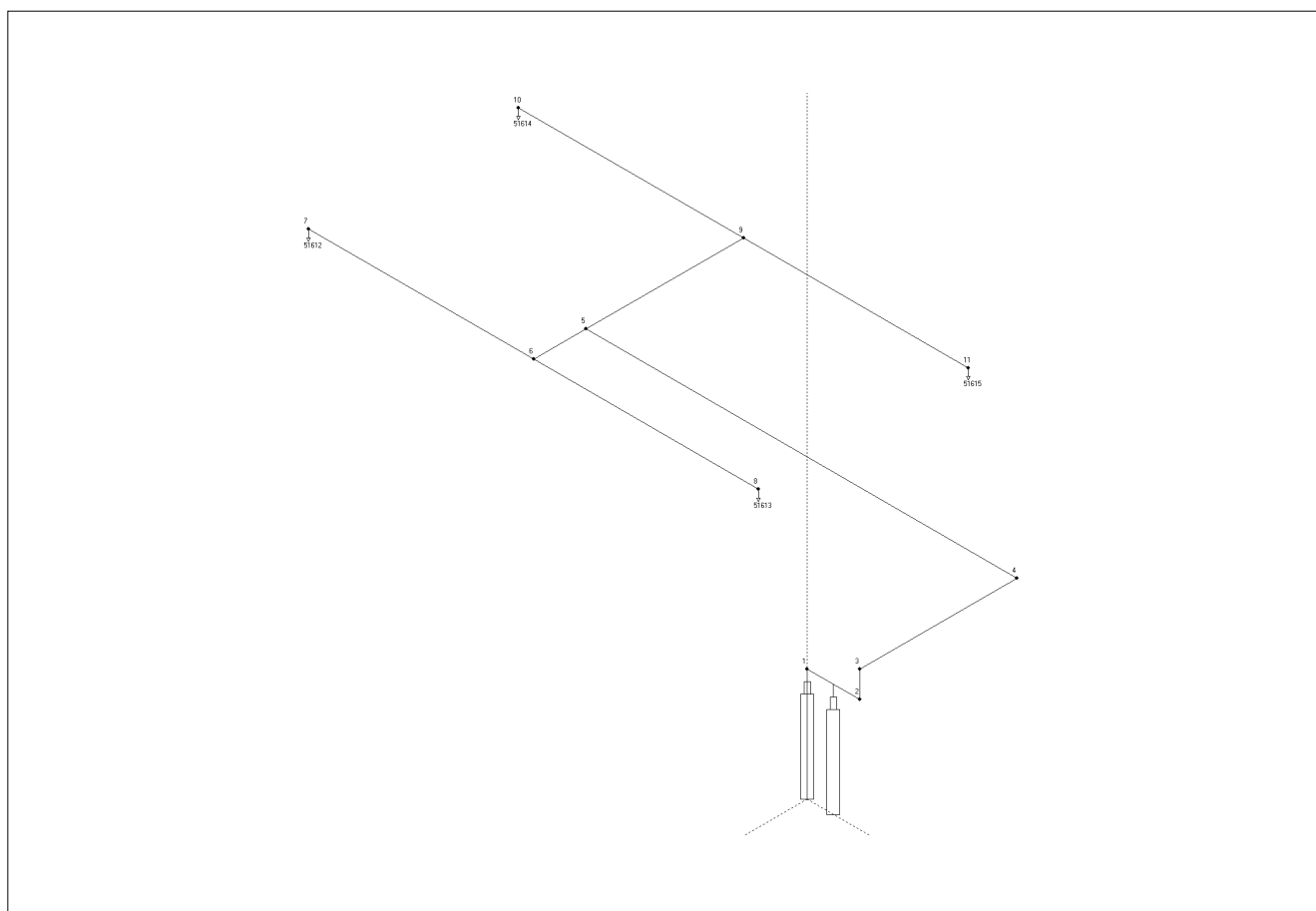


Project: Univerzita Karlova, Matematicko-fyzikální fakulta
Project-No: KEP-007-24/FS
Building: V Holešovičkách 2/747, 180 00 Praha 8
Object: HÚ 1, m.č. G 012a, Server 1.NP
Contractor:
Owner: FASS, s.r.o.
Project engineer: František Šťastný
Date: 08.02.2024
Altitude above sealevel: 250 m
Regulation rule for calculation of FK-5-1-12 quantities: ISO 14520-1, Edition 2000

Pipe catalogue: Fass.rkl
Component catalogue: Fass.arm
Nozzle catalogue: Fass.noz





Pipesystem data:

Section-No:	Starting-node	Endnode	Length [m]	Height [m]	Pipetype	Diameter [mm] **	Fitting *	Component code	coefficient	Nb of containers FK-5-1-12 quantity
1	0	1	0,100	0,100	42	32,1	C	420	4,200	2,0
2	1	2	0,700	0,000	30	41,5	E	-	-	0,0
3	2	3	0,350	0,350	31	41,5	E	-	-	0,0
4	3	4	2,100	0,000	31	41,5	E	-	-	0,0
5	4	5	5,750	0,000	31	41,5	E	-	-	0,0
6	5	6	0,700	0,000	31	36,0	T-90°	-	-	0,0
7	6	7	3,000	0,000	31	36,0	T-90°	-	-	0,0
8	7	51612	0,100	-0,100	31	36,0	E	-	-	0,0
9	6	8	3,000	0,000	31	36,0	T-90°	-	-	0,0
10	8	51613	0,100	-0,100	31	36,0	E	-	-	0,0
11	5	9	2,100	0,000	31	36,0	T-90°	-	-	0,0
12	9	11	3,000	0,000	31	36,0	T-90°	-	-	0,0
13	11	51615	0,100	-0,100	31	36,0	E	-	-	0,0
14	9	10	3,000	0,000	31	36,0	T-90°	-	-	0,0
15	10	51614	0,100	-0,100	31	36,0	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
42	Ventil láhve	hose
30	Distribuční potrubí	smooth
31	Distribuční potrubí	galvanized

Legend of components

Code	Type	Resistance coefficient
420	cylinder valves FK-5-1-12, 42 bar	4,200

Nozzle data:

No.	Calculation zone	Diameter [mm]
51612	Místnost + Podlaha + VZT	3,7
51613	Místnost + Podlaha + VZT	3,7
51614	Místnost + Podlaha + VZT	3,7
51615	Místnost + Podlaha + VZT	3,7

Legend of nozzles:

Type	Number of orifices	C1	C2	C3	C4	C5	C6
5 FK-5-1-12 (2 - 16 vr	16	4,62495	-0,08139	0,05363	-0,10202	-3,79175	1,84222



Calculation zone data:

Calculation of design quantity:

Zone	Total volume [m3]	Volume of building parts [m3]	Calculated volume [m3]	Max. Overpressure [mbar]	Design temp. [°C]	Extinguish-conc. [% Vol]	Design factor	Design conc. [% Vol]	Design quantity [kg]
1 Místnost + Podlah:	239,92	0,0	239,9	3,000	20,0	4,3	1,30	5,6	198,05

Regulation rule for calculation of FK-5-1-12 quantities: ISO 14520-1, Edition 2000
Altitude above sealevel: 250,0 m

FK-5-1-12 storage input data:

Container volume: 140,0 l
Filling ratio: -0,716 kg/l (fixed value)
Filling pressure: 42,0 bar abs
Storage temperature: 20,0 °C
Supplement factor: 1,00
Minimum storage quantity: 198,05 kg
Number of containers: 2

Discharge time (input value): 10,0 s

Further information:

Design with included gas discharge time
Design with predetermined orifice diameters



Calculation results:

FK-5-1-12 storage data:

Design quantity:	198,0 kg
Supplement factor:	1,00
Minimum storage quantity:	198,0 kg
Container volume:	140,0 l
Filling ratio:	0,72 kg/l
Filling pressure:	42,0 bar abs
FK-5-1-12 -mass per container:	100,8 kg
Number of containers:	2
Actual storage quantity:	201,6 kg
Storage temperature:	20,0 °C
Starting container pressure:	42,0 bar abs

Discharge time:

Discharge time air:	0,2 s
Total gas discharge time:	0,3 s
Two-phase discharge time:	9,5 s
Total discharge time:	9,8 s

System information:

Container working pressure:	27,2 bar abs
Container working temperature:	20,0 °C
Total network volume:	26,4 l
Medium pipe content:	26,8 kg FK-5-1-12
Filling portion in pipe system:	0,13 kg FK-5-1-12 /kg FK-5-1-12 -storage



Pipe system:

Section-No:	Starting-node	Endnode	Pressure [bar abs]	Flowrate [kg/s]	Pipedimension Di [mm]	DN
1	0	1	25,09	9,91	32,1	1 1/2"
2	1	2	23,55	19,84	41,5	1 1/2
3	2	3	21,87	19,84	41,5	1 1/2
4	3	4	19,68	19,84	41,5	1 1/2
5	4	5	16,40	19,84	41,5	1 1/2
6	5	6	14,45	9,96	36,0	1 1/4
7	6	7	13,31	4,98	36,0	1 1/4
8	7	51612	12,95	4,98	36,0	1 1/4
9	6	8	13,31	4,98	36,0	1 1/4
10	8	51613	12,95	4,98	36,0	1 1/4
11	5	9	14,28	9,88	36,0	1 1/4
12	9	11	13,16	4,94	36,0	1 1/4
13	11	51615	12,80	4,94	36,0	1 1/4
14	9	10	13,16	4,94	36,0	1 1/4
15	10	51614	12,80	4,94	36,0	1 1/4



Nozzle data:

Calculation- zone no:	Nozzle no.	Nozzle type	Number of orifices	Pipeconnection Di [mm]	DN	Orifice [mm]	FK-5-1-12 out- put [kg]
1	51612	5	16	36,0	1 1/4	3,7	49,8
1	51613	5	16	36,0	1 1/4	3,7	49,8
1	51614	5	16	36,0	1 1/4	3,7	49,4
1	51615	5	16	36,0	1 1/4	3,7	49,4

Two-phase discharge time: 9,5 s

MAXIMUM TRANSPORT TIME DIFF. BETWEEN NOZZLES: 51615./ 51613. IS 0.12 S

Calculation- zone no:	Nozzle no.	Outlet velocity [m/s]	Transport time [s]	Jetdistance [m]
1	51612	39,6	1,26	2,69
1	51613	39,6	1,26	2,69
1	51614	39,7	1,38	2,70
1	51615	39,7	1,38	2,70



Concentrations:

Calculation- zone no:	O2	Gascomposition after discharge [%]	
		FK-5-1-12	N2
1	19,7	5,6	73,7

Pressure relief opening:

Calculation- zone no:	Recommended area against overpressure		Max. flow [kg/s]
	Area [m ²]	Overpressure [mbar]	
1	0,112	3,0	



Component list:

Component	Number	Code	Coefficient
cylinder valves FK-5	1	420	4,200

Nozzle-type	Number	C1	C2	C3	C4	C5	C6
5	4	4,62000	-0,08130	0,05360	-0,10200	-3,79000	1,84000

Pipe-type	Di [mm]	DN	Length [m]
42	32,10	1 1/2"	0,100
30	41,50	1 1/2	0,700
31	41,50	1 1/2	8,200
31	36,00	1 1/4	15,200

Number of bends (+) and elbows (-)

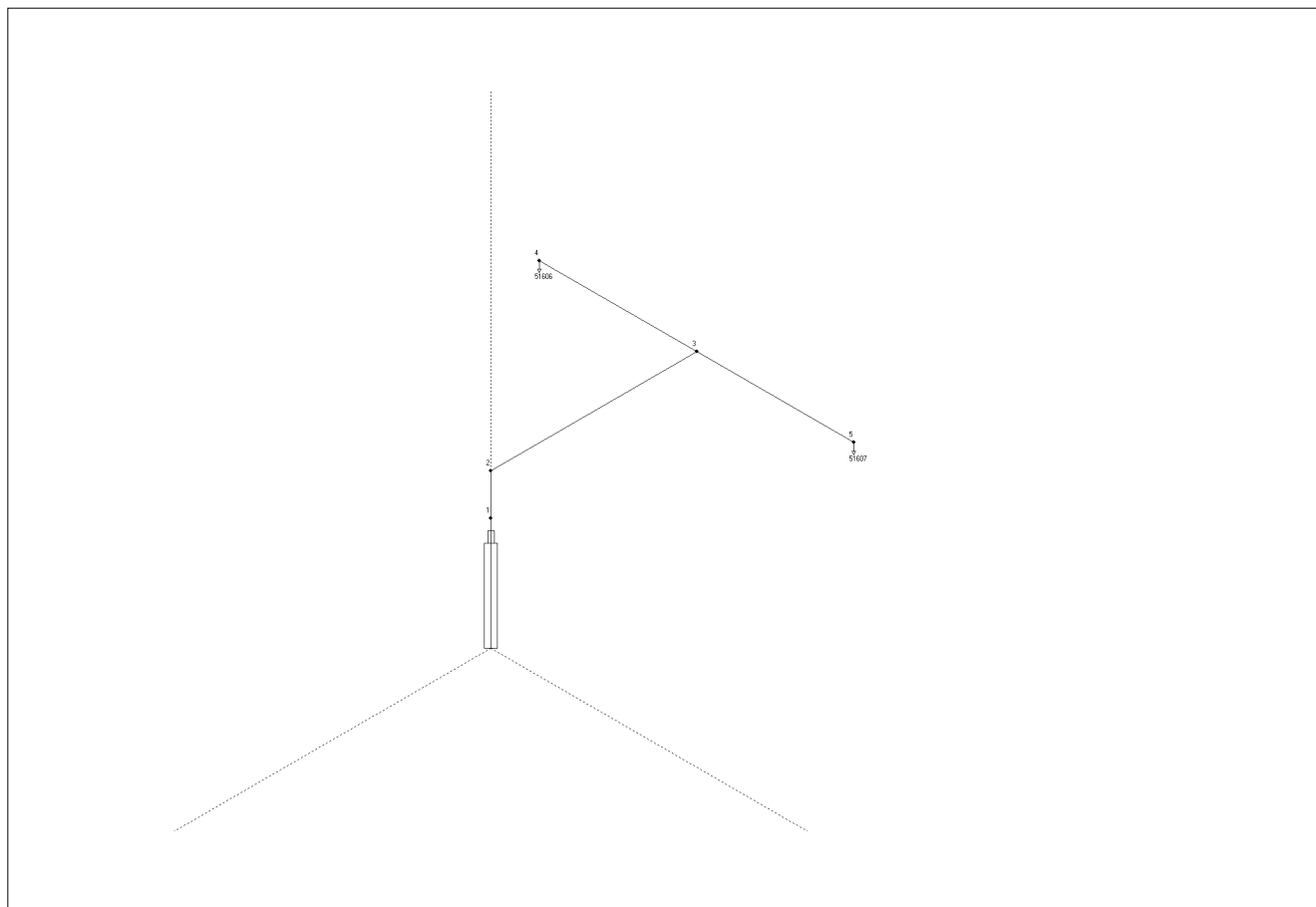
Bend-type	Di [mm]	DN	Number
-90	41,50	1 1/2	1
-90	41,50	1 1/2	3
-90	36,00	1 1/4	4

Number of T-distributors (in- and outdiameter)

Number	Input	90-out	90-out	0-out
1	41,5	36,0	36,0	0,0
2	36,0	36,0	36,0	0,0



Project:	Univerzita Karlova, Matematicko-fyzikální fakulta
Project-No:	KEP-007-24/FS
Building:	V Holešovičkách 2/747, 180 00 Praha 8
Object:	HÚ 2, m.č. G 001a, Technologické zázemí 1.NP
Contractor:	
Owner:	FASS, s.r.o.
Project engineer:	František Šťastný
Date:	08.02.2024
Altitude above sealevel:	250 m
Regulation rule for calculation of FK-5-1-12 quantities:	ISO 14520-1, Edition 2000
Pipe catalogue:	Fass.rkl
Component catalogue:	Fass.arm
Nozzle catalogue:	Fass.noz





Pipesystem data:

Section-No:	Starting-node	Endnode	Length [m]	Height [m]	Pipetype	Diameter [mm] **	Fitting *	Component code	Component coefficient	Nb of containers FK-5-1-12 quantity
1	0	1	0,100	0,100	42	32,1	C	420	4,200	1,0
2	1	2	0,550	0,550	31	36,0		-	-	0,0
3	2	3	2,750	0,000	31	36,0	E	-	-	0,0
4	3	4	2,100	0,000	31	36,0	T-90°	-	-	0,0
5	4	51606	0,100	-0,100	31	36,0	E	-	-	0,0
6	3	5	2,100	0,000	31	36,0	T-90°	-	-	0,0
7	5	51607	0,100	-0,100	31	36,0	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
42	Ventil láhve	hose
31	Distribuční potrubí	galvanized

Legend of components

Code	Type	Resistance coefficient
420	cylinder valves FK-5-1-12, 42 bar	4,200

Nozzle data:

No.	Calculation zone	Diameter [mm]
51606	Místnost + Podlaha	4,0
51607	Místnost + Podlaha	4,0

Legend of nozzles:

Type	Number of orifices	C1	C2	C3	C4	C5	C6
5 FK-5-1-12 (2 - 16 vr	16	4,62495	-0,08139	0,05363	-0,10202	-3,79175	1,84222



Calculation zone data:

Calculation of design quantity:

Zone	Total volume [m3]	Volume of building parts [m3]	Calculated volume [m3]	Max. Over-pressure [mbar]	Design temp. [°C]	Extinguish-conc. [% Vol]	Design factor	Design conc. [% Vol]	Design quantity [kg]
1 Místnost + Podlah:	152,6	0,0	152,6	3,000	20,0	4,3	1,30	5,6	125,96

Regulation rule for calculation of FK-5-1-12 quantities: ISO 14520-1, Edition 2000
Altitude above sealevel: 250,0 m

FK-5-1-12 storage input data:

Container volume: 140,0 l
Filling ratio: -0,900 kg/l (fixed value)
Filling pressure: 42,0 bar abs
Storage temperature: 20,0 °C
Supplement factor: 1,00
Minimum storage quantity: 125,96 kg
Number of containers: 1

Discharge time (input value): 10,0 s

Further information:

Design with included gas discharge time
Design with predetermined orifice diameters



Calculation results:

FK-5-1-12 storage data:

Design quantity:	126,0 kg
Supplement factor:	1,00
Minimum storage quantity:	126,0 kg
Container volume:	140,0 l
Filling ratio:	0,90 kg/l
Filling pressure:	42,0 bar abs
FK-5-1-12 -mass per container:	126,0 kg
Number of containers:	1
Actual storage quantity:	126,0 kg
Storage temperature:	20,0 °C
Starting container pressure:	42,0 bar abs

Discharge time:

Discharge time air:	0,1 s
Total gas discharge time:	0,1 s
Two-phase discharge time:	9,3 s
Total discharge time:	9,4 s

System information:

Container working pressure:	24,1 bar abs
Container working temperature:	20,0 °C
Total network volume:	7,6 l
Medium pipe content:	9,6 kg FK-5-1-12
Filling portion in pipe system:	0,08 kg FK-5-1-12 /kg FK-5-1-12 -storage



Pipe system:

Section-No:	Starting-node	Endnode	Pressure [bar abs]	Flowrate [kg/s]	Pipedimension Di [mm]	DN
1	0	1	20,29	12,81	32,1	1 1/2"
2	1	2	20,08	12,86	36,0	1 1/4
3	2	3	18,04	12,86	36,0	1 1/4
4	3	4	16,70	6,43	36,0	1 1/4
5	4	51606	16,27	6,43	36,0	1 1/4
6	3	5	16,70	6,43	36,0	1 1/4
7	5	51607	16,27	6,43	36,0	1 1/4



Nozzle data:

Calculation- zone no:	Nozzle no.	Nozzle type	Number of orifices	Pipeconnection Di [mm]	DN	Orifice [mm]	FK-5-1-12 out- put [kg]
1	51606	5	16	36,0	1 1/4	4,0	63,2
1	51607	5	16	36,0	1 1/4	4,0	63,2

Two-phase discharge time: 9,3 s

MAXIMUM TRANSPORT TIME DIFF. BETWEEN NOZZLES: 51607./ 51606. IS 0.00 S

Calculation- zone no:	Nozzle no.	Outlet velocity [m/s]	Transport time [s]	Jetdistance [m]
1	51606	29,8	0,73	2,37
1	51607	29,8	0,73	2,37



Concentrations:

Calculation- zone no:	O2	Gascomposition after discharge [%]	
		FK-5-1-12	N2
1	19,7	5,5	73,8

Pressure relief opening:

Calculation- zone no:	Recommended area against overpressure		Max. flow [kg/s]
	Area [m ²]	Overpressure [mbar]	
1	0,072	3,0	



Component list:

Component	Number	Code	Coefficient
cylinder valves FK-5	1	420	4,200

Nozzle-type	Number	C1	C2	C3	C4	C5	C6
5	2	4,62000	-0,08130	0,05360	-0,10200	-3,79000	1,84000

Pipe-type	Di [mm]	DN	Length [m]
42	32,10	1 1/2"	0,100
31	36,00	1 1/4	7,800

Number of bends (+) and elbows (-)

Bend-type	Di [mm]	DN	Number
-90	36,00	1 1/4	3

Number of T-distributors (in- and outdiameter)

Number	Input	90-out	90-out	0-out
1	36,0	36,0	36,0	0,0