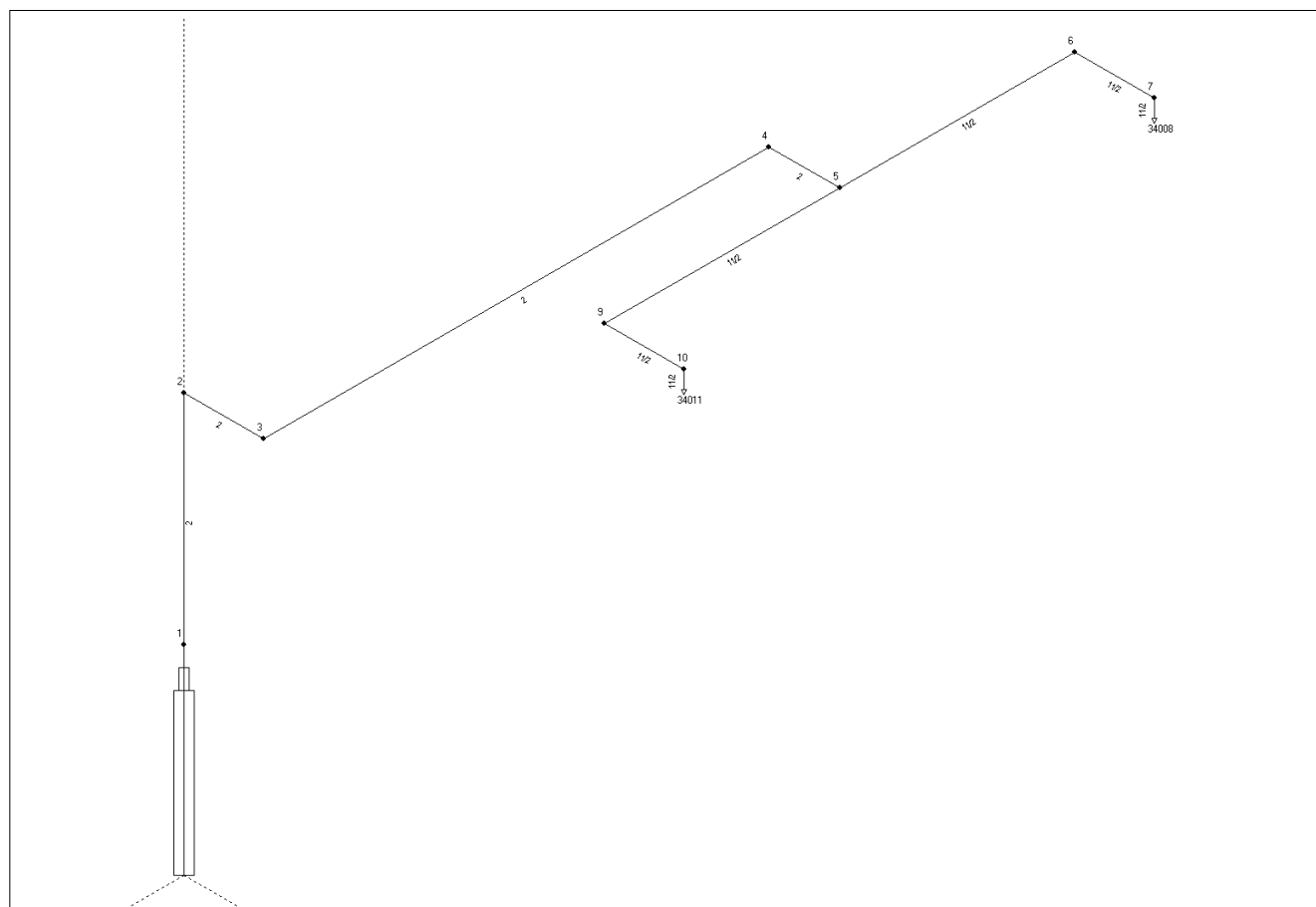


Project:  
Project-No:  
Building:  
Object: -1.3b Serwerownia  
Contractor: Uniwersytet Gdański  
Owner:  
Project engineer: Krzysztof Filipowicz  
Date: 2010-05-07  
Altitude above sealevel: 100 m  
Regulation rule for calculation of FM200 quantities: NFPA 2001 (edition 2000)

Pipe catalogue: DIN2458.rkl  
Component catalogue: Kidde\_18.10.2004.arm  
Nozzle catalogue: kidde\_18.10.2004.noz



**Pipesystem data:**

Section-No:	Starting-node	Endnode	Length [m]	Height [m]	Pipetype	Diameter [mm] **	Fitting *	Component code	Component coefficient	Nb of containers FM200 quantity
1	0	1	1,700	1,700	20	46,8		-	142,0000	1,0
2	1	2	1,850	1,850	11	53,1		-	-	0,0
3	2	3	0,450	0,000	11	53,1	E	-	-	0,0
4	3	4	4,300	0,000	11	53,1	E	-	-	0,0
5	4	5	0,400	0,000	11	53,1	E	-	-	0,0
6	5	6	2,000	0,000	11	41,9	T-90°	-	-	0,0
7	6	7	0,450	0,000	11	41,9	E	-	-	0,0
8	7	34008	0,100	-0,100	11	41,9	E	-	-	0,0
9	5	9	2,000	0,000	11	41,9	T-90°	-	-	0,0
10	9	10	0,450	0,000	11	41,9	E	-	-	0,0
11	10	34011	0,100	-0,100	11	41,9	E	-	-	0,0

\* C=Component, B=Bend, T=T-Piece, E=Elbow

\*\* If a pipe diameter is equal zero see the extra table of the calculated diameters

**Legend of pipetypes**

Type	Pipeclass	Pipe roughness
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20	RURKI SYFONOWE	smooth
11	RURY ST. O.C. wg DIN2458	galvanized

**Nozzle data:**

No.	Calculation zone	Diameter [mm]
34008	Serwerownia	0,0
34011	Serwerownia	0,0

**Legend of nozzles:**

Type	Number of orifices	C1	C2	C3	C4	C5	C6
3 KD-200/25 and /42 ba	4	1,000	-1,255	3,294	15,475	-0,791	0,000

**Calculation zone data:****Calculation of design quantity:**

Zone	Total volume [m3]	Volume of building parts [m3]	Calculated volume [m3]	Total surface [m2]	Max. Over-pressure [mbar]	Design temp. [°C]	Extinguish-conc. [% Vol]	Design factor	Design conc. [% Vol]	Design quantity [kg]
1 Serwerownia	193,1	0,0	193,1	0,0	2,000	20,0	6,6	1,20	7,9	120,97

Regulation rule for calculation of FM200 quantities: NFPA 2001 (edition 2000)

Altitude above sealevel: 100,0 m

**FM200 storage input data:**

Container volume:	140,0 l
Filling ratio:	1,050 kg/l
Filling pressure:	43,0 bar abs
Storage temperature:	15,0 °C
Supplement factor:	1,02
Minimum storage quantity:	123,39 kg
Number of containers:	1

**Discharge time (input value):** 9,5 s

**Further information:**

Design with included gas discharge time

## Calculation results:

### FM200 storage data:

Design quantity:	121,0 kg
Supplement factor:	1,02
Minimum storage quantity:	123,4 kg
Container volume:	140,0 l
Filling ratio:	0,88 kg/l
Filling pressure:	43,0 bar abs
FM200 -mass per container:	123,4 kg
Number of containers:	1
Actual storage quantity:	123,4 kg
Storage temperature:	15,0 °C
Starting container pressure:	41,6 bar abs

### Discharge time:

Discharge time air:	0,1 s
Total gas discharge time:	0,1 s
Two-phase discharge time:	9,4 s
Total discharge time:	9,5 s

### System information:

Container working pressure:	19,0 bar abs
Container working temperature:	13,3 °C
Total network volume:	25,0 l
Medium pipe content:	22,1 kg FM200
Filling portion in pipe system:	0,18 kg FM200 /kg FM200 -storage

**Pipe system:**

Section- No:	Starting- node	Endnode	Pressure [bar abs]	Flowrate [kg/s]	Pipedimension Di [mm]	DN
1	0	1	14,57	12,17	46,8	--
2	1	2	14,34	12,17	53,1	2
3	2	3	14,01	12,17	53,1	2
4	3	4	13,56	12,17	53,1	2
5	4	5	13,21	12,17	53,1	2
6	5	6	12,86	6,09	41,9	11/2
7	6	7	12,61	6,09	41,9	11/2
8	7	34008	12,38	6,09	41,9	11/2
9	5	9	12,86	6,09	41,9	11/2
10	9	10	12,61	6,09	41,9	11/2
11	10	34011	12,38	6,09	41,9	11/2

**Nozzle data:**

Calculation-zone no:	Nozzle no.	Nozzle type	Number of orifices	Pipeconnection Di [mm]	DN	Orifice [mm]	FM200 output [kg]
1	34008	3	4	41,9	11/2	15,5	60,5
1	34011	3	4	41,9	11/2	15,5	60,5

Two-phase discharge time: 9,4 s

Released two-phase FM200 : 121,0 kg

MAXIMUM TRANSPORT TIME DIFF. BETWEEN NOZZLES: 34011./ 34008. IS 0.00 S

Calculation-zone no:	Nozzle no.	Outlet velocity [m/s]	Transport time [s]	Jetdistance [m]
1	34008	10,6	1,81	4,36
1	34011	10,6	1,81	4,36

**Concentrations:**

Calculation- zone no:	O2	Gascomposition after discharge [%]	
		FM200	N2
1	19,2	8,0	71,8

**Pressure relief opening:**

Calculation- zone no:	Recommended area against overpressure	
	Area [m <sup>2</sup> ]	Overpressure [mbar]
1	0,152	2,0

**Component list:**

Component	Number	Code	Coefficient
cylinder valves KD-2	1	142	16,000

Nozzle-type	Number	C1	C2	C3	C4	C5	C6
3	2	1,000	-1,250	3,290	15,500	-0,791	0,000

Pipe-type	Di [mm]	DN	Length [m]
20	46,80		1,700
11	53,10	2	7,100
11	41,90	11/2	5,200

**Number of bends (+) and elbows (-)**

Bend-type	Di [mm]	DN	Number
-90	53,10	2	3
-90	41,90	11/2	4

**Number of T-distributors (in- and outdiameter)**

Number	Input	90-out	90-out	0-out
1	53,1	41,9	41,9	0,0