

CALCULATION SUMMARY

Project Name : Vannkanten

Project Location: -

Drawing No. : 13006

City: Stavanger, - -

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(m ²)	(l/min)	(bar)	(l/min/m ²)	(bar)	(l/min)	#	(l/min)	(bar)
1	Demand (HW)	OH 2 Tørt	180	1844,5	Required 4,65	5,1	0,5	57,08	25	0	-4,65
10	Demand (HW)	OH1	72	903,11	Required 2,93	5,3	0,5	57,08	13	0	-2,93
2	Demand (HW)	OH 2 Tørt	180	1754,07	Required 4,61	5,1	0,5	57,08	21	0	-4,61
3	Demand (HW)	OH 2 Tørt	180	1362,5	Required 2,49	5,1	0,5	57,08	19	0	-2,49
4	Demand (HW)	INSTA Type 3	48	216,75	Required 4,46	4,2	0,5	49,93	4	0	-4,46
6	Demand (HW)	OH1	72	585,11	Required 2,09	5,3	0,5	57,08	9	0	-2,09
B1141	Demand (HW)	INSTA Type 3	68	295,46	Required 4,95	4,1	0,97	69,7	4	0	-4,95

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

City: Stavanger, - -

Project Location: -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

City: Stavanger, - 4034

Phone Number: 51801110

E-mail: christian@aktivsprinkler.no

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

Design

Remote Area Name	1
Remote Area Location	Garasje 1
Occupancy Classification	OH 2 Tørt
Density (l/min/m ²)	5,1
Area of Application (m ²)	180
Coverage per Sprinkler (m ²)	11,3
Number of Calculated Sprinklers	25
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	1844,5
Required Pressure at Source (bar)	4,65
Type of System	Wet
Volume - Entire System (l)	1887,8 l

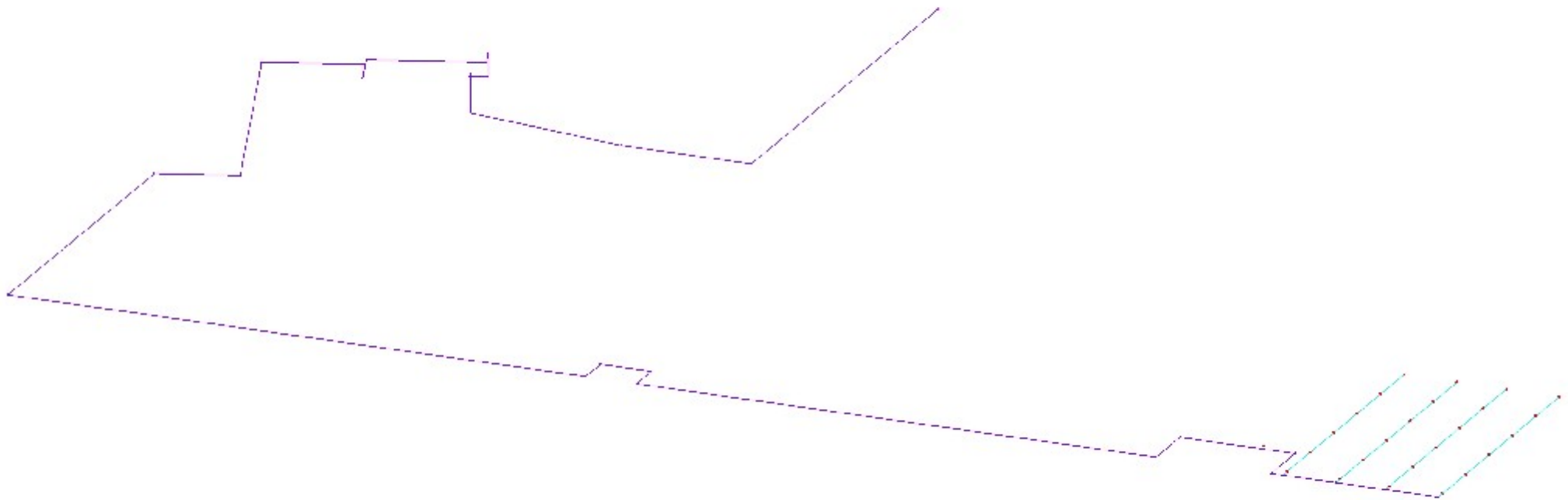
Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

SSU K80

Diagram for Design Area : 1
(Optimized Hydraulic Simplified)



Hydraulic Analysis for : 1

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Hoses

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 1844,5

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 1844,5

Other

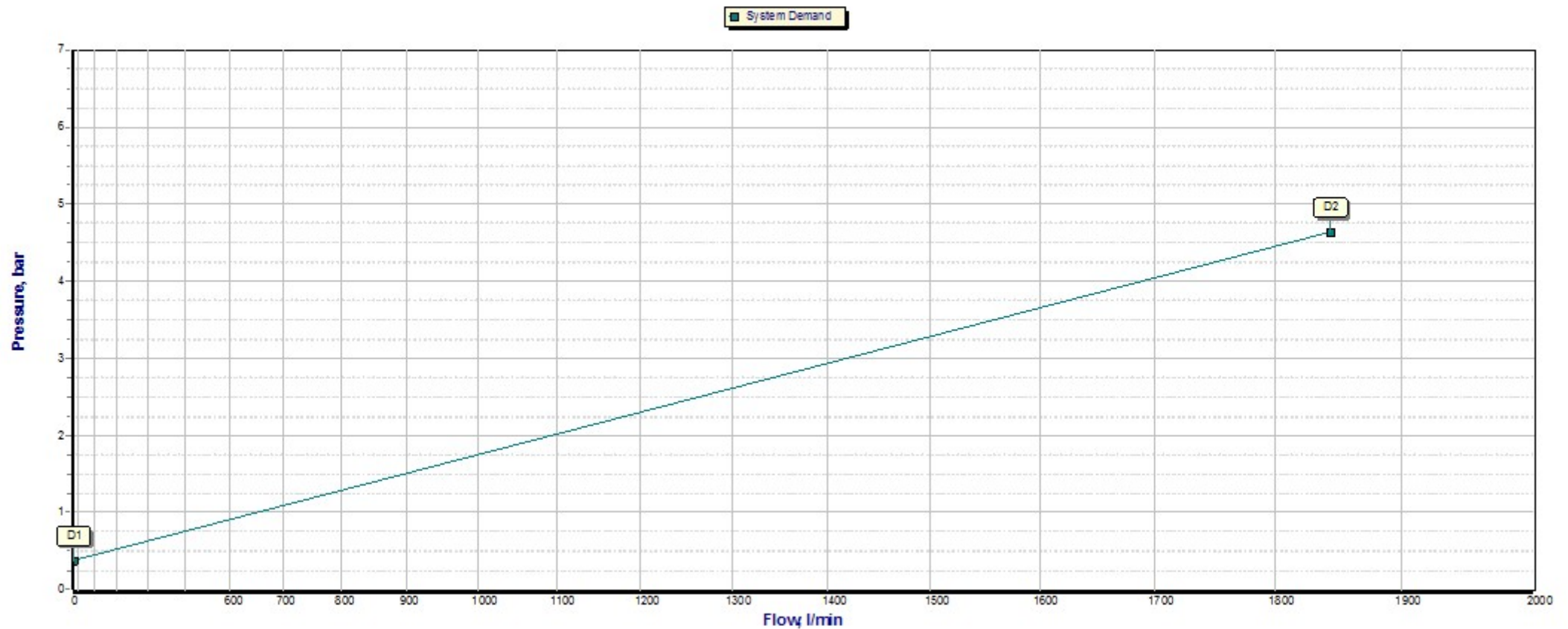
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 4,65

W1 - Flow (l/min) 1844,5

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 1



Hydraulic Analysis for : 1

Graph Labels

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	0,39
D2	System Demand	1844,5	4,65

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^½)	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
A1	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,9	89,3	1,22
A10	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,2	69,82	0,75
A11	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,3	60,01	0,55
A12	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,1	57,13	0,5
A13	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	8	89,62	1,23
A14	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,4	83,46	1,07
A15	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,7	74,99	0,86
A16	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,2	70,02	0,75
A17	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,3	60,18	0,56
A18	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,1	57,3	0,5
A19	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	8	90,18	1,25
A2	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,4	83,16	1,06
A20	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,5	83,99	1,08
A21	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,7	75,46	0,87
A22	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,3	70,47	0,76
A23	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,4	60,57	0,56
A24	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,1	57,67	0,51
A25	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	9,1	102,23	1,6
A3	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,6	74,71	0,86

A4	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,2	69,77	0,75
A5	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,3	59,96	0,55
A6	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,1	57,08	0,5
A7	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,9	89,38	1,23
A8	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,4	83,23	1,06
A9	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,6	74,78	0,86

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
A6 2,43	Overhead Sprinkler HEAD	80,7 Open	57,08 0,83	11,3 5,1	0,5 -0,39	0,5 56,25
A12 2,43	Overhead Sprinkler HEAD	80,7 Open	57,13 0,88	11,3 5,1	0,5 -0,39	0,5 56,25
A18 2,43	Overhead Sprinkler HEAD	80,7 Open	57,3 1,05	11,3 5,1	0,5 -0,39	0,5 56,25
A24 2,43	Overhead Sprinkler HEAD	80,7 Open	57,67 1,42	11,3 5,1	0,51 -0,39	0,5 56,25
A5 2,43	Overhead Sprinkler HEAD	80,7 Open	59,96 3,71	11,3 5,3	0,55 -0,39	0,5 56,25
A11 2,43	Overhead Sprinkler HEAD	80,7 Open	60,01 3,76	11,3 5,3	0,55 -0,39	0,5 56,25
A17 2,43	Overhead Sprinkler HEAD	80,7 Open	60,18 3,93	11,3 5,3	0,56 -0,39	0,5 56,25
A23 2,43	Overhead Sprinkler HEAD	80,7 Open	60,57 4,33	11,3 5,4	0,56 -0,39	0,5 56,25
A4 2,43	Overhead Sprinkler HEAD	80,7 Open	69,77 13,52	11,3 6,2	0,75 -0,39	0,5 56,25
A10 2,43	Overhead Sprinkler HEAD	80,7 Open	69,82 13,57	11,3 6,2	0,75 -0,39	0,5 56,25
A16 2,43	Overhead Sprinkler HEAD	80,7 Open	70,02 13,77	11,3 6,2	0,75 -0,39	0,5 56,25
A22 2,43	Overhead Sprinkler HEAD	80,7 Open	70,47 14,22	11,3 6,3	0,76 -0,39	0,5 56,25
A3 2,43	Overhead Sprinkler HEAD	80,7 Open	74,71 18,46	11,3 6,6	0,86 -0,39	0,5 56,25
A9 2,43	Overhead Sprinkler HEAD	80,7 Open	74,78 18,53	11,3 6,6	0,86 -0,39	0,5 56,25
A15 2,43	Overhead Sprinkler HEAD	80,7 Open	74,99 18,74	11,3 6,7	0,86 -0,39	0,5 56,25
A21 2,43	Overhead Sprinkler HEAD	80,7 Open	75,46 19,21	11,3 6,7	0,87 -0,39	0,5 56,25
A2 2,43	Overhead Sprinkler HEAD	80,7 Open	83,16 26,92	11,3 7,4	1,06 -0,39	0,5 56,25
A8 2,43	Overhead Sprinkler HEAD	80,7 Open	83,23 26,98	11,3 7,4	1,06 -0,39	0,5 56,25
A14 2,43	Overhead Sprinkler HEAD	80,7 Open	83,46 27,21	11,3 7,4	1,07 -0,39	0,5 56,25
A20 2,43	Overhead Sprinkler HEAD	80,7 Open	83,99 27,74	11,3 7,5	1,08 -0,39	0,5 56,25
A1 2,43	Overhead Sprinkler HEAD	80,7 Open	89,3 33,05	11,3 7,9	1,22 -0,39	0,5 56,25
A7 2,43	Overhead Sprinkler HEAD	80,7 Open	89,38 33,13	11,3 7,9	1,23 -0,39	0,5 56,25
A13 2,43	Overhead Sprinkler HEAD	80,7 Open	89,62 33,37	11,3 8	1,23 -0,39	0,5 56,25
A19 2,43	Overhead Sprinkler HEAD	80,7 Open	90,18 33,93	11,3 8	1,25 -0,39	0,5 56,25
A25 2,43	Overhead Sprinkler HEAD	80,7 Open	102,23 45,98	11,3 9,1	1,6 -0,39	0,5 56,25
001 2,43	Node NODE				1,46 -0,39	
002 2,43	Node NODE				1,46 -0,39	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
003 2,43	Node NODE				1,47 -0,39	
005 2,43	Node NODE				1,49 -0,39	
008 2,43	Node NODE				1,62 -0,39	
419 -1,5	Node NODE				4,48 0	
W1 -1,5	Supply SUPPLY		-1844,5		4,65 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

A6 A5	2,43 2,43	80,7 80,7	57,08 57,08	25 26,7		3 0 3	120 0,0172	0,5 0 0,05	
A5 A4	2,43 2,43	80,7 80,7	59,96 117,04	25 26,7		3 0 3	120 0,0651	0,55 0 0,2	
A4 A3	2,43 2,43	80,7 80,7	69,77 186,81	32 35,9		3 0 3	120 0,0366	0,75 0 0,11	
A3 A2	2,43 2,43	80,7 80,7	74,71 261,52	32 35,9		3,002 0 3,002	120 0,0682	0,86 0 0,2	
A2 A1	2,43 2,43	80,7 80,7	83,16 344,69	40 41,8		2,997 0 2,997	120 0,0542	1,06 0 0,16	
A1 001	2,43 2,43	80,7	89,3 433,99	40 41,8	1x(eu.TeeScr-Br)=2,4	0,476 2,4 2,876	120 0,0831	1,22 0 0,24	
001 002	2,43 2,43		0 433,99	100 107,1		2,799 0 2,799	120 0,0008	1,46 0 0,00	
002 003	2,43 2,43		434,36 868,35	100 107,1		2,6 0 2,6	120 0,0031	1,46 0 0,01	
003 005	2,43 2,43		435,57 1303,92	100 107,1		2,8 0 2,8	120 0,0065	1,47 0 0,02	
005 008	2,43 2,43		438,35 1742,27	100 107,1	2x(eu.90s)=6	5,521 6 11,521	120 0,0111	1,49 0 0,13	
008 419	2,43 -1,5		102,23 1844,5	100 107,1	15x(eu.90s)=45 4x(eu.TeeScr-Br)=24,4	130,59 6 69,4 199,99 6	120 0,0124	1,62 0,39 2,48	
419 W1	-1,5 -1,5		0 1844,5	150 130,8	1x(eu.90s)=5,719 1x(elbow.22.5)=1,419	39,446 7,138 46,584	140 0,0035	4,48 0 0,16	
W1								4,65	

PIPE INFORMATION**Path No: 2**

A12	2,43	80,7	57,13	25		3	120	0,5	
A11	2,43	80,7	57,13	26,7		0	0,0172	0	
						3		0,05	
A11	2,43	80,7	60,01	25		3	120	0,55	
A10	2,43	80,7	117,14	26,7		0	0,0652	0	
						3		0,2	
A10	2,43	80,7	69,82	32		3	120	0,75	
A9	2,43	80,7	186,97	35,9		0	0,0366	0	
						3		0,11	
A9	2,43	80,7	74,78	32		3,002	120	0,86	
A8	2,43	80,7	261,74	35,9		0	0,0683	0	
						3,002		0,21	
A8	2,43	80,7	83,23	40		2,997	120	1,06	
A7	2,43	80,7	344,98	41,8		0	0,0543	0	
						2,997		0,16	
A7	2,43	80,7	89,38	40	1x(eu.TeeScr-Br)=2,4	0,476	120	1,23	
002	2,43		434,36	41,8		2,4	0,0832	0	
						2,876		0,24	
002								1,46	

Path No: 3

A18	2,43	80,7	57,3	25		3	120	0,5	
A17	2,43	80,7	57,3	26,7		0	0,0173	0	
						3		0,05	
A17	2,43	80,7	60,18	25		3	120	0,56	
A16	2,43	80,7	117,48	26,7		0	0,0655	0	
						3		0,2	
A16	2,43	80,7	70,02	32		3	120	0,75	
A15	2,43	80,7	187,5	35,9		0	0,0368	0	
						3		0,11	
A15	2,43	80,7	74,99	32		3,002	120	0,86	
A14	2,43	80,7	262,49	35,9		0	0,0687	0	
						3,002		0,21	
A14	2,43	80,7	83,46	40		2,997	120	1,07	
A13	2,43	80,7	345,95	41,8		0	0,0546	0	
						2,997		0,16	
A13	2,43	80,7	89,62	40	1x(eu.TeeScr-Br)=2,4	0,476	120	1,23	
003	2,43		435,57	41,8		2,4	0,0836	0	
						2,876		0,24	
003								1,47	

PIPE INFORMATION**Path No: 4**

A24	2,43	80,7	57,67	25		3	120	0,51	
A23	2,43	80,7	57,67	26,7		0	0,0175	0	
						3		0,05	
A23	2,43	80,7	60,57	25		3	120	0,56	
A22	2,43	80,7	118,25	26,7		0	0,0663	0	
						3		0,2	
A22	2,43	80,7	70,47	32		3	120	0,76	
A21	2,43	80,7	188,72	35,9		0	0,0373	0	
						3		0,11	
A21	2,43	80,7	75,46	32		3,002	120	0,87	
A20	2,43	80,7	264,18	35,9		0	0,0695	0	
						3,002		0,21	
A20	2,43	80,7	83,99	40		2,997	120	1,08	
A19	2,43	80,7	348,17	41,8		0	0,0552	0	
						2,997		0,17	
A19	2,43	80,7	90,18	40	1x(eu.TeeScr-Br)=2,4	0,476	120	1,25	
005	2,43		438,35	41,8		2,4	0,0846	0	
						2,876		0,24	
005								1,49	

Path No: 5

A25	2,43	80,7	102,23	40	1x(eu.TeeScr-Br)=2,4	0,404	120	1,6	
008	2,43		102,23	41,8		2,4	0,0057	0	
						2,804		0,02	
008								1,62	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.

* Maximum Velocity of 5,32 m/s occurs in the following pipe(s): (005-A19)

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

City: Stavanger, - -

Project Location: -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

City: Stavanger, - 4034

Phone Number: 51801110

E-mail: christian@aktivsprinkler.no

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

Design

Remote Area Name	10
Remote Area Location	Næring B1
Occupancy Classification	OH1
Density (l/min/m ²)	5,3
Area of Application (m ²)	72
Coverage per Sprinkler (m ²)	10,8
Number of Calculated Sprinklers	13
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	903,11
Required Pressure at Source (bar)	2,93
Type of System	Wet
Volume - Entire System (l)	1597,1 l

Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

K80

**Diagram for Design Area : 10
(Optimized Hvdraulic Simnified)**



Hydraulic Analysis for : 10**Calculation Info**

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters**Hoses**

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 903,11

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 903,11

Other

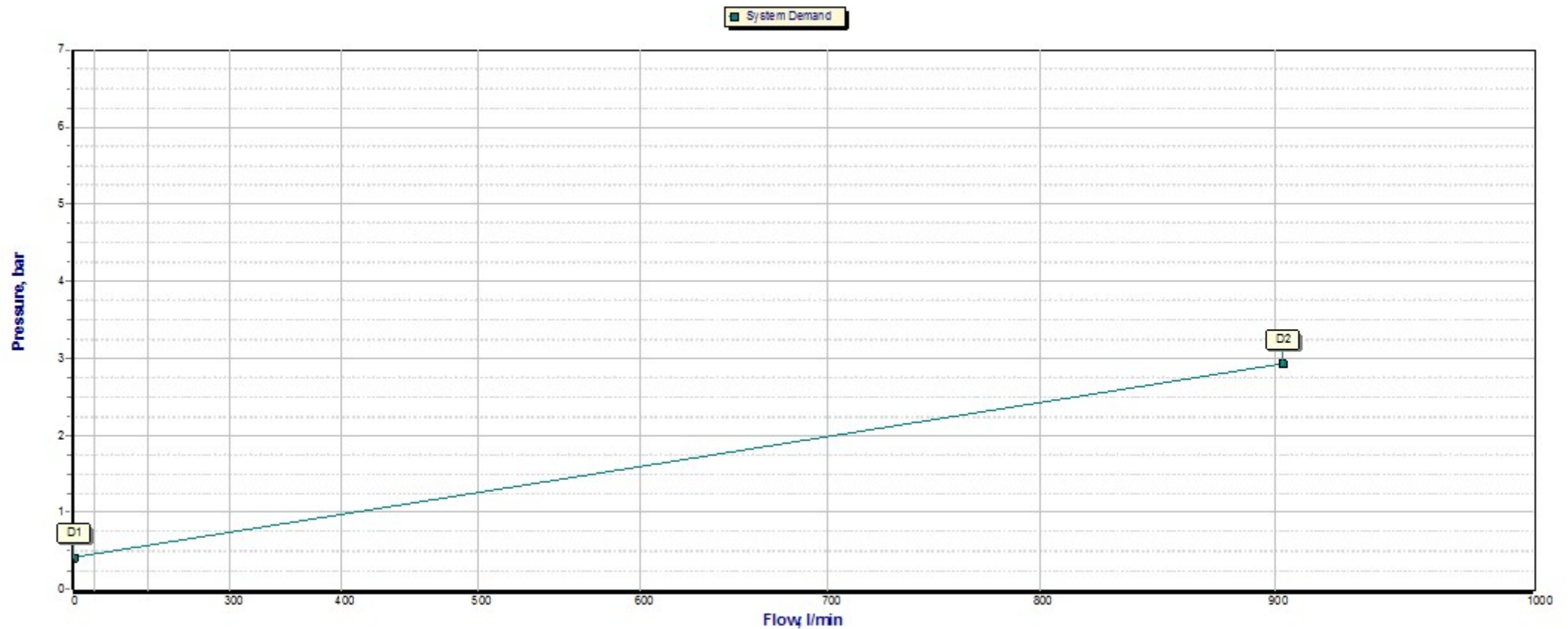
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 2,93

W1 - Flow (l/min) 903,11

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 10



Hydraulic Analysis for : 10

Graph Labels

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	0,42
D2	System Demand	903,11	2,93

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^½)	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
T1	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,8	62,96	0,61
T10	Overhead Sprinkler	10,8	80,7	5	54	0,5	7,2	77,87	0,93
T11	Overhead Sprinkler	10,8	80,7	5	54	0,5	7,3	78,71	0,95
T12	Overhead Sprinkler	10,8	80,7	5	54	0,5	7,4	79,57	0,97
T13	Overhead Sprinkler	10,8	80,7	5	54	0,5	8	86,24	1,14
T2	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,9	63,77	0,62
T3	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,3	57,08	0,5
T4	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,5	59,56	0,54
T5	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,2	66,87	0,69
T6	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,5	70,51	0,76
T7	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,7	61,09	0,57
T8	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,9	64,24	0,63
T9	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,9	74,63	0,85

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
419 -1,5	Node NODE				2,88 0	
436 -1,5	Node NODE				2,71 0	
442 -1,5	Node NODE				2,26 0	
446 2,38	Node NODE				1,74 -0,38	
448 2,7	Node NODE				1,35 -0,41	
449 2,7	Node NODE				1,31 -0,41	
450 2,7	Node NODE				1,18 -0,41	
452 2,7	Node NODE				1,04 -0,41	
453 2,7	Node NODE				1,04 -0,41	
454 2,7	Node NODE				1 -0,41	
455 2,7	Node NODE				1 -0,41	
456 2,7	Node NODE				0,82 -0,41	
457 2,7	Node NODE				0,81 -0,41	
458 2,7	Node NODE				0,67 -0,41	
460 2,7	Node NODE				0,57 -0,41	
T1 2,7	Overhead Sprinkler HEAD	80,7 Open	62,96 8,96	10,8 5,8	0,61 -0,41	0,5 54
T10 2,7	Overhead Sprinkler HEAD	80,7 Open	77,87 23,87	10,8 7,2	0,93 -0,41	0,5 54
T11 2,7	Overhead Sprinkler HEAD	80,7 Open	78,71 24,71	10,8 7,3	0,95 -0,41	0,5 54
T12 2,7	Overhead Sprinkler HEAD	80,7 Open	79,57 25,57	10,8 7,4	0,97 -0,41	0,5 54
T13 2,78	Overhead Sprinkler HEAD	80,7 Open	86,24 32,24	10,8 8	1,14 -0,42	0,5 54
T2 2,7	Overhead Sprinkler HEAD	80,7 Open	63,77 9,77	10,8 5,9	0,62 -0,41	0,5 54
T3 2,7	Overhead Sprinkler HEAD	80,7 Open	57,08 3,08	10,8 5,3	0,5 -0,41	0,5 54
T4 2,7	Overhead Sprinkler HEAD	80,7 Open	59,56 5,56	10,8 5,5	0,54 -0,41	0,5 54
T5 2,7	Overhead Sprinkler HEAD	80,7 Open	66,87 12,87	10,8 6,2	0,69 -0,41	0,5 54
T6 2,7	Overhead Sprinkler HEAD	80,7 Open	70,51 16,51	10,8 6,5	0,76 -0,41	0,5 54
T7 2,7	Overhead Sprinkler HEAD	80,7 Open	61,09 7,09	10,8 5,7	0,57 -0,41	0,5 54
T8 2,7	Overhead Sprinkler HEAD	80,7 Open	64,24 10,24	10,8 5,9	0,63 -0,41	0,5 54

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
T9 2,7	Overhead Sprinkler HEAD	80,7 Open	74,63 20,63	10,8 6,9	0,85 -0,41	0,5 54
W1 -1,5	Supply SUPPLY		-903,11		2,93 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

T3 460	2,7 2,7	80,7	57,08 57,08	25 26,7	1x(eu.TeeScr-Br)=1,5	2,3 1,5 3,8	120 0,0172	0,5 0 0,07	
460 T5	2,7 2,7	80,7	59,56 116,64	25 26,7		1,868 0 1,868	120 0,0647	0,57 0 0,12	
T5 457	2,7 2,7	80,7	66,87 183,52	32 35,9	1x(eu.TeeScr-Br)=2,1	1,311 2,1 3,411	120 0,0354	0,69 0 0,12	
457 456	2,7 2,7		126,73 310,24	40 41,8		0,301 0 0,301	120 0,0446	0,81 0 0,01	
456 455	2,7 2,7		70,51 380,75	40 41,8		2,699 0 2,699	120 0,0652	0,82 0 0,18	
455 454	2,7 2,7		199,96 580,71	65 70,3		0,301 0 0,301	120 0,0113	1 0 0,00	
454 453	2,7 2,7		77,87 658,59	65 70,3		2,699 0 2,699	120 0,0143	1 0 0,04	
453 452	2,7 2,7		78,71 737,29	65 70,3		0,301 0 0,301	120 0,0176	1,04 0 0,01	
452 450	2,7 2,7		79,57 816,87	65 70,3	1x(eu.90s)=1,9	4,623 1,9 6,523	120 0,0213	1,04 0 0,14	
450 449	2,7 2,7		86,24 903,11	65 70,3	1x(coupling)=0,305	4,645 0,305 4,949	120 0,0257	1,18 0 0,13	
449 448	2,7 2,7		0 903,11	100 107,1		13 0 13	120 0,0033	1,31 0 0,04	
448 446	2,7 2,38		0 903,11	50 53	2x(eu.90s)=3	0,497 3 3,497	120 0,1015	1,35 0,03 0,36	
446 442	2,38 -1,5		0 903,11	100 107,1	4x(eu.90s)=12	30,027 12 42,027	120 0,0033	1,74 0,38 0,14	
442 436	-1,5 -1,5		0 903,11	100 90	2x(eu.90s)=7,98 4x(eu.45s)=8,512	62,365 16,492 78,857	140 0,0058	2,26 0 0,46	
436 419	-1,5 -1,5		0 903,11	100 107,1	7x(eu.90s)=21 1x(eu.TeeScr-Br)=6,1	23,795 27,1 50,895	120 0,0033	2,71 0 0,17	
419 W1	-1,5 -1,5		0 903,11	150 130,8	1x(eu.90s)=5,719 1x(elbow.22.5)=1,419	39,446 7,138 46,584	140 0,0009	2,88 0 0,04	
W1								2,93	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 2

T4 460	2,7 2,7	80,7	59,56 59,56	25 26,7		1,132 0 1,132	120 0,0186	0,54 0 0,02	
460									0,57

Path No: 3

T7 T8	2,7 2,7	80,7 80,7	61,09 61,09	25 26,7	1x(eu.45s)=0,4	2,702 0,4 3,102	120 0,0195	0,57 0 0,06	
T8 T9	2,7 2,7	80,7 80,7	64,24 125,33	25 26,7		3 0 3	120 0,0738	0,63 0 0,22	
T9 455	2,7 2,7	80,7	74,63 199,96	32 35,9	1x(eu.TeeScr-Br)=2,1	1,311 2,1 3,411	120 0,0415	0,85 0 0,14	
455									1

Path No: 4

T1 458	2,7 2,7	80,7	62,96 62,96	25 26,7	1x(eu.90s)=0,77	2,212 0,77 2,982	120 0,0206	0,61 0 0,06	
458 457	2,7 2,7		63,77 126,73	25 26,7		1,818 0 1,818	120 0,0754	0,67 0 0,14	
457									0,81

Path No: 5

T2 458	2,7 2,7	80,7	63,77 63,77	25 26,7	1x(eu.TeeScr-Br)=1,5	0,675 1,5 2,175	120 0,0211	0,62 0 0,05	
458									0,67

Path No: 6

T6 456	2,7 2,7	80,7	70,51 70,51	25 26,7	1x(eu.TeeScr-Br)=1,5	0,759 1,5 2,259	120 0,0255	0,76 0 0,06	
456									0,82

Path No: 7

T10 454	2,7 2,7	80,7	77,87 77,87	25 26,7	1x(eu.TeeScr-Br)=1,5	0,759 1,5 2,259	120 0,0306	0,93 0 0,07	
454									1

Path No: 8

T11 453	2,7 2,7	80,7	78,71 78,71	25 26,7	1x(eu.TeeScr-Br)=1,5	1,311 1,5 2,811	120 0,0312	0,95 0 0,09	
453									1,04

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 9

T12	2,7	80,7	79,57	25	1x(eu.TeeScr-Br)=1,5	0,759	120	0,97	
452	2,7		79,57	26,7		1,5	0,0318	0	
						2,259		0,07	
452									1,04

Path No: 10

T13	2,78	80,7	86,24	32	1x(eu.TeeScr-Br)=2,1	0,739	120	1,14	
450	2,7		86,24	35,9	1x(eu.90s)=1	3,1	0,0087	0,01	
						3,839		0,03	
450									1,18

- * Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.
- * Maximum Velocity of 6,82 m/s occurs in the following pipe(s): (446-448)

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

City: Stavanger, - -

Project Location: -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

City: Stavanger, - 4034

Phone Number: 51801110

E-mail: christian@aktivsprinkler.no

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

Design

Remote Area Name	2
Remote Area Location	Garasje 2
Occupancy Classification	OH 2 Tørt
Density (l/min/m ²)	5,1
Area of Application (m ²)	180
Coverage per Sprinkler (m ²)	11,3
Number of Calculated Sprinklers	21
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	1754,07
Required Pressure at Source (bar)	4,61
Type of System	Wet
Volume - Entire System (l)	1545 l

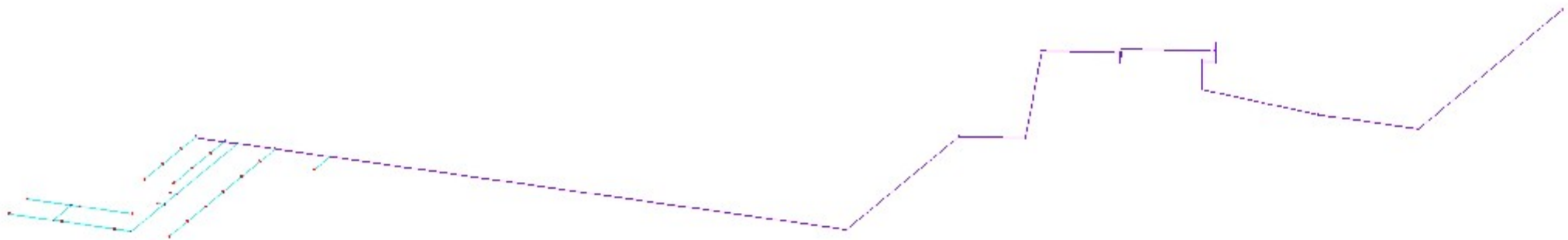
Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

SSU K80

Diagram for Design Area : 2
(Optimized Hydraulic Simnplified)



Hydraulic Analysis for : 2

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Hoses

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 1754,07

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 1754,07

Other

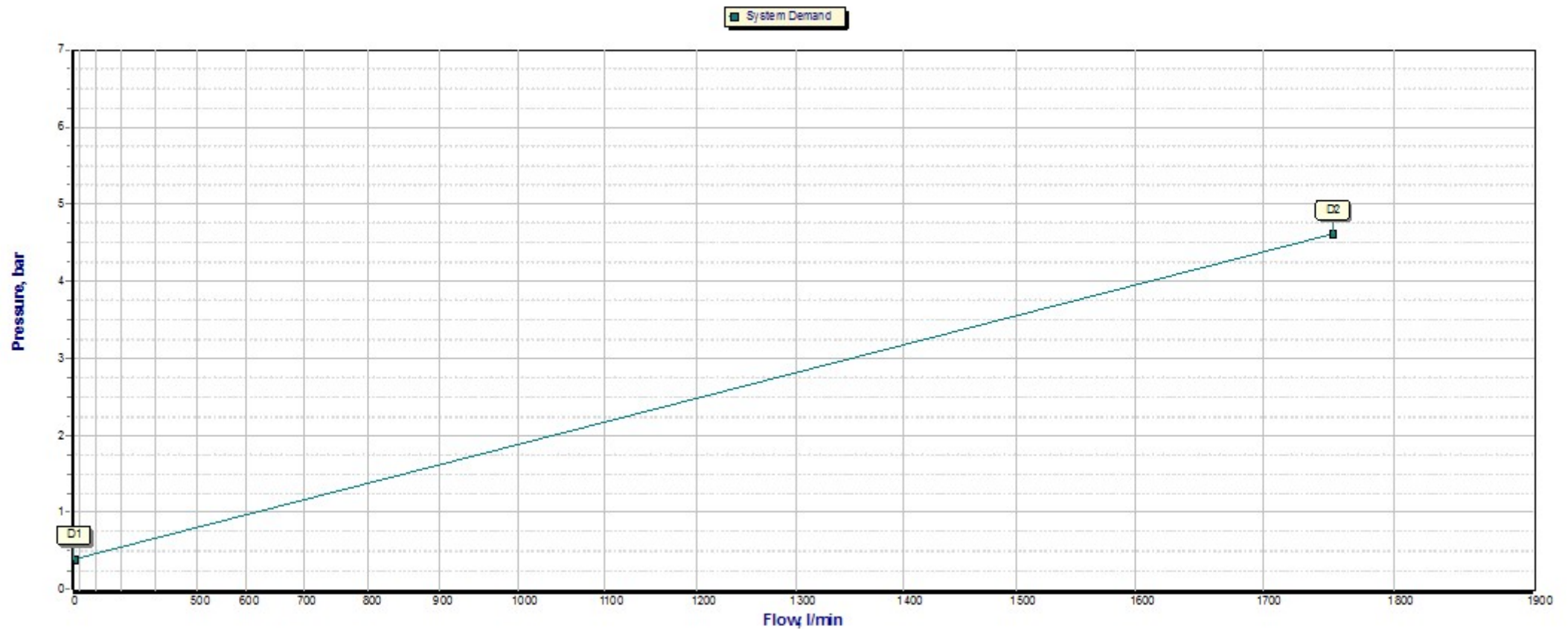
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 4,61

W1 - Flow (l/min) 1754,07

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 2



Hydraulic Analysis for : 2

Graph Labels

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	0,4
D2	System Demand	1754,07	4,61

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^½)	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
B1	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,6	62,89	0,61
B10	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,8	88	1,19
B11	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,8	75,96	0,89
B12	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,4	72,43	0,81
B13	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	9,2	103,22	1,63
B14	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	9	100,98	1,56
B15	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	9,6	107,56	1,78
B16	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	8,9	99,78	1,53
B17	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	8,4	94,67	1,38
B18	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,9	88,56	1,2
B19	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,8	76,45	0,9
B2	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,4	71,99	0,8
B20	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,5	72,94	0,82
B21	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	11,1	124,83	2,39
B3	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,4	60,52	0,56
B4	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,8	76,28	0,89
B5	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,8	88	1,19
B6	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,8	75,95	0,89
B7	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,4	72,43	0,8

B8	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,1	57,08	0,5
B9	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,4	83,57	1,07

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
061 2,43	Node NODE				2,43 -0,39	
063 2,43	Node NODE				2,4 -0,39	
064 2,43	Node NODE				2,38 -0,39	
066 2,43	Node NODE				2,38 -0,39	
068 2,43	Node NODE				2,38 -0,39	
088 2,43	Node NODE				1,73 -0,39	
089 2,43	Node NODE				1,66 -0,39	
091 2,43	Node NODE				0,87 -0,39	
092 2,43	Node NODE				0,7 -0,39	
419 -1,5	Node NODE				4,46 0	
B1 2,43	Overhead Sprinkler HEAD	80,7 Open	62,89 6,64	11,3 5,6	0,61 -0,39	0,5 56,25
B10 2,53	Overhead Sprinkler HEAD	80,7 Open	88 31,75	11,3 7,8	1,19 -0,4	0,5 56,25
B11 2,53	Overhead Sprinkler HEAD	80,7 Open	75,96 19,71	11,3 6,8	0,89 -0,4	0,5 56,25
B12 2,53	Overhead Sprinkler HEAD	80,7 Open	72,43 16,18	11,3 6,4	0,81 -0,4	0,5 56,25
B13 2,43	Overhead Sprinkler HEAD	80,7 Open	103,22 46,97	11,3 9,2	1,63 -0,39	0,5 56,25
B14 2,43	Overhead Sprinkler HEAD	80,7 Open	100,98 44,73	11,3 9	1,56 -0,39	0,5 56,25
B15 2,43	Overhead Sprinkler HEAD	80,7 Open	107,56 51,31	11,3 9,6	1,78 -0,39	0,5 56,25
B16 2,43	Overhead Sprinkler HEAD	80,7 Open	99,78 43,53	11,3 8,9	1,53 -0,39	0,5 56,25
B17 2,43	Overhead Sprinkler HEAD	80,7 Open	94,67 38,42	11,3 8,4	1,38 -0,39	0,5 56,25
B18 2,43	Overhead Sprinkler HEAD	80,7 Open	88,56 32,32	11,3 7,9	1,2 -0,39	0,5 56,25
B19 2,43	Overhead Sprinkler HEAD	80,7 Open	76,45 20,2	11,3 6,8	0,9 -0,39	0,5 56,25
B2 2,43	Overhead Sprinkler HEAD	80,7 Open	71,99 15,74	11,3 6,4	0,8 -0,39	0,5 56,25
B20 2,43	Overhead Sprinkler HEAD	80,7 Open	72,94 16,69	11,3 6,5	0,82 -0,39	0,5 56,25
B21 2,43	Overhead Sprinkler HEAD	80,7 Open	124,83 68,58	11,3 11,1	2,39 -0,39	0,5 56,25
B3 2,43	Overhead Sprinkler HEAD	80,7 Open	60,52 4,27	11,3 5,4	0,56 -0,39	0,5 56,25
B4 2,43	Overhead Sprinkler HEAD	80,7 Open	76,28 20,03	11,3 6,8	0,89 -0,39	0,5 56,25
B5 2,53	Overhead Sprinkler HEAD	80,7 Open	88 31,75	11,3 7,8	1,19 -0,4	0,5 56,25

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
B6 2,53	Overhead Sprinkler HEAD	80,7 Open	75,95 19,7	11,3 6,8	0,89 -0,4	0,5 56,25
B7 2,53	Overhead Sprinkler HEAD	80,7 Open	72,43 16,18	11,3 6,4	0,8 -0,4	0,5 56,25
B8 2,43	Overhead Sprinkler HEAD	80,7 Open	57,08 0,83	11,3 5,1	0,5 -0,39	0,5 56,25
B9 2,43	Overhead Sprinkler HEAD	80,7 Open	83,57 27,32	11,3 7,4	1,07 -0,39	0,5 56,25
W1 -1,5	Supply SUPPLY		-1754,07		4,61 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

B8 B3	2,43 2,43	80,7 80,7	57,08 57,08	25 26,7		3,6 0 3,6	120 0,0172	0,5 0 0,06	
B3 092	2,43 2,43	80,7	60,52 117,6	25 26,7	1x(eu.TeeScr-Br)=1,5	0,596 1,5 2,096	120 0,0656	0,56 0 0,14	
092 091	2,43 2,43		62,89 180,49	32 35,9	1x(eu.TeeScr-Br)=2,1	3,001 2,1 5,101	120 0,0343	0,7 0 0,18	
091 B4	2,43 2,43	80,7	71,99 252,47	40 41,8		0,596 0 0,596	120 0,0305	0,87 0 0,02	
B4 B9	2,43 2,43	80,7 80,7	76,28 328,75	40 41,8		3,602 0 3,602	120 0,0497	0,89 0 0,18	
B9 089	2,43 2,43	80,7	83,57 412,32	40 41,8	1x(eu.90s)=1,2	6,562 1,2 7,762	120 0,0755	1,07 0 0,59	
089 088	2,43 2,43		100,98 513,29	50 53		2,081 0 2,081	120 0,0357	1,66 0 0,07	
088 064	2,43 2,43		103,22 616,51	50 53	1x(eu.TeeScr-Br)=2,9	10,101 2,9 13,001	120 0,0501	1,73 0 0,65	
064 063	2,43 2,43		472,77 1089,28	100 107,1		2,585 0 2,585	120 0,0047	2,38 0 0,01	
063 061	2,43 2,43		539,96 1629,24	100 107,1		3,75 0 3,75	120 0,0098	2,4 0 0,04	
061 419	2,43 -1,5		124,83 1754,07	100 107,1	9x(eu.90s)=27 4x(eu.TeeScr-Br)=24,4	94,36 51,4 145,76	120 0,0113	2,43 0,39 1,65	
419 W1	-1,5 -1,5		0 1754,07	150 130,8	1x(eu.90s)=5,719 1x(elbow.22.5)=1,419	39,446 7,138 46,584	140 0,0032	4,46 0 0,15	
W1								4,61	

Path No: 2

B1 092	2,43 2,43	80,7	62,89 62,89	25 26,7	1x(eu.TeeScr-Br)=1,5	3,004 1,5 4,504	120 0,0206	0,61 0 0,09	
092								0,7	

Path No: 3

B2 091	2,43 2,43	80,7	71,99 71,99	25 26,7		3,003 0 3,003	120 0,0264	0,8 0 0,08	
091								0,87	

PIPE INFORMATION

Path No: 4

B7	2,53	80,7	72,43	25		2,997	120	0,8	
B6	2,53	80,7	72,43	26,7		0	0,0267	0	
						2,997		0,08	
B6	2,53	80,7	75,95	25		3,001	120	0,89	
B5	2,53	80,7	148,38	26,7		0	0,101	0	
						3,001		0,3	
B5	2,53	80,7	88	25	1x(eu.TeeScr-Br)=1,5	2,68	120	1,19	
068	2,43		236,37	26,7	1x(eu.90s)=0,77	2,27	0,2392	0,01	
						4,95		1,18	
068	2,43		0	100		2,003	120	2,38	
066	2,43		236,37	107,1		0	0,0003	0	
						2,003		0	
066	2,43		236,39	100		0,818	120	2,38	
064	2,43		472,77	107,1		0	0,001	0	
						0,818		0	
064								2,38	

Path No: 5

B12	2,53	80,7	72,43	25		2,997	120	0,81	
B11	2,53	80,7	72,43	26,7		0	0,0268	0	
						2,997		0,08	
B11	2,53	80,7	75,96	25		3,001	120	0,89	
B10	2,53	80,7	148,39	26,7		0	0,101	0	
						3,001		0,3	
B10	2,53	80,7	88	25	1x(eu.TeeScr-Br)=1,5	2,681	120	1,19	
066	2,43		236,39	26,7	1x(eu.90s)=0,77	2,27	0,2392	0,01	
						4,951		1,18	
066								2,38	

Path No: 6

B20	2,43	80,7	72,94	25		2,973	120	0,82	
B19	2,43	80,7	72,94	26,7		0	0,0271	0	
						2,973		0,08	
B19	2,43	80,7	76,45	25		3	120	0,9	
B18	2,43	80,7	149,39	26,7		0	0,1022	0	
						3		0,31	
B18	2,43	80,7	88,56	32		3	120	1,2	
B17	2,43	80,7	237,95	35,9		0	0,0573	0	
						3		0,17	
B17	2,43	80,7	94,67	40		3	120	1,38	
B16	2,43	80,7	332,63	41,8		0	0,0507	0	
						3		0,15	
B16	2,43	80,7	99,78	40		3	120	1,53	
B15	2,43	80,7	432,41	41,8		0	0,0825	0	
						3		0,25	
B15	2,43	80,7	107,56	40	1x(eu.TeeScr-Br)=2,4	2,582	120	1,78	
063	2,43		539,96	41,8		2,4	0,1245	0	
						4,982		0,62	
063								2,4	

Path No: 7

B14	2,43	80,7	100,98	25	1x(eu.TeeScr-Br)=1,5	0,387	120	1,56	
089	2,43		100,98	26,7		1,5	0,0495	0	
						1,887		0,09	
089								1,66	

PIPE INFORMATION**Path No: 8**

B13	2,43	80,7	103,22	25	1x(eu.TeeScr-Br)=1,5	0,388	120	1,63	
088	2,43		103,22	26,7		1,5	0,0516	0	
						1,888		0,1	
088									1,73

Path No: 9

B21	2,43	80,7	124,83	40	1x(eu.TeeScr-Br)=2,4	2,582	120	2,39	
061	2,43		124,83	41,8		2,4	0,0083	0	
						4,982		0,04	
061									2,43

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.

* Maximum Velocity of 7,04 m/s occurs in the following pipe(s): (066-B10)

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

City: Stavanger, - -

Project Location: -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

City: Stavanger, - 4034

Phone Number: 51801110

E-mail: christian@aktivsprinkler.no

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

Design

Remote Area Name	3
Remote Area Location	Garasje 3
Occupancy Classification	OH 2 Tørt
Density (l/min/m ²)	5,1
Area of Application (m ²)	180
Coverage per Sprinkler (m ²)	11,3
Number of Calculated Sprinklers	19
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	1362,5
Required Pressure at Source (bar)	2,49
Type of System	Wet
Volume - Entire System (l)	1227,1 l

Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

SSU K80

Diagram for Design Area : 3
(Optimized Hydraulic Simnified)



Hydraulic Analysis for : 3

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Hoses

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 1362,5

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 1362,5

Other

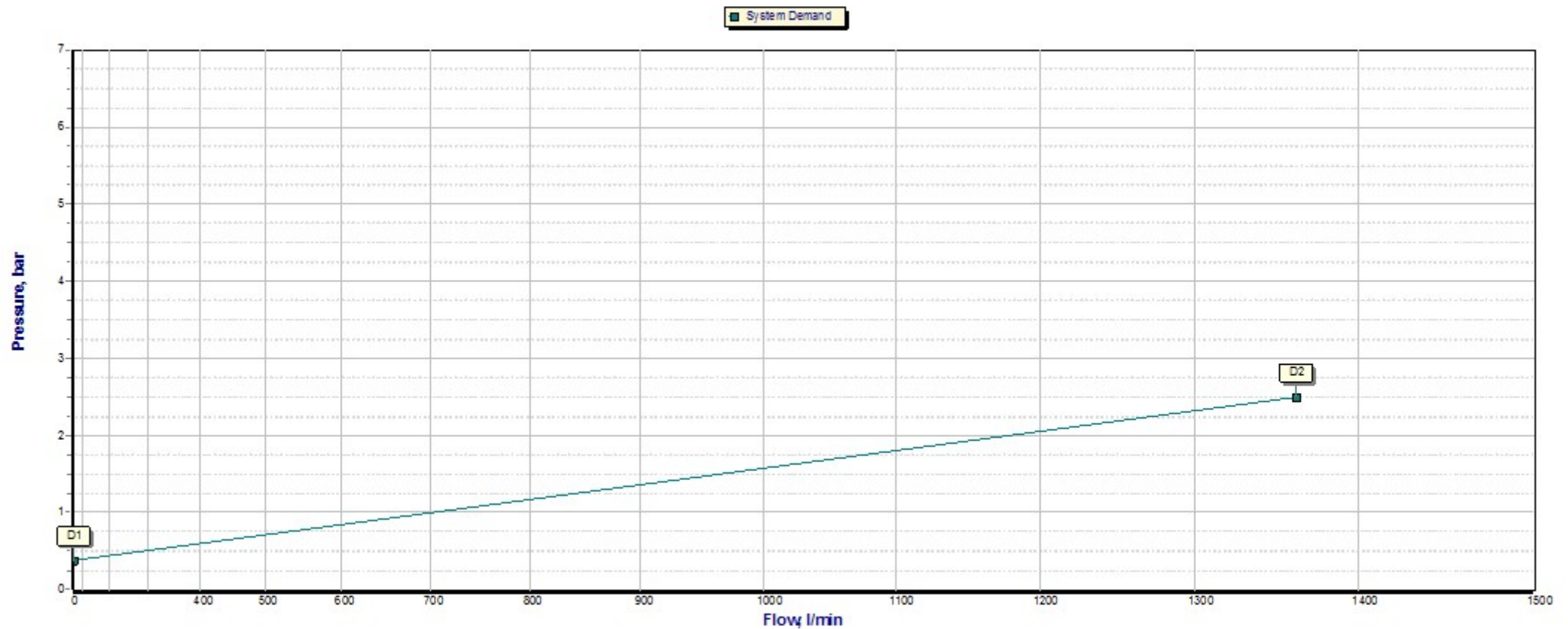
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 2,49

W1 - Flow (l/min) 1362,5

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 3



Hydraulic Analysis for : 3

Graph Labels

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	0,39
D2	System Demand	1362,5	2,49

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^½)	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
C1	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,3	59,18	0,54
C10	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,7	75,87	0,88
C11	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,5	72,67	0,81
C12	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,9	77,35	0,92
C13	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,6	74,66	0,86
C14	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,1	79,45	0,97
C15	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,7	75,01	0,86
C16	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,1	79,81	0,98
C17	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,7	75,46	0,87
C18	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,1	80,29	0,99
C19	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	7,4	83,09	1,06
C2	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,3	59,96	0,55
C3	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,1	57,08	0,5
C4	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,7	75,08	0,86
C5	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6	66,95	0,69
C6	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,3	71,31	0,78
C7	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,8	65,56	0,66
C8	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	5,6	62,45	0,6
C9	Overhead Sprinkler	11,3	80,7	5	56,25	0,5	6,3	71,27	0,78

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
310 2,43	Node NODE				1,28 -0,39	
313 2,43	Node NODE				1,26 -0,39	
314 2,43	Node NODE				1,25 -0,39	
315 2,43	Node NODE				1,24 -0,39	
316 2,43	Node NODE				1,17 -0,39	
317 2,43	Node NODE				1,13 -0,39	
318 2,43	Node NODE				1,1 -0,39	
320 2,43	Node NODE				0,81 -0,39	
321 2,43	Node NODE				0,68 -0,39	
326 2,43	Node NODE				1 -0,39	
419 -1,5	Node NODE				2,4 0	
C1 2,43	Overhead Sprinkler HEAD	80,7 Open	59,18 2,94	11,3 5,3	0,54 -0,39	0,5 56,25
C10 2,43	Overhead Sprinkler HEAD	80,7 Open	75,87 19,62	11,3 6,7	0,88 -0,39	0,5 56,25
C11 2,43	Overhead Sprinkler HEAD	80,7 Open	72,67 16,42	11,3 6,5	0,81 -0,39	0,5 56,25
C12 2,43	Overhead Sprinkler HEAD	80,7 Open	77,35 21,1	11,3 6,9	0,92 -0,39	0,5 56,25
C13 2,43	Overhead Sprinkler HEAD	80,7 Open	74,66 18,41	11,3 6,6	0,86 -0,39	0,5 56,25
C14 2,43	Overhead Sprinkler HEAD	80,7 Open	79,45 23,2	11,3 7,1	0,97 -0,39	0,5 56,25
C15 2,43	Overhead Sprinkler HEAD	80,7 Open	75,01 18,76	11,3 6,7	0,86 -0,39	0,5 56,25
C16 2,43	Overhead Sprinkler HEAD	80,7 Open	79,81 23,56	11,3 7,1	0,98 -0,39	0,5 56,25
C17 2,43	Overhead Sprinkler HEAD	80,7 Open	75,46 19,21	11,3 6,7	0,87 -0,39	0,5 56,25
C18 2,43	Overhead Sprinkler HEAD	80,7 Open	80,29 24,04	11,3 7,1	0,99 -0,39	0,5 56,25
C19 2,43	Overhead Sprinkler HEAD	80,7 Open	83,09 26,84	11,3 7,4	1,06 -0,39	0,5 56,25
C2 2,43	Overhead Sprinkler HEAD	80,7 Open	59,96 3,71	11,3 5,3	0,55 -0,39	0,5 56,25
C3 2,43	Overhead Sprinkler HEAD	80,7 Open	57,08 0,83	11,3 5,1	0,5 -0,39	0,5 56,25
C4 2,43	Overhead Sprinkler HEAD	80,7 Open	75,08 18,83	11,3 6,7	0,86 -0,39	0,5 56,25
C5 2,43	Overhead Sprinkler HEAD	80,7 Open	66,95 10,7	11,3 6	0,69 -0,39	0,5 56,25
C6 2,43	Overhead Sprinkler HEAD	80,7 Open	71,31 15,06	11,3 6,3	0,78 -0,39	0,5 56,25

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
C7 2,43	Overhead Sprinkler HEAD	80,7 Open	65,56 9,31	11,3 5,8	0,66 -0,39	0,5 56,25
C8 2,43	Overhead Sprinkler HEAD	80,7 Open	62,45 6,2	11,3 5,6	0,6 -0,39	0,5 56,25
C9 2,43	Overhead Sprinkler HEAD	80,7 Open	71,27 15,02	11,3 6,3	0,78 -0,39	0,5 56,25
W1 -1,5	Supply SUPPLY		-1362,5		2,49 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

C3	2,43	80,7	57,08	25		3	120	0,5	
C2	2,43	80,7	57,08	26,7		0	0,0172	0	
						3		0,05	
C2	2,43	80,7	59,96	25	1x(eu.TeeScr-Br)=1,5	0,505	120	0,55	
321	2,43		117,04	26,7		1,5	0,0651	0	
						2,005		0,13	
321	2,43		59,18	32		4	120	0,68	
320	2,43		176,23	35,9		0	0,0328	0	
						4		0,13	
320	2,43		128,01	40	1x(eu.TeeScr-Br)=2,4	2,977	120	0,81	
318	2,43		304,24	41,8	1x(eu.90s)=1,2	3,6	0,043	0	
						6,577		0,28	
318	2,43		213,33	50		0,962	120	1,1	
317	2,43		517,57	53		0	0,0362	0	
						0,962		0,03	
317	2,43		147,15	65		3	120	1,13	
316	2,43		664,71	70,3		0	0,0145	0	
						3		0,04	
316	2,43		150,02	65		3	120	1,17	
315	2,43		814,73	70,3		0	0,0212	0	
						3		0,06	
315	2,43		154,1	100		3	120	1,24	
314	2,43		968,83	107,1		0	0,0038	0	
						3		0,01	
314	2,43		154,82	100		3	120	1,25	
313	2,43		1123,65	107,1		0	0,0049	0	
						3		0,01	
313	2,43		155,75	100		3	120	1,26	
310	2,43		1279,41	107,1		0	0,0063	0	
						3		0,02	
310	2,43		83,09	100	10x(eu.90s)=30	61,135	120	1,28	
419	-1,5		1362,5	107,1	2x(eu.TeeScr-Br)=12,2	42,2	0,0071	0,39	
						103,33		0,73	
						5			
419	-1,5		0	150	1x(eu.90s)=5,719	39,446	140	2,4	
W1	-1,5		1362,5	130,8	1x(elbow.22.5)=1,419	7,138	0,002	0	
						46,584		0,09	
W1								2,49	

Path No: 2

C1	2,43	80,7	59,18	25	2x(elbow.22.5)=0,305	6,752	120	0,54	
321	2,43		59,18	26,7	2x(eu.45s)=0,8	1,105	0,0184	0	
						7,857		0,14	
321								0,68	

Path No: 3

C8	2,43	80,7	62,45	25		3	120	0,6	
C7	2,43	80,7	62,45	26,7		0	0,0203	0	
						3		0,06	
C7	2,43	80,7	65,56	25	1x(eu.TeeScr-Br)=1,5	0,505	120	0,66	
320	2,43		128,01	26,7		1,5	0,0768	0	
						2,005		0,15	
320								0,81	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 4

C5	2,43	80,7	66,95	25		4	120	0,69	
C6	2,43	80,7	66,95	26,7		0	0,0231	0	
						4		0,09	
C6	2,43	80,7	71,31	25	1x(eu.TeeScr-Br)=1,5	0,993	120	0,78	
326	2,43		138,25	26,7		1,5	0,0886	0	
						2,493		0,22	
326	2,43		75,08	32		2,038	120	1	
318	2,43		213,33	35,9		0	0,0468	0	
						2,038		0,1	
318								1,1	

Path No: 5

C9	2,43	80,7	71,27	25		4	120	0,78	
C10	2,43	80,7	71,27	26,7		0	0,026	0	
						4		0,1	
C10	2,43	80,7	75,87	25	1x(eu.TeeScr-Br)=1,5	0,993	120	0,88	
317	2,43		147,15	26,7		1,5	0,0994	0	
						2,493		0,25	
317								1,13	

Path No: 6

C11	2,43	80,7	72,67	25		4	120	0,81	
C12	2,43	80,7	72,67	26,7		0	0,0269	0	
						4		0,11	
C12	2,43	80,7	77,35	25	1x(eu.TeeScr-Br)=1,5	0,993	120	0,92	
316	2,43		150,02	26,7		1,5	0,103	0	
						2,493		0,26	
316								1,17	

Path No: 7

C13	2,43	80,7	74,66	25		4	120	0,86	
C14	2,43	80,7	74,66	26,7		0	0,0283	0	
						4		0,11	
C14	2,43	80,7	79,45	25	1x(eu.TeeScr-Br)=1,5	0,993	120	0,97	
315	2,43		154,1	26,7		1,5	0,1083	0	
						2,493		0,27	
315								1,24	

Path No: 8

C15	2,43	80,7	75,01	25		4	120	0,86	
C16	2,43	80,7	75,01	26,7		0	0,0285	0	
						4		0,11	
C16	2,43	80,7	79,81	25	1x(eu.TeeScr-Br)=1,5	0,993	120	0,98	
314	2,43		154,82	26,7		1,5	0,1092	0	
						2,493		0,27	
314								1,25	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 9

C4	2,43	80,7	75,08	25	1x(eu.90s)=0,77	3,993	120	0,86	
326	2,43		75,08	26,7		0,77	0,0286	0	
						4,763		0,14	
326									1

Path No: 10

C17	2,43	80,7	75,46	25		4	120	0,87	
C18	2,43	80,7	75,46	26,7		0	0,0289	0	
						4		0,12	
C18	2,43	80,7	80,29	25	1x(eu.TeeScr-Br)=1,5	0,993	120	0,99	
313	2,43		155,75	26,7		1,5	0,1104	0	
						2,493		0,28	
313									1,26

Path No: 11

C19	2,43	80,7	83,09	25	1x(eu.TeeScr-Br)=1,5	4,993	120	1,06	
310	2,43		83,09	26,7		1,5	0,0345	0	
						6,493		0,22	
310									1,28

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.

* Maximum Velocity of 4,64 m/s occurs in the following pipe(s): (313-C18)

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

City: Stavanger, - -

Project Location: -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

City: Stavanger, - 4034

Phone Number: 51801110

E-mail: christian@aktivsprinkler.no

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

Design

Remote Area Name	4
Remote Area Location	B9 7 etasje #1
Occupancy Classification	INSTA Type 3
Density (l/min/m ²)	4,2
Area of Application (m ²)	48
Coverage per Sprinkler (m ²)	12
Number of Calculated Sprinklers	4
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	216,75
Required Pressure at Source (bar)	4,46
Type of System	Wet
Volume - Entire System (l)	1155,9 l

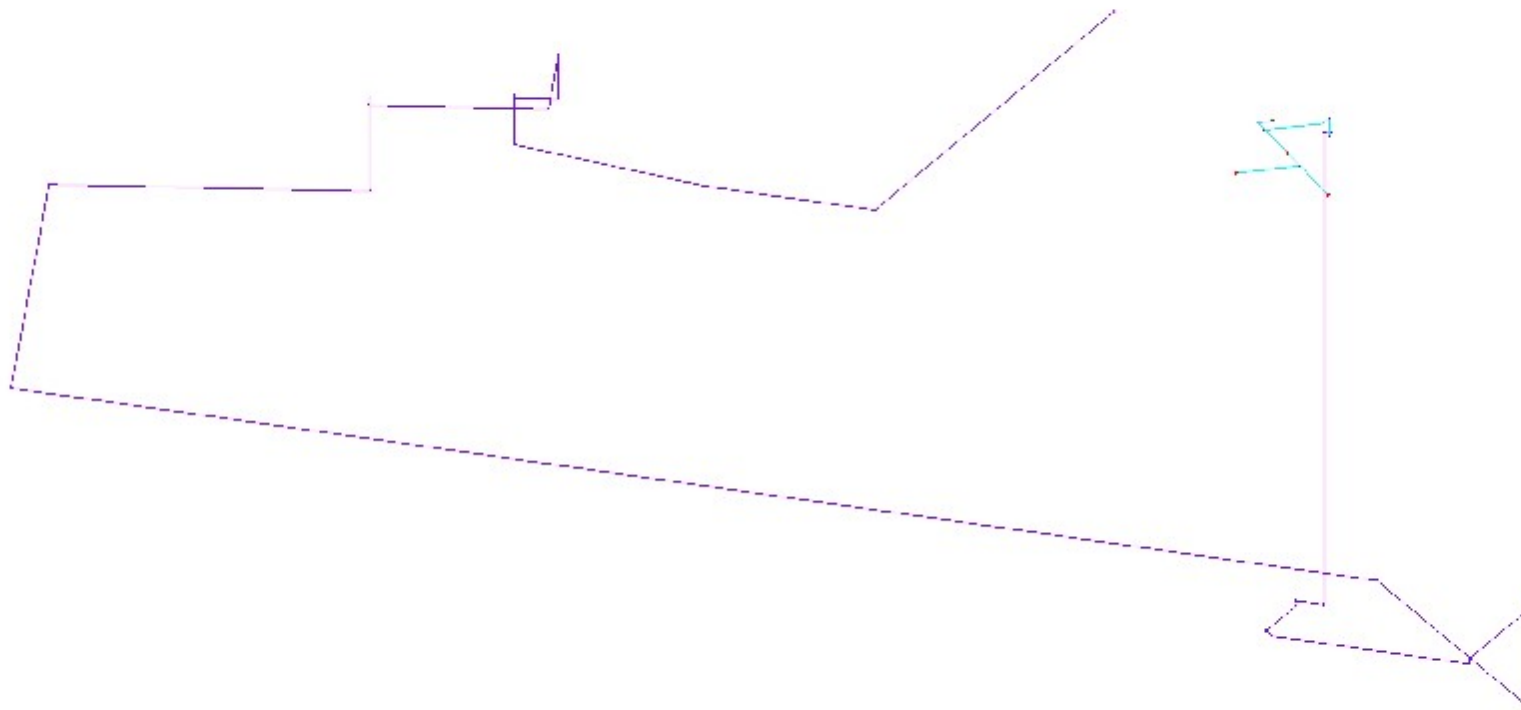
Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

SSP 70.6

Diagram for Design Area : 4
(Optimized Hydraulic Simplified)



Hydraulic Analysis for : 4

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Hoses

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 216,75

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 216,75

Other

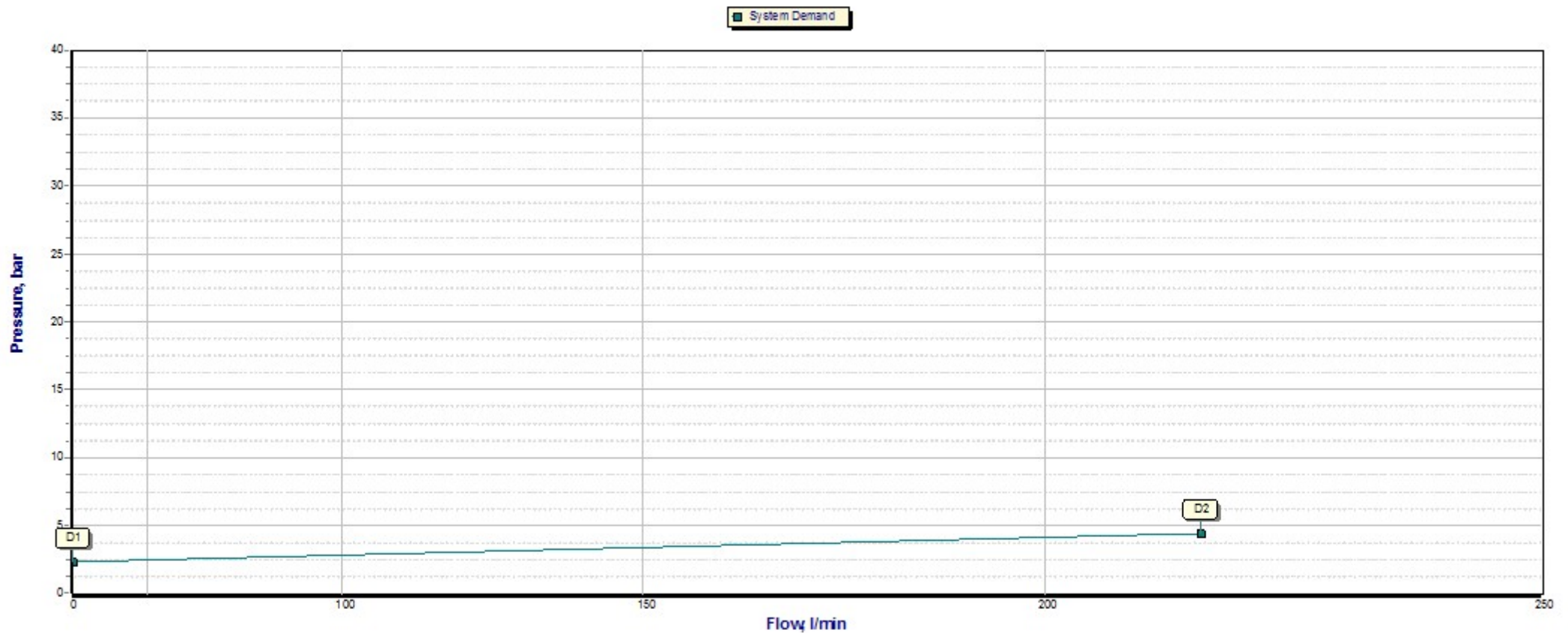
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 4,46

W1 - Flow (l/min) 216,75

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 4



Hydraulic Analysis for : 4

Graph Labels

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	2,36
D2	System Demand	216,75	4,46

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^{1/2})	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
G1	Overhead Sprinkler	12	70,6	4,1	49,2	0,5	4,2	50,58	0,51
G2	Overhead Sprinkler	12	70,6	4,1	49,2	0,5	4,2	49,93	0,5
G3	Overhead Sprinkler	12	70,6	4,1	49,2	0,5	4,6	55,76	0,62
G4	Overhead Sprinkler	12	70,6	4,1	49,2	0,5	5	60,49	0,73

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
419 -1,5	Node NODE				4,45 0	
503 -1,5	Node NODE				4,44 0	
507 -1,5	Node NODE				4,13 0	
517 21,886	Node NODE				1,44 -2,29	
522 22,577	Node NODE				0,81 -2,36	
523 22,577	Node NODE				0,56 -2,36	
G1 22,577	Overhead Sprinkler HEAD	70,6 Open	50,58 1,38	12 4,2	0,51 -2,36	0,5 49,2
G2 22,577	Overhead Sprinkler HEAD	70,6 Open	49,93 0,73	12 4,2	0,5 -2,36	0,5 49,2
G3 22,577	Overhead Sprinkler HEAD	70,6 Open	55,76 6,56	12 4,6	0,62 -2,36	0,5 49,2
G4 22,577	Overhead Sprinkler HEAD	70,6 Open	60,49 11,29	12 5	0,73 -2,36	0,5 49,2
W1 -1,5	Supply SUPPLY		-216,75		4,46 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

G2 523	22,577 22,577	70,6	49,93 49,93	25 25,6	1x(eu.TeeScr-Br)=1,995	2,557 1,995 4,552	140 0,0124	0,5 0 0,06	
523 G3	22,577 22,577	70,6	50,58 100,5	25 25,6		1,486 0 1,486	140 0,0453	0,56 0 0,07	
G3 522	22,577 22,577	70,6	55,76 156,26	32 32	1x(eu.TeeScr-Br)=2,793	2,699 2,793 5,492	140 0,0346	0,62 0 0,19	
522 517	22,577 21,886		60,49 216,75	32 32	3x(eu.90s)=3,99 1x(eu.45s)=0,731	4,113 4,721 8,834	140 0,0634	0,81 0,07 0,56	
517 507	21,886 -1,5		0 216,75	50 51	8x(eu.90s)=15,96 2x(eu.45s)=2,022	43,172 17,982 61,154	140 0,0065	1,44 2,29 0,4	
507 503	-1,5 -1,5		0 216,75	65 61,4	3x(eu.90s)=7,581 1x(eu.45s)=1,33	106,70 1 8,911 115,61 2	140 0,0027	4,13 0 0,31	
503 419	-1,5 -1,5		0 216,75	100 107,1	7x(eu.90s)=21 1x(eu.TeeScr-Br)=6,1	23,49 27,1 50,59	120 0,0002	4,44 0 0,01	
419 W1	-1,5 -1,5		0 216,75	150 130,8	1x(eu.90s)=5,719 1x(elbow.22.5)=1,419	39,446 7,138 46,584	140 0,0001	4,45 0 0,00	
W1								4,46	

Path No: 2

G1 523	22,577 22,577	70,6	50,58 50,58	25 25,6		3,414 0 3,414	140 0,0127	0,51 0 0,04	
523								0,56	

Path No: 3

G4 522	22,577 22,577	70,6	60,49 60,49	25 25,6	1x(eu.TeeScr-Br)=1,995 1x(eu.90s)=1,024	1,495 3,019 4,514	140 0,0177	0,73 0 0,08	
522								0,81	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.

* Maximum Velocity of 4,49 m/s occurs in the following pipe(s): (517-522)

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

City: Stavanger, - -

Project Location: -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

City: Stavanger, - 4034

Phone Number: 51801110

E-mail: christian@aktivsprinkler.no

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

Design

Remote Area Name	6
Remote Area Location	Næring B8
Occupancy Classification	OH1
Density (l/min/m ²)	5,3
Area of Application (m ²)	72
Coverage per Sprinkler (m ²)	10,8
Number of Calculated Sprinklers	9
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	585,11
Required Pressure at Source (bar)	2,09
Type of System	Wet
Volume - Entire System (l)	1698,9 l

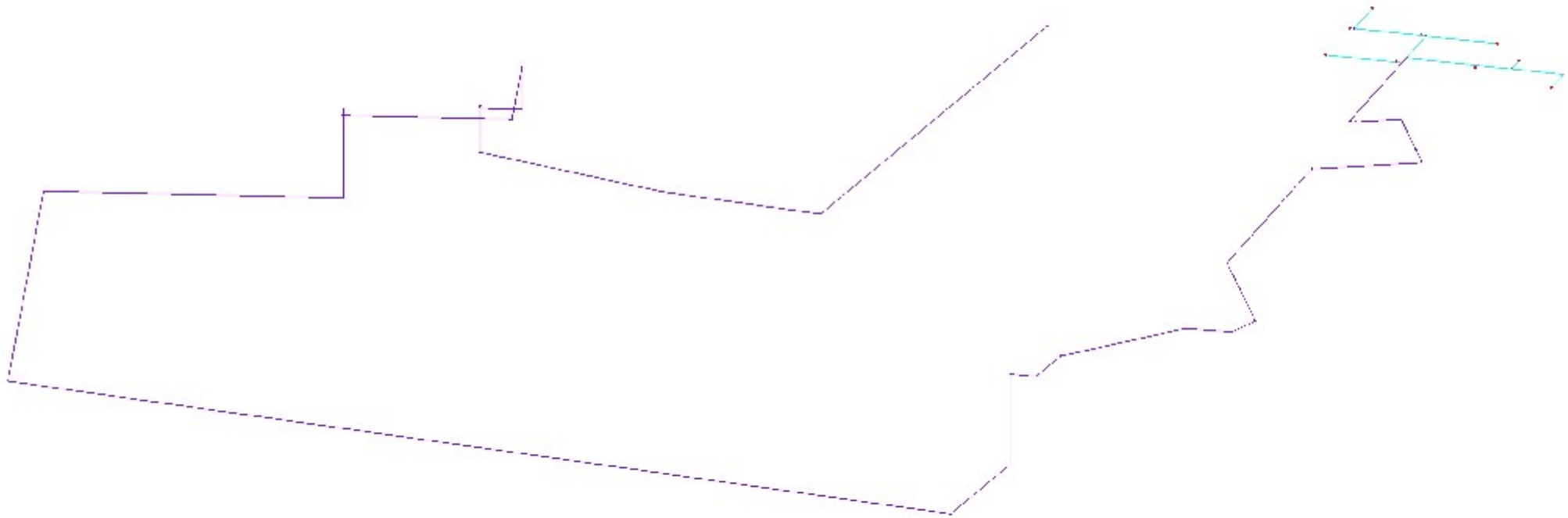
Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

K80

Diagram for Design Area : 6
(Optimized Hvdraulic Simnlfied)



Hydraulic Analysis for : 6

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Hoses

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 585,11

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 585,11

Other

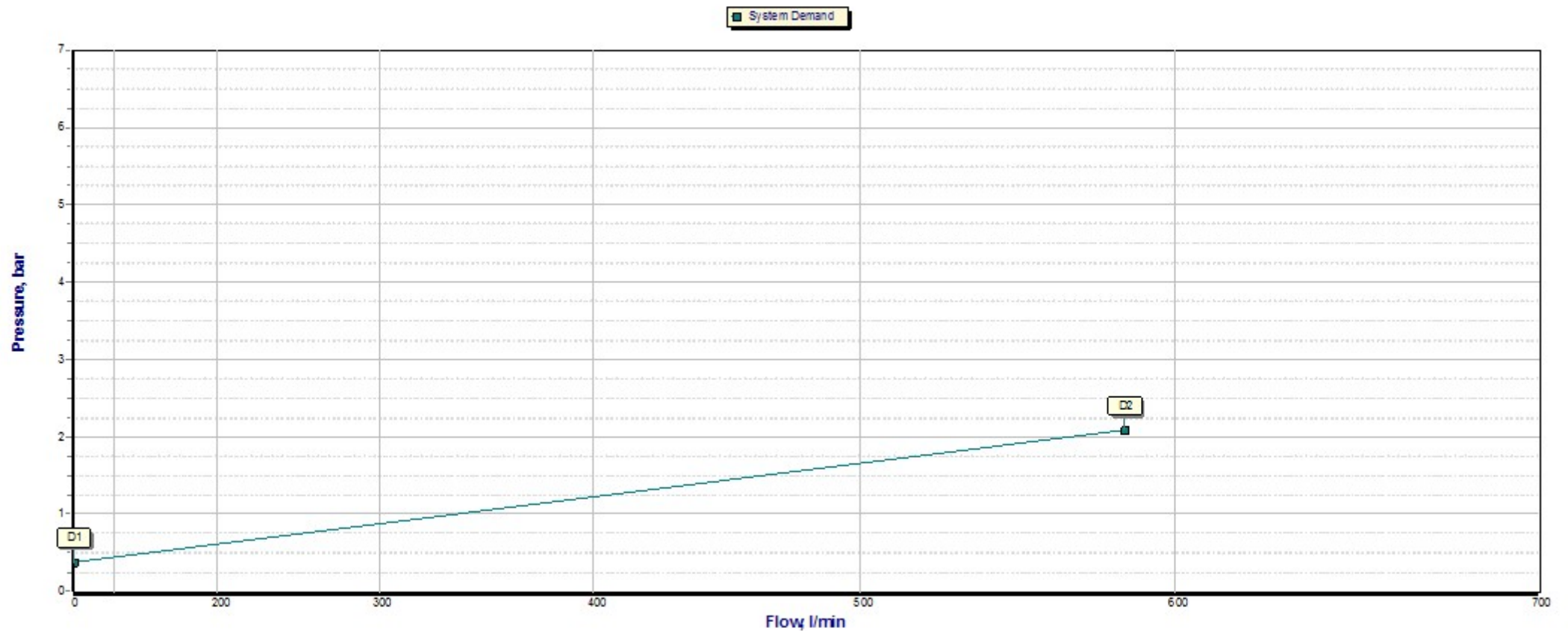
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 2,09

W1 - Flow (l/min) 585,11

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 6



Hydraulic Analysis for : 6

Graph Labels

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	0,38
D2	System Demand	585,11	2,09

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^{1/2})	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
F1	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,3	57,08	0,5
F2	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,4	68,95	0,73
F3	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,5	70,06	0,75
F4	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,6	60,68	0,56
F5	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,7	61,7	0,58
F6	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,2	67,18	0,69
F7	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,6	71,52	0,78
F8	Overhead Sprinkler	10,8	80,7	5	54	0,5	6,3	68,17	0,71
F9	Overhead Sprinkler	10,8	80,7	5	54	0,5	5,5	59,78	0,55

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
419 -1,5	Node NODE				2,07 0	
525 -1,5	Node NODE				1,99 0	
529 -1,5	Node NODE				1,74 0	
539 2,4	Node NODE				1,26 -0,38	
543 2,4	Node NODE				1,1 -0,38	
544 2,4	Node NODE				0,94 -0,38	
545 2,4	Node NODE				0,92 -0,38	
546 2,4	Node NODE				0,84 -0,38	
547 2,4	Node NODE				0,57 -0,38	
548 2,4	Node NODE				0,73 -0,38	
549 2,4	Node NODE				0,63 -0,38	
F1 2,4	Overhead Sprinkler HEAD	80,7 Open	57,08 3,08	10,8 5,3	0,5 -0,38	0,5 54
F2 2,4	Overhead Sprinkler HEAD	80,7 Open	68,95 14,95	10,8 6,4	0,73 -0,38	0,5 54
F3 2,4	Overhead Sprinkler HEAD	80,7 Open	70,06 16,06	10,8 6,5	0,75 -0,38	0,5 54
F4 2,4	Overhead Sprinkler HEAD	80,7 Open	60,68 6,68	10,8 5,6	0,56 -0,38	0,5 54
F5 2,4	Overhead Sprinkler HEAD	80,7 Open	61,7 7,7	10,8 5,7	0,58 -0,38	0,5 54
F6 2,4	Overhead Sprinkler HEAD	80,7 Open	67,18 13,18	10,8 6,2	0,69 -0,38	0,5 54
F7 2,4	Overhead Sprinkler HEAD	80,7 Open	71,52 17,52	10,8 6,6	0,78 -0,38	0,5 54
F8 2,4	Overhead Sprinkler HEAD	80,7 Open	68,17 14,17	10,8 6,3	0,71 -0,38	0,5 54
F9 2,4	Overhead Sprinkler HEAD	80,7 Open	59,78 5,78	10,8 5,5	0,55 -0,38	0,5 54
W1 -1,5	Supply SUPPLY		-585,11		2,09 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

F1 547	2,4 2,4	80,7	57,08 57,08	25 26,7	1x(eu.TeeScr-Br)=1,5	2,5 1,5 4	120 0,0172	0,5 0 0,07	
547 F3	2,4 2,4	80,7	60,68 117,76	25 26,7		2,8 0 2,8	120 0,0658	0,57 0 0,18	
F3 546	2,4 2,4	80,7	70,06 187,82	32 35,9	1x(eu.TeeScr-Br)=2,1	0,22 2,1 2,32	120 0,0369	0,75 0 0,09	
546 545	2,4 2,4		68,95 256,77	40 41,8		2,698 0 2,698	120 0,0314	0,84 0 0,08	
545 544	2,4 2,4		188,65 445,42	50 53		0,602 0 0,602	120 0,0274	0,92 0 0,02	
544 543	2,4 2,4		139,69 585,11	50 53		3,6 0 3,6	120 0,0455	0,94 0 0,16	
543 539	2,4 2,4		0 585,11	65 70,3	2x(eu.90s)=3,8 1x(elbow.22.5)=0,457	9,362 4,257 13,619	120 0,0115	1,1 0 0,16	
539 529	2,4 -1,5		0 585,11	100 107,1	6x(eu.90s)=18 3x(eu.45s)=4,8 1x(elbow.22.5)=0,61	41,661 23,41 65,071	120 0,0015	1,26 0,38 0,1	
529 525	-1,5 -1,5		0 585,11	100 90	4x(eu.90s)=15,96	81,795 15,96 97,755	140 0,0026	1,74 0 0,25	
525 419	-1,5 -1,5		0 585,11	100 107,1	7x(eu.90s)=21 1x(eu.TeeScr-Br)=6,1	23,338 27,1 50,438	120 0,0015	1,99 0 0,07	
419 W1	-1,5 -1,5		0 585,11	150 130,8	1x(eu.90s)=5,719 1x(elbow.22.5)=1,419	39,446 7,138 46,584	140 0,0004	2,07 0 0,02	
W1								2,09	

Path No: 2

F9 549	2,4 2,4	80,7	59,78 59,78	25 26,7	1x(eu.90s)=0,77	3,791 0,77 4,561	120 0,0187	0,55 0 0,09	
549 548	2,4 2,4		61,7 121,48	25 26,7		1,441 0 1,441	120 0,0697	0,63 0 0,1	
548 545	2,4 2,4		67,18 188,65	32 35,9	1x(eu.TeeScr-Br)=2,1	2,981 2,1 5,081	120 0,0372	0,73 0 0,19	
545								0,92	

Path No: 3

F4 547	2,4 2,4	80,7	60,68 60,68	25 26,7		0,2 0 0,2	120 0,0193	0,56 0 0,00	
547								0,57	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 4

F5 549	2,4 2,4	80,7	61,7 61,7	25 26,7	1x(eu.TeeScr-Br)=1,5	1,004 1,5 2,504	120 0,0199	0,58 0 0,05	
549									0,63

Path No: 5

F6 548	2,4 2,4	80,7	67,18 67,18	25 26,7	1x(eu.TeeScr-Br)=1,5	0,301 1,5 1,801	120 0,0233	0,69 0 0,04	
548									0,73

Path No: 6

F8 F7	2,4 2,4	80,7 80,7	68,17 68,17	25 26,7		3 0 3	120 0,0239	0,71 0 0,07	
F7 544	2,4 2,4	80,7	71,52 139,69	25 26,7	1x(eu.TeeScr-Br)=1,5	0,22 1,5 1,72	120 0,0903	0,78 0 0,16	
544									0,94

Path No: 7

F2 546	2,4 2,4	80,7	68,95 68,95	25 26,7	1x(eu.TeeScr-Br)=1,5	2,98 1,5 4,48	120 0,0244	0,73 0 0,11	
546									0,84

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.

* Maximum Velocity of 4,42 m/s occurs in the following pipe(s): (543-544)

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Vannkanten

Contract No. : 13006

Project Location: -

City: Stavanger, - -

Date: 21.08.2011

Contractor Information

Name of Contractor: Aktiv Sprinkler AS

Address: Godesetdalen 20

Phone Number: 51801110

Name of Designer: Christian Sletbakk

Authority Having Jurisdiction: -

City: Stavanger, - 4034

E-mail: christian@aktivsprinkler.no

Design

Remote Area Name	B1141
Remote Area Location	B1 4 etg leil 1
Occupancy Classification	INSTA Type 3
Density (l/min/m ²)	4,1
Area of Application (m ²)	68
Coverage per Sprinkler (m ²)	17
Number of Calculated Sprinklers	4
In-Rack Demand (l/min)	0
Special Heads	
Hose Streams (l/min)	0
Total Water Required (incl. Hose Streams) (l/min)	295,46
Required Pressure at Source (bar)	4,95
Type of System	Wet
Volume - Entire System (l)	1501,2 l

Water Supply Information

Date	DD/MM/YYYY
Location	
Source	W1

Notes

SSP 70.6

**Diagram for Design Area : B1141
(Optimized Hvdraulic Simnplified)**



Hydraulic Analysis for : B1141**Calculation Info**

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (N/m ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (Pa·s)	N/A for Hazen-Williams calculation.

Water Supply Parameters**Hoses**

Inside Hose Flow / Standpipe Demand (l/min)

Outside Hose Flow (l/min)

Additional Outside Hose Flow (l/min)

Other (custom defined) Hose Flow (l/min)

Total Hose Flow (l/min)

Sprinklers

Ovehead Sprinkler Flow (l/min) 295,46

InRack Sprinkler Flow (l/min) 0

Other (custom defined) Sprinkler Flow (l/min) 0

Total Sprinkler Flow (l/min) 295,46

Other

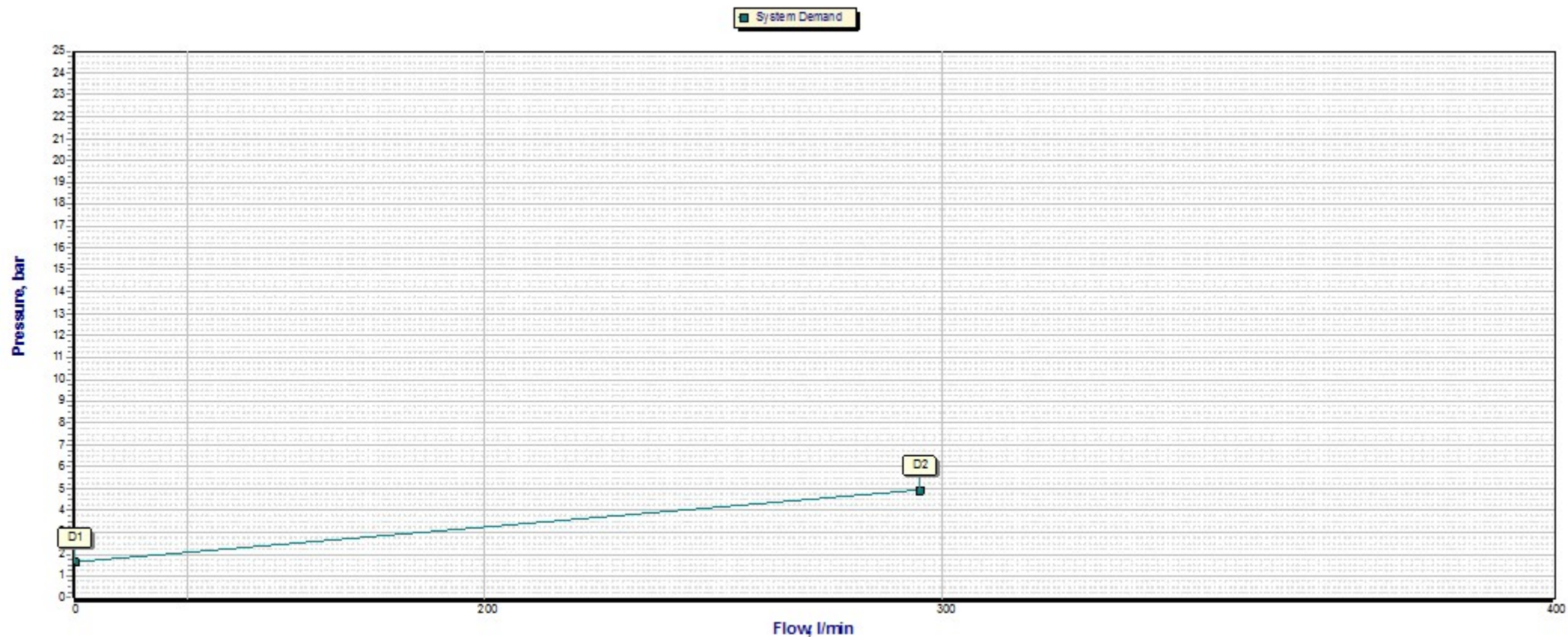
Required Margin of Safety (bar) 0

W1 - Pressure (bar) 4,95

W1 - Flow (l/min) 295,46

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : B1141



Hydraulic Analysis for : B1141**Graph Labels**

Label	Description	Values	
		Flow (l/min)	Pressure (bar)
D1	Elevation Pressure	0	1,63
D2	System Demand	295,46	4,95

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(m ²)	(lpm/bar ^{1/2})	(l/min/m ²)	(l/min)	(bar)	(l/min/m ²)	(l/min)	(bar)
J1	Overhead Sprinkler	17	70,6	4,1	69,7	0,97	4,2	70,59	1
J2	Overhead Sprinkler	17	70,6	4,1	69,7	0,97	4,1	69,7	0,97
J3	Overhead Sprinkler	17	70,6	4,1	69,7	0,97	4,5	76,06	1,16
J4	Overhead Sprinkler	17	70,6	4,1	69,7	0,97	4,7	79,12	1,25

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
m		lpm/bar ^{1/2}	l/min l/min	m ² l/min/m ²	bar bar	bar l/min
419 -1,5	Node NODE				4,94 0	
436 -1,5	Node NODE				4,92 0	
442 -1,5	Node NODE				4,86 0	
446 2,38	Node NODE				4,47 -0,38	
470 15,128	Node NODE				2,55 -1,63	
490 15,128	Node NODE				1,31 -1,63	
491 15,128	Node NODE				1,3 -1,63	
492 15,128	Node NODE				1,08 -1,63	
J1 15,14	Overhead Sprinkler HEAD	70,6 Open	70,59 0,89	17 4,2	1 -1,63	0,97 69,7
J2 15,14	Overhead Sprinkler HEAD	70,6 Open	69,7 0	17 4,1	0,97 -1,63	0,97 69,7
J3 15,14	Overhead Sprinkler HEAD	70,6 Open	76,06 6,36	17 4,5	1,16 -1,63	0,97 69,7
J4 15,14	Overhead Sprinkler HEAD	70,6 Open	79,12 9,42	17 4,7	1,25 -1,63	0,97 69,7
W1 -1,5	Supply SUPPLY		-295,46		4,95 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

Path No: 1

J2 492	15,14 15,128	70,6	69,7 69,7	25 25,6	1x(eu.TeeScr-Br)=1,995 1x(eu.90s)=1,024	1,734 3,019 4,753	140 0,023	0,97 0,00 0,11	
492 491	15,128 15,128		70,59 140,29	25 25,6		2,604 0 2,604	140 0,084	1,08 0 0,22	
491 490	15,128 15,128		76,06 216,35	32 32		0,181 0 0,181	140 0,0632	1,3 0 0,01	
490 470	15,128 15,128		79,12 295,46	32 32	3x(eu.90s)=3,99 1x(eu.TeeScr-Br)=2,793	4,196 6,783 10,979	140 0,1125	1,31 0 1,24	
470 446	15,128 2,38		0 295,46	50 53	8x(eu.90s)=12 1x(eu.TeeScr-Br)=2,9	37,061 14,9 51,961	120 0,0128	2,55 1,25 0,67	
446 442	2,38 -1,5		0 295,46	100 107,1	4x(eu.90s)=12	30,027 12 42,027	120 0,0004	4,47 0,38 0,02	
442 436	-1,5 -1,5		0 295,46	100 90	2x(eu.90s)=7,98 4x(eu.45s)=8,512	62,365 16,492 78,857	140 0,0007	4,86 0 0,06	
436 419	-1,5 -1,5		0 295,46	100 107,1	7x(eu.90s)=21 1x(eu.TeeScr-Br)=6,1	23,795 27,1 50,895	120 0,0004	4,92 0 0,02	
419 W1	-1,5 -1,5		0 295,46	150 130,8	1x(eu.90s)=5,719 1x(elbow.22.5)=1,419	39,446 7,138 46,584	140 0,0001	4,94 0 0,01	
W1								4,95	

Path No: 2

J1 492	15,14 15,128	70,6	70,59 70,59	25 25,6	2x(eu.90s)=2,048	1,537 2,048 3,585	140 0,0235	1 0,00 0,08	
492								1,08	

Path No: 3

J3 491	15,14 15,128	70,6	76,06 76,06	25 25,6	1x(eu.TeeScr-Br)=1,995 1x(eu.90s)=1,024	2,238 3,019 5,257	140 0,027	1,16 0,00 0,14	
491								1,3	

Path No: 4

J4 490	15,14 15,128	70,6	79,12 79,12	25 25,6	1x(eu.TeeScr-Br)=1,995	0,012 1,995 2,007	140 0,0291	1,25 0,00 0,06	
490								1,31	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per m	total (Pt) elev (Pe) frict (Pf)	NOTES
	(m)	(lpm/bar ^{1/2})	(l/min)	(mm)	(m)	(m)	(bar)	(bar)	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.01 bar due to display rounding.

* Maximum Velocity of 6,12 m/s occurs in the following pipe(s): (470-490)