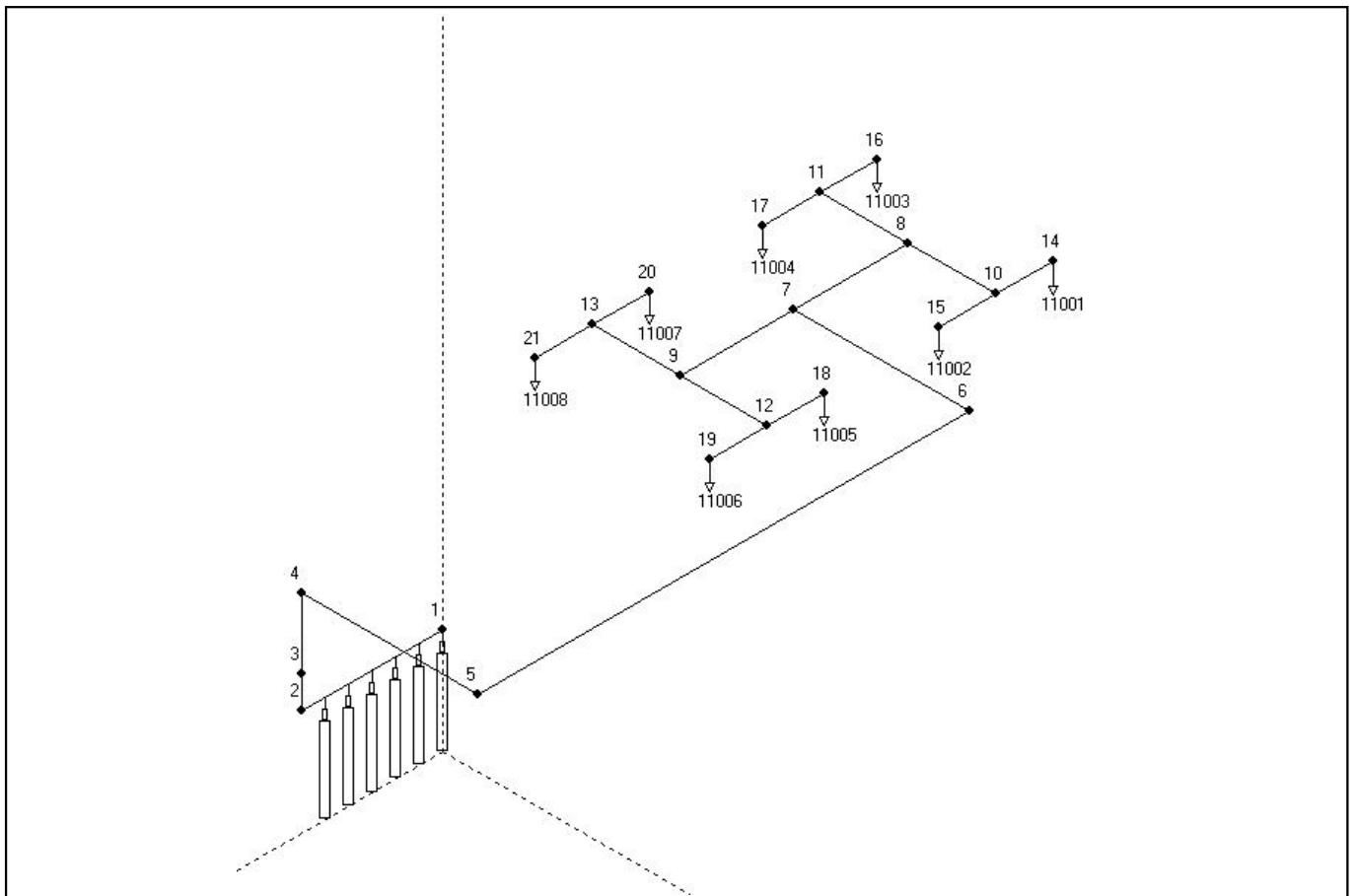


Project: S KA YAPI K MYASALLARI
Project-No:
System type: Room protection / Total flooding
System: High pressure
Building:
Object:
Contractor:
Owner:
Project engineer: DEKA MÜHENDİSLİK
Date: 9.8.2017
Altitude above sea level: 0 m
Regulation rule to calculate the CO2 quantity: NFPA 12

Pipe class catalogue: VdS.rkl
Component catalogue: VdS.arm
Nozzle catalogue: VdS.noz

Error messages:

No errors detected!





Calculation zone data:

Calculation zone	Total volume [m3]	Ventilation volume [m3]	Volume build. parts [m3]	Opening areas [m2]	Calcul. volume [m3]	Max. Over Pressure	Design temp. [°C]	Design concentration [% Vol]	Design quantity [kg]
1 New calculat	162,5	0,0	0,0	0,0	162,5	1,0 mbar	15,0	50,00	260,00

Calculation results:

CO2 design data:

Design quantity:	260,00 kg
Minimum storage quantity:	260,00 kg
Actual storage quantity:	269,3 kg
Container volume:	67,0 l
Filling ratio:	0,67 kg/l
CO2 quantity in one container:	44,9 kg
Number of container:	6
Storage temperature:	21,0 °C
Starting container pressure:	58,7 bar abs

Discharge time:

Full discharge	
Discharge time of air:	1,0 s
Discharge time of CO2-vapor:	0,0 s
Vaporized CO2 during the start phase:	0,0 kg
Total gas discharge time:	1,0 s
The discharge time to achieve an extinguishing concentration of 30% is:	25,1 s
Discharge time:	49,7 s
Total discharge time:	50,7 s

System information:

Working pressure in the container:	50,3 bar abs
Working temperature in the container:	14,6 °C
Volume of the pipe system:	26,6 l
Mean CO2 quantity in the pipe system:	17,6 kg
CO2 filling ratio of the pipe system:	0,066 kg/kg CO2 Vorrat



Pipe system:

Section- No:	Start- node	End node Nozzle	Pressure [bar abs]	Mass flow [kg/s]	Pipe dimension Di [mm]	DN
1	0	1	49,78	0,81	12,5	3/8
2	1	2	49,31	5,37	35,0	1 1/4
3	2	3	49,07	5,37	35,0	1 1/4
4	3	4	48,89	5,37	35,0	1 1/4
5	4	5	48,43	5,37	35,0	1 1/4
6	5	6	46,68	5,37	35,0	1 1/4
7	6	7	46,17	5,37	35,0	1 1/4
8	7	8	45,53	2,68	26,6	1
9	8	10	45,02	1,34	20,9	3/4
10	10	14	44,65	0,67	15,8	1/2
11	14	11001	44,46	0,67	15,8	1/2
12	10	15	44,65	0,67	15,8	1/2
13	15	11002	44,46	0,67	15,8	1/2
14	8	11	45,02	1,34	20,9	3/4
15	11	16	44,65	0,67	15,8	1/2
16	16	11003	44,46	0,67	15,8	1/2
17	11	17	44,65	0,67	15,8	1/2
18	17	11004	44,46	0,67	15,8	1/2
19	7	9	45,53	2,68	26,6	1
20	9	13	45,02	1,34	20,9	3/4
21	13	21	44,65	0,67	15,8	1/2
22	21	11008	44,46	0,67	15,8	1/2
23	13	20	44,65	0,67	15,8	1/2
24	20	11007	44,46	0,67	15,8	1/2
25	9	12	45,02	1,34	20,9	3/4
26	12	18	44,65	0,67	15,8	1/2
27	18	11005	44,46	0,67	15,8	1/2
28	12	19	44,65	0,67	15,8	1/2
29	19	11006	44,46	0,67	15,8	1/2



Nozzle data:

Calculation zone no.:	Nozzle	Nozzle Type	Number of orifices	Pipe connection Di [mm]	DN	Orifice [mm]	CO2 output [kg] in relation to design quantity
(1) New calculat	11001	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11002	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11003	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11004	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11005	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11006	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11007	1	1	15,8	1/2	5,0	32,5
(1) New calculat	11008	1	1	15,8	1/2	5,0	32,5

Maximum transport time difference between nozzles 11008./ 11007 is 0,00 s



Concentrations (1013,25 hPa, 25,5°C):

Calculation Zone, Volume:	Quantity [kg]	Gas Composition	
		O2	CO2
(1) New calculation zone, 162,5 m ³			
According to design	260,0	10,5 %	50,0 %
End of flooding time	260,0	8,6 %	58,8 %
After total discharge	269,3	8,3 %	60,1 %

Total flooded CO2 quantity: 269,3 kg

Pressure relief openings:

Calculation zone no.:	Net open area of the pressure relief opening [m ²]	Overpressure	Resistance coefficient C1
(1) New calculation zone	0,369	1,0 mbar	2,00

Dynamic flooding results

The calculation bases on a mean nozzle pressure!

Flooding time [s]	Storage quantity [kg]	Mass flow [kg/s]	Temperature [°C]	Storage pressure [bar]	Mean nozzle pressure [bar]	Pressure at nozzles [bar]	
						Best	worst
0,0	269,34	0,00	21,0	58,70	1,00	1,00	1,00
4,1	249,90	4,21	21,0	58,62	52,63	52,63	52,63
6,6	237,82	5,35	20,6	58,05	51,68	51,68	51,68
9,1	224,23	5,51	20,1	57,35	51,02	51,02	51,02
11,6	210,43	5,53	19,4	56,40	50,12	50,12	50,12
14,1	196,61	5,53	18,7	55,56	49,33	49,33	49,33
16,6	182,81	5,50	18,0	54,64	48,51	48,51	48,51
19,1	169,07	5,48	17,2	53,64	47,61	47,61	47,61
21,6	155,39	5,46	16,4	52,57	46,63	46,63	46,63
24,1	141,77	5,43	15,5	51,42	45,57	45,57	45,57
26,6	128,23	5,40	14,4	50,18	44,46	44,46	44,46
29,1	114,78	5,36	13,3	48,86	43,25	43,25	43,25
31,6	101,42	5,32	12,2	47,46	41,98	41,98	41,98
34,1	88,19	5,27	10,9	45,99	40,62	40,62	40,62
36,6	75,07	5,21	9,5	44,43	39,20	39,20	39,20
39,1	62,11	5,15	8,0	42,77	37,69	37,69	37,69
41,6	49,30	5,08	6,3	41,01	36,10	36,10	36,10
44,1	36,68	5,00	4,4	39,13	34,40	34,40	34,40
46,6	24,28	4,91	2,4	37,08	32,56	32,56	32,56
49,1	12,09	4,81	-0,1	34,79	30,46	30,46	30,46
51,6	0,19	4,67	-3,1	32,12	28,05	28,05	28,05

The design quantity to achieve an extinguishing concentration of 30% is: 133,8kg

The discharge time to achieve an extinguishing concentration of 30% is: 25,1 s

The design quantity for deep seated fires is: 260,0kg

The discharge time of the design quantity for deep seated fires is: 49,7 s

