

FHC - Hydraulic Calculation Report

Submitted by FHC user number: 9991

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Project: 1

Project Ref: ---

Area Ref: Most Unfavourable

Inst. Number: 1

Project Data and Design Parameters

Project name : 1

Area reference : Most Unfavourable

Address / location : ---

Project number : ---

Installation number(s) : 1

Drawing number(s) : ---

Issue no / date : ---

Designers reference : ---

Project Data File : Test.FHC

Hazard classification : ligh hazard

Design authority : NFPA 13 : 2016 - Installation of Sprinkler

Insurance company : ---

Specified density of discharge : 18.00 mm/min (l/min/m2)

Assumed maximum area of operation : 360.00 m2

Number of operating sprinkler heads : 30 + 2 hydrant(s)

Maximum area covered per head : 12.00 m2

Highest head / nozzle above source : 12.00 m

Number of pipes in system : 55 from 25 to 125 mm

Pressure loss equation used : Hazen-Williams

Fluid : WATER

Pipe Data Table : STD_PIPE.PDT

Maximum fluid velocity : 12.32 m/s in pipe 203 214

Volume of pipework and fittings : 5.67 m3

Elbows are welded for : 0 mm and above

Comment : ---

Checked by & Date :

Source duty = 8411.7 l/min @ 22.542 bar at node no 100

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Operating Sprinkler Heads, Nozzles and Hydrants

Head no	Node no	Size mm	'K' factor	Flow l/min	Area m2	Density Req.d	mm/min Actual	Pressure Min	bar Actual	Height m	Pipe no
1	561	15.0	115.00	302.5	12.000	18.00	25.21	0.50	6.918	12.000	23
2	571	15.0	115.00	292.4	12.000	18.00	24.37	0.50	6.466	12.000	24
3	581	15.0	115.00	270.7	12.000	18.00	22.56	0.50	5.541	12.000	25
4	591	15.0	115.00	243.4	12.000	18.00	20.28	0.50	4.478	12.000	26
5	601	15.0	115.00	230.1	12.000	18.00	19.17	0.50	4.003	12.000	27
6	611	15.0	115.00	216.0	12.000	18.00	18.00	0.50	3.528	12.000	28
7	222	15.0	115.00	302.7	12.000	18.00	25.22	0.50	6.927	12.000	30
8	232	15.0	115.00	292.6	12.000	18.00	24.39	0.50	6.475	12.000	31
9	242	15.0	115.00	270.9	12.000	18.00	22.57	0.50	5.549	12.000	32
10	252	15.0	115.00	243.5	12.000	18.00	20.29	0.50	4.484	12.000	33
11	262	15.0	115.00	230.2	12.000	18.00	19.19	0.50	4.008	12.000	34
12	272	15.0	115.00	216.1	12.000	18.00	18.01	0.50	3.533	12.000	35
13	212	15.0	115.00	303.3	12.000	18.00	25.27	0.50	6.954	12.000	36
14	223	15.0	115.00	293.2	12.000	18.00	24.43	0.50	6.501	12.000	37
15	233	15.0	115.00	271.4	12.000	18.00	22.62	0.50	5.571	12.000	38
16	243	15.0	115.00	244.0	12.000	18.00	20.33	0.50	4.502	12.000	39
17	253	15.0	115.00	230.7	12.000	18.00	19.23	0.50	4.024	12.000	40
18	263	15.0	115.00	216.6	12.000	18.00	18.05	0.50	3.547	12.000	41
19	202	15.0	115.00	304.5	12.000	18.00	25.37	0.50	7.010	12.000	42
20	213	15.0	115.00	294.4	12.000	18.00	24.53	0.50	6.553	12.000	43
21	224	15.0	115.00	272.5	12.000	18.00	22.71	0.50	5.616	12.000	44
22	234	15.0	115.00	245.0	12.000	18.00	20.42	0.50	4.539	12.000	45
23	244	15.0	115.00	231.6	12.000	18.00	19.30	0.50	4.058	12.000	46
24	254	15.0	115.00	217.5	12.000	18.00	18.12	0.50	3.577	12.000	47
25	192	15.0	115.00	306.5	12.000	18.00	25.54	0.50	7.102	12.000	48
26	203	15.0	115.00	296.3	12.000	18.00	24.69	0.50	6.639	12.000	49
27	214	15.0	115.00	274.3	12.000	18.00	22.86	0.50	5.691	12.000	50
28	225	15.0	115.00	246.6	12.000	18.00	20.55	0.50	4.600	12.000	51
29	235	15.0	115.00	233.2	12.000	18.00	19.43	0.50	4.113	12.000	52
30	245	15.0	115.00	219.0	12.000	18.00	18.25	0.50	3.626	12.000	53
	621			300.0		Hydrant			9.861	12.000	29
	651			300.0		Hydrant			8.042	12.000	55

0 heads are under the required density / minimum pressures

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Hydraulically Significant Pipes in System

NUMBERS		P I P E		F L O W		DIMENSIONS		ANGLE	VALUES		HEIGHT M		PRESSURES BARS	
Pipe no	Start End	Size Bore	Type 'C'	L/min Vel m/s	Length EL T	VJ VT	Dir. Slope		Eq. len mbar/m		Start End		Start End	Frict Static
1	100 101	125mm 128.20	SS4 150	8411.7 10.9	1.000 0 0		180 0.0		1.00 56.4		0.000 0.000		22.542 22.486	-0.056 0.000
2	101 111	125mm 128.20	SS4 150	8411.7 10.9	20.000 1 0		90 0.0		23.68 56.4		0.000 0.000		22.486 21.149	-1.337 0.000
3	111 121	125mm 128.20	SS4 150	8411.7 10.9	12.000 1 0		Up 90.0		15.68 56.4		0.000 12.000		21.149 19.088	-0.885 -1.176
4	121 131	125mm 128.20	SS4 150	8411.7 10.9	16.000 1 0		180 0.0		19.68 56.4		12.000 12.000		19.088 17.978	-1.111 0.000
5	131 141	125mm 128.20	SS4 150	8411.7 10.9	48.000 1 0		90 0.0		51.68 56.4		12.000 12.000		17.978 15.061	-2.917 0.000
6	141 151	125mm 128.20	SS4 150	8411.7 10.9	72.000 0 0		90 0.0		72.00 56.4		12.000 12.000		15.061 10.997	-4.064 0.000
7	151 161	125mm 128.20	SS4 150	8411.7 10.9	16.000 1 0		0 0.0		19.68 56.4		12.000 12.000		10.997 9.886	-1.111 0.000
8	161 171	125mm 128.20	SS4 150	8111.7 10.5	25.000 0 0		0 0.0		25.00 52.8		12.000 12.000		9.886 8.566	-1.319 0.000
9	171 181	125mm 128.20	SS4 150	8111.7 10.5	2.000 1 0		270 0.0		5.68 52.8		12.000 12.000		8.566 8.267	-0.300 0.000
10	181 191	125mm 128.20	SS4 150	6535.8 8.4	3.000 0 0		270 0.0		3.00 35.4		12.000 12.000		8.267 8.160	-0.106 0.000
11	191 201	125mm 128.20	SS4 150	4970.3 6.4	3.000 0 0		270 0.0		3.00 21.3		12.000 12.000		8.160 8.096	-0.064 0.000
12	201 211	125mm 128.20	SS4 150	3411.1 4.4	3.000 0 0		270 0.0		3.00 10.6		12.000 12.000		8.096 8.065	-0.032 0.000
13	211 221	125mm 128.20	SS4 150	1855.0 2.4	3.000 0 0		270 0.0		3.00 3.4		12.000 12.000		8.065 8.054	-0.010 0.000
14	221 231	125mm 128.20	SS4 150	300.0 0.4	3.000 0 0		270 0.0		3.00 0.1		12.000 12.000		8.054 8.054	-0.000 0.000
15	231 241	125mm 128.20	SS4 150	300.0 0.4	55.000 0 0		270 0.0		55.00 0.1		12.000 12.000		8.054 8.047	-0.007 0.000
21	241 641	125mm 128.20	SS4 150	300.0 0.4	20.000 0 1		180 0.0		31.51 0.1		12.000 12.000		8.047 8.044	-0.004 0.000
23	221 561	50mm 52.48	SS4 150	1555.0 12.0	1.300 0 1		180 0.0		5.90 192.4		12.000 12.000		8.054 6.918	-1.136 0.000
24	561 571	50mm 52.48	SS4 150	1252.6 9.7	3.500 0 0		180 0.0		3.50 128.9		12.000 12.000		6.918 6.467	-0.451 0.000
25	571 581	40mm 40.94	SS4 150	960.1 12.2	3.500 0 0		180 0.0		3.50 264.2		12.000 12.000		6.467 5.542	-0.925 0.000
26	581 591	32mm 35.08	SS4 150	689.4 11.9	3.500 0 0		180 0.0		3.50 303.8		12.000 12.000		5.542 4.478	-1.064 0.000
27	591 601	32mm 35.08	SS4 150	446.1 7.7	3.500 0 0		180 0.0		3.50 135.8		12.000 12.000		4.478 4.003	-0.475 0.000
28	601 611	25mm 26.64	SS4 150	216.0 6.5	3.500 0 0		180 0.0		3.50 135.6		12.000 12.000		4.003 3.528	-0.475 0.000
29	161 621	65mm 62.68	SS4 150	300.0 1.6	1.000 0 1		90 0.0		6.52 3.9		12.000 12.000		9.886 9.861	-0.025 0.000
30	211 222	50mm 52.48	SS4 150	1556.0 12.0	1.300 0 1		180 0.0		5.90 192.7		12.000 12.000		8.065 6.927	-1.137 0.000
31	222 232	50mm 52.48	SS4 150	1253.4 9.7	3.500 0 0		180 0.0		3.50 129.1		12.000 12.000		6.927 6.475	-0.452 0.000
32	232 242	40mm 40.94	SS4 150	960.8 12.2	3.500 0 0		180 0.0		3.50 264.6		12.000 12.000		6.475 5.549	-0.926 0.000
33	242 252	32mm 35.08	SS4 150	689.9 11.9	3.500 0 0		180 0.0		3.50 304.2		12.000 12.000		5.549 4.484	-1.065 0.000
34	252 262	32mm 35.08	SS4 150	446.4 7.7	3.500 0 0		180 0.0		3.50 135.9		12.000 12.000		4.484 4.008	-0.476 0.000
35	262 272	25mm 26.64	SS4 150	216.1 6.5	3.500 0 0		180 0.0		3.50 135.8		12.000 12.000		4.008 3.533	-0.475 0.000

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NUMBERS		P I P E		F L O W		DIMENSIONS		ANGLE	VALUES	HEIGHT M	PRESSURES BARS	
Pipe no	Start	Size	Type	L/min	Length	VJ	Dir.	Eq. len	Start	Start	Frict	Static
no	End	Bore	'C'	Vel m/s	EL	T	VT	Slope	mbar/m	End	End	Static
36	201	50mm	SS4	1559.2	1.300		180		5.90	12.000	8.096	-1.142
	212	52.48	150	12.0	0	1		0.0	193.4	12.000	6.955	0.000
37	212	50mm	SS4	1255.9	3.500		180		3.50	12.000	6.955	-0.454
	223	52.48	150	9.7	0	0		0.0	129.6	12.000	6.501	0.000
38	223	40mm	SS4	962.7	3.500		180		3.50	12.000	6.501	-0.930
	233	40.94	150	12.2	0	0		0.0	265.6	12.000	5.571	0.000
39	233	32mm	SS4	691.3	3.500		180		3.50	12.000	5.571	-1.069
	243	35.08	150	11.9	0	0		0.0	305.4	12.000	4.502	0.000
40	243	32mm	SS4	447.3	3.500		180		3.50	12.000	4.502	-0.478
	253	35.08	150	7.7	0	0		0.0	136.5	12.000	4.024	0.000
41	253	25mm	SS4	216.6	3.500		180		3.50	12.000	4.024	-0.477
	263	26.64	150	6.5	0	0		0.0	136.3	12.000	3.547	0.000
42	191	50mm	SS4	1565.5	1.300		180		5.90	12.000	8.160	-1.150
	202	52.48	150	12.1	0	1		0.0	194.8	12.000	7.010	0.000
43	202	50mm	SS4	1261.0	3.500		180		3.50	12.000	7.010	-0.457
	213	52.48	150	9.7	0	0		0.0	130.6	12.000	6.553	0.000
44	213	40mm	SS4	966.7	3.500		180		3.50	12.000	6.553	-0.937
	224	40.94	150	12.2	0	0		0.0	267.6	12.000	5.616	0.000
45	224	32mm	SS4	694.1	3.500		180		3.50	12.000	5.616	-1.077
	234	35.08	150	12.0	0	0		0.0	307.7	12.000	4.539	0.000
46	234	32mm	SS4	449.1	3.500		180		3.50	12.000	4.539	-0.481
	244	35.08	150	7.7	0	0		0.0	137.5	12.000	4.058	0.000
47	244	25mm	SS4	217.5	3.500		180		3.50	12.000	4.058	-0.481
	254	26.64	150	6.5	0	0		0.0	137.3	12.000	3.577	0.000
48	181	50mm	SS4	1575.9	1.300		180		5.90	12.000	8.267	-1.164
	192	52.48	150	12.1	0	1		0.0	197.2	12.000	7.102	0.000
49	192	50mm	SS4	1269.5	3.500		180		3.50	12.000	7.102	-0.463
	203	52.48	150	9.8	0	0		0.0	132.2	12.000	6.639	0.000
50	203	40mm	SS4	973.2	3.500		180		3.50	12.000	6.639	-0.949
	214	40.94	150	12.3	0	0		0.0	270.9	12.000	5.691	0.000
51	214	32mm	SS4	698.8	3.500		180		3.50	12.000	5.691	-1.091
	225	35.08	150	12.1	0	0		0.0	311.5	12.000	4.600	0.000
52	225	32mm	SS4	452.2	3.500		180		3.50	12.000	4.600	-0.487
	235	35.08	150	7.8	0	0		0.0	139.2	12.000	4.113	0.000
53	235	25mm	SS4	219.0	3.500		180		3.50	12.000	4.113	-0.487
	245	26.64	150	6.5	0	0		0.0	139.1	12.000	3.626	0.000
55	641	125mm	SS4	300.0	1.000		90		12.51	12.000	8.044	-0.001
	651	128.20	150	0.4	0	1		0.0	0.1	12.000	8.042	0.000

Maximum flow rate error at nodes : 0.00836 L/min
Maximum pressure drop error at nodes : 0.00096 bar
Maximum pressure drop error in loops : 0.00000 bar
Overall head flow balance error : 0.00130 %