2
14819	VK530	Upright	--	20 mm	11.2	161.3	2-5/16	58.7	A1, A2

Approved Temperature Ratings
A - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C)

Approved Finishes
1 - Brass and Chrome
2 - ENT[4]

Footnotes

[1] Base part number shown. For complete part number, 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 FM Approvals available at the time of printing. Other approvals may be in process.

[4] FM Approved as corrosion resistant.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

FM Approval Requirements:

Standard Response Extra-Large Orifice Upright Sprinkler VK530 is FM Approved as a standard response upright **Non-Storage** sprinkler, and as a standard response upright **Storage** sprinkler 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 8-9). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

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

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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TECHNICAL DATA

VK3021 QUICK RESPONSE PENDENT SPRINKLER (K5.6)

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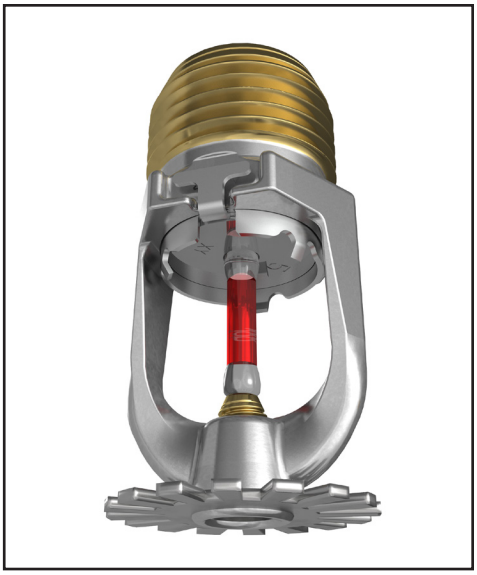
1. DESCRIPTION

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



2. LISTINGS AND APPROVALS

c UL US — UL Listed: Category VNIV

FM APPROVED — FM Approved: Classes 2017, 2015, 2043
Approved for use in FM Approved vacuum dry sprinkler sytems with a maximum supervisory vacuum pressure of -3psi (-207mbar)

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

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: 7 psi (0.5 bar)
Rated to: UL - 250 PSI (24 bar) WWP
FM - 175 PSI (12 bar) WWP
Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" NPT (15 mm BSPT)
Nominal K-factor: 5.6 U.S. (80.6 metric*)
Glass-bulb fluid temperature rated to -65 °F (-55 °C)

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

Material Standards:
Sprinkler Body: Brass CW602N, UNS-C84400 or QM Brass
Deflector: Stainless Steel UNS S30400
Pip Cap Shell - Stainless Steel UNS-S44400
Pip Cap Disc - Stainless Steel UNS-S30100
Belleville Spring - Nickel Alloy
Pip Cap Seal - Polytetrafluoroethylene (PTFE)
Compression Screw: Brass CW612N, CW508L, UNS-C36000 or UNS-C26000
Shipping Cap: Polyethylene
Bulb: Glass, nominal 3 mm diameter

Finishes and Temperatures:

Finish	Brass	Chrome	White Polyester	Black Polyester	ENT	--
Suffix	A	F	M-/W	M-/B	JN	--
Temperature	135 °F (57 °C)	155 °F (68 °C)	175 °F (79 °C)	200 °F (93 °C)	286 °F (141 °C)	Open
Suffix	A	B	D	E	G	Z

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.

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 Sprinkler Model VK3021 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.

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TECHNICAL DATA

VK3021 QUICK RESPONSE PENDENT SPRINKLER (K5.6)

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TABLE 1: ORDERING INFORMATION

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

Sprinkler Base Part No.	Size		1: Finishes		2: Temperature Ratings			
	NPT Inch	BSPT mm	Description	Suffix[1]	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature[3]	Suffix
19917	1/2	--	Brass	A	135 °F (57 °C)	Orange	100 °F (38 °C)	A
19929[7]	--	15	Chrome	F	155 °F (68 °C)	Red	100 °F (38 °C)	B
23101[7]	1/2		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: 19917MB/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. Installer Wrench: Part No. 22055 (available since 2017).
B. Cabinet Wrench: Part No. 20901M/B (available since 2017).
C. Recessed Socket Wrench: Part No. 20951M/B[2] (available since 2017).
D. Straight Wrench: Part No. 22940MB

Sprinkler Cabinet:

A. Up to 6 sprinklers: Part number 01724A (available since 1971).
B. 6-12 Sprinklers: Part number 01725A (available since 1971).

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.

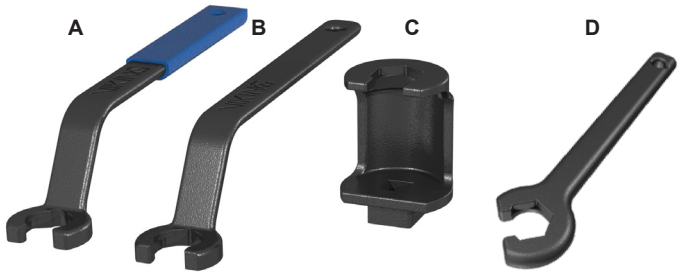

Figure 1: Sprinkler Wrenches

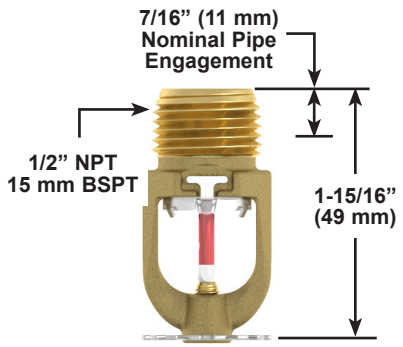

Figure 2: Sprinkler Dimensions

TECHNICAL DATA

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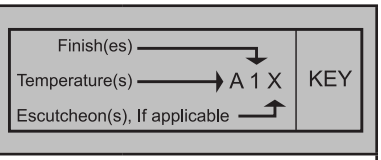
APPROVAL CHART

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



Sprinkler Base Part Number[1]	Thread Size		Listings and Approvals[2]			
	NPT	BSPT	cULus		FM	
	Inch	mm	Approval Code(s)	Maximum WWP	Approval Code(s)	Maximum WWP
19917	1/2	--	A1, B2X, B3Y	175 PSI (12 bar)	A1, B2X, B3Y	175 PSI (12 bar)
19929	--	15	A1, B2X, B3Y	250 PSI (17 bar)	A1, B2X, B3Y	175 PSI (12 bar)
23101	1/2	--	A1, B2X, B3Y	250 PSI (17 bar)	A1, B2X, B3Y	175 PSI (12 bar)

Approved Temperature Rating Codes:

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)

Approved Finish Codes:

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.

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 occupancies.
- The sprinkler installation rules contained in NFPA 13 for standard spray Pendent sprinklers shall be followed.

IMPORTANT: Always refer to Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking Technical Data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

DESIGN CRITERIA - FM

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 No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking Technical Data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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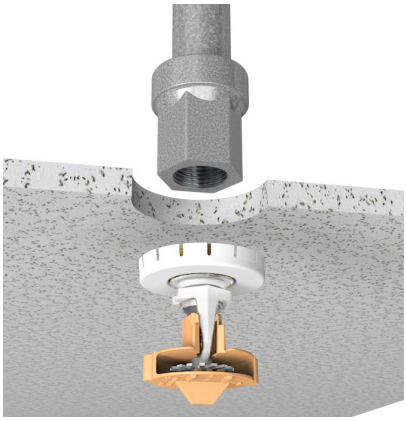
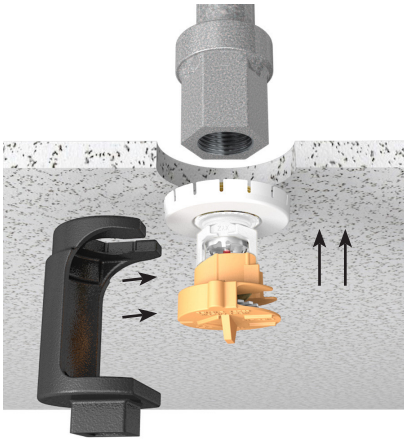
1. Install the escutcheon inner ring onto the sprinkler threads.



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.

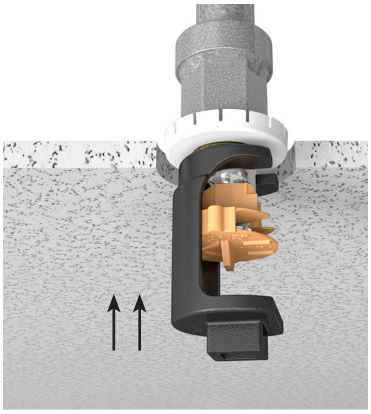
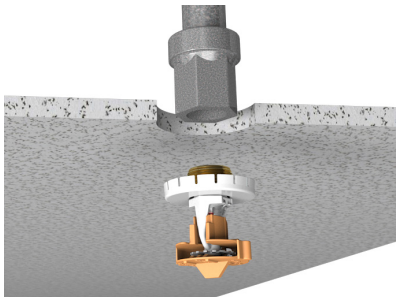


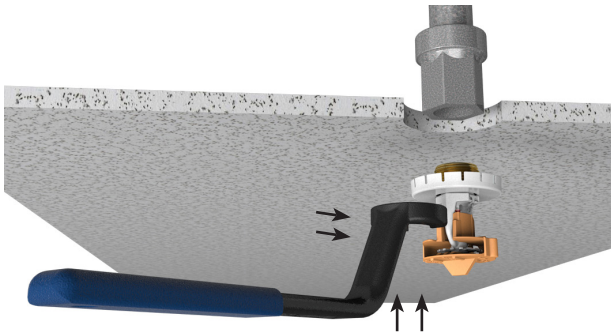
Figure 3: Recessed Installation (with Recessed Socket Wrench)

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

1. Install the escutcheon 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.

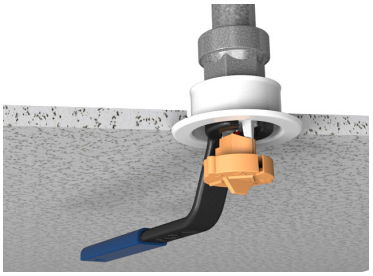


Figure 4: Recessed Installation (with standard Installer's Wrench)

TECHNICAL DATA

VK3021 QUICK RESPONSE PENDENT SPRINKLER (K5.6)

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1. Install the escutcheon 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 contacts the surface of the finished ceiling.

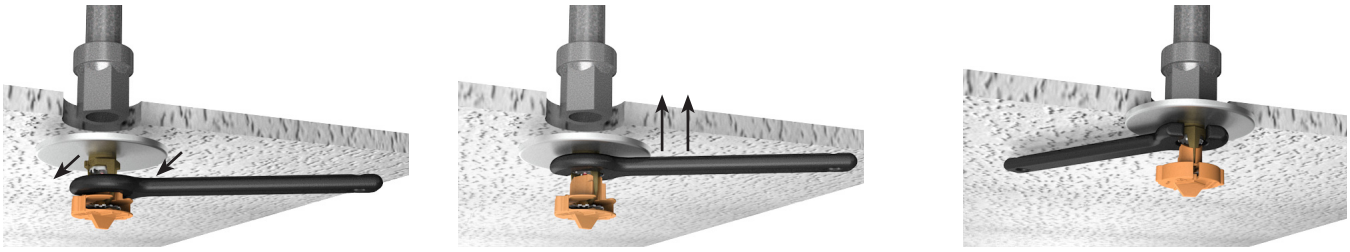


Figure 5: Installation (with Straight Wrench)

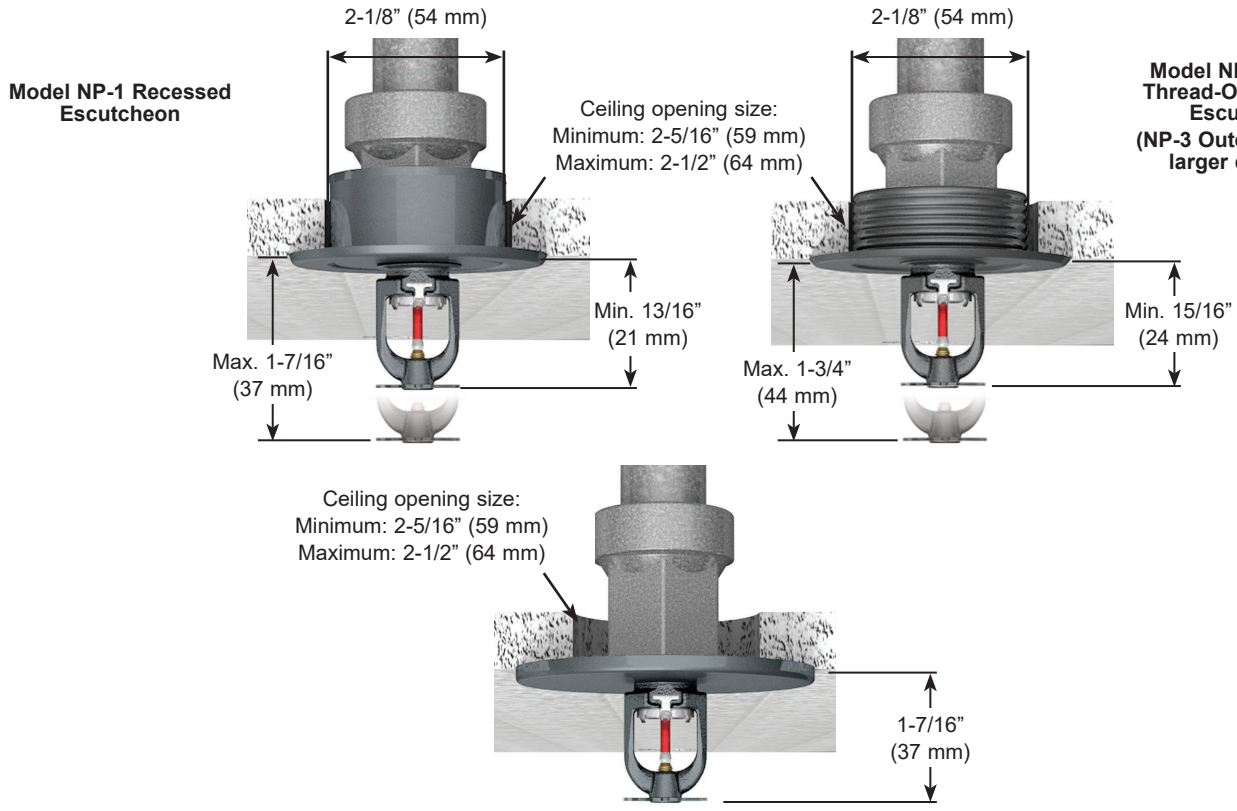


Figure 6: Installation Dimensions with Viking Escutcheons

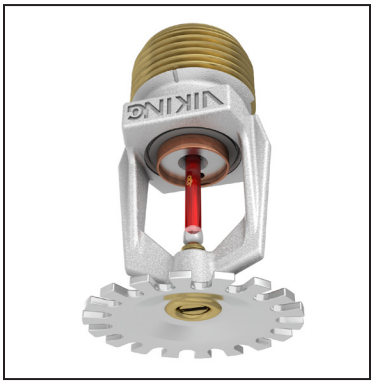
TECHNICAL DATA

STANDARD/QUICK RESPONSE EXTENDED COVERAGE PENDENT SPRINKLER VK534 (K11.2)

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

Viking EC/QREC Pendent Sprinkler VK534 is a thermosensitive spray sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The extra-large orifice produces the flows required to meet Light and Ordinary Hazard density requirements at lower pressures than standard orifice or large orifice sprinklers. The glass bulb operating element and special deflector characteristics meet the challenges of quick response extended coverage standards. Pendent Sprinkler VK534 is cULus Listed as standard and quick response. The special Polyester and Electroless Nickel PTFE (ENT) coatings can be used in decorative applications where colors are desired. In addition, ENT coating has been investigated for installation in corrosive atmospheres. See Approval Charts.



NOTE: As of May 2018 all logos have been removed from the wrench boss.

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

2. LISTINGS AND APPROVALS

c UL us **cULus Listed:** Category VNIV
Refer to Approval Chart 1 and Design Criteria cULus Listing requirements.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: Refer to the Approval Charts.
Maximum Working Pressure: 175 psi (12 Bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 3/4" (20 mm) NPT
Nominal K-Factor: 11.2 U.S. (161.3 metric†)
† Metric K-factor measurement shown is 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: 2-3/8" (61 mm)

Material Standards:
Sprinkler Frame: 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
Screw: Brass UNS-C36000
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
For Polyester Coated Sprinklers: Belleville Spring-Exposed
For ENT Coated Sprinkler: Belleville Spring-Exposed, Screw and Pipcap-ENT plated.

Ordering Information: (Also refer to the current Viking price list.)
Order Viking EC/QREC Pendent Sprinkler VK534 by first adding 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, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, and ENT = JN
Temperature Suffix: 135 °F (57 °C) = A, 155 °F (68 °C) = B, 175 °F (79 °C) = D, 200 °F (93 °C) = E, and 286 °F (141 °C) = G
For example, sprinkler VK534 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 08340AB

Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website)

Sprinkler Wrenches:
A. Standard Wrench: Part No. 05118CW/B (available since 1981)
B. Wrench for recessed pendent sprinkler: Part No. 11663W/B** (available since 2001)
**A ½" ratchet is required (not available from Viking).

Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

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5. OPERATION

During fire conditions, 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 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 EC/QREC Pendent Sprinkler VK534 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.

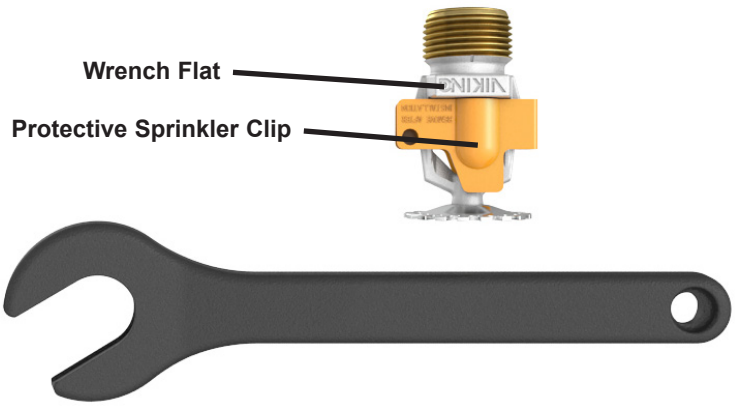

Figure 1:
Standard Sprinkler Wrench 05118CW/B

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TECHNICAL DATA

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TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

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

Sprinkler Finishes: Brass, Chrome, White Polyester[3], Black Polyester[3], and ENT

Corrosion-Resistant Coatings[4]: ENT

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] For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester coatings.

[4] 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 ENT sprinklers, all exposed surfaces and the waterway are coated, but note that the spring is exposed.

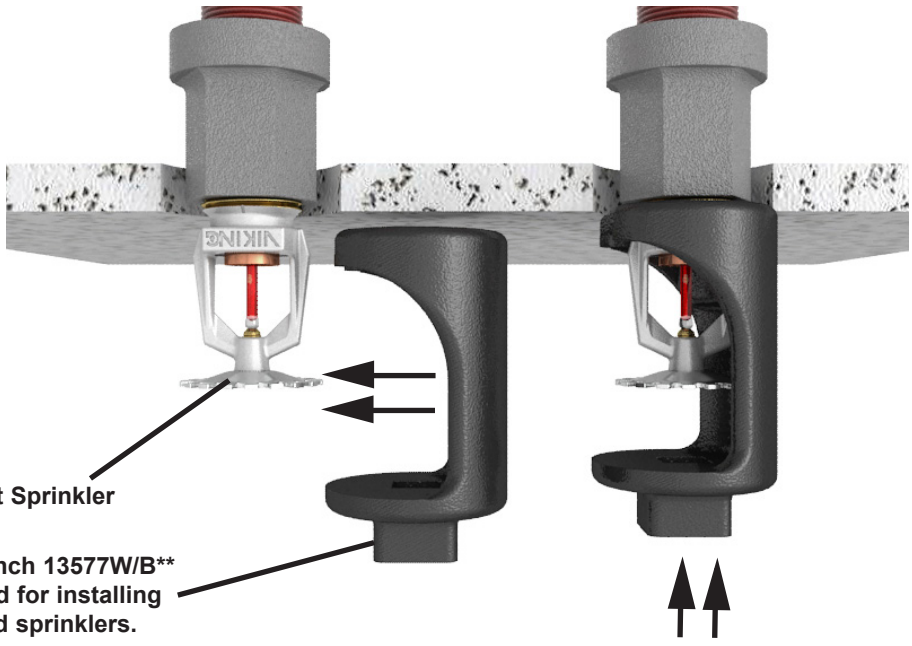

Figure 2: Wrench 11663W/B for Recessed Pendent Sprinkler VK534

TECHNICAL DATA

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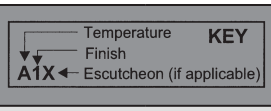
Approval Chart 1 (UL)

SR/QR EC Pendent Sprinkler VK534



Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric[2]		Inches	mm
08340 Pendent	VK534	3/4	20	11.2	161.3	175 psi (12 Bar)	2-5/16	59

Max. Sprinkler Spacing (L x W[7])	Maximum Area per Sprinkler	Minimum Water Supply Requirements[5]			Listings and Approvals[3] (Refer also to UL Design Criteria)
		Light Hazard	Ordinary Hazard Group I	Ordinary Hazard Group II	
		Flow / Pressure	Flow / Pressure	Flow / Pressure	cULus[4]
Standard Response					
16 ft. x 16 ft. (4.9 m x 4.9 m)	256 ft² (23.8 m²)	--	38 gpm @ 11.5 psi (143.9 L/min @ .79 Bar)	51 gpm @ 20.7 psi (193.1 L/min @ 1.43 Bar)	C1W, D1Y, D2Z, C2W
18 ft. x 18 ft. (5.5 m x 5.5 m)	324 ft² (30.1 m²)	--	49 gpm @ 19.1 psi (185.5 L/min @ 1.32 Bar)	65 gpm @ 33.7 psi (246.1 L/min @ 2.32 Bar)	C1W, D1Y, D2Z, C2W
20 ft. x 20 ft. (6.1 m x 6.1 m)	400 ft² (37.2 m²)	--	60 gpm @ 28.7 psi (227.1 L/min @ 1.98 Bar)	80 gpm @ 51.0 psi (302.8 L/min @ 3.52 Bar)	C1W, D1Y, D2Z, C2W
Quick Response					
12 ft. x 12 ft. (3.7 m x 3.7 m)	144 ft² (13.4 m²)	--	30 gpm @ 7.2 psi (113.6 L/min @ .50 Bar)	39 gpm @ 12.1 psi (147.7 L/min @ .84 Bar)	E1Y, E2Z
14 ft. x 14 ft. (4.3 m x 4.3 m)	196 ft² (18.2 m²)	--	30 gpm @ 7.2 psi (113.6 L/min @ .50 Bar)	39 gpm @ 12.1 psi (147.7 L/min @ .84 Bar)	E1Y, E2Z
16 ft. x 16 ft. (4.9 m x 4.9 m)	256 ft² (23.8 m²)	30 gpm @ 7.2 psi (113.6 L/min @ .50 Bar)	--	--	B1Y, F2Z
18 ft. x 18 ft. (5.5 m x 5.5 m)	324 ft² (30.1 m²)	33 gpm @ 8.7 psi (124.9 L/min @ .60 Bar)	--	--	B1Y, F2Z
20 ft. x 20 ft. (6.1 m x 6.1 m)	400 ft² (37.2 m²)	40 gpm @ 12.8 psi (151.4 L/min @ .88 Bar)	--	--	A1Y, G2Z

Approved Temperature Ratings

A - 135 °F (57 °C) and 175 °F (79 °C)
B - 135 °F (57 °C), 155 °F (68 °C), and 175 °F (79 °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)
E - 155 °F (68 °C)
F - 155 °F (68 °C), and 175 °F (79 °C)
G - 175 °F (79 °C)

Approved Finishes

1 - Brass, Chrome, White Polyester, and Black Polyester
2 - ENT[6]

Approved Escutcheons

W - Standard surface-mounted escutcheons only
Y - Standard surface-mounted escutcheons or the Microfast® Model F-1 Adjustable Escutcheon, or recessed with the Micromatic® Model E-1, E-2, or E-3 Recessed Escutcheon
Z - Standard surface-mounted escutcheons or the Micromatic Model E-1 Recessed Escutcheon.

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list 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 chart shows listings and approvals available at time of printing. Check with the manufacturer for any additional approvals.

[4] cULus Listed for use in the U.S. and Canada.

[5] To determine "Minimum Water Supply Requirement" for areas of coverage where length and width of actual sprinkler spacing are not equal, select the "Maximum Sprinkler Spacing" from the chart that is equal to or greater than the larger of the actual spacing (length or width) dimensions used. Example: When using 10'-6" x 13'-0" sprinkler spacing, provide the "Minimum Water Supply Requirement" listed in the chart for 14'-0" x 14'-0" spacing. For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" in the appropriate hazard group for the next larger area listed. The distance from sprinklers to walls shall not exceed one-half the "Maximum Sprinkler Spacing" listed for the "Minimum Water Supply Requirement" used.

[6] cULus Listed as corrosion-resistant.

VIKING®	TECHNICAL DATA	STANDARD/QUICK RESPONSE EXTENDED COVERAGE PENDENT SPRINKLER VK534 (K11.2)

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DESIGN CRITERIA - UL

(Also refer to Approval Chart 1.)

cULus Listing Requirements:

EC-ELO Pendent Sprinkler VK534 is cULus Listed as indicated in Approval Chart 1 for installation in accordance with the latest edition of NFPA 13 for extended coverage pendent spray sprinklers as indicated below:

- The minimum water supplies and maximum areas of coverage shown in Approval Chart 1 are designed to provide the following design densities: 0.10 gpm/ft^2 (4.1 mm/min) for Light Hazard densities; 0.15 gpm/ft^2 (6.1 mm/min) for Ordinary-Hazard Group I densities; 0.2 gpm/ft.^{2} (8.1 mm/min) for Ordinary-Hazard Group II densities.
- The sprinkler installation rules contained in NFPA 13 for extended coverage pendent spray sprinklers must be followed.
- Viking EC-ELO Pendent Sprinklers are cULus Listed for use in unobstructed construction, and noncombustible obstructed construction consisting of solid steel and/or concrete beams as defined in the latest edition of NFPA 13.
- Ceiling slope not to exceed 2/12 (9.5°).

Also, Viking ECOH-ELO Pendent Sprinkler VK534 is specifically cULus Listed for Ordinary Hazard Occupancies:

- For non-combustible obstructed construction within trusses or bar joists having non-combustible web members greater than 1” (25.4 mm) when applying the 4 times obstruction criteria rule as defined in NFPA 13 under “Obstructions to Sprinkler Discharge Pattern Development”.
- For installation under concrete tees when installed as follows:
  1. The stems of the concrete tee construction must be spaced between 3 ft (0.9 m) and 7 ft-6 in (2.3 m) on center. The depth of the concrete tees must not exceed 30 in (762 mm). The maximum permitted concrete tee length is 32 ft (9.8 m). However, where the concrete tee length exceeds 32 ft (9.8 m), non-combustible baffles, equal in height to the depth of the tees, can be installed so that the space between the tees does not exceed 32 ft (9.8 m).
  2. The sprinkler deflector is to be located in a horizontal plane at or above 1” (25.4 mm) below the bottom of the concrete tee stems.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

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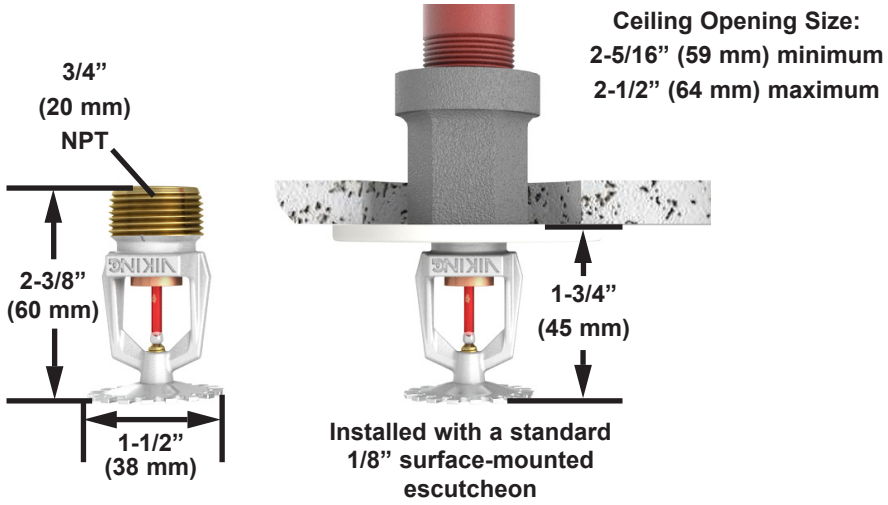

Figure 3: Sprinkler Dimensions with a Standard Escutcheon

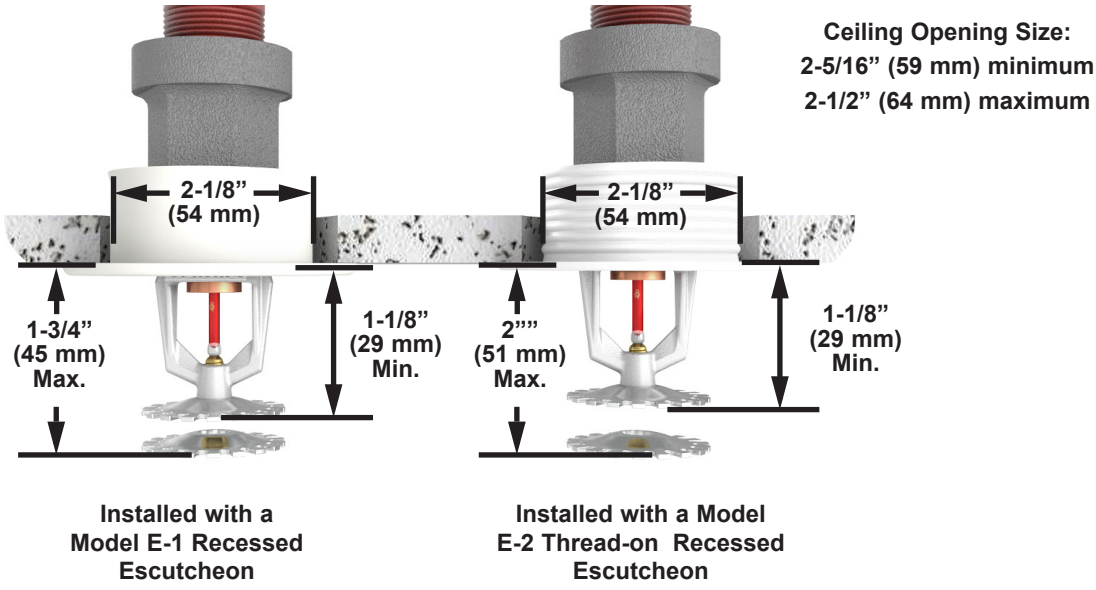

Figure 4: Sprinkler Dimensions with the Model E-1 and E-2 Recessed Escutcheons

TECHNICAL DATA

EC/QREC ORDINARY HAZARD PENDENT SPRINKLER VK572 (K14.0)

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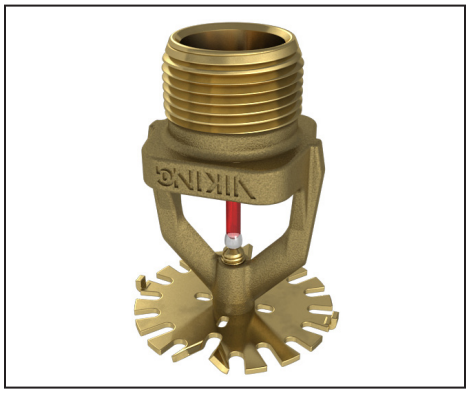
1. DESCRIPTION

Viking Standard/Quick Response Extended Coverage Ordinary Hazard (ECOH) Pendent Sprinkler VK572 is a thermosensitive glass bulb spray sprinkler with a 14.0 (202 metric*) nominal K-Factor. The sprinkler produces the flows required to meet Ordinary Hazard density requirements at lower pressures than 8.0 or 11.2 (115.2 or 161.4 metric*) K-Factor sprinklers. The glass bulb operating element and special deflector characteristics meet the challenges of quick response extended coverage standards. Viking EC/QREC Ordinary Hazard Sprinklers are available in various finishes and temperature ratings to meet design requirements. The special Polyester coatings can be used in decorative applications where colors are desired. In addition, the ENT coating has been investigated for installation in corrosive environments and is listed as indicated in the Approval Charts. The Viking VK572 Sprinkler may be ordered and/or used as an open sprinkler (glass bulb and pip-cap assembly removed) on deluge systems. Refer to Ordering Instructions on the next page.



NOTE: As of May 2018 all logos have been removed from the wrench boss.

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

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Class 2022

NYC Approved: MEA 89-92-E, Volume 38

Refer to Approval Chart 1 and Design Criteria for cULus Listing requirements and refer to Approval Chart 2 and Design Criteria for FM Approval requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Available since 2004.
Minimum Operating Pressure: Refer to the Approval Charts.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 3/4” (20 mm) NPT
Nominal K-Factor: 14.0 U.S. (202 metric*)

* Metric K-factor measurement shown is 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: 2-7/16” (62 mm)

Material Standards:

Sprinkler Frame: Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Bulb: Glass, nominal 3 mm diameter
Pip Cap: Brass UNS-C31400 or UNS-C31600
Compression Screw: Brass UNS-C36000
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
For ENT coated Sprinklers: Belleville Spring - Exposed, Screw and Pipcap - ENT plated.
For Polyester Coated Sprinklers: Belleville Spring-Exposed

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

Order EC/QREC Ordinary Hazard Pendent Sprinkler VK572 by first adding 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, Chrome = F, White Polyester = M-/W, Black Polyester = M-/B, and ENT = JN
Temperature Suffix (°F/°C): 155°/68° = B, 175°/79° = D, 200°/93° = E, and 286°/141° = G, OPEN = Z (PTFE only).
For example, sprinkler VK572 with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 13722AB.

Available Finishes And Temperature Ratings: Refer to Table 1.

TECHNICAL DATA

EC/QREC ORDINARY HAZARD PENDENT SPRINKLER VK572 (K14.0)

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Accessories: (Also refer to the Viking website.)

Sprinkler Wrenches:

A. Standard Wrench: Part No. 07297W/B (available since 1991)
B. Wrench for coated and/or recessed pendent sprinkler: Part No. 13032W/B** (available since 2004)
**A ½" ratchet is required (not available from Viking).

Sprinkler Cabinets:

A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

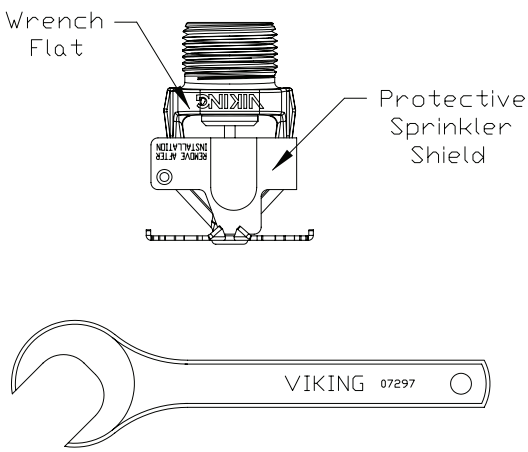

Figure 1:
Standard Sprinkler Wrench 07297W/B (Pendent Sprinkler VK572 shown)

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

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 and sealing spring 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

The Viking Model VK572 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.

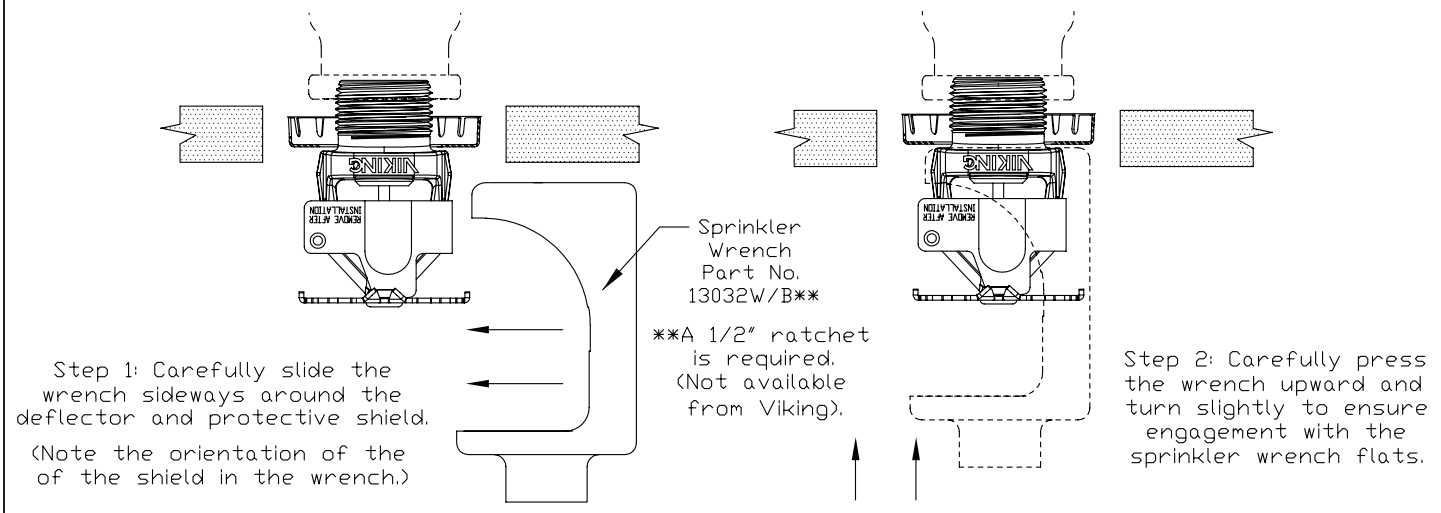

Figure 2: Wrench 13032W/B for Recessed and/or Coated Sprinklers (Pendent Sprinker VK572 shown)

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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

Available Sprinkler Finishes: Brass, Chrome, White Polyester[3], Black Polyester[3], and ENT[3]

Corrosion Resistant/Proofing Sprinkler Finishe: 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] The corrosion-resistant 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. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and ENT. For ENT coated automatic sprinklers, the waterway is coated.

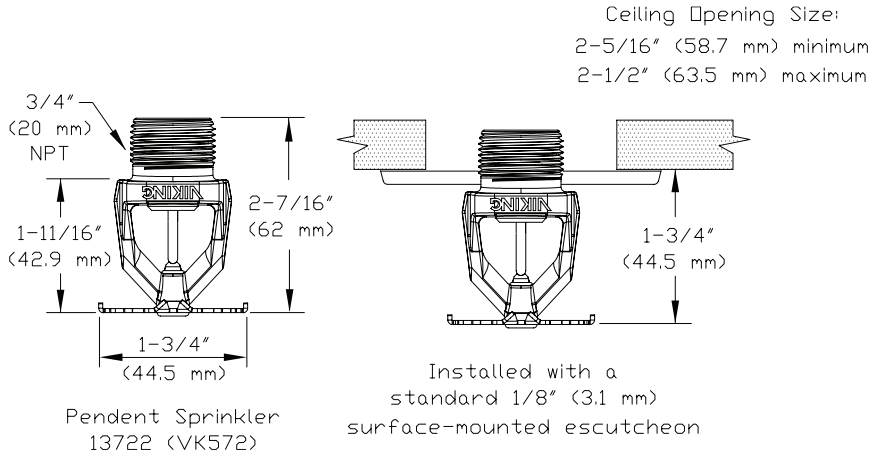

Figure 3: Pendent Sprinkler VK572 Dimensions with a Standard Escutcheon

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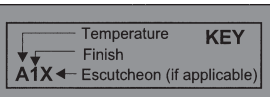
Approval Chart 1 (UL)

Standard/Quick Response Extended Coverage Ordinary Hazard Pendent Sprinkler VK572 (K14.0)



Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric[2]		Inches	mm
13722 Pendent	VK572	3/4	20	14.0	202	175 psi (12 bar)	2-7/16	62

Maximum Sprinkler Spacing L x W[5]	Maximum Area per Sprinkler	Minimum Water Supply Requirements (cULus only)		cULus/NYC Listings[3,4,7] (See Design Criteria)
		Ordinary Hazard Group I	Ordinary Hazard Group II	
		Flow / Pressure	Flow / Pressure	
Standard Response				Pendent VK572
16 ft. x 16 ft. (4.9 m x 4.9 m)	256 ft² (23.8 m²)	39 gpm @ 7.8 psi (147.6 l/min @ 0.54 bar)	51 gpm @ 13.3 psi (193.1 l/min @ 0.92 bar)	A1X, B1Y
18 ft. x 18 ft. (5.5 m x 5.5 m)	324 ft² (30.1 m²)	49 gpm @ 12.3 psi (185.5 l/min @ 0.85 bar)	65 gpm @ 21.6 psi (246.1 l/min @ 1.49 bar)	A1X, B1Y
20 ft. x 20 ft. (6.1 m x 6.1 m)	400 ft² (37.2 m²)	60 gpm @ 18.4 psi (227.1 l/min @ 1.27 bar)	80 gpm @ 32.7 psi (302.8 l/min @ 2.25 bar)	A1X, B1Y
Quick Response[6, 8]				
12 ft. x 12 ft. (3.7 m x 3.7 m)	144 ft² (13.4 m²)	39 gpm @ 7.8 psi (147.6 l/min @ 0.54 bar)	39 gpm @ 7.8 psi (147.6 l/min @ 0.54 bar)	A1X, B1Y
14 ft. x 14 ft. (4.3 m x 4.3 m)	196 ft² (18.2 m²)	39 gpm @ 7.8 psi (147.6 l/min @ 0.54 bar)	39 gpm @ 7.8 psi (147.6 l/min @ 0.54 bar)	A1X, B1Y

Approved Temperature Ratings

A - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C)[6]
B - 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)

Approved Finishes

1 - Brass, Chrome, White Polyester, Black Polyester, and ENT[9]

Approved Escutcheons

X - Standard surface-mounted escutcheons
Y - Standard surface-mounted escutcheons **or** recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list 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 chart shows listings and approvals available at time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.

[4] cULus Listed for use in the U.S. and Canada.

[5] To determine “Minimum Water Supply Requirement” for areas of coverage where length and width of actual sprinkler spacing are not equal, select the “Maximum Sprinkler Spacing” from the chart that is equal to or greater than the larger of the actual spacing (length or width) dimensions used. Example: When using 10 ft 6 in x 13 ft (3.2 m x 4 m) sprinkler spacing, provide the “Minimum Water Supply Requirement” listed in the chart for 14 ft x 14 ft (4.3 m x 4.3 m) spacing. For areas of coverage smaller than shown, use the “Minimum Water Supply Requirement” in the appropriate hazard group for the next larger area listed. The distance from sprinklers to walls shall not exceed one-half the “Maximum Sprinkler Spacing” listed for the “Minimum Water Supply Requirement” used.

[6] For Sprinkler VK572 with High Temperature 286 °F rating, UL restricts the QR listing to their use in Ordinary Hazard occupancies to the high temperature zones within a building only. VK572 quick response sprinklers with this temperature rating cannot be used throughout the property.

[7] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 38.

[8] Prior to 2007, sprinkler VK572 was classified as Standard Response for all room sizes.

[9] cULus Listed as corrosion resistant.

VIKING®	TECHNICAL DATA	EC/QREC ORDINARY HAZARD PENDENT SPRINKLER VK572 (K14.0)

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 - UL

(Also refer to Approval Chart 1.)

cULus Listing Requirements: ECOH Pendent Sprinkler VK572 is cULus Listed as Standard and Quick Response for installation in accordance with the latest edition of NFPA 13 for extended coverage pendent spray sprinklers as indicated below:

- The minimum water supplies and maximum areas of coverage shown in Approval Chart 1 are designed to provide the following design densities: 0.15 gpm/ft^2 (6.1 mm/min) for Ordinary-Hazard Group I densities; 0.2 gpm/ft.^{2} (8.1 mm/min) for Ordinary-Hazard Group II densities.
- The sprinkler installation rules contained in NFPA 13 for extended coverage pendent spray sprinklers must be followed with the exception that cULus Listing requires the spacing between Viking ECOH Pendent Sprinklers to be a minimum of **9 ft. (2.75 m)** to prevent cold soldering.
- Viking ECOH Pendent Sprinklers are cULus Listed for use in unobstructed construction, and noncombustible obstructed construction consisting of solid steel and/or concrete beams as defined in the latest edition of NFPA 13.
- Ceiling slope not to exceed 2/12 (9.5°).

Also, Viking ECOH Pendent Sprinkler VK572 is specifically cULus Listed for:

- For non-combustible obstructed construction within trusses or bar joists having non-combustible web members greater than 1" (25.4 mm) when applying the 4 times obstruction criteria rule as defined in NFPA 13 under "Obstructions to Sprinkler Discharge Pattern Development".
- For installation under concrete tees when installed as follows:
  1. The stems of the concrete tee construction must be spaced between 3 ft (0.9 m) and 7 ft-6 in (2.3 m) on center. The depth of the concrete tees must not exceed 30 in (762 mm). The maximum permitted concrete tee length is 32 ft (9.8 m). However, where the concrete tee length exceeds 32 ft (9.8 m), non-combustible baffles, equal in height to the depth of the tees, can be installed so that the space between the tees does not exceed 32 ft (9.8 m).
  2. The sprinkler deflector is to be located in a horizontal plane at or above 1" (25.4 mm) below the bottom of the concrete tee stems.

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

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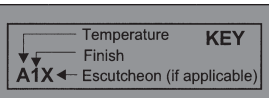
Approval Chart 2 (FM)

Quick Response Extended Coverage Pendent Sprinkler VK572 (K14.0)
For HC-1, HC-2, and HC-3 Occupancies



Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
		Inches	mm	U.S.	metric[2]		Inches	mm
13722	VK572	3/4	20	14.0	202	175 psi (12 bar)	2-7/16	62

Maximum Sprinkler Spacing L x W[4]	Maximum Area per Sprinkler		FM Approvals[3] Pendent Sprinkler VK572
12 ft. x 12 ft. (3.7 m x 3.7 m)	144 ft² (13.4 m²)	**Refer to Design Criteria below.** NOTE: FM installation guidelines may differ from cULus and/or NFPA criteria. Refer to the latest applicable FM Loss Prevention Data Sheets (including 2-0 and 3-26).	A1X
14 ft. x 14 ft. (4.3 m x 4.3 m)	196 ft² (18.2 m²)		A1X
16 ft. x 16 ft. (4.9 m x 4.9 m)	256 ft² (23.8 m²)		A1X
18 ft. x 18 ft. (5.5 m x 5.5 m)	324 ft² (30.1 m²)		A1X
20 ft. x 20 ft. (6.1 m x 6.1 m)	400 ft² (37.2 m²)		A1X

Approved Temperature Ratings	Approved Finish	Approved Escutcheons
A - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C)[6]	1 - Brass	X - Standard surface-mounted escutcheons

Footnotes

[1] Part number shown is the base part number. For complete part number, refer to current Viking price list 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 chart shows the FM Approvals available at time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.

[4] To determine "Minimum Water Supply Requirement" for areas of coverage where length and width of actual sprinkler spacing are not equal, select the "Maximum Sprinkler Spacing" from the chart that is equal to or greater than the larger of the actual spacing (length or width) dimensions used. Example: When using 10 ft 6 in x 13 ft (3.2 m x 4 m) sprinkler spacing, provide the "Minimum Water Supply Requirement" listed in the chart for 14 ft x 14 ft (4.3 m x 4.3 m) spacing. For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" in the appropriate hazard group for the next larger area listed. The distance from sprinklers to walls shall not exceed one-half the "Maximum Sprinkler Spacing" listed for the "Minimum Water Supply Requirement" used.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

FM Approval Requirements:

Sprinkler VK572 is FM Approved as a quick response **Non-Storage** extended coverage pendent sprinkler as indicated in the FM Approval Guide for use in occupancy hazard classifications HC-1, HC-2, and HC-3. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0 and 3-26). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

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

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