

Full Hydraulic Calculations Computer Printout Page No 1

Submitted by user number 0920
Riksheim Consulting AS
Breivika Industrivei 35B
6018 Ålesund
Norway
Norway
Tel:+4770115880 Fax:

Project: Kriesenter for SUNnmøre
Address: ---
Number: ---
Area ref: Rom 112 og 114
Hazard: Boligsprinkler Type 2
Authority: INSTA 900-1 : Residential and domestic sprin
Source: 151.0 l/min @ 3.543 bar
Printout: 4-november-16 at 08:03

Project Data and Design Parameters

Project name : Kriesenter for SUNnmøre
Area reference : Rom 112 og 114
Address / location : ---
Project number : ---
Installation number(s) : 1
Drawing number(s) : ---
Issue no / date : ---
Designers reference : 1. etasje Servicebygg
Project Data File : R:\PROSJEKT\201603400 KRISEENTER FOR SUNNMORE\11 B
Hazard classification : Boligsprinkler Type 2
Design authority : INSTA 900-1 : Residential and domestic sprinklers
Insurance company : ---
Specified density of discharge : 2.04 mm/min (l/min/m2)
Assumed maximum area of operation : 15.30 m2
Number of operating sprinkler heads : 2
Maximum area covered per head : 10.50 m2
Highest head / nozzle above source : 4.70 m
Number of pipes in system : 30 from 25 to 50 mm
Pressure loss equation used : Hazen-Williams
Fluid : Water
Pipe Data Table : EN_12845.PDT
Maximum fluid velocity : 4.30 m/s in pipe 220 230
Volume of pipework and fittings : 0.07 m3
Elbows are welded for : 65 mm and above
Comment : ---
Checked by & Date :

Source duty = 151.0 l/min @ 3.543 bar at node no 100

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Project: Krisesenter for SUNnmøre
Address: ---
Number: ---
Area ref: 4 HEADS
Hazard: Boligsprinkler Type 2
Authority: Loss Prevention Council
Source: 241.7 l/min @ 3.414 bar
Printout: 3-november-16 at 14:13

Project Data and Design Parameters

Project name : Krisesenter for SUNnmøre
Area reference : 4 HEADS
Address / location : ---
Project number : ---
Installation number(s) : 1
Drawing number(s) : ---
Issue no / date : ---
Designers reference : Kaldt Loft
Project Data File : R:\PROSJEKT\201603400 Krisesenter for Sunnmore\11 B
Hazard classification : Boligsprinkler Type 2
Design authority : Loss Prevention Council
Insurance company : ---
Specified density of discharge : 2.04 mm/min (l/min/m2)
Assumed maximum area of operation : 74.40 m2
Number of operating sprinkler heads : 4
Maximum area covered per head : 18.60 m2
Highest head / nozzle above source : 7.00 m
Number of pipes in system : 22 from 25 to 32 mm
Pressure loss equation used : Hazen-Williams
Fluid : Water
Pipe Data Table : EN_12845.PDT
Maximum fluid velocity : 4.61 m/s in pipe 180 190
Volume of pipework and fittings : 0.06 m3
Elbows are welded for : 65 mm and above
Comment : Kaldt Loft
Checked by & Date :

Source duty = 241.7 l/min @ 3.414 bar at node no 100

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Authority: Loss Prevention Council
Source: 241.7 l/min @ 3.414 bar
Printout: 3-november-16 at 14:13

Operating Sprinkler Heads, Nozzles and Hydrants

Head no	Node no	Size mm	'K' factor	F l o w l/min	A r e a m2	Density Req.d	mm/min Actual	Pressure Min	bar Actual	Heights m	Pipe no
2	180	15.0	70.60	79.7	18.600	2.04	4.29	0.48	1.275	7.000	8
3	190	15.0	70.60	61.3	18.600	2.04	3.29	0.48	0.754	7.000	9
4	200	15.0	70.60	51.7	18.600	2.04	2.78	0.48	0.537	7.000	10
5	210	15.0	70.60	48.9	18.600	2.04	2.63	0.48	0.480	7.000	11

0 heads are under the required density / minimum pressures

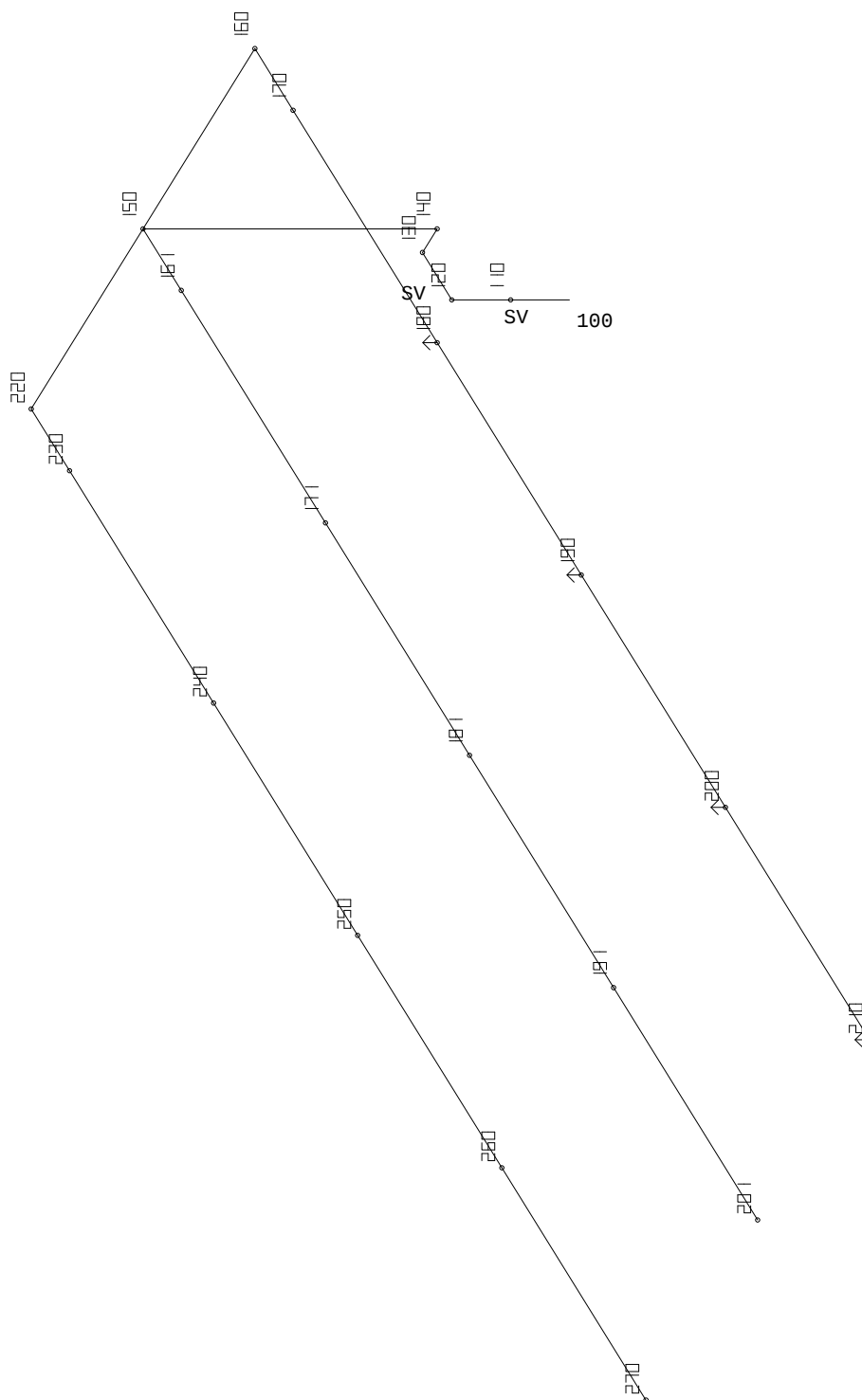
Full Hydraulic Calculations Computer Printout Page No 3

Submitted by user number 0920 Riksheim Consulting AS Breivika Industrivei 35B 6018 Ålesund Norway Norway Tel:+4770115880 Fax:	Project: Krisesenter for Sunnmøre Address: --- Number: --- Area ref: 4 HEADS Hazard: Boligsprinkler Type 2 Authority: Loss Prevention Council Source: 241.7 l/min @ 3.414 bar Printout: 3-november-16 at 14:13
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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 VJ EL T	VT	Dir. Slope	Eq.len mbar/m	Start End	Start End	Frict Static	
1	100	32mm	MW	241.7	1.000		Up	1.00	0.000	3.414	-0.058	
	110	35.97	120	4.0	0 0	SV	90.0	58.4	1.000	3.255	-0.100	
2	110	32mm	MW	241.7	1.000		Up	1.00	1.000	3.255	-0.058	
	120	35.97	120	4.0	0 0		90.0	58.4	2.000	3.097	-0.100	
3	120	32mm	MW	241.7	1.000		90	2.00	2.000	3.097	-0.117	
	130	35.97	120	4.0	1 0	SV	0.0	58.4	2.000	2.980	+0.000	
4	130	32mm	MW	241.7	0.500		180	1.50	2.000	2.980	-0.088	
	140	35.97	120	4.0	1 0		0.0	58.4	2.000	2.892	+0.000	
5	140	32mm	MW	241.7	5.000		Up	6.00	2.000	2.892	-0.351	
	150	35.97	120	4.0	1 0		90.0	58.4	7.000	2.042	-0.500	
6	150	32mm	MW	241.7	3.800		180	5.90	7.000	2.042	-0.345	
	160	35.97	120	4.0	0 1		0.0	58.4	7.000	1.697	+0.000	
7	160	32mm	MW	241.7	1.300		270	2.30	7.000	1.697	-0.134	
	170	35.97	120	4.0	1 0		0.0	58.4	7.000	1.562	+0.000	
8	170	32mm	MW	241.7	4.900		270	4.90	7.000	1.562	-0.286	
	180	35.97	120	4.0	0 0		0.0	58.4	7.000	1.276	+0.000	
9	180	25mm	MW	161.9	4.900		270	4.90	7.000	1.276	-0.522	
	190	27.31	120	4.6	0 0		0.0	106.6	7.000	0.754	+0.000	
10	190	25mm	MW	100.6	4.900		270	4.90	7.000	0.754	-0.217	
	200	27.31	120	2.9	0 0		0.0	44.2	7.000	0.537	+0.000	
11	200	25mm	MW	48.9	4.900		270	4.90	7.000	0.537	-0.057	
	210	27.31	120	1.4	0 0		0.0	11.6	7.000	0.480	+0.000	

Maximum flow rate error at nodes : 0.00958 L/min
Maximum pressure drop error at nodes : 0.00085 bar
Maximum pressure drop error in loops : 0.00000 bar
Overall head flow balance error : 0.00530 %



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Operating Sprinkler Heads, Nozzles and Hydrants

Head no	Node no	Size mm	'K' factor	F l o w l/min	A r e a m2	Density Req.d	mm/min Actual	Pressure Min	bar Actual	Heights m	Pipe no
1	300	15.0	70.60	75.7	10.500	2.04	7.21	1.15	1.150	4.700	20
7	400	15.0	70.60	75.3	4.800	2.04	15.69	0.48	1.137	4.700	30

0 heads are under the required density / minimum pressures

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Authority: INSTA 900-1 : Residential and domestic sprinkler
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Hydraulically Significant Pipes in System	
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NUMBERS		PIPE		FLOW		DIMENSIONS		ANGLE	VALUES	HEIGHT M	PRESSURES BARS	
Pipe no	Start End	Size Bore	Type 'C'	L/min Vel m/s	Length VJ EL	VT	Dir. Slope	Eq. len mbar/m	Start End	Start End	Frict Static	
1	100	50mm	MW	151.0	1.000	SV	Up	3.40	0.000	3.543	-0.013	
	110	52.98	120	1.1	0 0		90.0	3.7	1.000	3.433	-0.098	
2	110	50mm	MW	151.0	1.000	0 0	Up	1.00	1.000	3.433	-0.004	
	120	52.98	120	1.1	0 0		90.0	3.7	2.000	3.331	-0.098	
3	120	32mm	MW	151.0	0.500	1 0	180	1.50	2.000	3.331	-0.037	
	130	35.97	120	2.5	1 0		0.0	24.5	2.000	3.294	+0.000	
4	130	32mm	MW	151.0	2.700	1 0	Up	3.70	2.000	3.294	-0.091	
	140	35.97	120	2.5	1 0		90.0	24.5	4.700	2.939	-0.265	
5	140	32mm	MW	151.0	3.000	1 0	0	4.00	4.700	2.939	-0.098	
	150	35.97	120	2.5	1 0		0.0	24.5	4.700	2.841	+0.000	
6	150	32mm	MW	151.0	23.000	1 0	270	24.00	4.700	2.841	-0.588	
	160	35.97	120	2.5	1 0		0.0	24.5	4.700	2.254	+0.000	
7	160	32mm	MW	151.0	2.500	1 0	180	3.50	4.700	2.254	-0.086	
	170	35.97	120	2.5	1 0		0.0	24.5	4.700	2.168	+0.000	
8	170	32mm	MW	151.0	3.000	0 0	180	3.00	4.700	2.168	-0.073	
	180	35.97	120	2.5	0 0		0.0	24.5	4.700	2.094	+0.000	
9	180	32mm	MW	151.0	1.000	0 0	180	1.00	4.700	2.094	-0.024	
	190	35.97	120	2.5	0 0		0.0	24.5	4.700	2.070	+0.000	
10	190	32mm	MW	151.0	1.500	1 0	270	2.50	4.700	2.070	-0.061	
	200	35.97	120	2.5	1 0		0.0	24.5	4.700	2.009	+0.000	
11	200	32mm	MW	151.0	1.000	0 0	270	1.00	4.700	2.009	-0.024	
	210	35.97	120	2.5	0 0		0.0	24.5	4.700	1.984	+0.000	
12	210	32mm	MW	151.0	0.700	0 0	270	0.70	4.700	1.984	-0.017	
	220	35.97	120	2.5	0 0		0.0	24.4	4.700	1.967	+0.000	
13	220	25mm	MW	151.0	1.500	0 0	270	1.50	4.700	1.967	-0.140	
	230	27.31	120	4.3	0 0		0.0	93.6	4.700	1.827	+0.000	
14	230	25mm	MW	151.0	0.700	0 0	270	0.70	4.700	1.827	-0.066	
	240	27.31	120	4.3	0 0		0.0	93.5	4.700	1.761	+0.000	
15	240	25mm	MW	151.0	0.200	1 0	180	0.97	4.700	1.761	-0.091	
	250	27.31	120	4.3	1 0		0.0	93.5	4.700	1.670	+0.000	
16	250	25mm	MW	151.0	2.000	0 0	180	2.00	4.700	1.670	-0.187	
	260	27.31	120	4.3	0 0		0.0	93.6	4.700	1.483	+0.000	
17	260	25mm	MW	151.0	0.700	1 0	270	1.47	4.700	1.483	-0.138	
	270	27.31	120	4.3	1 0		0.0	93.6	4.700	1.345	+0.000	
18	270	25mm	MW	151.0	0.600	1 0	180	1.37	4.700	1.345	-0.128	
	280	27.31	120	4.3	1 0		0.0	93.6	4.700	1.217	+0.000	
19	280	25mm	MW	75.7	1.500	0 0	180	1.50	4.700	1.217	-0.039	
	290	27.31	120	2.2	0 0		0.0	26.1	4.700	1.178	+0.000	
20	290	25mm	MW	75.7	0.300	1 0	90	1.07	4.700	1.178	-0.028	
	300	27.31	120	2.2	1 0		0.0	26.1	4.700	1.150	+0.000	
29	280	25mm	MW	75.3	0.300	0 1	270	1.80	4.700	1.217	-0.047	
	390	27.31	120	2.1	0 1		0.0	25.8	4.700	1.171	+0.000	

Continued on the next page

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 Area ref: Rom 112 og 114
 Hazard: Boligsprinkler Type 2
 Authority: INSTA 900-1 : Residential and domestic sprin
 Source: 151.0 l/min @ 3.543 bar
 Printout: 4-november-16 at 08:03

Hydraulically Significant Pipes in System

NUMBERS		P I P E		F L O W		DIMENSIONS		ANGLE	VALUES	HEIGHT M	PRESSURES BARS	
Pipe	Start	Size	Type	L/min	Length VJ	Dir.	Eq.len	Start	Start	Frict		
no	End	Bore	'C'	Vel m/s	EL T VT	Slope	mbar/m	End	End	Static		
30	390	25mm	MW	75.3	0.500	0	1.27	4.700	1.171	-0.033		
	400	27.31	120	2.1	1 0	0.0	25.8	4.700	1.138	+0.000		

Maximum flow rate error at nodes : 0.01036 L/min
 Maximum pressure drop error at nodes : 0.00082 bar
 Maximum pressure drop error in loops : 0.00000 bar
 Overall head flow balance error : 0.00684 %