GEBERIT MEPLA
PRESSURE LOSS TABLES

GEBERIT

DRUKVERLIESTABELLEN

KNOW
HOW
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Table of contents

2 Pressure loss in Geberit Mepla, drinking water

2.1 Potable water 10 °C

Medium:	Water
Temperature:	10 °C
Density:	999.7 kg/m^3
Viscosity:	0.001306 Pa•s
Surface roughness:	0.007 mm

The pressure loss values are shown in the diagram or in the Geberit pressure loss tables.

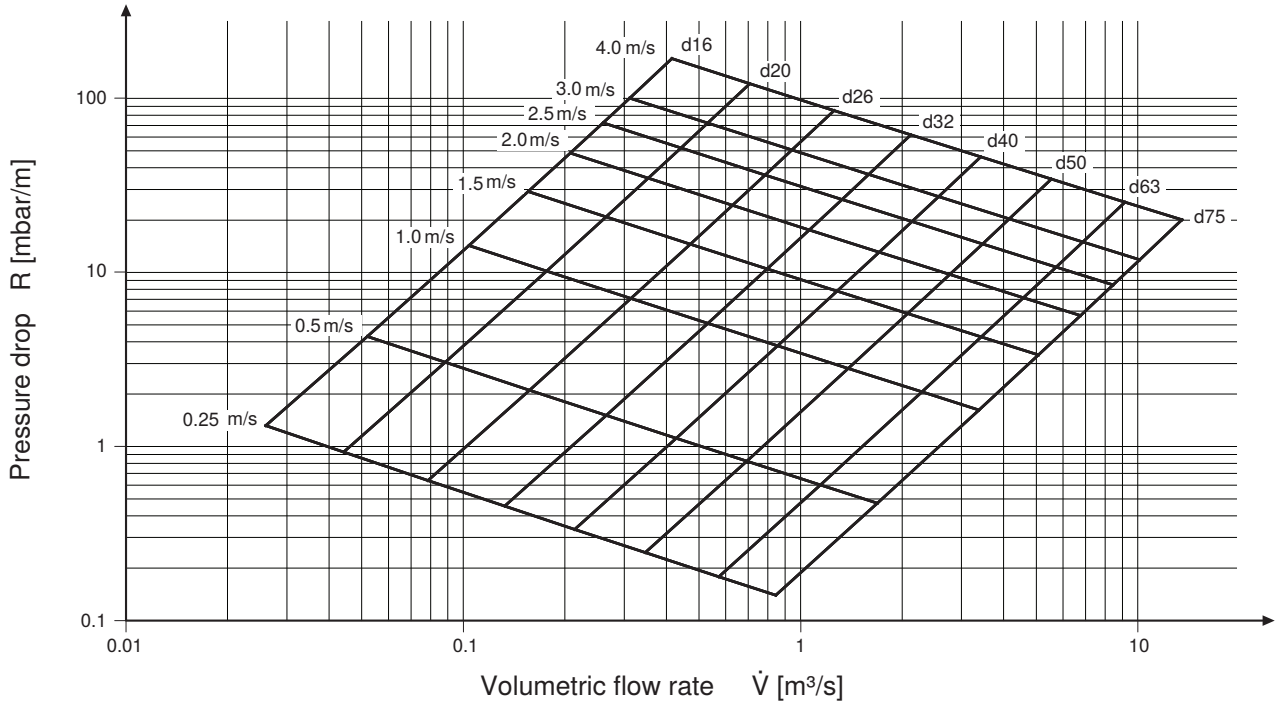

Table 1: Pressure loss in Geberit Mepla system pipes, drinking water 10 °C, d16–32

d [mm]	16		20		26		32	
V̇ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.01	0.10	0.30						
0.02	0.19	0.61	0.11	0.21				
0.03	0.29	1.68	0.17	0.32				
0.04	0.39	2.74	0.23	0.78	0.13	0.13		
0.05	0.48	4.02	0.28	1.15	0.16	0.30		
0.06	0.58	5.50	0.34	1.56	0.19	0.40		
0.07	0.67	7.18	0.40	2.04	0.22	0.52	0.13	0.15
0.08	0.77	9.06	0.45	2.56	0.25	0.66	0.15	0.19
0.09	0.87	11.12	0.51	3.14	0.29	0.81	0.17	0.23
0.10	0.96	13.37	0.57	3.77	0.32	0.97	0.19	0.28
0.15	1.44	27.26	0.85	7.64	0.48	1.94	0.28	0.56
0.20	1.93	45.41	1.13	12.67	0.64	3.21	0.38	0.92

d [mm]	16		20		26		32	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.25	2.41	67.65	1.41	18.80	0.80	4.74	0.47	1.36
0.30	2.89	93.88	1.70	25.99	0.95	6.53	0.57	1.87
0.35	3.37	124.00	1.98	34.21	1.11	8.58	0.66	2.45
0.40	3.85	157.95	2.26	43.45	1.27	10.87	0.75	3.09
0.45	4.33	195.71	2.55	53.70	1.43	13.40	0.85	3.81
0.50	4.81	237.22	2.83	64.92	1.59	16.16	0.94	4.59
0.55	5.30	282.46	3.11	77.13	1.75	19.16	1.04	5.43
0.60	5.78	331.41	3.40	90.30	1.91	22.39	1.13	6.33
0.65	6.26	384.04	3.68	104.42	2.07	25.85	1.22	7.30
0.70	6.74	440.33	3.96	119.50	2.23	29.53	1.32	8.33
0.75			4.24	135.53	2.39	33.43	1.41	9.42
0.80			4.53	152.49	2.55	37.56	1.51	10.57
0.85			4.81	170.38	2.71	41.90	1.60	11.78
0.90			5.09	189.21	2.86	46.47	1.70	13.05
0.95			5.38	208.97	3.02	51.25	1.79	14.38
1.00			5.66	229.65	3.18	56.25	1.88	15.77
1.05			5.94	251.25	3.34	61.46	1.98	17.22
1.10			6.22	273.76	3.50	66.89	2.07	18.72
1.15			6.51	297.20	3.66	72.53	2.17	20.28
1.20			6.79	321.54	3.82	78.38	2.26	21.90
1.25					3.98	84.44	2.35	23.57
1.30					4.14	90.71	2.45	25.30
1.40					4.46	103.89	2.64	28.93
1.50					4.77	117.90	2.83	32.79
1.60					5.09	132.74	3.01	36.86
1.70					5.41	148.41	3.20	41.16
1.80					5.73	164.90	3.39	45.67
1.90					6.05	182.21	3.58	50.40
2.00					6.37	200.34	3.77	55.35
2.10					6.68	219.29	3.96	60.51
2.20							4.14	65.89
2.30							4.33	71.49
2.40							4.52	77.29
2.50							4.71	83.31
2.60							4.90	89.54
2.70							5.09	95.98
2.80							5.27	102.64
2.90							5.46	109.50
3.00							5.65	116.57
3.10							5.84	123.86

d [mm]	16		20		26		32	
V̇ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3.20							6.03	131.35
3.30							6.22	139.05
3.40							6.40	146.95
3.50							6.59	155.07
3.60							6.78	163.39
3.70							6.97	171.92

As a rule, the values highlighted in blue do not occur in potable water installations.

Table 2: Pressure loss in Geberit Mepla system pipes, drinking water 10 °C, d40–75

d [mm]	40		50		63		75	
V̇ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.09	0.11	0.08						
0.10	0.12	0.09						
0.15	0.18	0.18	0.11	0.06				
0.20	0.23	0.30	0.14	0.10	0.09	0.03		
0.25	0.29	0.44	0.18	0.14	0.11	0.04		
0.30	0.35	0.60	0.22	0.19	0.13	0.06	0.09	0.02
0.35	0.41	0.79	0.25	0.25	0.15	0.08	0.10	0.03
0.40	0.47	0.99	0.29	0.32	0.17	0.10	0.12	0.04
0.45	0.53	1.22	0.32	0.39	0.20	0.12	0.13	0.05
0.50	0.58	1.47	0.36	0.47	0.22	0.14	0.15	0.06
0.55	0.64	1.73	0.40	0.55	0.24	0.17	0.16	0.07
0.60	0.70	2.02	0.43	0.64	0.26	0.19	0.18	0.08
0.65	0.76	2.33	0.47	0.74	0.28	0.22	0.19	0.09
0.70	0.82	2.66	0.51	0.84	0.31	0.25	0.21	0.10
0.75	0.88	3.00	0.54	0.95	0.33	0.29	0.22	0.11
0.80	0.94	3.36	0.58	1.06	0.35	0.32	0.24	0.13
0.85	0.99	3.75	0.61	1.18	0.37	0.36	0.25	0.14
0.90	1.05	4.15	0.65	1.31	0.39	0.39	0.27	0.16
0.95	1.11	4.57	0.69	1.44	0.41	0.43	0.28	0.17
1.00	1.17	5.00	0.72	1.57	0.44	0.47	0.30	0.19
1.05	1.23	5.46	0.76	1.72	0.46	0.52	0.31	0.20
1.10	1.29	5.93	0.79	1.86	0.48	0.56	0.33	0.22
1.15	1.34	6.42	0.83	2.02	0.50	0.61	0.34	0.24
1.20	1.40	6.93	0.87	2.17	0.52	0.65	0.36	0.26
1.25	1.46	7.45	0.90	2.34	0.55	0.70	0.37	0.28
1.30	1.52	7.99	0.94	2.51	0.57	0.75	0.38	0.30
1.40	1.64	9.13	1.01	2.86	0.61	0.86	0.41	0.34
1.50	1.75	10.33	1.08	3.24	0.65	0.97	0.44	0.38

d [mm]	40		50		63		75	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1.60	1.87	11.61	1.15	3.63	0.70	1.09	0.47	0.43
1.70	1.99	12.95	1.23	4.05	0.74	1.21	0.50	0.48
1.80	2.10	14.35	1.30	4.48	0.79	1.34	0.53	0.53
1.90	2.22	15.83	1.37	4.94	0.83	1.48	0.56	0.58
2.00	2.34	17.36	1.44	5.41	0.87	1.62	0.59	0.64
2.10	2.46	18.97	1.52	5.91	0.92	1.76	0.62	0.69
2.20	2.57	20.64	1.59	6.42	0.96	1.92	0.65	0.75
2.30	2.69	22.37	1.66	6.96	1.00	2.07	0.68	0.82
2.40	2.81	24.17	1.73	7.51	1.05	2.24	0.71	0.88
2.50	2.92	26.03	1.80	8.09	1.09	2.41	0.74	0.95
2.60	3.04	27.95	1.88	8.68	1.14	2.58	0.77	1.01
2.70	3.16	29.94	1.95	9.29	1.18	2.76	0.80	1.09
2.80	3.27	32.00	2.02	9.92	1.22	2.95	0.83	1.16
2.90	3.39	34.11	2.09	10.57	1.27	3.14	0.86	1.23
3.00	3.51	36.29	2.17	11.24	1.31	3.34	0.89	1.31
3.10	3.62	38.53	2.24	11.93	1.35	3.54	0.92	1.39
3.20	3.74	40.84	2.31	12.64	1.40	3.75	0.95	1.47
3.30	3.86	43.20	2.38	13.36	1.44	3.96	0.98	1.55
3.40	3.98	45.63	2.45	14.11	1.48	4.18	1.01	1.64
3.50	4.09	48.12	2.53	14.87	1.53	4.41	1.04	1.73
3.60	4.21	50.67	2.60	15.65	1.57	4.64	1.07	1.82
3.70	4.33	53.29	2.67	16.45	1.62	4.87	1.09	1.91
3.80	4.44	55.97	2.74	17.27	1.66	5.11	1.12	2.00
3.90	4.56	58.70	2.81	18.10	1.70	5.36	1.15	2.10
4.00	4.68	61.50	2.89	18.96	1.75	5.61	1.18	2.19
4.10	4.79	64.36	2.96	19.83	1.79	5.86	1.21	2.29
4.20	4.91	67.28	3.03	20.72	1.83	6.12	1.24	2.39
4.30	5.03	70.27	3.10	21.63	1.88	6.39	1.27	2.50
4.40	5.14	73.31	3.18	22.56	1.92	6.66	1.30	2.60
4.50	5.26	76.42	3.25	23.50	1.96	6.94	1.33	2.71
4.60	5.38	79.58	3.32	24.47	2.01	7.22	1.36	2.82
4.70	5.50	82.81	3.39	25.45	2.05	7.51	1.39	2.93
4.80	5.61	86.09	3.46	26.45	2.10	7.80	1.42	3.04
4.90	5.73	89.44	3.54	27.46	2.14	8.10	1.45	3.16
5.00	5.85	92.85	3.61	28.50	2.18	8.40	1.48	3.28
5.50	6.43	110.79	3.97	33.94	2.40	9.98	1.63	3.89
6.00			4.33	39.82	2.62	11.70	1.78	4.56
6.50			4.69	46.15	2.84	13.54	1.92	5.27
7.00			5.05	52.91	3.06	15.50	2.07	6.02
7.50			5.41	60.11	3.27	17.58	2.22	6.83

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d [mm]	40		50		63		75	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8.00			5.77	67.74	3.49	19.79	2.37	7.68
8.50			6.14	75.80	3.71	22.12	2.51	8.58
9.00			6.50	84.29	3.93	24.57	2.66	9.52
9.50			6.86	93.21	4.15	27.14	2.81	10.51
10.00					4.37	29.82	2.96	11.54
10.50					4.58	32.63	3.11	12.62
11.00					4.80	35.56	3.25	13.74
11.50					5.02	38.60	3.40	14.90
12.00					5.24	41.77	3.55	16.12
12.50					5.46	45.05	3.70	17.37
13.00					5.68	48.44	3.85	18.67
13.50					5.89	51.96	3.99	20.01
14.00					6.11	55.59	4.14	21.40
14.50					6.33	59.34	4.29	22.83
15.00					6.55	63.20	4.44	24.30
15.50					6.77	67.18	4.59	25.82
16.00					6.99	71.27	4.73	27.38
16.50							4.88	28.98

As a rule, the values highlighted in blue do not occur in potable water installations.

2.2 Potable water 60 °C

Medium:	Water
Temperature:	60 °C
Density:	983.2 kg/m³
Viscosity:	0.000467 Pa•s
Surface roughness:	0.007 mm

The pressure loss values are shown in the diagram or in the Geberit pressure loss tables.

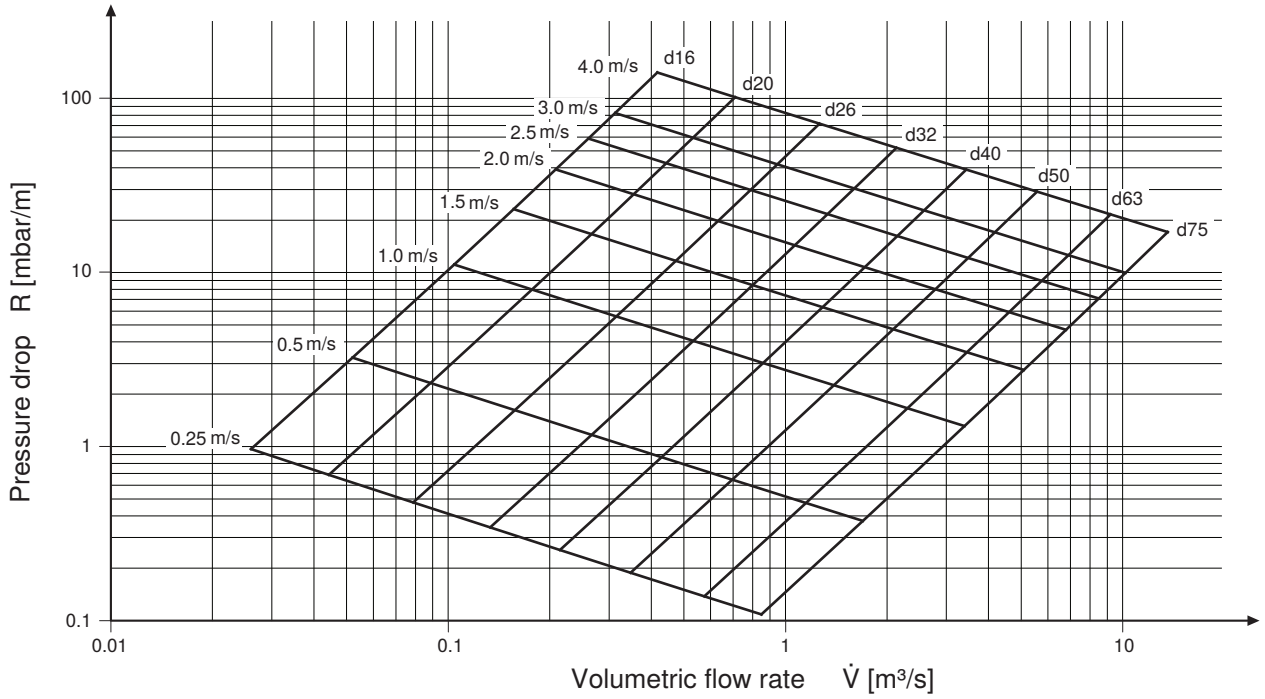

Table 3: Pressure loss in Geberit Mepla system pipes, drinking water 60 °C, d16–32

d [mm]	16		20		26		32	
V̇ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.01	0.10	0.19						
0.02	0.19	0.62	0.11	0.18				
0.03	0.29	1.24	0.17	0.35				
0.04	0.39	2.05	0.23	0.58	0.13	0.15		
0.05	0.48	3.04	0.28	0.85	0.16	0.22		
0.06	0.58	4.20	0.34	1.17	0.19	0.30		
0.07	0.67	5.52	0.40	1.54	0.22	0.39	0.13	0.11
0.08	0.77	7.00	0.45	1.95	0.25	0.49	0.15	0.14
0.09	0.87	8.64	0.51	2.40	0.29	0.61	0.17	0.17
0.10	0.96	10.44	0.57	2.89	0.32	0.73	0.19	0.21
0.15	1.44	21.72	0.85	5.97	0.48	1.49	0.28	0.42
0.20	1.93	36.73	1.13	10.03	0.64	2.49	0.38	0.71
0.25	2.41	55.38	1.41	15.04	0.80	3.72	0.47	1.05
0.30	2.89	77.63	1.70	20.98	0.95	5.16	0.57	1.45
0.35	3.37	103.44	1.98	27.83	1.11	6.82	0.66	1.91

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d [mm]	16		20		26		32	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.40	3.85	132.79	2.26	35.60	1.27	8.70	0.75	2.43
0.45	4.33	165.67	2.55	44.26	1.43	10.78	0.85	3.01
0.50	4.81	202.06	2.83	53.82	1.59	13.07	0.94	3.64
0.55	5.30	241.95	3.11	64.27	1.75	15.57	1.04	4.33
0.60	5.78	285.34	3.40	75.61	1.91	18.27	1.13	5.07
0.65	6.26	332.22	3.68	87.82	2.07	21.17	1.22	5.86
0.70	6.74	382.58	3.96	100.92	2.23	24.27	1.32	6.71
0.75			4.24	114.90	2.39	27.58	1.41	7.61
0.80			4.53	129.76	2.55	31.08	1.51	8.57
0.85			4.81	145.49	2.71	34.79	1.60	9.58
0.90			5.09	162.09	2.86	38.69	1.70	10.63
0.95			5.38	179.57	3.02	42.79	1.79	11.75
1.00			5.66	197.92	3.18	47.09	1.88	12.91
1.05			5.94	217.14	3.34	51.59	1.98	14.12
1.10			6.22	237.23	3.50	56.28	2.07	15.39
1.15			6.51	258.19	3.66	61.18	2.17	16.71
1.20			6.79	280.02	3.82	66.26	2.26	18.08
1.25					3.98	71.55	2.35	19.50
1.30					4.14	77.03	2.45	20.97
1.40					4.46	88.57	2.64	24.07
1.50					4.77	100.90	2.83	27.37
1.60					5.09	114.00	3.01	30.87
1.70					5.41	127.88	3.20	34.57
1.80					5.73	142.54	3.39	38.48
1.90					6.05	157.98	3.58	42.58
2.00					6.37	174.19	3.77	46.89
2.10					6.68	191.18	3.96	51.39
2.20							4.14	56.10
2.30							4.33	61.00
2.40							4.52	66.11
2.50							4.71	71.41
2.60							4.90	76.91
2.70							5.09	82.61
2.80							5.27	88.51
2.90							5.46	94.60
3.00							5.65	100.90
3.10							5.84	107.39
3.20							6.03	114.08
3.30							6.22	120.97
3.40							6.40	128.05

d [mm]	16		20		26		32	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3.50							6.59	135.33
3.60							6.78	142.81
3.70							6.97	150.49

As a rule, the values highlighted in blue do not occur in potable water installations.

Table 4: Pressure loss in Geberit system pipes, drinking water 60 °C, d40–75

d [mm]	40		50		63		75	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.08	0.09	0.05						
0.09	0.11	0.06						
0.10	0.12	0.07						
0.15	0.18	0.14	0.11	0.04				
0.20	0.23	0.23	0.14	0.07	0.09	0.02		
0.25	0.29	0.33	0.18	0.11	0.11	0.03		
0.30	0.35	0.46	0.22	0.15	0.13	0.04	0.09	0.02
0.35	0.41	0.61	0.25	0.19	0.15	0.06	0.10	0.02
0.40	0.47	0.77	0.29	0.24	0.17	0.07	0.12	0.03
0.45	0.53	0.95	0.32	0.30	0.20	0.09	0.13	0.04
0.50	0.58	1.15	0.36	0.36	0.22	0.11	0.15	0.04
0.55	0.64	1.36	0.40	0.43	0.24	0.13	0.16	0.05
0.60	0.70	1.60	0.43	0.50	0.26	0.15	0.18	0.06
0.65	0.76	1.84	0.47	0.58	0.28	0.17	0.19	0.07
0.70	0.82	2.11	0.51	0.66	0.31	0.20	0.21	0.08
0.75	0.88	2.39	0.54	0.74	0.33	0.22	0.22	0.09
0.80	0.94	2.68	0.58	0.84	0.35	0.25	0.24	0.10
0.85	0.99	3.00	0.61	0.93	0.37	0.28	0.25	0.11
0.90	1.05	3.32	0.65	1.03	0.39	0.31	0.27	0.12
0.95	1.11	3.67	0.69	1.14	0.41	0.34	0.28	0.13
1.00	1.17	4.03	0.72	1.25	0.44	0.37	0.30	0.15
1.05	1.23	4.40	0.76	1.36	0.46	0.41	0.31	0.16
1.10	1.29	4.79	0.79	1.48	0.48	0.44	0.33	0.17
1.15	1.34	5.20	0.83	1.61	0.50	0.48	0.34	0.19
1.20	1.40	5.62	0.87	1.74	0.52	0.52	0.36	0.20
1.25	1.46	6.05	0.90	1.87	0.55	0.55	0.37	0.22
1.30	1.52	6.51	0.94	2.01	0.57	0.60	0.38	0.23
1.40	1.64	7.45	1.01	2.30	0.61	0.68	0.41	0.27
1.50	1.75	8.46	1.08	2.61	0.65	0.77	0.44	0.30
1.60	1.87	9.53	1.15	2.93	0.70	0.87	0.47	0.34
1.70	1.99	10.66	1.23	3.28	0.74	0.97	0.50	0.38

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d [mm]	40		50		63		75	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1.80	2.10	11.85	1.30	3.64	0.79	1.07	0.53	0.42
1.90	2.22	13.10	1.37	4.02	0.83	1.18	0.56	0.46
2.00	2.34	14.41	1.44	4.41	0.87	1.30	0.59	0.51
2.10	2.46	15.77	1.52	4.83	0.92	1.42	0.62	0.55
2.20	2.57	17.20	1.59	5.26	0.96	1.54	0.65	0.60
2.30	2.69	18.68	1.66	5.71	1.00	1.67	0.68	0.65
2.40	2.81	20.22	1.73	6.17	1.05	1.81	0.71	0.70
2.50	2.92	21.83	1.80	6.65	1.09	1.95	0.74	0.76
2.60	3.04	23.49	1.88	7.15	1.14	2.09	0.77	0.81
2.70	3.16	25.20	1.95	7.67	1.18	2.24	0.80	0.87
2.80	3.27	26.98	2.02	8.21	1.22	2.40	0.83	0.93
2.90	3.39	28.81	2.09	8.76	1.27	2.56	0.86	0.99
3.00	3.51	30.71	2.17	9.33	1.31	2.72	0.89	1.06
3.10	3.62	32.66	2.24	9.91	1.35	2.89	0.92	1.12
3.20	3.74	34.66	2.31	10.51	1.40	3.07	0.95	1.19
3.30	3.86	36.73	2.38	11.13	1.44	3.24	0.98	1.26
3.40	3.98	38.85	2.45	11.77	1.48	3.43	1.01	1.33
3.50	4.09	41.04	2.53	12.42	1.53	3.61	1.04	1.40
3.60	4.21	43.27	2.60	13.09	1.57	3.81	1.07	1.47
3.70	4.33	45.57	2.67	13.77	1.62	4.00	1.09	1.55
3.80	4.44	47.92	2.74	14.48	1.66	4.21	1.12	1.63
3.90	4.56	50.34	2.81	15.20	1.70	4.41	1.15	1.71
4.00	4.68	52.81	2.89	15.93	1.75	4.62	1.18	1.79
4.10	4.79	55.33	2.96	16.68	1.79	4.84	1.21	1.87
4.20	4.91	57.92	3.03	17.45	1.83	5.06	1.24	1.95
4.30	5.03	60.56	3.10	18.24	1.88	5.28	1.27	2.04
4.40	5.14	63.26	3.18	19.04	1.92	5.51	1.30	2.13
4.50	5.26	66.01	3.25	19.86	1.96	5.75	1.33	2.22
4.60	5.38	68.83	3.32	20.70	2.01	5.99	1.36	2.31
4.70	5.50	71.70	3.39	21.55	2.05	6.23	1.39	2.40
4.80	5.61	74.62	3.46	22.42	2.10	6.48	1.42	2.50
4.90	5.73	77.61	3.54	23.30	2.14	6.73	1.45	2.59
5.00	5.85	80.65	3.61	24.21	2.18	6.99	1.48	2.69
5.50	6.43	96.72	3.97	28.96	2.40	8.35	1.63	3.21
6.00			4.33	34.13	2.62	9.82	1.78	3.77
6.50			4.69	39.71	2.84	11.40	1.92	4.37
7.00			5.05	45.70	3.06	13.09	2.07	5.02
7.50			5.41	52.10	3.27	14.90	2.22	5.70
8.00			5.77	58.90	3.49	16.82	2.37	6.43
8.50			6.14	66.12	3.71	18.86	2.51	7.20

d [mm]	40		50		63		75	
$\dot{V}$ [l/s]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
9.00			6.50	73.74	3.93	21.00	2.66	8.01
9.50			6.86	81.77	4.15	23.26	2.81	8.86
10.00					4.37	25.63	2.96	9.75
10.50					4.58	28.11	3.11	10.69
11.00					4.80	30.70	3.25	11.66
11.50					5.02	33.40	3.40	12.68
12.00					5.24	36.21	3.55	13.74
12.50					5.46	39.13	3.70	14.84
13.00					5.68	42.16	3.85	15.97
13.50					5.89	45.31	3.99	17.15
14.00					6.11	48.56	4.14	18.37
14.50					6.33	51.93	4.29	19.63
15.00					6.55	55.40	4.44	20.93
15.50					6.77	58.98	4.59	22.28
16.00					6.99	62.68	4.73	23.66
16.50							4.88	25.08

As a rule, the values highlighted in blue do not occur in potable water installations.

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3 Pressure loss in Geberit Mepla, cooling

3.1 Water without glycol, inlet flow 10 °C, return flow 11 °C

Medium:	Water
Inlet flow temperature:	10 °C
Return temperature:	11 °C
Range:	1 K
Average temperature:	10.5 °C
Density:	999.70 kg/m^3
Viscosity:	0.0012891 Pa•s
Specific thermal capacity:	4187.6 J/(kg•K)
Surface roughness:	0.007 mm

Table 5: Pressure loss in Geberit Mepla system pipes, cold water containing no glycol, inlet flow 10 °C / return flow 11 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	171.9	0.46	3.705	0.27	1.057	0.15	0.273		
300	257.9	0.69	7.457	0.41	2.115	0.23	0.543		
400	343.9	0.92	12.303	0.54	3.474	0.30	0.889		
500	429.8	1.15	18.190	0.68	5.118	0.38	1.306		
600	515.8	1.38	25.078	0.81	7.036	0.46	1.790	0.27	0.516
700	601.8	1.61	32.942	0.95	9.218	0.53	2.339	0.31	0.674
800	687.7	1.84	41.759	1.08	11.657	0.61	2.952	0.36	0.849
900	773.7	2.07	51.513	1.22	14.349	0.68	3.627	0.40	1.041
1000	859.7	2.30	62.190	1.35	17.288	0.76	4.362	0.45	1.250
1100	945.6	2.53	73.777	1.49	20.471	0.84	5.157	0.49	1.476
1200	1031.6	2.76	86.265	1.62	23.895	0.91	6.011	0.54	1.719
1300	1117.6	2.99	99.647	1.76	27.556	0.99	6.922	0.58	1.977
1400	1203.6			1.89	31.452	1.06	7.889	0.63	2.251
1500	1289.5			2.03	35.581	1.14	8.914	0.67	2.541
1600	1375.5			2.16	39.941	1.22	9.993	0.72	2.846
1700	1461.5			2.30	44.530	1.29	11.129	0.76	3.167
1800	1547.4			2.43	49.346	1.37	12.318	0.81	3.502
1900	1633.4			2.57	54.388	1.44	13.562	0.85	3.853
2000	1719.4			2.70	59.654	1.52	14.860	0.90	4.218
2500	2149.2					1.90	22.142	1.12	6.263
3000	2579.0					2.28	30.722	1.35	8.664
3500	3008.9					2.66	40.570	1.57	11.410
4000	3438.7					3.04	51.666	1.80	14.495
4500	3868.6							2.02	17.912
5000	4298.4							2.25	21.658
5500	4728.2							2.47	25.726
6000	5158.1							2.70	30.116

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
6500	5587.9							2.92	34.822
7000	6017.8							3.15	39.843

Table 6: Pressure loss in Geberit Mepla system pipes, cold water containing no glycol, inlet flow 10 °C / return flow 11 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1100	945.6	0.31	0.476						
1200	1031.6	0.34	0.553						
1300	1117.6	0.36	0.636						
1400	1203.6	0.39	0.724						
1500	1289.5	0.42	0.816						
1600	1375.5	0.45	0.913						
1700	1461.5	0.47	1.016						
1800	1547.4	0.50	1.122						
1900	1633.4	0.53	1.234						
2000	1719.4	0.56	1.350	0.34	0.428				
2500	2149.2	0.70	2.000	0.43	0.633				
3000	2579.0	0.84	2.760	0.52	0.872				
3500	3008.9	0.98	3.627	0.60	1.143				
4000	3438.7	1.12	4.599	0.69	1.448	0.42	0.436		
4500	3868.6	1.26	5.674	0.78	1.784	0.47	0.536		
5000	4298.4	1.40	6.850	0.86	2.150	0.52	0.646		
5500	4728.2	1.54	8.125	0.95	2.547	0.57	0.764		
6000	5158.1	1.68	9.498	1.03	2.975	0.63	0.892		
6500	5587.9	1.82	10.969	1.12	3.431	0.68	1.028		
7000	6017.8	1.96	12.535	1.21	3.917	0.73	1.172	0.49	0.462
7500	6447.6	2.09	14.196	1.29	4.432	0.78	1.325	0.53	0.522
8000	6877.4	2.23	15.952	1.38	4.976	0.83	1.487	0.57	0.585
8500	7307.3	2.37	17.801	1.47	5.548	0.89	1.656	0.60	0.652
9000	7737.1	2.51	19.743	1.55	6.148	0.94	1.834	0.64	0.721
9500	8167.0	2.65	21.778	1.64	6.776	0.99	2.020	0.67	0.794
10000	8596.8	2.79	23.905	1.72	7.432	1.04	2.214	0.71	0.870
10500	9026.7	2.93	26.123	1.81	8.115	1.10	2.416	0.74	0.949
11000	9456.5	3.07	28.432	1.90	8.826	1.15	2.626	0.78	1.031
11500	9886.3			1.98	9.564	1.20	2.844	0.81	1.116
12000	10316.2			2.07	10.329	1.25	3.069	0.85	1.204
12500	10746.0			2.16	11.121	1.30	3.303	0.88	1.295
13000	11175.9			2.24	11.939	1.36	3.544	0.92	1.389
13500	11605.7			2.33	12.785	1.41	3.793	0.95	1.486

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
14000	12035.5			2.41	13.657	1.46	4.049	0.99	1.586
14500	12465.4			2.50	14.556	1.51	4.313	1.02	1.689
15000	12895.2			2.59	15.480	1.56	4.585	1.06	1.795
15500	13325.1			2.67	16.432	1.62	4.865	1.10	1.904
16000	13754.9			2.76	17.409	1.67	5.151	1.13	2.015
16500	14184.7			2.84	18.413	1.72	5.446	1.17	2.130
17000	14614.6			2.93	19.442	1.77	5.747	1.20	2.247
17500	15044.4			3.02	20.498	1.83	6.057	1.24	2.367
18000	15474.3			3.10	21.579	1.88	6.373	1.27	2.490
18500	15904.1			3.19	22.686	1.93	6.697	1.31	2.616
19000	16333.9					1.98	7.029	1.34	2.745
19500	16763.8					2.03	7.367	1.38	2.876
20000	17193.6					2.09	7.713	1.41	3.011
20500	17623.5					2.14	8.067	1.45	3.148
21000	18053.3					2.19	8.427	1.48	3.288
21500	18483.1					2.24	8.795	1.52	3.430
22000	18913.0					2.29	9.170	1.55	3.576
22500	19342.8					2.35	9.553	1.59	3.724
23000	19772.7					2.40	9.942	1.63	3.875
23500	20202.5					2.45	10.339	1.66	4.028
24000	20632.3					2.50	10.743	1.70	4.185
24500	21062.2					2.56	11.154	1.73	4.344
25000	21492.0					2.61	11.572	1.77	4.505
25500	21921.9					2.66	11.997	1.80	4.670
26000	22351.7					2.71	12.429	1.84	4.837
26500	22781.5					2.76	12.869	1.87	5.007
27000	23211.4					2.82	13.315	1.91	5.180
27500	23641.2					2.87	13.768	1.94	5.355
28000	24071.1					2.92	14.229	1.98	5.533
28500	24500.9					2.97	14.697	2.01	5.713
29000	24930.7					3.02	15.171	2.05	5.897
29500	25360.6					3.08	15.653	2.09	6.083
30000	25790.4					3.13	16.142	2.12	6.271
32500	27939.6							2.30	7.254
35000	30088.8							2.47	8.302
37500	32238.0							2.65	9.415
40000	34387.2							2.83	10.593
42500	36536.4							3.00	11.835
45000	38685.6							3.18	13.142

3.2 Water containing 30 % glycol, inlet flow 5 °C, return flow 12 °C

Medium:	Water containing 30 % glycol
Inlet flow temperature:	5 °C
Return temperature:	12 °C
Range:	7 K
Average temperature:	8.5 °C
Density:	1033.8 kg/m^3
Viscosity:	0.00299794 Pa•s
Specific thermal capacity:	3654.1 J/(kg•K)
Surface roughness:	0.007 mm

Table 7: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 30 % glycol, inlet flow 5 °C / return flow 12 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	28.1	0.07	0.528	0.04	0.182	0.02	0.058		
300	42.2	0.11	0.792	0.06	0.274	0.04	0.087	0.02	0.030
400	56.3	0.15	1.056	0.09	0.365	0.05	0.115	0.03	0.040
500	70.4	0.18	1.321	0.11	0.456	0.06	0.144	0.04	0.051
600	84.4	0.22	1.585	0.13	0.547	0.07	0.173	0.04	0.061
700	98.5	0.25	1.849	0.15	0.639	0.08	0.202	0.05	0.071
800	112.6	0.29	2.113	0.17	0.730	0.10	0.231	0.06	0.081
900	126.7	0.33	2.377	0.19	0.821	0.11	0.260	0.06	0.091
1000	140.7	0.36	2.641	0.21	0.912	0.12	0.289	0.07	0.101
1100	154.8	0.40	2.905	0.24	1.004	0.13	0.318	0.08	0.111
1200	168.9	0.44	3.169	0.26	1.095	0.14	0.346	0.09	0.121
1300	183.0	0.47	3.433	0.28	1.186	0.16	0.375	0.09	0.131
1400	197.0	0.51	3.698	0.30	1.277	0.17	0.404	0.10	0.142
1500	211.1	0.55	3.962	0.32	1.369	0.18	0.433	0.11	0.152
1600	225.2	0.58	7.288	0.34	1.460	0.19	0.462	0.11	0.162
1700	239.3	0.62	8.075	0.36	1.551	0.20	0.491	0.12	0.172
1800	253.3	0.66	8.896	0.39	1.642	0.22	0.520	0.13	0.182
1900	267.4	0.69	9.750	0.41	1.734	0.23	0.549	0.14	0.192
2000	281.5	0.73	10.638	0.43	1.825	0.24	0.577	0.14	0.202
2500	351.9	0.91	15.563	0.54	4.447	0.30	0.722	0.18	0.253
3000	422.2	1.09	21.274	0.64	6.063	0.36	1.566	0.21	0.303
3500	492.6	1.27	27.741	0.75	7.889	0.42	2.033	0.25	0.354
4000	563.0	1.46	34.943	0.86	9.918	0.48	2.552	0.28	0.743
4500	633.3	1.64	42.861	0.96	12.145	0.54	3.119	0.32	0.907
5000	703.7	1.82	51.480	1.07	14.564	0.60	3.735	0.36	1.085
5500	774.1	2.00	60.786	1.18	17.172	0.66	4.397	0.39	1.275
6000	844.4	2.18	70.770	1.28	19.966	0.72	5.106	0.43	1.480
6500	914.8	2.37	81.420	1.39	22.942	0.78	5.861	0.46	1.696
7000	985.2	2.55	92.728	1.50	26.098	0.84	6.659	0.50	1.926
7500	1055.6	2.73	104.687	1.61	29.431	0.90	7.502	0.53	2.168

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d [mm]		16		20		26		32	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	1125.9	2.91	117.289	1.71	32.939	0.96	8.388	0.57	2.422
8500	1196.3			1.82	36.620	1.02	9.317	0.61	2.688
9000	1266.7			1.93	40.473	1.08	10.288	0.64	2.966
9500	1337.0			2.03	44.496	1.14	11.302	0.68	3.256
10000	1407.4			2.14	48.686	1.20	12.356	0.71	3.557
10500	1477.8			2.25	53.044	1.26	13.451	0.75	3.871
11000	1548.2			2.35	57.567	1.32	14.588	0.78	4.195
11500	1618.5			2.46	62.254	1.38	15.764	0.82	4.531
12000	1688.9			2.57	67.104	1.44	16.981	0.85	4.878
12500	1759.3			2.68	72.116	1.50	18.237	0.89	5.236
13000	1829.6			2.78	77.290	1.56	19.532	0.93	5.605
13500	1900.0			2.89	82.622	1.63	20.867	0.96	5.985
14000	1970.4			3.00	88.114	1.69	22.240	1.00	6.376
14500	2040.7					1.75	23.652	1.03	6.778
15000	2111.1					1.81	25.103	1.07	7.190
15500	2181.5					1.87	26.591	1.10	7.613
16000	2251.9					1.93	28.118	1.14	8.047
16500	2322.2					1.99	29.682	1.18	8.491
17000	2392.6					2.05	31.285	1.21	8.946
17500	2463.0					2.11	32.924	1.25	9.411
18000	2533.3					2.17	34.600	1.28	9.886
18500	2603.7					2.23	36.314	1.32	10.372
19000	2674.1					2.29	38.064	1.35	10.868
19500	2744.5					2.35	39.851	1.39	11.374
20000	2814.8					2.41	41.675	1.42	11.890
20500	2885.2					2.47	43.535	1.46	12.417
21000	2955.6					2.53	45.431	1.50	12.953
21500	3025.9					2.59	47.365	1.53	13.500
22000	3096.3					2.65	49.333	1.57	14.056
22500	3166.7					2.71	51.337	1.60	14.623
23000	3237.1					2.77	53.378	1.64	15.199
23500	3307.4					2.83	55.453	1.67	15.785
24000	3377.8					2.89	57.566	1.71	16.381
24500	3448.2					2.95	59.711	1.75	16.987
25000	3518.5							1.78	17.603
25500	3588.9							1.82	18.228
26000	3659.3							1.85	18.863
26500	3729.6							1.89	19.508
27000	3800.0							1.92	20.162
27500	3870.4							1.96	20.826

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28000	3940.8							1.99	21.500
28500	4011.1							2.03	22.183
29000	4081.5							2.07	22.876
29500	4151.9							2.10	23.578
30000	4222.2							2.14	24.289
32500	4574.1							2.31	27.988
35000	4925.9							2.49	31.920
37500	5277.8							2.67	36.083
40000	5629.7							2.85	40.474

Table 8: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 30 % glycol, inlet flow 5 °C / return flow 12 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
500	70.4	0.02	0.019						
600	84.4	0.03	0.023						
700	98.5	0.03	0.027						
800	112.6	0.04	0.031	0.02	0.012				
900	126.7	0.04	0.035	0.02	0.013				
1000	140.7	0.04	0.039	0.03	0.015				
1100	154.8	0.05	0.043	0.03	0.016				
1200	168.9	0.05	0.047	0.03	0.018				
1300	183.0	0.06	0.051	0.04	0.019	0.02	0.007		
1400	197.0	0.06	0.055	0.04	0.021	0.02	0.008		
1500	211.1	0.07	0.058	0.04	0.022	0.02	0.008		
1600	225.2	0.07	0.062	0.04	0.024	0.03	0.009		
1700	239.3	0.08	0.066	0.05	0.025	0.03	0.009		
1800	253.3	0.08	0.070	0.05	0.027	0.03	0.010	0.02	0.004
1900	267.4	0.08	0.074	0.05	0.028	0.03	0.010	0.02	0.005
2000	281.5	0.09	0.078	0.05	0.030	0.03	0.011	0.02	0.005
2500	351.9	0.11	0.097	0.07	0.037	0.04	0.014	0.03	0.006
3000	422.2	0.13	0.117	0.08	0.045	0.05	0.016	0.03	0.007
3500	492.6	0.15	0.136	0.10	0.052	0.06	0.019	0.04	0.009
4000	563.0	0.18	0.156	0.11	0.059	0.07	0.022	0.04	0.010
4500	633.3	0.20	0.175	0.12	0.067	0.07	0.024	0.05	0.011
5000	703.7	0.22	0.354	0.14	0.074	0.08	0.027	0.06	0.012
5500	774.1	0.24	0.416	0.15	0.082	0.09	0.030	0.06	0.014
6000	844.4	0.27	0.482	0.16	0.155	0.10	0.033	0.07	0.015
6500	914.8	0.29	0.552	0.18	0.178	0.11	0.035	0.07	0.016
7000	985.2	0.31	0.626	0.19	0.201	0.12	0.038	0.08	0.017

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d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
7500	1055.6	0.33	0.704	0.20	0.226	0.12	0.070	0.08	0.019
8000	1125.9	0.35	0.786	0.22	0.253	0.13	0.078	0.09	0.020
8500	1196.3	0.38	0.872	0.23	0.280	0.14	0.086	0.10	0.021
9000	1266.7	0.40	0.961	0.25	0.309	0.15	0.095	0.10	0.022
9500	1337.0	0.42	1.055	0.26	0.338	0.16	0.104	0.11	0.042
10000	1407.4	0.44	1.152	0.27	0.369	0.17	0.113	0.11	0.045
10500	1477.8	0.46	1.253	0.29	0.401	0.17	0.123	0.12	0.049
11000	1548.2	0.49	1.357	0.30	0.435	0.18	0.133	0.12	0.053
11500	1618.5	0.51	1.465	0.31	0.469	0.19	0.144	0.13	0.058
12000	1688.9	0.53	1.576	0.33	0.504	0.20	0.154	0.13	0.062
12500	1759.3	0.55	1.691	0.34	0.541	0.21	0.165	0.14	0.066
13000	1829.6	0.57	1.810	0.35	0.579	0.21	0.177	0.15	0.071
13500	1900.0	0.60	1.932	0.37	0.617	0.22	0.189	0.15	0.075
14000	1970.4	0.62	2.057	0.38	0.657	0.23	0.201	0.16	0.080
14500	2040.7	0.64	2.186	0.40	0.698	0.24	0.213	0.16	0.085
15000	2111.1	0.66	2.318	0.41	0.740	0.25	0.226	0.17	0.090
15500	2181.5	0.69	2.454	0.42	0.783	0.26	0.239	0.17	0.096
16000	2251.9	0.71	2.592	0.44	0.827	0.26	0.252	0.18	0.101
16500	2322.2	0.73	2.735	0.45	0.872	0.27	0.266	0.18	0.106
17000	2392.6	0.75	2.880	0.46	0.918	0.28	0.280	0.19	0.112
17500	2463.0	0.77	3.029	0.48	0.966	0.29	0.294	0.20	0.118
18000	2533.3	0.80	3.181	0.49	1.014	0.30	0.309	0.20	0.123
18500	2603.7	0.82	3.336	0.50	1.063	0.31	0.324	0.21	0.129
19000	2674.1	0.84	3.495	0.52	1.113	0.31	0.339	0.21	0.135
19500	2744.5	0.86	3.656	0.53	1.164	0.32	0.354	0.22	0.141
20000	2814.8	0.88	3.821	0.55	1.217	0.33	0.370	0.22	0.148
20500	2885.2	0.91	3.989	0.56	1.270	0.34	0.386	0.23	0.154
21000	2955.6	0.93	4.161	0.57	1.324	0.35	0.403	0.23	0.161
21500	3025.9	0.95	4.335	0.59	1.379	0.36	0.419	0.24	0.167
22000	3096.3	0.97	4.513	0.60	1.435	0.36	0.436	0.25	0.174
22500	3166.7	0.99	4.693	0.61	1.492	0.37	0.454	0.25	0.181
23000	3237.1	1.02	4.877	0.63	1.550	0.38	0.471	0.26	0.188
23500	3307.4	1.04	5.064	0.64	1.609	0.39	0.489	0.26	0.195
24000	3377.8	1.06	5.254	0.66	1.669	0.40	0.507	0.27	0.202
24500	3448.2	1.08	5.447	0.67	1.730	0.40	0.526	0.27	0.209
25000	3518.5	1.11	5.643	0.68	1.792	0.41	0.544	0.28	0.217
25500	3588.9	1.13	5.842	0.70	1.855	0.42	0.563	0.29	0.224
26000	3659.3	1.15	6.045	0.71	1.919	0.43	0.583	0.29	0.232
26500	3729.6	1.17	6.250	0.72	1.984	0.44	0.602	0.30	0.240
27000	3800.0	1.19	6.458	0.74	2.050	0.45	0.622	0.30	0.248

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
27500	3870.4	1.22	6.669	0.75	2.116	0.45	0.642	0.31	0.255
28000	3940.8	1.24	6.884	0.76	2.184	0.46	0.662	0.31	0.264
28500	4011.1	1.26	7.101	0.78	2.252	0.47	0.683	0.32	0.272
29000	4081.5	1.28	7.321	0.79	2.322	0.48	0.704	0.32	0.280
29500	4151.9	1.30	7.544	0.81	2.392	0.49	0.725	0.33	0.288
30000	4222.2	1.33	7.770	0.82	2.463	0.50	0.747	0.34	0.297
32500	4574.1	1.44	8.945	0.89	2.833	0.54	0.858	0.36	0.341
35000	4925.9	1.55	10.193	0.96	3.226	0.58	0.976	0.39	0.388
37500	5277.8	1.66	11.512	1.02	3.641	0.62	1.101	0.42	0.437
40000	5629.7	1.77	12.903	1.09	4.078	0.66	1.232	0.45	0.489
42500	5981.5	1.88	14.363	1.16	4.536	0.70	1.370	0.48	0.544
45000	6333.4	1.99	15.894	1.23	5.016	0.74	1.514	0.50	0.600
47500	6685.2	2.10	17.493	1.30	5.518	0.78	1.665	0.53	0.660
50000	7037.1	2.21	19.160	1.36	6.040	0.83	1.821	0.56	0.722
52500	7388.9	2.32	20.896	1.43	6.584	0.87	1.984	0.59	0.786
55000	7740.8	2.43	22.699	1.50	7.148	0.91	2.153	0.62	0.852
57500	8092.6	2.54	24.568	1.57	7.732	0.95	2.328	0.64	0.921
60000	8444.5	2.65	26.504	1.64	8.337	0.99	2.509	0.67	0.993
62500	8796.3	2.76	28.506	1.71	8.963	1.03	2.696	0.70	1.066
65000	9148.2	2.87	30.573	1.77	9.608	1.07	2.889	0.73	1.142
67500	9500.0	2.98	32.706	1.84	10.273	1.11	3.088	0.76	1.221
70000	9851.9			1.91	10.959	1.16	3.293	0.78	1.301
72500	10203.7			1.98	11.664	1.20	3.503	0.81	1.384
75000	10555.6			2.05	12.389	1.24	3.719	0.84	1.469
77500	10907.5			2.12	13.133	1.28	3.941	0.87	1.556
80000	11259.3			2.18	13.897	1.32	4.169	0.90	1.646
82500	11611.2			2.25	14.680	1.36	4.402	0.92	1.738
85000	11963.0			2.32	15.482	1.40	4.642	0.95	1.832
87500	12314.9			2.39	16.303	1.44	4.886	0.98	1.928
90000	12666.7			2.46	17.144	1.49	5.136	1.01	2.026
92500	13018.6			2.52	18.004	1.53	5.392	1.03	2.126
95000	13370.4			2.59	18.882	1.57	5.654	1.06	2.229
97500	13722.3			2.66	19.780	1.61	5.920	1.09	2.334
100000	14074.1			2.73	20.696	1.65	6.193	1.12	2.441
105000	14777.8			2.87	22.584	1.73	6.754	1.17	2.661
110000	15481.5					1.82	7.337	1.23	2.889
115000	16185.3					1.90	7.941	1.29	3.126
120000	16889.0					1.98	8.567	1.34	3.371
125000	17592.7					2.06	9.214	1.40	3.624
130000	18296.4					2.15	9.882	1.45	3.886

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
135000	19000.1					2.23	10.571	1.51	4.156
140000	19703.8					2.31	11.281	1.57	4.433
145000	20407.5					2.39	12.012	1.62	4.719
150000	21111.2					2.48	12.763	1.68	5.013
155000	21814.9					2.56	13.536	1.73	5.315
160000	22518.6					2.64	14.328	1.79	5.624
165000	23222.3					2.72	15.141	1.85	5.942
170000	23926.0					2.81	15.974	1.90	6.267
175000	24629.7					2.89	16.827	1.96	6.600
180000	25333.4					2.97	17.701	2.01	6.940
185000	26037.1							2.07	7.289
190000	26740.9							2.13	7.645
195000	27444.6							2.18	8.009
200000	28148.3							2.24	8.380
205000	28852.0							2.29	8.759
210000	29555.7							2.35	9.146
215000	30259.4							2.41	9.540
220000	30963.1							2.46	9.941
225000	31666.8							2.52	10.351
230000	32370.5							2.57	10.767
235000	33074.2							2.63	11.191
240000	33777.9							2.69	11.623
245000	34481.6							2.74	12.061
250000	35185.3							2.80	12.508
255000	35889.0							2.85	12.961
260000	36592.7							2.91	13.422
265000	37296.5							2.97	13.890

3.3 Water containing 50 % glycol, inlet flow 5 °C, return flow 12 °C

Medium:	Water containing 50 % glycol
Inlet flow temperature:	5 °C
Return temperature:	12 °C
Range:	7 K
Average temperature:	8.5 °C
Density:	1056.4 kg/m^3
Viscosity:	0.00633845 Pa•s
Specific thermal capacity:	3295.8 J/(kg•K)
Surface roughness:	0.007 mm

Table 9: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 50 % glycol, inlet flow 5 °C / return flow 12 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	31.2	0.08	1.212	0.05	0.419	0.03	0.132		
300	46.8	0.12	1.818	0.07	0.628	0.04	0.199	0.02	0.070
400	62.4	0.16	2.423	0.09	0.837	0.05	0.265	0.03	0.093
500	78.0	0.20	3.029	0.12	1.047	0.07	0.331	0.04	0.116
600	93.6	0.24	3.635	0.14	1.256	0.08	0.397	0.05	0.139
700	109.2	0.28	4.241	0.16	1.465	0.09	0.464	0.05	0.162
800	124.8	0.32	4.847	0.19	1.674	0.10	0.530	0.06	0.186
900	140.4	0.36	5.453	0.21	1.884	0.12	0.596	0.07	0.209
1000	156.0	0.40	6.058	0.23	2.093	0.13	0.662	0.08	0.232
1100	171.6	0.43	6.664	0.26	2.302	0.14	0.728	0.09	0.255
1200	187.3	0.47	7.270	0.28	2.512	0.16	0.795	0.09	0.278
1300	202.9	0.51	7.876	0.30	2.721	0.17	0.861	0.10	0.301
1400	218.5	0.55	8.482	0.33	2.930	0.18	0.927	0.11	0.325
1500	234.1	0.59	9.088	0.35	3.140	0.20	0.993	0.12	0.348
1600	249.7	0.63	9.694	0.37	3.349	0.21	1.060	0.12	0.371
1700	265.3	0.67	10.299	0.39	3.558	0.22	1.126	0.13	0.394
1800	280.9	0.71	10.905	0.42	3.768	0.24	1.192	0.14	0.417
1900	296.5	0.75	11.511	0.44	3.977	0.25	1.258	0.15	0.441
2000	312.1	0.79	12.117	0.46	4.186	0.26	1.325	0.15	0.464
2500	390.1	0.99	15.146	0.58	5.233	0.33	1.656	0.19	0.580
3000	468.1	1.19	18.175	0.70	6.279	0.39	1.987	0.23	0.696
3500	546.1	1.38	40.219	0.81	7.326	0.46	2.318	0.27	0.812
4000	624.2	1.58	50.462	0.93	14.456	0.52	2.649	0.31	0.928
4500	702.2	1.78	61.685	1.04	17.641	0.59	2.980	0.35	1.043
5000	780.2	1.98	73.863	1.16	21.092	0.65	3.311	0.39	1.159
5500	858.2	2.17	86.974	1.28	24.804	0.72	6.411	0.43	1.275
6000	936.3	2.37	101.004	1.39	28.769	0.78	7.426	0.46	1.391
6500	1014.3	2.57	115.935	1.51	32.984	0.85	8.505	0.50	1.507
7000	1092.3	2.77	131.754	1.63	37.444	0.91	9.645	0.54	2.812
7500	1170.3	2.96	148.447	1.74	42.146	0.98	10.845	0.58	3.159

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d [mm]		16		20		26		32	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	1248.3			1.86	47.087	1.04	12.105	0.62	3.523
8500	1326.4			1.97	52.263	1.11	13.424	0.66	3.904
9000	1404.4			2.09	57.670	1.18	14.801	0.70	4.301
9500	1482.4			2.21	63.309	1.24	16.235	0.73	4.715
10000	1560.4			2.32	69.174	1.31	17.726	0.77	5.145
10500	1638.4			2.44	75.264	1.37	19.273	0.81	5.590
11000	1716.5			2.55	81.578	1.44	20.875	0.85	6.051
11500	1794.5			2.67	88.111	1.50	22.533	0.89	6.528
12000	1872.5			2.79	94.866	1.57	24.245	0.93	7.021
12500	1950.5			2.90	101.837	1.63	26.011	0.97	7.528
13000	2028.6					1.70	27.830	1.00	8.051
13500	2106.6					1.76	29.703	1.04	8.589
14000	2184.6					1.83	31.628	1.08	9.141
14500	2262.6					1.89	33.606	1.12	9.709
15000	2340.6					1.96	35.636	1.16	10.291
15500	2418.7					2.02	37.717	1.20	10.888
16000	2496.7					2.09	39.850	1.24	11.499
16500	2574.7					2.15	42.034	1.28	12.124
17000	2652.7					2.22	44.268	1.31	12.764
17500	2730.7					2.29	46.553	1.35	13.418
18000	2808.8					2.35	48.888	1.39	14.086
18500	2886.8					2.42	51.273	1.43	14.768
19000	2964.8					2.48	53.707	1.47	15.464
19500	3042.8					2.55	56.191	1.51	16.174
20000	3120.9					2.61	58.724	1.55	16.898
20500	3198.9					2.68	61.306	1.58	17.635
21000	3276.9					2.74	63.937	1.62	18.386
21500	3354.9					2.81	66.615	1.66	19.151
22000	3432.9					2.87	69.343	1.70	19.929
22500	3511.0					2.94	72.118	1.74	20.721
23000	3589.0							1.78	21.526
23500	3667.0							1.82	22.344
24000	3745.0							1.85	23.176
24500	3823.0							1.89	24.021
25000	3901.1							1.93	24.880
25500	3979.1							1.97	25.751
26000	4057.1							2.01	26.635
26500	4135.1							2.05	27.533
27000	4213.2							2.09	28.443
27500	4291.2							2.13	29.367

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28000	4369.2							2.16	30.303
28500	4447.2							2.20	31.253
29000	4525.2							2.24	32.214
29500	4603.3							2.28	33.189
30000	4681.3							2.32	34.177
32500	5071.4							2.51	39.304
35000	5461.5							2.70	44.745
37500	5851.6							2.90	50.495

Table 10: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 50 % glycol, inlet flow 5 °C / return flow 12 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
500	78.0	0.02	0.045						
600	93.6	0.03	0.054						
700	109.2	0.03	0.063	0.02	0.024				
800	124.8	0.04	0.071	0.02	0.027				
900	140.4	0.04	0.080	0.03	0.031				
1000	156.0	0.05	0.089	0.03	0.034				
1100	171.6	0.05	0.098	0.03	0.037				
1200	187.3	0.06	0.107	0.04	0.041	0.02	0.015		
1300	202.9	0.06	0.116	0.04	0.044	0.02	0.016		
1400	218.5	0.07	0.125	0.04	0.048	0.03	0.017		
1500	234.1	0.07	0.134	0.04	0.051	0.03	0.019		
1600	249.7	0.08	0.143	0.05	0.054	0.03	0.020		
1700	265.3	0.08	0.152	0.05	0.058	0.03	0.021	0.02	0.010
1800	280.9	0.09	0.161	0.05	0.061	0.03	0.022	0.02	0.010
1900	296.5	0.09	0.170	0.06	0.065	0.03	0.024	0.02	0.011
2000	312.1	0.10	0.179	0.06	0.068	0.04	0.025	0.02	0.011
2500	390.1	0.12	0.223	0.07	0.085	0.04	0.031	0.03	0.014
3000	468.1	0.14	0.268	0.09	0.102	0.05	0.037	0.04	0.017
3500	546.1	0.17	0.313	0.10	0.119	0.06	0.044	0.04	0.020
4000	624.2	0.19	0.357	0.12	0.136	0.07	0.050	0.05	0.023
4500	702.2	0.22	0.402	0.13	0.153	0.08	0.056	0.05	0.026
5000	780.2	0.24	0.447	0.15	0.170	0.09	0.062	0.06	0.029
5500	858.2	0.26	0.491	0.16	0.187	0.10	0.069	0.07	0.031
6000	936.3	0.29	0.536	0.18	0.204	0.11	0.075	0.07	0.034
6500	1014.3	0.31	0.581	0.19	0.221	0.12	0.081	0.08	0.037
7000	1092.3	0.34	0.625	0.21	0.238	0.13	0.087	0.08	0.040
7500	1170.3	0.36	0.670	0.22	0.255	0.13	0.093	0.09	0.043

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d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	1248.3	0.38	0.715	0.24	0.272	0.14	0.100	0.10	0.046
8500	1326.4	0.41	0.759	0.25	0.289	0.15	0.106	0.10	0.049
9000	1404.4	0.43	1.404	0.27	0.306	0.16	0.112	0.11	0.051
9500	1482.4	0.46	1.538	0.28	0.324	0.17	0.118	0.12	0.054
10000	1560.4	0.48	1.677	0.30	0.341	0.18	0.125	0.12	0.057
10500	1638.4	0.50	1.822	0.31	0.358	0.19	0.131	0.13	0.060
11000	1716.5	0.53	1.971	0.33	0.375	0.20	0.137	0.13	0.063
11500	1794.5	0.55	2.125	0.34	0.685	0.21	0.143	0.14	0.066
12000	1872.5	0.58	2.284	0.36	0.736	0.21	0.150	0.15	0.069
12500	1950.5	0.60	2.449	0.37	0.789	0.22	0.156	0.15	0.072
13000	2028.6	0.62	2.617	0.39	0.843	0.23	0.162	0.16	0.074
13500	2106.6	0.65	2.791	0.40	0.898	0.24	0.168	0.16	0.077
14000	2184.6	0.67	2.970	0.41	0.955	0.25	0.174	0.17	0.080
14500	2262.6	0.70	3.153	0.43	1.014	0.26	0.312	0.18	0.083
15000	2340.6	0.72	3.341	0.44	1.074	0.27	0.330	0.18	0.086
15500	2418.7	0.74	3.533	0.46	1.135	0.28	0.349	0.19	0.089
16000	2496.7	0.77	3.730	0.47	1.198	0.29	0.368	0.19	0.092
16500	2574.7	0.79	3.932	0.49	1.262	0.30	0.388	0.20	0.094
17000	2652.7	0.82	4.138	0.50	1.328	0.30	0.408	0.21	0.097
17500	2730.7	0.84	4.348	0.52	1.395	0.31	0.428	0.21	0.172
18000	2808.8	0.86	4.564	0.53	1.464	0.32	0.449	0.22	0.180
18500	2886.8	0.89	4.783	0.55	1.534	0.33	0.470	0.22	0.189
19000	2964.8	0.91	5.007	0.56	1.605	0.34	0.492	0.23	0.197
19500	3042.8	0.94	5.236	0.58	1.678	0.35	0.514	0.24	0.206
20000	3120.9	0.96	5.468	0.59	1.752	0.36	0.537	0.24	0.215
20500	3198.9	0.98	5.706	0.61	1.828	0.37	0.560	0.25	0.224
21000	3276.9	1.01	5.947	0.62	1.905	0.38	0.583	0.25	0.234
21500	3354.9	1.03	6.193	0.64	1.983	0.39	0.607	0.26	0.243
22000	3432.9	1.06	6.443	0.65	2.063	0.39	0.631	0.27	0.253
22500	3511.0	1.08	6.697	0.67	2.144	0.40	0.656	0.27	0.263
23000	3589.0	1.10	6.956	0.68	2.226	0.41	0.681	0.28	0.273
23500	3667.0	1.13	7.219	0.70	2.309	0.42	0.706	0.29	0.283
24000	3745.0	1.15	7.486	0.71	2.394	0.43	0.732	0.29	0.293
24500	3823.0	1.18	7.757	0.73	2.481	0.44	0.758	0.30	0.304
25000	3901.1	1.20	8.033	0.74	2.568	0.45	0.785	0.30	0.314
25500	3979.1	1.22	8.312	0.76	2.657	0.46	0.812	0.31	0.325
26000	4057.1	1.25	8.596	0.77	2.747	0.47	0.839	0.32	0.336
26500	4135.1	1.27	8.884	0.78	2.839	0.47	0.867	0.32	0.347
27000	4213.2	1.30	9.176	0.80	2.931	0.48	0.895	0.33	0.358
27500	4291.2	1.32	9.472	0.81	3.025	0.49	0.924	0.33	0.369

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28000	4369.2	1.34	9.772	0.83	3.121	0.50	0.953	0.34	0.381
28500	4447.2	1.37	10.076	0.84	3.217	0.51	0.982	0.35	0.393
29000	4525.2	1.39	10.384	0.86	3.315	0.52	1.012	0.35	0.404
29500	4603.3	1.42	10.696	0.87	3.414	0.53	1.042	0.36	0.416
30000	4681.3	1.44	11.013	0.89	3.514	0.54	1.072	0.36	0.429
32500	5071.4	1.56	12.654	0.96	4.035	0.58	1.230	0.39	0.491
35000	5461.5	1.68	14.394	1.04	4.586	0.63	1.397	0.42	0.558
37500	5851.6	1.80	16.231	1.11	5.168	0.67	1.573	0.46	0.628
40000	6241.7	1.92	18.164	1.18	5.780	0.72	1.758	0.49	0.701
42500	6631.8	2.04	20.192	1.26	6.421	0.76	1.952	0.52	0.778
45000	7021.9	2.16	22.314	1.33	7.091	0.81	2.155	0.55	0.859
47500	7412.0	2.28	24.528	1.41	7.791	0.85	2.366	0.58	0.942
50000	7802.1	2.40	26.834	1.48	8.519	0.90	2.586	0.61	1.029
52500	8192.2	2.52	29.231	1.55	9.275	0.94	2.814	0.64	1.120
55000	8582.4	2.64	31.718	1.63	10.059	0.99	3.050	0.67	1.214
57500	8972.5	2.76	34.295	1.70	10.871	1.03	3.295	0.70	1.310
60000	9362.6	2.88	36.960	1.78	11.711	1.07	3.548	0.73	1.411
62500	9752.7	3.00	39.713	1.85	12.578	1.12	3.809	0.76	1.514
65000	10142.8			1.93	13.472	1.16	4.078	0.79	1.620
67500	10532.9			2.00	14.393	1.21	4.355	0.82	1.730
70000	10923.0			2.07	15.340	1.25	4.641	0.85	1.843
72500	11313.1			2.15	16.315	1.30	4.934	0.88	1.959
75000	11703.2			2.22	17.315	1.34	5.234	0.91	2.078
77500	12093.3			2.30	18.342	1.39	5.543	0.94	2.199
80000	12483.4			2.37	19.395	1.43	5.859	0.97	2.324
82500	12873.5			2.44	20.474	1.48	6.183	1.00	2.452
85000	13263.6			2.52	21.578	1.52	6.515	1.03	2.583
87500	13653.7			2.59	22.709	1.57	6.854	1.06	2.717
90000	14043.8			2.67	23.865	1.61	7.201	1.09	2.854
92500	14434.0			2.74	25.046	1.66	7.555	1.12	2.994
95000	14824.1			2.81	26.252	1.70	7.917	1.15	3.137
97500	15214.2			2.89	27.484	1.75	8.286	1.18	3.282
100000	15604.3			2.96	28.740	1.79	8.662	1.21	3.431
105000	16384.5					1.88	9.437	1.27	3.736
110000	17164.7					1.97	10.242	1.34	4.053
115000	17944.9					2.06	11.075	1.40	4.382
120000	18725.1					2.15	11.937	1.46	4.721
125000	19505.3					2.24	12.827	1.52	5.072
130000	20285.6					2.33	13.746	1.58	5.433
135000	21065.8					2.42	14.693	1.64	5.806

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
140000	21846.0					2.51	15.667	1.70	6.189
145000	22626.2					2.60	16.670	1.76	6.584
150000	23406.4					2.69	17.700	1.82	6.989
155000	24186.6					2.78	18.757	1.88	7.404
160000	24966.8					2.87	19.842	1.94	7.831
165000	25747.1					2.96	20.954	2.00	8.267
170000	26527.3							2.06	8.714
175000	27307.5							2.12	9.172
180000	28087.7							2.19	9.640
185000	28867.9							2.25	10.118
190000	29648.1							2.31	10.607
195000	30428.3							2.37	11.106
200000	31208.6							2.43	11.615
205000	31988.8							2.49	12.134
210000	32769.0							2.55	12.663
215000	33549.2							2.61	13.202
220000	34329.4							2.67	13.752
225000	35109.6							2.73	14.311
230000	35889.8							2.79	14.880
235000	36670.0							2.85	15.459
240000	37450.3							2.91	16.048
245000	38230.5							2.97	16.647

3.4 Water containing 30 % glycol, inlet flow -2 °C, return flow 1 °C

Medium:	Water containing 30 % glycol
Inlet flow temperature:	-2 °C
Return temperature:	1 °C
Range:	3 K
Average temperature:	-0.5 °C
Density:	1033.9 kg/m^3
Viscosity:	0.00423899 Pa•s
Specific thermal capacity:	3646 J/(kg•K)
Surface roughness:	0.007 mm

Table 11: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 30 % glycol, inlet flow -2 °C / return flow 1 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	65.8	0.17	1.746	0.10	0.603	0.06	0.191	0.03	0.067
300	98.7	0.26	2.620	0.15	0.905	0.08	0.286	0.05	0.100
400	131.7	0.34	3.493	0.20	1.207	0.11	0.382	0.07	0.134
500	164.6	0.43	4.366	0.25	1.508	0.14	0.477	0.08	0.167
600	197.5	0.51	5.239	0.30	1.810	0.17	0.573	0.10	0.201
700	230.4	0.60	6.112	0.35	2.112	0.20	0.668	0.12	0.234
800	263.3	0.68	6.986	0.40	2.413	0.23	0.764	0.13	0.267
900	296.2	0.77	7.859	0.45	2.715	0.25	0.859	0.15	0.301
1000	329.1	0.85	15.408	0.50	3.017	0.28	0.955	0.17	0.334
1100	362.0	0.94	18.107	0.55	3.318	0.31	1.050	0.18	0.368
1200	395.0	1.02	20.989	0.60	3.620	0.34	1.145	0.20	0.401
1300	427.9	1.11	24.051	0.65	6.888	0.37	1.241	0.22	0.434
1400	460.8	1.19	27.291	0.70	7.807	0.39	1.336	0.23	0.468
1500	493.7	1.28	30.705	0.75	8.775	0.42	1.432	0.25	0.501
1600	526.6	1.36	34.290	0.80	9.791	0.45	1.527	0.27	0.535
1700	559.5	1.45	38.046	0.85	10.854	0.48	2.806	0.28	0.568
1800	592.4	1.53	41.968	0.90	11.963	0.51	3.091	0.30	0.602
1900	625.3	1.62	46.057	0.95	13.119	0.53	3.387	0.32	0.635
2000	658.3	1.70	50.310	1.00	14.319	0.56	3.694	0.33	0.668
2500	822.8	2.13	73.977	1.25	20.988	0.70	5.397	0.42	1.571
3000	987.4	2.55	101.540	1.50	28.730	0.84	7.368	0.50	2.140
3500	1151.9	2.98	132.869	1.75	37.507	0.99	9.597	0.58	2.782
4000	1316.5			2.00	47.288	1.13	12.077	0.67	3.495
4500	1481.1			2.25	58.050	1.27	14.799	0.75	4.277
5000	1645.6			2.50	69.769	1.41	17.759	0.83	5.125
5500	1810.2			2.75	82.432	1.55	20.951	0.92	6.039
6000	1974.8					1.69	24.371	1.00	7.018
6500	2139.3					1.83	28.017	1.08	8.059
7000	2303.9					1.97	31.883	1.17	9.163
7500	2468.5					2.11	35.968	1.25	10.328

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d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	2633.0					2.25	40.269	1.33	11.553
8500	2797.6					2.39	44.783	1.42	12.838
9000	2962.2					2.53	49.508	1.50	14.182
9500	3126.7					2.67	54.441	1.58	15.584
10000	3291.3					2.81	59.583	1.67	17.044
10500	3455.8					2.96	64.929	1.75	18.561
11000	3620.4							1.83	20.135
11500	3785.0							1.92	21.765
12000	3949.5							2.00	23.451
12500	4114.1							2.08	25.192
13000	4278.7							2.17	26.988
13500	4443.2							2.25	28.838
14000	4607.8							2.33	30.744
14500	4772.4							2.41	32.702
15000	4936.9							2.50	34.715
15500	5101.5							2.58	36.780
16000	5266.0							2.66	38.899
16500	5430.6							2.75	41.071
17000	5595.2							2.83	43.294
17500	5759.7							2.91	45.570
18000	5924.3							3.00	47.898

Table 12: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 30 % glycol, inlet flow -2 °C / return flow 1 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	65.8	0.02	0.026						
300	98.7	0.03	0.039						
400	131.7	0.04	0.052	0.03	0.020				
500	164.6	0.05	0.064	0.03	0.025				
600	197.5	0.06	0.077	0.04	0.029	0.02	0.011		
700	230.4	0.07	0.090	0.04	0.034	0.03	0.013		
800	263.3	0.08	0.103	0.05	0.039	0.03	0.014	0.02	0.007
900	296.2	0.09	0.116	0.06	0.044	0.03	0.016	0.02	0.007
1000	329.1	0.10	0.129	0.06	0.049	0.04	0.018	0.03	0.008
1100	362.0	0.11	0.142	0.07	0.054	0.04	0.020	0.03	0.009
1200	395.0	0.12	0.155	0.08	0.059	0.05	0.022	0.03	0.010
1300	427.9	0.13	0.167	0.08	0.064	0.05	0.023	0.03	0.011
1400	460.8	0.14	0.180	0.09	0.069	0.05	0.025	0.04	0.012
1500	493.7	0.16	0.193	0.10	0.074	0.06	0.027	0.04	0.012

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1600	526.6	0.17	0.206	0.10	0.079	0.06	0.029	0.04	0.013
1700	559.5	0.18	0.219	0.11	0.083	0.07	0.031	0.04	0.014
1800	592.4	0.19	0.232	0.11	0.088	0.07	0.032	0.05	0.015
1900	625.3	0.20	0.245	0.12	0.093	0.07	0.034	0.05	0.016
2000	658.3	0.21	0.258	0.13	0.098	0.08	0.036	0.05	0.016
2500	822.8	0.26	0.322	0.16	0.123	0.10	0.045	0.07	0.021
3000	987.4	0.31	0.698	0.19	0.147	0.12	0.054	0.08	0.025
3500	1151.9	0.36	0.906	0.22	0.172	0.14	0.063	0.09	0.029
4000	1316.5	0.41	1.137	0.26	0.366	0.15	0.072	0.10	0.033
4500	1481.1	0.47	1.389	0.29	0.447	0.17	0.081	0.12	0.037
5000	1645.6	0.52	1.663	0.32	0.534	0.19	0.164	0.13	0.041
5500	1810.2	0.57	1.957	0.35	0.628	0.21	0.193	0.14	0.077
6000	1974.8	0.62	2.272	0.38	0.729	0.23	0.223	0.16	0.090
6500	2139.3	0.67	2.607	0.41	0.835	0.25	0.256	0.17	0.103
7000	2303.9	0.72	2.962	0.45	0.948	0.27	0.290	0.18	0.116
7500	2468.5	0.78	3.336	0.48	1.067	0.29	0.326	0.20	0.131
8000	2633.0	0.83	3.730	0.51	1.192	0.31	0.364	0.21	0.146
8500	2797.6	0.88	4.142	0.54	1.323	0.33	0.404	0.22	0.162
9000	2962.2	0.93	4.572	0.57	1.460	0.35	0.446	0.24	0.178
9500	3126.7	0.98	5.022	0.61	1.603	0.37	0.489	0.25	0.195
10000	3291.3	1.03	5.489	0.64	1.751	0.39	0.534	0.26	0.213
10500	3455.8	1.09	5.974	0.67	1.905	0.41	0.581	0.27	0.232
11000	3620.4	1.14	6.478	0.70	2.064	0.42	0.629	0.29	0.251
11500	3785.0	1.19	6.999	0.73	2.229	0.44	0.679	0.30	0.271
12000	3949.5	1.24	7.537	0.77	2.400	0.46	0.730	0.31	0.291
12500	4114.1	1.29	8.093	0.80	2.576	0.48	0.784	0.33	0.313
13000	4278.7	1.34	8.667	0.83	2.757	0.50	0.838	0.34	0.334
13500	4443.2	1.40	9.257	0.86	2.944	0.52	0.895	0.35	0.357
14000	4607.8	1.45	9.864	0.89	3.136	0.54	0.953	0.37	0.380
14500	4772.4	1.50	10.489	0.93	3.333	0.56	1.013	0.38	0.403
15000	4936.9	1.55	11.130	0.96	3.535	0.58	1.074	0.39	0.428
15500	5101.5	1.60	11.788	0.99	3.743	0.60	1.136	0.41	0.452
16000	5266.0	1.65	12.462	1.02	3.956	0.62	1.201	0.42	0.478
16500	5430.6	1.71	13.153	1.05	4.174	0.64	1.266	0.43	0.504
17000	5595.2	1.76	13.861	1.09	4.397	0.66	1.334	0.44	0.531
17500	5759.7	1.81	14.584	1.12	4.625	0.68	1.402	0.46	0.558
18000	5924.3	1.86	15.324	1.15	4.858	0.69	1.473	0.47	0.586
18500	6088.9	1.91	16.080	1.18	5.097	0.71	1.545	0.48	0.614
19000	6253.4	1.96	16.853	1.21	5.340	0.73	1.618	0.50	0.643
19500	6418.0	2.02	17.641	1.24	5.588	0.75	1.693	0.51	0.673

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d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
20000	6582.6	2.07	18.445	1.28	5.841	0.77	1.769	0.52	0.703
20500	6747.1	2.12	19.265	1.31	6.099	0.79	1.847	0.54	0.734
21000	6911.7	2.17	20.101	1.34	6.362	0.81	1.926	0.55	0.765
21500	7076.2	2.22	20.952	1.37	6.630	0.83	2.006	0.56	0.797
22000	7240.8	2.27	21.820	1.40	6.903	0.85	2.088	0.58	0.829
22500	7405.4	2.33	22.703	1.44	7.180	0.87	2.172	0.59	0.862
23000	7569.9	2.38	23.601	1.47	7.463	0.89	2.257	0.60	0.896
23500	7734.5	2.43	24.514	1.50	7.750	0.91	2.343	0.61	0.930
24000	7899.1	2.48	25.444	1.53	8.042	0.93	2.431	0.63	0.965
24500	8063.6	2.53	26.389	1.56	8.339	0.95	2.520	0.64	1.000
25000	8228.2	2.58	27.349	1.60	8.640	0.97	2.610	0.65	1.036
25500	8392.8	2.64	28.324	1.63	8.946	0.98	2.702	0.67	1.072
26000	8557.3	2.69	29.315	1.66	9.257	1.00	2.796	0.68	1.109
26500	8721.9	2.74	30.320	1.69	9.573	1.02	2.891	0.69	1.146
27000	8886.5	2.79	31.341	1.72	9.893	1.04	2.987	0.71	1.184
27500	9051.0	2.84	32.378	1.76	10.218	1.06	3.084	0.72	1.223
28000	9215.6	2.89	33.429	1.79	10.547	1.08	3.183	0.73	1.262
28500	9380.1	2.95	34.494	1.82	10.881	1.10	3.283	0.75	1.301
29000	9544.7	3.00	35.576	1.85	11.220	1.12	3.385	0.76	1.342
29500	9709.3			1.88	11.564	1.14	3.488	0.77	1.382
30000	9873.8			1.91	11.912	1.16	3.592	0.78	1.423
32500	10696.7			2.07	13.720	1.25	4.134	0.85	1.637
35000	11519.5			2.23	15.641	1.35	4.709	0.92	1.864
37500	12342.3			2.39	17.674	1.45	5.317	0.98	2.103
40000	13165.1			2.55	19.817	1.54	5.958	1.05	2.355
42500	13987.9			2.71	22.069	1.64	6.630	1.11	2.620
45000	14810.8			2.87	24.429	1.74	7.335	1.18	2.897
47500	15633.6					1.83	8.070	1.24	3.187
50000	16456.4					1.93	8.837	1.31	3.488
52500	17279.2					2.03	9.635	1.37	3.801
55000	18102.0					2.12	10.464	1.44	4.127
57500	18924.8					2.22	11.322	1.50	4.464
60000	19747.7					2.32	12.211	1.57	4.813
62500	20570.5					2.41	13.130	1.64	5.173
65000	21393.3					2.51	14.079	1.70	5.545
67500	22216.1					2.61	15.057	1.77	5.929
70000	23038.9					2.70	16.065	1.83	6.323
72500	23861.8					2.80	17.102	1.90	6.730
75000	24684.6					2.90	18.168	1.96	7.147
77500	25507.4					2.99	19.263	2.03	7.576

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
80000	26330.2							2.09	8.015
82500	27153.0							2.16	8.466
85000	27975.9							2.22	8.928
87500	28798.7							2.29	9.401
90000	29621.5							2.35	9.884
92500	30444.3							2.42	10.379
95000	31267.1							2.49	10.884
97500	32090.0							2.55	11.400
100000	32912.8							2.62	11.927
105000	34558.4							2.75	13.013
110000	36204.1							2.88	14.141

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3.5 Water containing 38 % glycol, inlet flow -8 °C, return flow -4 °C

Medium:	Water containing 38 % glycol
Inlet flow temperature:	-8 °C
Return temperature:	-4 °C
Range:	4 K
Average temperature:	-6 °C
Density:	1042.9 kg/m^3
Viscosity:	0.00719629 Pa•s
Specific thermal capacity:	3503.6 J/(kg•K)
Surface roughness:	0.007 mm

Table 13: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 38 % glycol, inlet flow -8 °C / return flow -4 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	51.4	0.13	2.294	0.08	0.793	0.04	0.251	0.03	0.088
300	77.1	0.20	3.441	0.12	1.189	0.07	0.376	0.04	0.132
400	102.8	0.26	4.588	0.15	1.585	0.09	0.502	0.05	0.176
500	128.4	0.33	5.735	0.19	1.981	0.11	0.627	0.06	0.219
600	154.1	0.40	6.882	0.23	2.378	0.13	0.752	0.08	0.263
700	179.8	0.46	8.029	0.27	2.774	0.15	0.878	0.09	0.307
800	205.5	0.53	9.176	0.31	3.170	0.17	1.003	0.10	0.351
900	231.2	0.59	10.323	0.35	3.566	0.20	1.128	0.12	0.395
1000	256.9	0.66	11.469	0.39	3.963	0.22	1.254	0.13	0.439
1100	282.6	0.72	12.616	0.43	4.359	0.24	1.379	0.14	0.483
1200	308.3	0.79	13.763	0.46	4.755	0.26	1.505	0.15	0.527
1300	333.9	0.86	14.910	0.50	5.151	0.28	1.630	0.17	0.571
1400	359.6	0.92	16.057	0.54	5.548	0.30	1.755	0.18	0.615
1500	385.3	0.99	17.204	0.58	5.944	0.33	1.881	0.19	0.658
1600	411.0	1.05	18.351	0.62	6.340	0.35	2.006	0.21	0.702
1700	436.7	1.12	19.498	0.66	6.736	0.37	2.131	0.22	0.746
1800	462.4	1.19	20.645	0.70	7.133	0.39	2.257	0.23	0.790
1900	488.1	1.25	21.792	0.74	7.529	0.41	2.382	0.24	0.834
2000	513.8	1.32	22.939	0.77	7.925	0.44	2.508	0.26	0.878
2500	642.2	1.65	55.732	0.97	9.906	0.54	3.134	0.32	1.097
3000	770.6	1.98	76.008	1.16	21.748	0.65	3.761	0.39	1.317
3500	899.1	2.31	98.925	1.36	28.244	0.76	4.388	0.45	1.536
4000	1027.5	2.63	124.401	1.55	35.450	0.87	9.156	0.52	1.756
4500	1156.0	2.96	152.370	1.74	43.347	0.98	11.176	0.58	1.975
5000	1284.4			1.94	51.917	1.09	13.366	0.64	3.895
5500	1412.8			2.13	61.146	1.20	15.720	0.71	4.575
6000	1541.3			2.32	71.021	1.31	18.236	0.77	5.302
6500	1669.7			2.52	81.532	1.42	20.911	0.84	6.073
7000	1798.2			2.71	92.667	1.52	23.741	0.90	6.889
7500	1926.6			2.90	104.419	1.63	26.725	0.97	7.748

d [mm]		16		20		26		32	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	2055.0					1.74	29.860	1.03	8.650
8500	2183.5					1.85	33.145	1.10	9.595
9000	2311.9					1.96	36.576	1.16	10.581
9500	2440.3					2.07	40.154	1.22	11.608
10000	2568.8					2.18	43.876	1.29	12.676
10500	2697.2					2.29	47.741	1.35	13.784
11000	2825.7					2.40	51.746	1.42	14.932
11500	2954.1					2.50	55.892	1.48	16.119
12000	3082.5					2.61	60.177	1.55	17.346
12500	3211.0					2.72	64.600	1.61	18.611
13000	3339.4					2.83	69.160	1.68	19.915
13500	3467.9					2.94	73.854	1.74	21.257
14000	3596.3							1.80	22.637
14500	3724.7							1.87	24.054
15000	3853.2							1.93	25.509
15500	3981.6							2.00	27.001
16000	4110.1							2.06	28.529
16500	4238.5							2.13	30.095
17000	4366.9							2.19	31.696
17500	4495.4							2.26	33.334
18000	4623.8							2.32	35.008
18500	4752.3							2.38	36.717
19000	4880.7							2.45	38.462
19500	5009.1							2.51	40.243
20000	5137.6							2.58	42.059
20500	5266.0							2.64	43.910
21000	5394.5							2.71	45.796
21500	5522.9							2.77	47.716
22000	5651.3							2.83	49.672
22500	5779.8							2.90	51.661
23000	5908.2							2.96	53.685

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Table 14: Pressure loss in Geberit Mepla system pipes, cold water replacement containing 38 % glycol, inlet flow -8 °C / return flow -4 °C, d40–75

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
300	77.1	0.02	0.051						
400	102.8	0.03	0.068						
500	128.4	0.04	0.085	0.02	0.032				
600	154.1	0.05	0.101	0.03	0.039				
700	179.8	0.06	0.118	0.03	0.045	0.02	0.017		
800	205.5	0.06	0.135	0.04	0.052	0.02	0.019		
900	231.2	0.07	0.152	0.04	0.058	0.03	0.021		
1000	256.9	0.08	0.169	0.05	0.064	0.03	0.024	0.02	0.011
1100	282.6	0.09	0.186	0.05	0.071	0.03	0.026	0.02	0.012
1200	308.3	0.10	0.203	0.06	0.077	0.04	0.028	0.02	0.013
1300	333.9	0.10	0.220	0.06	0.084	0.04	0.031	0.03	0.014
1400	359.6	0.11	0.237	0.07	0.090	0.04	0.033	0.03	0.015
1500	385.3	0.12	0.254	0.07	0.097	0.04	0.035	0.03	0.016
1600	411.0	0.13	0.271	0.08	0.103	0.05	0.038	0.03	0.017
1700	436.7	0.14	0.288	0.08	0.110	0.05	0.040	0.03	0.018
1800	462.4	0.14	0.304	0.09	0.116	0.05	0.042	0.04	0.019
1900	488.1	0.15	0.321	0.09	0.122	0.06	0.045	0.04	0.021
2000	513.8	0.16	0.338	0.10	0.129	0.06	0.047	0.04	0.022
2500	642.2	0.20	0.423	0.12	0.161	0.07	0.059	0.05	0.027
3000	770.6	0.24	0.507	0.15	0.193	0.09	0.071	0.06	0.032
3500	899.1	0.28	0.592	0.17	0.226	0.10	0.083	0.07	0.038
4000	1027.5	0.32	0.677	0.20	0.258	0.12	0.094	0.08	0.043
4500	1156.0	0.36	0.761	0.22	0.290	0.13	0.106	0.09	0.049
5000	1284.4	0.40	0.846	0.25	0.322	0.15	0.118	0.10	0.054
5500	1412.8	0.44	0.930	0.27	0.355	0.16	0.130	0.11	0.060
6000	1541.3	0.48	1.015	0.30	0.387	0.18	0.142	0.12	0.065
6500	1669.7	0.52	1.981	0.32	0.419	0.19	0.153	0.13	0.070
7000	1798.2	0.56	2.246	0.35	0.451	0.21	0.165	0.14	0.076
7500	1926.6	0.60	2.524	0.37	0.484	0.22	0.177	0.15	0.081
8000	2055.0	0.64	2.816	0.40	0.908	0.24	0.189	0.16	0.087
8500	2183.5	0.68	3.121	0.42	1.005	0.25	0.201	0.17	0.092
9000	2311.9	0.72	3.440	0.44	1.107	0.27	0.212	0.18	0.097
9500	2440.3	0.76	3.771	0.47	1.213	0.28	0.224	0.19	0.103
10000	2568.8	0.80	4.116	0.49	1.323	0.30	0.407	0.20	0.108
10500	2697.2	0.84	4.474	0.52	1.438	0.31	0.442	0.21	0.114
11000	2825.7	0.88	4.844	0.54	1.556	0.33	0.478	0.22	0.119
11500	2954.1	0.92	5.227	0.57	1.678	0.34	0.515	0.23	0.125
12000	3082.5	0.96	5.622	0.59	1.804	0.36	0.554	0.24	0.222

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
12500	3211.0	1.00	6.029	0.62	1.934	0.37	0.593	0.25	0.238
13000	3339.4	1.04	6.449	0.64	2.068	0.39	0.634	0.26	0.254
13500	3467.9	1.08	6.881	0.67	2.205	0.40	0.676	0.27	0.271
14000	3596.3	1.12	7.325	0.69	2.347	0.42	0.719	0.28	0.288
14500	3724.7	1.16	7.780	0.72	2.492	0.43	0.763	0.29	0.306
15000	3853.2	1.20	8.248	0.74	2.641	0.45	0.808	0.30	0.324
15500	3981.6	1.24	8.727	0.77	2.793	0.46	0.855	0.31	0.342
16000	4110.1	1.28	9.218	0.79	2.949	0.48	0.902	0.32	0.361
16500	4238.5	1.32	9.721	0.81	3.109	0.49	0.951	0.33	0.381
17000	4366.9	1.36	10.235	0.84	3.273	0.51	1.001	0.34	0.401
17500	4495.4	1.40	10.760	0.86	3.440	0.52	1.051	0.35	0.421
18000	4623.8	1.44	11.297	0.89	3.610	0.54	1.103	0.36	0.441
18500	4752.3	1.48	11.845	0.91	3.784	0.55	1.156	0.37	0.462
19000	4880.7	1.52	12.405	0.94	3.962	0.57	1.210	0.38	0.484
19500	5009.1	1.56	12.976	0.96	4.143	0.58	1.265	0.39	0.506
20000	5137.6	1.60	13.557	0.99	4.328	0.60	1.321	0.40	0.528
20500	5266.0	1.64	14.150	1.01	4.516	0.61	1.378	0.41	0.551
21000	5394.5	1.68	14.754	1.04	4.708	0.63	1.436	0.43	0.574
21500	5522.9	1.72	15.369	1.06	4.903	0.64	1.495	0.44	0.597
22000	5651.3	1.76	15.995	1.09	5.101	0.66	1.555	0.45	0.621
22500	5779.8	1.80	16.632	1.11	5.303	0.67	1.617	0.46	0.646
23000	5908.2	1.84	17.279	1.14	5.508	0.69	1.679	0.47	0.670
23500	6036.6	1.88	17.937	1.16	5.717	0.70	1.742	0.48	0.696
24000	6165.1	1.92	18.606	1.19	5.929	0.72	1.806	0.49	0.721
24500	6293.5	1.96	19.286	1.21	6.144	0.73	1.871	0.50	0.747
25000	6422.0	2.00	19.976	1.23	6.363	0.75	1.938	0.51	0.773
25500	6550.4	2.04	20.677	1.26	6.585	0.76	2.005	0.52	0.800
26000	6678.8	2.08	21.389	1.28	6.810	0.78	2.073	0.53	0.827
26500	6807.3	2.12	22.111	1.31	7.038	0.79	2.142	0.54	0.854
27000	6935.7	2.16	22.843	1.33	7.270	0.81	2.212	0.55	0.882
27500	7064.2	2.20	23.586	1.36	7.505	0.82	2.283	0.56	0.911
28000	7192.6	2.24	24.339	1.38	7.743	0.84	2.355	0.57	0.939
28500	7321.0	2.28	25.103	1.41	7.985	0.85	2.428	0.58	0.968
29000	7449.5	2.32	25.877	1.43	8.230	0.87	2.502	0.59	0.997
29500	7577.9	2.36	26.662	1.46	8.478	0.88	2.577	0.60	1.027
30000	7706.4	2.40	27.456	1.48	8.729	0.90	2.653	0.61	1.057
32500	8348.6	2.60	31.582	1.60	10.032	0.97	3.047	0.66	1.214
35000	8990.8	2.80	35.961	1.73	11.414	1.05	3.464	0.71	1.379
37500	9632.9	3.00	40.588	1.85	12.874	1.12	3.904	0.76	1.553
40000	10275.1			1.98	14.410	1.19	4.367	0.81	1.737

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
42500	10917.3			2.10	16.021	1.27	4.853	0.86	1.929
45000	11559.5			2.22	17.707	1.34	5.360	0.91	2.130
47500	12201.7			2.35	19.467	1.42	5.890	0.96	2.339
50000	12843.9			2.47	21.300	1.49	6.441	1.01	2.557
52500	13486.1			2.59	23.206	1.57	7.014	1.06	2.784
55000	14128.3			2.72	25.183	1.64	7.608	1.11	3.018
57500	14770.5			2.84	27.232	1.72	8.223	1.16	3.261
60000	15412.7			2.96	29.351	1.79	8.859	1.21	3.512
62500	16054.9					1.87	9.516	1.27	3.772
65000	16697.1					1.94	10.193	1.32	4.039
67500	17339.3					2.02	10.891	1.37	4.314
70000	17981.5					2.09	11.609	1.42	4.597
72500	18623.7					2.17	12.347	1.47	4.888
75000	19265.9					2.24	13.105	1.52	5.187
77500	19908.1					2.32	13.883	1.57	5.494
80000	20550.3					2.39	14.681	1.62	5.808
82500	21192.5					2.46	15.499	1.67	6.130
85000	21834.7					2.54	16.336	1.72	6.460
87500	22476.9					2.61	17.193	1.77	6.797
90000	23119.1					2.69	18.069	1.82	7.142
92500	23761.3					2.76	18.964	1.87	7.494
95000	24403.5					2.84	19.878	1.92	7.854
97500	25045.7					2.91	20.812	1.97	8.221
100000	25687.9					2.99	21.764	2.02	8.596
105000	26972.3							2.13	9.367
110000	28256.7							2.23	10.167
115000	29541.0							2.33	10.996
120000	30825.4							2.43	11.854
125000	32109.8							2.53	12.741
130000	33394.2							2.63	13.656
135000	34678.6							2.73	14.598
140000	35963.0							2.83	15.569
145000	37247.4							2.94	16.568

4 Pressure loss in Geberit Mepla, heating

4.1 Recommended flow velocities

The following recommendations apply for the heating pressure loss tables:

- Radiator connection pipes: Flow velocity ≤ 0.3 m/s
- Distribution pipes: Flow velocity ≤ 0.5 m/s
- Riser pipes and cellar pipes: flow velocity ≤ 0.8 m/s

4.2 Heating, inlet flow 35 °C / return flow 30 °C

Medium:	Water
Inlet flow temperature:	35 °C
Return temperature:	30 °C
Range:	5 K
Average temperature:	32.5 °C
Density:	994.9 kg/m^3
Viscosity:	0.00075865 Pa•s
Specific thermal capacity:	4183 J/(kg•K)
Surface roughness:	0.007 mm

Table 15: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 35 °C / return flow 30 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	34.4	0.09	0.170	0.05	0.059	0.03	0.019		
300	51.6	0.14	0.255	0.08	0.088	0.05	0.028		
400	68.9	0.19	0.668	0.11	0.117	0.06	0.037		
500	86.1	0.23	0.977	0.14	0.279	0.08	0.046		
600	103.3	0.28	1.335	0.16	0.381	0.09	0.098	0.05	0.020
700	120.5	0.32	1.741	0.19	0.495	0.11	0.128	0.06	0.023
800	137.7	0.37	2.192	0.22	0.623	0.12	0.160	0.07	0.047
900	154.9	0.42	2.689	0.24	0.762	0.14	0.196	0.08	0.057
1000	172.1	0.46	3.229	0.27	0.914	0.15	0.234	0.09	0.068
1100	189.3	0.51	3.812	0.30	1.077	0.17	0.276	0.10	0.080
1200	206.6	0.56	4.437	0.33	1.253	0.18	0.321	0.11	0.093
1300	223.8	0.60	5.104	0.35	1.439	0.20	0.368	0.12	0.107
1400	241.0	0.65	5.813	0.38	1.637	0.21	0.418	0.13	0.121
1500	258.2	0.69	6.562	0.41	1.846	0.23	0.471	0.14	0.136
1600	275.4	0.74	7.351	0.44	2.066	0.24	0.526	0.14	0.152
1700	292.6	0.79	8.180	0.46	2.296	0.26	0.585	0.15	0.169
1800	309.8	0.83	9.048	0.49	2.538	0.28	0.645	0.16	0.186
1900	327.0	0.88	9.956	0.52	2.790	0.29	0.709	0.17	0.204
2000	344.3	0.93	10.902	0.54	3.052	0.31	0.775	0.18	0.223
2500	430.3	1.16	16.208	0.68	4.519	0.38	1.143	0.23	0.328
3000	516.4	1.39	22.449	0.82	6.238	0.46	1.574	0.27	0.451
3500	602.4	1.62	29.606	0.95	8.202	0.54	2.063	0.32	0.590

d [mm]		16		20		26		32	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
4000	688.5	1.85	37.663	1.09	10.405	0.61	2.611	0.36	0.745
4500	774.6	2.08	46.608	1.22	12.844	0.69	3.216	0.41	0.917
5000	860.6			1.36	15.515	0.76	3.877	0.45	1.103
5500	946.7			1.50	18.414	0.84	4.593	0.50	1.305
6000	1032.8			1.63	21.540	0.92	5.363	0.54	1.522
6500	1118.8			1.77	24.890	0.99	6.187	0.59	1.754
7000	1204.9			1.90	28.464	1.07	7.064	0.63	2.000
7500	1290.9			2.04	32.258	1.15	7.993	0.68	2.260
8000	1377.0					1.22	8.975	0.72	2.535
8500	1463.1					1.30	10.008	0.77	2.824
9000	1549.1					1.38	11.092	0.81	3.127
9500	1635.2					1.45	12.228	0.86	3.444
10000	1721.3					1.53	13.414	0.91	3.774
10500	1807.3					1.61	14.650	0.95	4.119
11000	1893.4					1.68	15.937	1.00	4.477
11500	1979.4					1.76	17.273	1.04	4.848
12000	2065.5					1.84	18.659	1.09	5.233
12500	2151.6					1.91	20.095	1.13	5.631
13000	2237.6					1.99	21.580	1.18	6.043
13500	2323.7					2.07	23.113	1.22	6.467
14000	2409.8					2.14	24.696	1.27	6.905
14500	2495.8							1.31	7.356
15000	2581.9							1.36	7.820
15500	2667.9							1.40	8.297
16000	2754.0							1.45	8.787
16500	2840.1							1.49	9.290
17000	2926.1							1.54	9.806
17500	3012.2							1.58	10.335
18000	3098.3							1.63	10.876
18500	3184.3							1.67	11.430
19000	3270.4							1.72	11.997
19500	3356.4							1.77	12.577
20000	3442.5							1.81	13.169
20500	3528.6							1.86	13.774
21000	3614.6							1.90	14.391
21500	3700.7							1.95	15.021
22000	3786.8							1.99	15.664
22500	3872.8							2.04	16.319
23000	3958.9							2.08	16.986
23500	4044.9							2.13	17.666

Table 16: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 35 °C / return flow 30 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1200	206.6	0.07	0.030						
1300	223.8	0.07	0.035						
1400	241.0	0.08	0.039						
1500	258.2	0.08	0.044						
1600	275.4	0.09	0.049						
1700	292.6	0.10	0.055						
1800	309.8	0.10	0.060						
1900	327.0	0.11	0.066						
2000	344.3	0.11	0.072						
2500	430.3	0.14	0.106	0.09	0.034				
3000	516.4	0.17	0.145	0.10	0.046				
3500	602.4	0.20	0.190	0.12	0.061				
4000	688.5	0.22	0.240	0.14	0.076				
4500	774.6	0.25	0.294	0.16	0.094				
5000	860.6	0.28	0.354	0.17	0.112	0.10	0.034		
5500	946.7	0.31	0.418	0.19	0.133	0.12	0.040		
6000	1032.8	0.34	0.487	0.21	0.154	0.13	0.047		
6500	1118.8	0.37	0.561	0.23	0.178	0.14	0.054		
7000	1204.9	0.39	0.639	0.24	0.202	0.15	0.061		
7500	1290.9	0.42	0.721	0.26	0.228	0.16	0.069		
8000	1377.0	0.45	0.808	0.28	0.256	0.17	0.077	0.11	0.031
8500	1463.1	0.48	0.900	0.29	0.284	0.18	0.086	0.12	0.034
9000	1549.1	0.51	0.996	0.31	0.314	0.19	0.095	0.13	0.038
9500	1635.2	0.53	1.096	0.33	0.346	0.20	0.104	0.14	0.041
10000	1721.3	0.56	1.200	0.35	0.379	0.21	0.114	0.14	0.045
10500	1807.3	0.59	1.309	0.36	0.413	0.22	0.124	0.15	0.049
11000	1893.4	0.62	1.422	0.38	0.448	0.23	0.135	0.16	0.053
11500	1979.4	0.65	1.539	0.40	0.484	0.24	0.146	0.16	0.058
12000	2065.5	0.67	1.660	0.42	0.522	0.25	0.157	0.17	0.062
12500	2151.6	0.70	1.785	0.43	0.562	0.26	0.169	0.18	0.067
13000	2237.6	0.73	1.915	0.45	0.602	0.27	0.181	0.18	0.072
13500	2323.7	0.76	2.048	0.47	0.644	0.28	0.194	0.19	0.077
14000	2409.8	0.79	2.186	0.49	0.687	0.29	0.206	0.20	0.082
14500	2495.8	0.81	2.327	0.50	0.731	0.30	0.220	0.21	0.087
15000	2581.9	0.84	2.473	0.52	0.776	0.31	0.233	0.21	0.092
15500	2667.9	0.87	2.622	0.54	0.823	0.33	0.247	0.22	0.098
16000	2754.0	0.90	2.776	0.56	0.870	0.34	0.261	0.23	0.103
16500	2840.1	0.93	2.933	0.57	0.919	0.35	0.276	0.23	0.109
17000	2926.1	0.96	3.095	0.59	0.970	0.36	0.291	0.24	0.115

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d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
17500	3012.2	0.98	3.260	0.61	1.021	0.37	0.306	0.25	0.121
18000	3098.3	1.01	3.429	0.62	1.074	0.38	0.322	0.26	0.127
18500	3184.3	1.04	3.602	0.64	1.127	0.39	0.338	0.26	0.133
19000	3270.4	1.07	3.779	0.66	1.182	0.40	0.354	0.27	0.140
19500	3356.4	1.10	3.960	0.68	1.239	0.41	0.371	0.28	0.146
20000	3442.5	1.12	4.145	0.69	1.296	0.42	0.388	0.28	0.153
20500	3528.6	1.15	4.334	0.71	1.354	0.43	0.405	0.29	0.160
21000	3614.6	1.18	4.526	0.73	1.414	0.44	0.423	0.30	0.167
21500	3700.7	1.21	4.722	0.75	1.475	0.45	0.441	0.31	0.174
22000	3786.8	1.24	4.922	0.76	1.537	0.46	0.460	0.31	0.181
22500	3872.8	1.26	5.126	0.78	1.600	0.47	0.478	0.32	0.188
23000	3958.9	1.29	5.334	0.80	1.664	0.48	0.497	0.33	0.196
23500	4044.9	1.32	5.545	0.82	1.730	0.49	0.517	0.33	0.203
24000	4131.0	1.35	5.760	0.83	1.796	0.50	0.537	0.34	0.211
24500	4217.1	1.38	5.979	0.85	1.864	0.51	0.557	0.35	0.219
25000	4303.1	1.40	6.202	0.87	1.933	0.52	0.577	0.36	0.227
25500	4389.2	1.43	6.429	0.88	2.003	0.54	0.598	0.36	0.235
26000	4475.3	1.46	6.659	0.90	2.074	0.55	0.619	0.37	0.243
26500	4561.3	1.49	6.893	0.92	2.146	0.56	0.640	0.38	0.252
27000	4647.4	1.52	7.130	0.94	2.220	0.57	0.662	0.38	0.260
27500	4733.4	1.55	7.372	0.95	2.294	0.58	0.684	0.39	0.269
28000	4819.5	1.57	7.617	0.97	2.370	0.59	0.706	0.40	0.278
28500	4905.6	1.60	7.866	0.99	2.447	0.60	0.729	0.41	0.287
29000	4991.6	1.63	8.118	1.01	2.524	0.61	0.752	0.41	0.296
29500	5077.7	1.66	8.374	1.02	2.603	0.62	0.775	0.42	0.305
30000	5163.8	1.69	8.634	1.04	2.683	0.63	0.799	0.43	0.314
32500	5594.1	1.83	9.988	1.13	3.100	0.68	0.922	0.46	0.362
35000	6024.4	1.97	11.433	1.21	3.545	0.73	1.053	0.50	0.413
37500	6454.7	2.11	12.969	1.30	4.016	0.79	1.192	0.53	0.468
40000	6885.0	2.25	14.595	1.39	4.514	0.84	1.339	0.57	0.525
42500	7315.3			1.47	5.040	0.89	1.494	0.60	0.585
45000	7745.6			1.56	5.591	0.94	1.656	0.64	0.648
47500	8176.0			1.65	6.170	1.00	1.825	0.68	0.714
50000	8606.3			1.73	6.774	1.05	2.002	0.71	0.783
52500	9036.6			1.82	7.404	1.10	2.187	0.75	0.855
55000	9466.9			1.91	8.061	1.15	2.379	0.78	0.929
57500	9897.2			1.99	8.743	1.21	2.579	0.82	1.007
60000	10327.5			2.08	9.452	1.26	2.786	0.85	1.087
62500	10757.8			2.17	10.186	1.31	3.000	0.89	1.170
65000	11188.1			2.25	10.945	1.36	3.221	0.92	1.256

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
67500	11618.5			2.34	11.730	1.42	3.450	0.96	1.345
70000	12048.8			2.43	12.541	1.47	3.686	1.00	1.436
72500	12479.1			2.51	13.376	1.52	3.929	1.03	1.530
75000	12909.4					1.57	4.180	1.07	1.627
77500	13339.7					1.63	4.437	1.10	1.727
80000	13770.0					1.68	4.702	1.14	1.829
82500	14200.3					1.73	4.974	1.17	1.934
85000	14630.6					1.78	5.253	1.21	2.042
87500	15061.0					1.84	5.539	1.24	2.152
90000	15491.3					1.89	5.832	1.28	2.265
92500	15921.6					1.94	6.131	1.32	2.381
95000	16351.9					1.99	6.438	1.35	2.499
97500	16782.2					2.05	6.752	1.39	2.620
100000	17212.5					2.10	7.073	1.42	2.744
105000	18073.2					2.20	7.736	1.49	2.999
110000	18933.8					2.31	8.426	1.56	3.264
115000	19794.4					2.41	9.145	1.64	3.540
120000	20655.0					2.52	9.890	1.71	3.827
125000	21515.7					2.62	10.663	1.78	4.124
130000	22376.3					2.73	11.463	1.85	4.431
135000	23236.9					2.83	12.291	1.92	4.748
140000	24097.5					2.94	13.145	1.99	5.075
145000	24958.2							2.06	5.413
150000	25818.8							2.13	5.761
155000	26679.4							2.20	6.119
160000	27540.0							2.28	6.487
165000	28400.7							2.35	6.865
170000	29261.3							2.42	7.253
175000	30121.9							2.49	7.651
180000	30982.5							2.56	8.059
185000	31843.2							2.63	8.477
190000	32703.8							2.70	8.906
195000	33564.4							2.77	9.344
200000	34425.1							2.84	9.791
205000	35285.7							2.91	10.249

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4.3 Heating, inlet flow 55 °C / return flow 45 °C

Medium:	Water
Inlet flow temperature:	55 °C
Return temperature:	45 °C
Range:	10 K
Average temperature:	50 °C
Density:	988.0 kg/m^3
Viscosity:	0.0005477 Pa•s
Specific thermal capacity:	4181 J/(kg•K)
Surface roughness:	0.007 mm

Table 17: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 55 °C / return flow 45 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	17.2	0.05	0.062	0.03	0.021				
300	25.8	0.07	0.093	0.04	0.032	0.02	0.010		
400	34.4	0.09	0.124	0.05	0.043	0.03	0.014		
500	43.1	0.12	0.275	0.07	0.053	0.04	0.017	0.02	0.006
600	51.7	0.14	0.374	0.08	0.064	0.05	0.020	0.03	0.007
700	60.3	0.16	0.487	0.10	0.139	0.05	0.024	0.03	0.008
800	68.9	0.19	0.612	0.11	0.175	0.06	0.027	0.04	0.009
900	77.5	0.21	0.749	0.12	0.213	0.07	0.055	0.04	0.011
1000	86.1	0.23	0.898	0.14	0.255	0.08	0.066	0.05	0.012
1100	94.7	0.26	1.058	0.15	0.301	0.08	0.077	0.05	0.023
1200	103.3	0.28	1.230	0.16	0.349	0.09	0.090	0.05	0.026
1300	111.9	0.30	1.413	0.18	0.401	0.10	0.103	0.06	0.030
1400	120.5	0.33	1.607	0.19	0.455	0.11	0.117	0.06	0.034
1500	129.2	0.35	1.812	0.21	0.513	0.12	0.131	0.07	0.038
1600	137.8	0.37	2.028	0.22	0.573	0.12	0.147	0.07	0.043
1700	146.4	0.40	2.254	0.23	0.637	0.13	0.163	0.08	0.047
1800	155.0	0.42	2.491	0.25	0.703	0.14	0.180	0.08	0.052
1900	163.6	0.44	2.739	0.26	0.772	0.15	0.197	0.09	0.057
2000	172.2	0.47	2.997	0.27	0.844	0.15	0.215	0.09	0.062
2500	215.3	0.58	4.438	0.34	1.245	0.19	0.317	0.11	0.091
3000	258.3	0.70	6.127	0.41	1.714	0.23	0.435	0.14	0.125
3500	301.4	0.82	8.058	0.48	2.248	0.27	0.569	0.16	0.164
4000	344.4	0.93	10.225	0.55	2.846	0.31	0.719	0.18	0.206
4500	387.5	1.05	12.625	0.62	3.506	0.35	0.884	0.21	0.253
5000	430.5	1.17	15.255	0.68	4.227	0.39	1.064	0.23	0.304
5500	473.6	1.28	18.112	0.75	5.009	0.42	1.258	0.25	0.359
6000	516.6	1.40	21.194	0.82	5.851	0.46	1.467	0.27	0.419
6500	559.7	1.51	24.499	0.89	6.751	0.50	1.691	0.30	0.482
7000	602.7	1.63	28.025	0.96	7.710	0.54	1.928	0.32	0.549
7500	645.8	1.75	31.770	1.03	8.727	0.58	2.179	0.34	0.620

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	688.8	1.86	35.734	1.10	9.801	0.62	2.444	0.36	0.694
8500	731.9	1.98	39.916	1.16	10.932	0.65	2.723	0.39	0.773
9000	774.9	2.10	44.314	1.23	12.120	0.69	3.015	0.41	0.855
9500	818.0			1.30	13.365	0.73	3.321	0.43	0.941
10000	861.0			1.37	14.665	0.77	3.640	0.46	1.031
10500	904.1			1.44	16.021	0.81	3.973	0.48	1.124
11000	947.1			1.51	17.432	0.85	4.318	0.50	1.221
11500	990.2			1.58	18.899	0.89	4.677	0.52	1.321
12000	1033.2			1.64	20.421	0.92	5.048	0.55	1.425
12500	1076.3			1.71	21.997	0.96	5.433	0.57	1.533
13000	1119.3			1.78	23.628	1.00	5.830	0.59	1.644
13500	1162.4			1.85	25.314	1.04	6.241	0.62	1.758
14000	1205.5			1.92	27.054	1.08	6.664	0.64	1.876
14500	1248.5			1.99	28.848	1.12	7.100	0.66	1.998
15000	1291.6			2.05	30.696	1.16	7.548	0.68	2.122
15500	1334.6			2.12	32.599	1.19	8.009	0.71	2.251
16000	1377.7					1.23	8.483	0.73	2.383
16500	1420.7					1.27	8.969	0.75	2.518
17000	1463.8					1.31	9.468	0.78	2.656
17500	1506.8					1.35	9.980	0.80	2.798
18000	1549.9					1.39	10.503	0.82	2.943
18500	1592.9					1.43	11.040	0.84	3.092
19000	1636.0					1.46	11.588	0.87	3.244
19500	1679.0					1.50	12.149	0.89	3.399
20000	1722.1					1.54	12.722	0.91	3.558
20500	1765.1					1.58	13.308	0.93	3.720
21000	1808.2					1.62	13.906	0.96	3.885
21500	1851.2					1.66	14.516	0.98	4.054
22000	1894.3					1.70	15.138	1.00	4.225
22500	1937.3					1.73	15.772	1.03	4.400
23000	1980.4					1.77	16.419	1.05	4.579
23500	2023.4					1.81	17.078	1.07	4.760
24000	2066.5					1.85	17.749	1.09	4.945
24500	2109.5					1.89	18.432	1.12	5.133
25000	2152.6					1.93	19.127	1.14	5.325
25500	2195.6					1.96	19.834	1.16	5.519
26000	2238.7					2.00	20.553	1.19	5.717
26500	2281.8					2.04	21.284	1.21	5.918
27000	2324.8					2.08	22.028	1.23	6.122
27500	2367.9					2.12	22.783	1.25	6.329

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d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28000	2410.9					2.16	23.550	1.28	6.540
28500	2454.0							1.30	6.754
29000	2497.0							1.32	6.970
29500	2540.1							1.35	7.191
30000	2583.1							1.37	7.414
32500	2798.4							1.48	8.578
35000	3013.6							1.60	9.820
37500	3228.9							1.71	11.141
40000	3444.2							1.82	12.539
42500	3659.4							1.94	14.014
45000	3874.7							2.05	15.566
47500	4089.9							2.17	17.195

Table 18: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 55 °C / return flow 45 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
800	68.9	0.02	0.004						
900	77.5	0.03	0.004						
1000	86.1	0.03	0.005						
1100	94.7	0.03	0.005						
1200	103.3	0.03	0.005						
1300	111.9	0.04	0.006						
1400	120.5	0.04	0.011						
1500	129.2	0.04	0.012						
1600	137.8	0.05	0.014						
1700	146.4	0.05	0.015	0.03	0.003				
1800	155.0	0.05	0.017	0.03	0.005				
1900	163.6	0.05	0.019	0.03	0.006				
2000	172.2	0.06	0.020	0.03	0.007				
2500	215.3	0.07	0.030	0.04	0.010				
3000	258.3	0.08	0.041	0.05	0.013				
3500	301.4	0.10	0.053	0.06	0.017	0.04	0.005		
4000	344.4	0.11	0.067	0.07	0.021	0.04	0.007		
4500	387.5	0.13	0.082	0.08	0.026	0.05	0.008		
5000	430.5	0.14	0.098	0.09	0.031	0.05	0.010		
5500	473.6	0.16	0.116	0.10	0.037	0.06	0.011	0.04	0.004
6000	516.6	0.17	0.135	0.10	0.043	0.06	0.013	0.04	0.005
6500	559.7	0.18	0.155	0.11	0.049	0.07	0.015	0.05	0.006
7000	602.7	0.20	0.176	0.12	0.056	0.07	0.017	0.05	0.007

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
7500	645.8	0.21	0.199	0.13	0.063	0.08	0.019	0.05	0.008
8000	688.8	0.23	0.222	0.14	0.071	0.08	0.021	0.06	0.009
8500	731.9	0.24	0.247	0.15	0.078	0.09	0.024	0.06	0.009
9000	774.9	0.25	0.274	0.16	0.087	0.10	0.026	0.06	0.010
9500	818.0	0.27	0.301	0.17	0.095	0.10	0.029	0.07	0.011
10000	861.0	0.28	0.329	0.17	0.104	0.11	0.032	0.07	0.013
10500	904.1	0.30	0.359	0.18	0.114	0.11	0.034	0.08	0.014
11000	947.1	0.31	0.390	0.19	0.123	0.12	0.037	0.08	0.015
11500	990.2	0.33	0.421	0.20	0.133	0.12	0.040	0.08	0.016
12000	1033.2	0.34	0.454	0.21	0.144	0.13	0.043	0.09	0.017
12500	1076.3	0.35	0.488	0.22	0.154	0.13	0.047	0.09	0.018
13000	1119.3	0.37	0.523	0.23	0.165	0.14	0.050	0.09	0.020
13500	1162.4	0.38	0.560	0.24	0.177	0.14	0.053	0.10	0.021
14000	1205.5	0.40	0.597	0.24	0.188	0.15	0.057	0.10	0.023
14500	1248.5	0.41	0.635	0.25	0.200	0.15	0.060	0.10	0.024
15000	1291.6	0.42	0.675	0.26	0.213	0.16	0.064	0.11	0.025
15500	1334.6	0.44	0.715	0.27	0.225	0.16	0.068	0.11	0.027
16000	1377.7	0.45	0.757	0.28	0.238	0.17	0.072	0.11	0.028
16500	1420.7	0.47	0.799	0.29	0.252	0.17	0.076	0.12	0.030
17000	1463.8	0.48	0.843	0.30	0.265	0.18	0.080	0.12	0.032
17500	1506.8	0.50	0.887	0.31	0.279	0.18	0.084	0.13	0.033
18000	1549.9	0.51	0.933	0.31	0.294	0.19	0.088	0.13	0.035
18500	1592.9	0.52	0.980	0.32	0.308	0.20	0.093	0.13	0.037
19000	1636.0	0.54	1.028	0.33	0.323	0.20	0.097	0.14	0.038
19500	1679.0	0.55	1.076	0.34	0.338	0.21	0.102	0.14	0.040
20000	1722.1	0.57	1.126	0.35	0.354	0.21	0.106	0.14	0.042
20500	1765.1	0.58	1.177	0.36	0.370	0.22	0.111	0.15	0.044
21000	1808.2	0.59	1.229	0.37	0.386	0.22	0.116	0.15	0.046
21500	1851.2	0.61	1.282	0.38	0.402	0.23	0.121	0.15	0.048
22000	1894.3	0.62	1.336	0.38	0.419	0.23	0.126	0.16	0.050
22500	1937.3	0.64	1.391	0.39	0.436	0.24	0.131	0.16	0.052
23000	1980.4	0.65	1.446	0.40	0.454	0.24	0.136	0.16	0.054
23500	2023.4	0.67	1.503	0.41	0.471	0.25	0.141	0.17	0.056
24000	2066.5	0.68	1.561	0.42	0.489	0.25	0.147	0.17	0.058
24500	2109.5	0.69	1.620	0.43	0.508	0.26	0.152	0.18	0.060
25000	2152.6	0.71	1.680	0.44	0.526	0.26	0.158	0.18	0.062
25500	2195.6	0.72	1.741	0.45	0.545	0.27	0.163	0.18	0.064
26000	2238.7	0.74	1.802	0.45	0.564	0.27	0.169	0.19	0.067
26500	2281.8	0.75	1.865	0.46	0.584	0.28	0.175	0.19	0.069
27000	2324.8	0.76	1.929	0.47	0.604	0.29	0.181	0.19	0.071

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d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
27500	2367.9	0.78	1.994	0.48	0.624	0.29	0.187	0.20	0.074
28000	2410.9	0.79	2.059	0.49	0.644	0.30	0.193	0.20	0.076
28500	2454.0	0.81	2.126	0.50	0.665	0.30	0.199	0.20	0.078
29000	2497.0	0.82	2.194	0.51	0.686	0.31	0.205	0.21	0.081
29500	2540.1	0.83	2.262	0.52	0.707	0.31	0.212	0.21	0.083
30000	2583.1	0.85	2.332	0.52	0.729	0.32	0.218	0.21	0.086
32500	2798.4	0.92	2.694	0.57	0.841	0.34	0.251	0.23	0.099
35000	3013.6	0.99	3.081	0.61	0.961	0.37	0.287	0.25	0.113
37500	3228.9	1.06	3.491	0.66	1.087	0.40	0.324	0.27	0.128
40000	3444.2	1.13	3.924	0.70	1.221	0.42	0.364	0.29	0.143
42500	3659.4	1.20	4.381	0.74	1.362	0.45	0.406	0.30	0.159
45000	3874.7	1.27	4.861	0.79	1.510	0.48	0.449	0.32	0.177
47500	4089.9	1.34	5.364	0.83	1.665	0.50	0.495	0.34	0.194
50000	4305.2	1.42	5.890	0.87	1.826	0.53	0.543	0.36	0.213
52500	4520.4	1.49	6.439	0.92	1.995	0.55	0.593	0.38	0.232
55000	4735.7	1.56	7.010	0.96	2.170	0.58	0.644	0.39	0.253
57500	4951.0	1.63	7.604	1.00	2.352	0.61	0.698	0.41	0.273
60000	5166.2	1.70	8.221	1.05	2.541	0.63	0.753	0.43	0.295
62500	5381.5	1.77	8.860	1.09	2.737	0.66	0.811	0.45	0.317
65000	5596.7	1.84	9.521	1.14	2.939	0.69	0.870	0.47	0.341
67500	5812.0	1.91	10.205	1.18	3.148	0.71	0.932	0.48	0.364
70000	6027.3	1.98	10.911	1.22	3.363	0.74	0.995	0.50	0.389
72500	6242.5	2.05	11.640	1.27	3.586	0.77	1.060	0.52	0.414
75000	6457.8	2.12	12.390	1.31	3.814	0.79	1.127	0.54	0.440
77500	6673.0	2.19	13.162	1.35	4.050	0.82	1.196	0.56	0.467
80000	6888.3			1.40	4.291	0.85	1.267	0.57	0.495
82500	7103.6			1.44	4.540	0.87	1.339	0.59	0.523
85000	7318.8			1.49	4.795	0.90	1.414	0.61	0.552
87500	7534.1			1.53	5.056	0.92	1.490	0.63	0.581
90000	7749.3			1.57	5.324	0.95	1.568	0.64	0.612
92500	7964.6			1.62	5.598	0.98	1.648	0.66	0.643
95000	8179.9			1.66	5.879	1.00	1.730	0.68	0.674
97500	8395.1			1.70	6.166	1.03	1.814	0.70	0.707
100000	8610.4			1.75	6.459	1.06	1.899	0.72	0.740
105000	9040.9			1.83	7.066	1.11	2.075	0.75	0.808
110000	9471.4			1.92	7.697	1.16	2.259	0.79	0.879
115000	9901.9			2.01	8.354	1.22	2.450	0.82	0.953
120000	10332.5			2.10	9.037	1.27	2.648	0.86	1.029
125000	10763.0			2.18	9.744	1.32	2.853	0.90	1.109
130000	11193.5			2.27	10.477	1.37	3.065	0.93	1.191

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
135000	11624.0			2.36	11.235	1.43	3.285	0.97	1.275
140000	12054.5			2.45	12.018	1.48	3.511	1.00	1.362
145000	12485.1			2.53	12.825	1.53	3.744	1.04	1.452
150000	12915.6			2.62	13.658	1.59	3.985	1.07	1.545
155000	13346.1			2.71	14.516	1.64	4.232	1.11	1.640
160000	13776.6			2.80	15.398	1.69	4.486	1.15	1.738
165000	14207.1			2.88	16.305	1.74	4.748	1.18	1.838
170000	14637.6			2.97	17.237	1.80	5.016	1.22	1.941
175000	15068.2					1.85	5.291	1.25	2.047
180000	15498.7					1.90	5.573	1.29	2.155
185000	15929.2					1.96	5.862	1.33	2.266
190000	16359.7					2.01	6.158	1.36	2.380
195000	16790.2					2.06	6.461	1.40	2.496
200000	17220.8					2.11	6.770	1.43	2.614
205000	17651.3					2.17	7.086	1.47	2.735
210000	18081.8					2.22	7.410	1.50	2.859
215000	18512.3					2.27	7.740	1.54	2.986
220000	18942.8					2.33	8.076	1.58	3.114
225000	19373.4					2.38	8.420	1.61	3.246
230000	19803.9					2.43	8.770	1.65	3.380
235000	20234.4					2.48	9.127	1.68	3.516
240000	20664.9					2.54	9.491	1.72	3.655
245000	21095.4					2.59	9.862	1.75	3.797
250000	21526.0					2.64	10.239	1.79	3.941
255000	21956.5					2.70	10.623	1.83	4.087
260000	22387.0					2.75	11.014	1.86	4.236
265000	22817.5					2.80	11.412	1.90	4.388
270000	23248.0					2.85	11.816	1.93	4.542
275000	23678.5					2.91	12.227	1.97	4.699
280000	24109.1					2.96	12.645	2.01	4.858
285000	24539.6							2.04	5.019
290000	24970.1							2.08	5.184
295000	25400.6							2.11	5.350
300000	25831.1							2.15	5.519
305000	26261.7							2.18	5.691
310000	26692.2							2.22	5.865
315000	27122.7							2.26	6.041
320000	27553.2							2.29	6.220
325000	27983.7							2.33	6.402
330000	28414.3							2.36	6.586

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
335000	28844.8							2.40	6.772
340000	29275.3							2.44	6.961
345000	29705.8							2.47	7.152
350000	30136.3							2.51	7.346
355000	30566.9							2.54	7.542
360000	30997.4							2.58	7.741
365000	31427.9							2.61	7.942
370000	31858.4							2.65	8.146
375000	32288.9							2.69	8.352
380000	32719.4							2.72	8.561
385000	33150.0							2.76	8.772
390000	33580.5							2.79	8.985
395000	34011.0							2.83	9.201
400000	34441.5							2.86	9.419
405000	34872.0							2.90	9.640
410000	35302.6							2.94	9.863
415000	35733.1							2.97	10.089

4.4 Heating, inlet flow 70 °C / return flow 50 °C

Medium:	Water
Inlet flow temperature:	70 °C
Return temperature:	50 °C
Range:	20 K
Average temperature:	60 °C
Density:	983.2 kg/m^3
Viscosity:	0.0004666 Pa•s
Specific thermal capacity:	4183 J/(kg•K)
Surface roughness:	0.007 mm

Table 19: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 70 °C / return flow 50 °C, d16–32

d [mm]		16		20		26		32	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	8.6	0.02	0.026						
300	12.9	0.04	0.040	0.02	0.014				
400	17.2	0.05	0.053	0.03	0.018				
500	21.5	0.06	0.066	0.03	0.023				
600	25.8	0.07	0.079	0.04	0.027	0.02	0.009		
700	30.1	0.08	0.093	0.05	0.032	0.03	0.010		
800	34.4	0.09	0.106	0.06	0.037	0.03	0.012		
900	38.7	0.11	0.220	0.06	0.041	0.03	0.013	0.02	0.005
1000	43.0	0.12	0.263	0.07	0.046	0.04	0.014	0.02	0.005
1100	47.3	0.13	0.309	0.08	0.089	0.04	0.016	0.03	0.006
1200	51.6	0.14	0.359	0.08	0.103	0.05	0.017	0.03	0.006
1300	55.9	0.15	0.411	0.09	0.117	0.05	0.019	0.03	0.007
1400	60.2	0.16	0.467	0.10	0.133	0.05	0.020	0.03	0.007
1500	64.5	0.18	0.525	0.10	0.150	0.06	0.039	0.03	0.008
1600	68.9	0.19	0.587	0.11	0.167	0.06	0.043	0.04	0.008
1700	73.2	0.20	0.652	0.12	0.185	0.07	0.048	0.04	0.009
1800	77.5	0.21	0.719	0.12	0.204	0.07	0.053	0.04	0.009
1900	81.8	0.22	0.790	0.13	0.224	0.07	0.058	0.04	0.017
2000	86.1	0.23	0.863	0.14	0.245	0.08	0.063	0.05	0.018
2500	107.6	0.29	1.271	0.17	0.360	0.10	0.092	0.06	0.027
3000	129.1	0.35	1.747	0.21	0.493	0.12	0.126	0.07	0.037
3500	150.6	0.41	2.289	0.24	0.644	0.14	0.164	0.08	0.048
4000	172.1	0.47	2.894	0.28	0.813	0.15	0.207	0.09	0.060
4500	193.6	0.53	3.563	0.31	0.999	0.17	0.254	0.10	0.073
5000	215.2	0.59	4.293	0.34	1.202	0.19	0.305	0.11	0.088
5500	236.7	0.64	5.085	0.38	1.421	0.21	0.360	0.13	0.104
6000	258.2	0.70	5.936	0.41	1.656	0.23	0.419	0.14	0.120
6500	279.7	0.76	6.847	0.45	1.907	0.25	0.482	0.15	0.138
7000	301.2	0.82	7.816	0.48	2.174	0.27	0.549	0.16	0.157
7500	322.7	0.88	8.844	0.52	2.457	0.29	0.620	0.17	0.177

d [mm]		16		20		26		32	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	344.3	0.94	9.929	0.55	2.755	0.31	0.694	0.18	0.199
8500	365.8	0.99	11.072	0.58	3.068	0.33	0.772	0.19	0.221
9000	387.3	1.05	12.272	0.62	3.397	0.35	0.854	0.21	0.244
9500	408.8			0.65	3.740	0.37	0.939	0.22	0.268
10000	430.3			0.69	4.099	0.39	1.028	0.23	0.293
10500	451.8			0.72	4.472	0.41	1.121	0.24	0.320
11000	473.3			0.76	4.860	0.43	1.217	0.25	0.347
11500	494.9			0.79	5.263	0.45	1.317	0.26	0.375
12000	516.4			0.83	5.680	0.46	1.420	0.27	0.404
12500	537.9			0.86	6.112	0.48	1.527	0.29	0.434
13000	559.4			0.89	6.559	0.50	1.637	0.30	0.465
13500	580.9			0.93	7.019	0.52	1.751	0.31	0.498
14000	602.4			0.96	7.494	0.54	1.868	0.32	0.531
14500	624.0			1.00	7.984	0.56	1.989	0.33	0.564
15000	645.5			1.03	8.487	0.58	2.113	0.34	0.599
15500	667.0			1.07	9.005	0.60	2.240	0.35	0.635
16000	688.5			1.10	9.537	0.62	2.371	0.37	0.672
16500	710.0					0.64	2.505	0.38	0.709
17000	731.5					0.66	2.642	0.39	0.748
17500	753.0					0.68	2.783	0.40	0.788
18000	774.6					0.70	2.927	0.41	0.828
18500	796.1					0.72	3.074	0.42	0.869
19000	817.6					0.74	3.225	0.44	0.911
19500	839.1					0.75	3.379	0.45	0.954
20000	860.6					0.77	3.536	0.46	0.998
20500	882.1					0.79	3.696	0.47	1.043
21000	903.7					0.81	3.860	0.48	1.089
21500	925.2					0.83	4.027	0.49	1.136
22000	946.7					0.85	4.197	0.50	1.183
22500	968.2					0.87	4.370	0.52	1.232
23000	989.7					0.89	4.547	0.53	1.281
23500	1011.2					0.91	4.727	0.54	1.331
24000	1032.8					0.93	4.910	0.55	1.382
24500	1054.3					0.95	5.096	0.56	1.434
25000	1075.8					0.97	5.285	0.57	1.487
25500	1097.3					0.99	5.478	0.58	1.540
26000	1118.8					1.01	5.674	0.60	1.595
26500	1140.3					1.03	5.873	0.61	1.650
27000	1161.8					1.04	6.075	0.62	1.706
27500	1183.4					1.06	6.280	0.63	1.764

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28000	1204.9					1.08	6.488	0.64	1.821
28500	1226.4					1.10	6.700	0.65	1.880
29000	1247.9					1.12	6.915	0.66	1.940
29500	1269.4					1.14	7.133	0.68	2.000
30000	1290.9					1.16	7.353	0.69	2.062
32500	1398.5					1.26	8.505	0.74	2.381
35000	1506.1					1.35	9.734	0.80	2.721
37500	1613.7							0.86	3.081
40000	1721.3							0.92	3.463
42500	1828.8							0.97	3.864
45000	1936.4							1.03	4.286
47500	2044.0							1.09	4.728
50000	2151.6							1.14	5.190
52500	2259.1							1.20	5.672
55000	2366.7							1.26	6.174
57500	2474.3							1.32	6.695
60000	2581.9							1.37	7.236
62500	2689.5							1.43	7.797
65000	2797.0							1.49	8.377
67500	2904.6							1.55	8.977
70000	3012.2							1.60	9.596
72500	3119.8							1.66	10.235

Table 20: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 70 °C / return flow 50 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
2000	86.1	0.03	0.004						
2500	107.6	0.04	0.009						
3000	129.1	0.04	0.012	0.03	0.004				
3500	150.6	0.05	0.015	0.03	0.005				
4000	172.1	0.06	0.019	0.04	0.006				
4500	193.6	0.06	0.024	0.04	0.008				
5000	215.2	0.07	0.028	0.04	0.009				
5500	236.7	0.08	0.034	0.05	0.011				
6000	258.2	0.09	0.039	0.05	0.012				
6500	279.7	0.09	0.045	0.06	0.014				
7000	301.2	0.10	0.051	0.06	0.016	0.04	0.005		
7500	322.7	0.11	0.057	0.07	0.018	0.04	0.006		
8000	344.3	0.11	0.064	0.07	0.020	0.04	0.006		

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8500	365.8	0.12	0.071	0.07	0.023	0.05	0.007		
9000	387.3	0.13	0.079	0.08	0.025	0.05	0.008		
9500	408.8	0.14	0.086	0.08	0.027	0.05	0.008		
10000	430.3	0.14	0.094	0.09	0.030	0.05	0.009		
10500	451.8	0.15	0.103	0.09	0.033	0.06	0.010		
11000	473.3	0.16	0.111	0.10	0.035	0.06	0.011		
11500	494.9	0.16	0.120	0.10	0.038	0.06	0.012	0.04	0.005
12000	516.4	0.17	0.130	0.11	0.041	0.06	0.013	0.04	0.005
12500	537.9	0.18	0.139	0.11	0.044	0.07	0.013	0.04	0.005
13000	559.4	0.18	0.149	0.11	0.047	0.07	0.014	0.05	0.006
13500	580.9	0.19	0.159	0.12	0.051	0.07	0.015	0.05	0.006
14000	602.4	0.20	0.170	0.12	0.054	0.07	0.016	0.05	0.007
14500	624.0	0.21	0.181	0.13	0.057	0.08	0.017	0.05	0.007
15000	645.5	0.21	0.192	0.13	0.061	0.08	0.018	0.05	0.007
15500	667.0	0.22	0.203	0.14	0.064	0.08	0.020	0.06	0.008
16000	688.5	0.23	0.215	0.14	0.068	0.08	0.021	0.06	0.008
16500	710.0	0.23	0.227	0.14	0.072	0.09	0.022	0.06	0.009
17000	731.5	0.24	0.239	0.15	0.076	0.09	0.023	0.06	0.009
17500	753.0	0.25	0.252	0.15	0.080	0.09	0.024	0.06	0.010
18000	774.6	0.26	0.264	0.16	0.084	0.10	0.025	0.06	0.010
18500	796.1	0.26	0.277	0.16	0.088	0.10	0.027	0.07	0.011
19000	817.6	0.27	0.291	0.17	0.092	0.10	0.028	0.07	0.011
19500	839.1	0.28	0.304	0.17	0.096	0.10	0.029	0.07	0.012
20000	860.6	0.28	0.318	0.18	0.101	0.11	0.030	0.07	0.012
20500	882.1	0.29	0.333	0.18	0.105	0.11	0.032	0.07	0.013
21000	903.7	0.30	0.347	0.18	0.110	0.11	0.033	0.08	0.013
21500	925.2	0.31	0.362	0.19	0.114	0.11	0.035	0.08	0.014
22000	946.7	0.31	0.377	0.19	0.119	0.12	0.036	0.08	0.014
22500	968.2	0.32	0.392	0.20	0.124	0.12	0.037	0.08	0.015
23000	989.7	0.33	0.408	0.20	0.129	0.12	0.039	0.08	0.015
23500	1011.2	0.33	0.424	0.21	0.134	0.12	0.040	0.08	0.016
24000	1032.8	0.34	0.440	0.21	0.139	0.13	0.042	0.09	0.017
24500	1054.3	0.35	0.456	0.21	0.144	0.13	0.043	0.09	0.017
25000	1075.8	0.36	0.473	0.22	0.149	0.13	0.045	0.09	0.018
25500	1097.3	0.36	0.490	0.22	0.154	0.14	0.047	0.09	0.018
26000	1118.8	0.37	0.507	0.23	0.160	0.14	0.048	0.09	0.019
26500	1140.3	0.38	0.524	0.23	0.165	0.14	0.050	0.10	0.020
27000	1161.8	0.38	0.542	0.24	0.171	0.14	0.051	0.10	0.020
27500	1183.4	0.39	0.560	0.24	0.176	0.15	0.053	0.10	0.021
28000	1204.9	0.40	0.578	0.25	0.182	0.15	0.055	0.10	0.022

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28500	1226.4	0.41	0.597	0.25	0.188	0.15	0.057	0.10	0.022
29000	1247.9	0.41	0.615	0.25	0.194	0.15	0.058	0.10	0.023
29500	1269.4	0.42	0.635	0.26	0.200	0.16	0.060	0.11	0.024
30000	1290.9	0.43	0.654	0.26	0.206	0.16	0.062	0.11	0.025
32500	1398.5	0.46	0.754	0.29	0.237	0.17	0.071	0.12	0.028
35000	1506.1	0.50	0.861	0.31	0.270	0.19	0.081	0.13	0.032
37500	1613.7	0.53	0.974	0.33	0.306	0.20	0.092	0.13	0.036
40000	1721.3	0.57	1.093	0.35	0.343	0.21	0.103	0.14	0.041
42500	1828.8	0.60	1.219	0.37	0.382	0.23	0.115	0.15	0.045
45000	1936.4	0.64	1.351	0.39	0.423	0.24	0.127	0.16	0.050
47500	2044.0	0.68	1.489	0.42	0.466	0.25	0.139	0.17	0.055
50000	2151.6	0.71	1.633	0.44	0.510	0.27	0.153	0.18	0.060
52500	2259.1	0.75	1.783	0.46	0.557	0.28	0.167	0.19	0.066
55000	2366.7	0.78	1.940	0.48	0.605	0.29	0.181	0.20	0.071
57500	2474.3	0.82	2.102	0.50	0.656	0.31	0.196	0.21	0.077
60000	2581.9	0.85	2.270	0.53	0.708	0.32	0.211	0.22	0.083
62500	2689.5	0.89	2.444	0.55	0.762	0.33	0.227	0.22	0.089
65000	2797.0	0.92	2.624	0.57	0.817	0.35	0.244	0.23	0.096
67500	2904.6	0.96	2.810	0.59	0.875	0.36	0.261	0.24	0.103
70000	3012.2	1.00	3.002	0.61	0.934	0.37	0.278	0.25	0.109
72500	3119.8	1.03	3.199	0.64	0.995	0.38	0.296	0.26	0.116
75000	3227.3	1.07	3.403	0.66	1.057	0.40	0.315	0.27	0.124
77500	3334.9	1.10	3.612	0.68	1.122	0.41	0.334	0.28	0.131
80000	3442.5	1.14	3.827	0.70	1.188	0.42	0.353	0.29	0.139
82500	3550.1	1.17	4.048	0.72	1.256	0.44	0.373	0.30	0.147
85000	3657.7	1.21	4.274	0.75	1.325	0.45	0.394	0.31	0.155
87500	3765.2	1.24	4.507	0.77	1.397	0.46	0.415	0.31	0.163
90000	3872.8	1.28	4.745	0.79	1.470	0.48	0.437	0.32	0.171
92500	3980.4	1.31	4.988	0.81	1.545	0.49	0.459	0.33	0.180
95000	4088.0	1.35	5.238	0.83	1.621	0.50	0.481	0.34	0.189
97500	4195.6	1.39	5.493	0.86	1.699	0.52	0.504	0.35	0.198
100000	4303.1	1.42	5.753	0.88	1.779	0.53	0.528	0.36	0.207
105000	4518.3	1.49	6.292	0.92	1.944	0.56	0.576	0.38	0.226
110000	4733.4	1.56	6.852	0.97	2.115	0.58	0.626	0.40	0.245
115000	4948.6	1.63	7.435	1.01	2.294	0.61	0.679	0.41	0.266
120000	5163.8	1.71	8.041	1.05	2.478	0.64	0.733	0.43	0.287
125000	5378.9	1.78	8.669	1.10	2.670	0.66	0.789	0.45	0.308
130000	5594.1	1.85	9.319	1.14	2.868	0.69	0.847	0.47	0.331
135000	5809.2	1.92	9.991	1.18	3.073	0.72	0.907	0.49	0.354
140000	6024.4	1.99	10.685	1.23	3.284	0.74	0.969	0.50	0.378

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
145000	6239.5			1.27	3.502	0.77	1.032	0.52	0.403
150000	6454.7			1.32	3.726	0.80	1.098	0.54	0.428
155000	6669.9			1.36	3.956	0.82	1.165	0.56	0.454
160000	6885.0			1.40	4.194	0.85	1.234	0.58	0.481
165000	7100.2			1.45	4.437	0.88	1.305	0.59	0.509
170000	7315.3			1.49	4.687	0.90	1.378	0.61	0.537
175000	7530.5			1.54	4.944	0.93	1.453	0.63	0.566
180000	7745.6			1.58	5.207	0.96	1.529	0.65	0.595
185000	7960.8			1.62	5.476	0.98	1.608	0.67	0.626
190000	8176.0			1.67	5.752	1.01	1.688	0.68	0.657
195000	8391.1			1.71	6.034	1.04	1.770	0.70	0.688
200000	8606.3			1.76	6.322	1.06	1.853	0.72	0.721
205000	8821.4			1.80	6.617	1.09	1.939	0.74	0.754
210000	9036.6			1.84	6.918	1.11	2.026	0.76	0.787
215000	9251.7			1.89	7.225	1.14	2.115	0.77	0.822
220000	9466.9			1.93	7.539	1.17	2.206	0.79	0.857
225000	9682.0			1.97	7.859	1.19	2.299	0.81	0.893
230000	9897.2			2.02	8.185	1.22	2.393	0.83	0.929
235000	10112.4			2.06	8.518	1.25	2.489	0.85	0.966
240000	10327.5			2.11	8.857	1.27	2.587	0.86	1.004
245000	10542.7			2.15	9.202	1.30	2.687	0.88	1.042
250000	10757.8			2.19	9.553	1.33	2.788	0.90	1.081
255000	10973.0			2.24	9.911	1.35	2.892	0.92	1.121
260000	11188.1			2.28	10.275	1.38	2.997	0.94	1.162
265000	11403.3					1.41	3.103	0.95	1.203
270000	11618.5					1.43	3.212	0.97	1.244
275000	11833.6					1.46	3.322	0.99	1.287
280000	12048.8					1.49	3.434	1.01	1.330
285000	12263.9					1.51	3.548	1.03	1.373
290000	12479.1					1.54	3.663	1.04	1.418
295000	12694.2					1.57	3.780	1.06	1.463
300000	12909.4					1.59	3.899	1.08	1.508
305000	13124.6					1.62	4.020	1.10	1.555
310000	13339.7					1.65	4.142	1.12	1.602
315000	13554.9					1.67	4.266	1.13	1.649
320000	13770.0					1.70	4.392	1.15	1.698
325000	13985.2					1.73	4.520	1.17	1.747
330000	14200.3					1.75	4.649	1.19	1.796
335000	14415.5					1.78	4.780	1.21	1.846
340000	14630.6					1.80	4.913	1.22	1.897

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
345000	14845.8					1.83	5.047	1.24	1.949
350000	15061.0					1.86	5.183	1.26	2.001
355000	15276.1					1.88	5.321	1.28	2.054
360000	15491.3					1.91	5.461	1.29	2.107
365000	15706.4					1.94	5.602	1.31	2.161
370000	15921.6					1.96	5.745	1.33	2.216
375000	16136.7					1.99	5.890	1.35	2.271
380000	16351.9					2.02	6.036	1.37	2.327
385000	16567.1					2.04	6.184	1.38	2.384
390000	16782.2					2.07	6.334	1.40	2.441
395000	16997.4					2.10	6.485	1.42	2.499
400000	17212.5					2.12	6.639	1.44	2.557
405000	17427.7					2.15	6.794	1.46	2.617
410000	17642.8					2.18	6.950	1.47	2.676
415000	17858.0					2.20	7.108	1.49	2.737
420000	18073.2					2.23	7.268	1.51	2.798
425000	18288.3					2.26	7.430	1.53	2.860
430000	18503.5					2.28	7.593	1.55	2.922
435000	18718.6					2.31	7.758	1.56	2.985
440000	18933.8					2.34	7.925	1.58	3.049
445000	19148.9					2.36	8.094	1.60	3.113
450000	19364.1					2.39	8.264	1.62	3.178
455000	19579.2					2.42	8.435	1.64	3.243
460000	19794.4					2.44	8.609	1.65	3.309
465000	20009.6					2.47	8.784	1.67	3.376
470000	20224.7					2.49	8.961	1.69	3.443
475000	20439.9					2.52	9.139	1.71	3.511
480000	20655.0					2.55	9.320	1.73	3.580
485000	20870.2					2.57	9.501	1.74	3.649
490000	21085.3					2.60	9.685	1.76	3.719
495000	21300.5					2.63	9.870	1.78	3.790
500000	21515.7					2.65	10.057	1.80	3.861
505000	21730.8					2.68	10.246	1.82	3.933
510000	21946.0							1.83	4.005
515000	22161.1							1.85	4.078
520000	22376.3							1.87	4.152
525000	22591.4							1.89	4.226
530000	22806.6							1.91	4.301
535000	23021.8							1.92	4.376
540000	23236.9							1.94	4.452

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
545000	23452.1							1.96	4.529
550000	23667.2							1.98	4.607
555000	23882.4							2.00	4.685
560000	24097.5							2.01	4.763
565000	24312.7							2.03	4.842
570000	24527.9							2.05	4.922
575000	24743.0							2.07	5.003
580000	24958.2							2.09	5.084
585000	25173.3							2.10	5.166
590000	25388.5							2.12	5.248
595000	25603.6							2.14	5.331
600000	25818.8							2.16	5.414

4.5 Heating, inlet flow 70 °C / return flow 55 °C

Medium:	Water
Inlet flow temperature:	70 °C
Return temperature:	55 °C
Range:	15 K
Average temperature:	62.5 °C
Density:	981.9 kg/m^3
Viscosity:	0.00045098 Pa•s
Specific thermal capacity:	4184 J/(kg•K)
Surface roughness:	0.007 mm

Table 21: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 70 °C / return flow 55 °C, d16–32

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	11.5	0.03	0.034						
300	17.2	0.05	0.051						
400	22.9	0.06	0.068	0.04	0.024				
500	28.7	0.08	0.085	0.05	0.029				
600	34.4	0.09	0.178	0.06	0.035	0.03	0.011		
700	40.2	0.11	0.232	0.06	0.041	0.04	0.013		
800	45.9	0.12	0.291	0.07	0.083	0.04	0.015		
900	51.6	0.14	0.355	0.08	0.102	0.05	0.017		
1000	57.4	0.16	0.426	0.09	0.121	0.05	0.019		
1100	63.1	0.17	0.501	0.10	0.143	0.06	0.037	0.03	0.007
1200	68.8	0.19	0.582	0.11	0.166	0.06	0.043	0.04	0.008
1300	74.6	0.20	0.668	0.12	0.190	0.07	0.049	0.04	0.008
1400	80.3	0.22	0.759	0.13	0.216	0.07	0.056	0.04	0.016
1500	86.0	0.23	0.856	0.14	0.243	0.08	0.062	0.05	0.018
1600	91.8	0.25	0.957	0.15	0.271	0.08	0.070	0.05	0.020
1700	97.5	0.27	1.063	0.16	0.301	0.09	0.077	0.05	0.022
1800	103.3	0.28	1.174	0.17	0.332	0.09	0.085	0.06	0.025
1900	109.0	0.30	1.290	0.17	0.365	0.10	0.094	0.06	0.027
2000	114.7	0.31	1.411	0.18	0.399	0.10	0.102	0.06	0.030
2500	143.4	0.39	2.085	0.23	0.587	0.13	0.150	0.08	0.043
3000	172.1	0.47	2.874	0.28	0.807	0.15	0.205	0.09	0.059
3500	200.8	0.55	3.774	0.32	1.057	0.18	0.268	0.11	0.077
4000	229.4	0.62	4.782	0.37	1.336	0.21	0.339	0.12	0.097
4500	258.1	0.70	5.897	0.41	1.644	0.23	0.416	0.14	0.119
5000	286.8	0.78	7.118	0.46	1.981	0.26	0.500	0.15	0.143
5500	315.5	0.86	8.442	0.51	2.345	0.28	0.591	0.17	0.169
6000	344.2	0.94	9.869	0.55	2.736	0.31	0.689	0.18	0.197
6500	372.8	1.02	11.398	0.60	3.155	0.34	0.793	0.20	0.227
7000	401.5	1.09	13.028	0.64	3.601	0.36	0.904	0.21	0.258
7500	430.2	1.17	14.757	0.69	4.073	0.39	1.021	0.23	0.291

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8000	458.9	1.25	16.586	0.73	4.571	0.41	1.145	0.24	0.326
8500	487.6	1.33	18.514	0.78	5.095	0.44	1.275	0.26	0.363
9000	516.3	1.41	20.540	0.83	5.646	0.46	1.411	0.28	0.401
9500	544.9	1.48	22.664	0.87	6.222	0.49	1.553	0.29	0.441
10000	573.6			0.92	6.824	0.52	1.701	0.31	0.483
10500	602.3			0.96	7.451	0.54	1.856	0.32	0.527
11000	631.0			1.01	8.103	0.57	2.016	0.34	0.572
11500	659.7			1.06	8.781	0.59	2.183	0.35	0.619
12000	688.3			1.10	9.484	0.62	2.356	0.37	0.667
12500	717.0			1.15	10.211	0.65	2.534	0.38	0.717
13000	745.7			1.19	10.964	0.67	2.718	0.40	0.769
13500	774.4			1.24	11.741	0.70	2.909	0.41	0.822
14000	803.1			1.29	12.543	0.72	3.105	0.43	0.877
14500	831.7			1.33	13.369	0.75	3.307	0.44	0.934
15000	860.4			1.38	14.221	0.77	3.515	0.46	0.992
15500	889.1			1.42	15.096	0.80	3.728	0.47	1.052
16000	917.8			1.47	15.996	0.83	3.947	0.49	1.113
16500	946.5					0.85	4.172	0.50	1.176
17000	975.1					0.88	4.403	0.52	1.240
17500	1003.8					0.90	4.640	0.53	1.306
18000	1032.5					0.93	4.882	0.55	1.373
18500	1061.2					0.96	5.130	0.57	1.442
19000	1089.9					0.98	5.383	0.58	1.513
19500	1118.5					1.01	5.642	0.60	1.585
20000	1147.2					1.03	5.907	0.61	1.659
20500	1175.9					1.06	6.177	0.63	1.734
21000	1204.6					1.08	6.453	0.64	1.810
21500	1233.3					1.11	6.734	0.66	1.888
22000	1262.0					1.14	7.022	0.67	1.968
22500	1290.6					1.16	7.314	0.69	2.049
23000	1319.3					1.19	7.612	0.70	2.132
23500	1348.0					1.21	7.916	0.72	2.216
24000	1376.7					1.24	8.225	0.73	2.302
24500	1405.4					1.27	8.540	0.75	2.389
25000	1434.0					1.29	8.860	0.76	2.477
25500	1462.7					1.32	9.185	0.78	2.567
26000	1491.4					1.34	9.517	0.79	2.659
26500	1520.1					1.37	9.853	0.81	2.752
27000	1548.8					1.39	10.195	0.83	2.846
27500	1577.4					1.42	10.543	0.84	2.942

d [mm]		16		20		26		32	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28000	1606.1					1.45	10.895	0.86	3.039
28500	1634.8					1.47	11.254	0.87	3.138
29000	1663.5					1.50	11.618	0.89	3.238
29500	1692.2					1.52	11.987	0.90	3.340
30000	1720.8					1.55	12.361	0.92	3.443
32500	1864.2							0.99	3.981
35000	2007.6							1.07	4.554
37500	2151.1							1.15	5.163
40000	2294.5							1.22	5.807
42500	2437.9							1.30	6.486
45000	2581.3							1.38	7.200
47500	2724.7							1.45	7.949
50000	2868.1							1.53	8.733
52500	3011.5							1.60	9.551
55000	3154.9							1.68	10.403
57500	3298.3							1.76	11.290
60000	3441.7							1.83	12.211
62500	3585.1							1.91	13.165
65000	3728.5							1.99	14.154
67500	3871.9							2.06	15.177

Table 22: Pressure loss in Geberit Mepla system pipes, heating, inlet flow 70 °C / return flow 55 °C, d40–75

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1800	103.3	0.03	0.008						
1900	109.0	0.04	0.009						
2000	114.7	0.04	0.010						
2500	143.4	0.05	0.014						
3000	172.1	0.06	0.019						
3500	200.8	0.07	0.025	0.04	0.008				
4000	229.4	0.08	0.032	0.05	0.010				
4500	258.1	0.09	0.039	0.05	0.012				
5000	286.8	0.09	0.046	0.06	0.015				
5500	315.5	0.10	0.055	0.06	0.017				
6000	344.2	0.11	0.063	0.07	0.020				
6500	372.8	0.12	0.073	0.08	0.023	0.05	0.007		
7000	401.5	0.13	0.083	0.08	0.026	0.05	0.008		
7500	430.2	0.14	0.094	0.09	0.030	0.05	0.009		
8000	458.9	0.15	0.105	0.09	0.033	0.06	0.010		

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d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8500	487.6	0.16	0.116	0.10	0.037	0.06	0.011		
9000	516.3	0.17	0.129	0.11	0.041	0.06	0.012		
9500	544.9	0.18	0.141	0.11	0.045	0.07	0.014		
10000	573.6	0.19	0.155	0.12	0.049	0.07	0.015		
10500	602.3	0.20	0.169	0.12	0.053	0.07	0.016		
11000	631.0	0.21	0.183	0.13	0.058	0.08	0.018		
11500	659.7	0.22	0.198	0.13	0.063	0.08	0.019	0.06	0.008
12000	688.3	0.23	0.213	0.14	0.068	0.09	0.020	0.06	0.008
12500	717.0	0.24	0.229	0.15	0.073	0.09	0.022	0.06	0.009
13000	745.7	0.25	0.246	0.15	0.078	0.09	0.024	0.06	0.009
13500	774.4	0.26	0.262	0.16	0.083	0.10	0.025	0.06	0.010
14000	803.1	0.27	0.280	0.16	0.088	0.10	0.027	0.07	0.011
14500	831.7	0.28	0.298	0.17	0.094	0.10	0.028	0.07	0.011
15000	860.4	0.28	0.316	0.18	0.100	0.11	0.030	0.07	0.012
15500	889.1	0.29	0.335	0.18	0.106	0.11	0.032	0.07	0.013
16000	917.8	0.30	0.354	0.19	0.112	0.11	0.034	0.08	0.013
16500	946.5	0.31	0.374	0.19	0.118	0.12	0.036	0.08	0.014
17000	975.1	0.32	0.395	0.20	0.125	0.12	0.038	0.08	0.015
17500	1003.8	0.33	0.415	0.20	0.131	0.12	0.040	0.08	0.016
18000	1032.5	0.34	0.437	0.21	0.138	0.13	0.042	0.09	0.016
18500	1061.2	0.35	0.458	0.22	0.145	0.13	0.044	0.09	0.017
19000	1089.9	0.36	0.481	0.22	0.151	0.13	0.046	0.09	0.018
19500	1118.5	0.37	0.503	0.23	0.159	0.14	0.048	0.09	0.019
20000	1147.2	0.38	0.527	0.23	0.166	0.14	0.050	0.10	0.020
20500	1175.9	0.39	0.550	0.24	0.173	0.15	0.052	0.10	0.021
21000	1204.6	0.40	0.574	0.25	0.181	0.15	0.054	0.10	0.022
21500	1233.3	0.41	0.599	0.25	0.188	0.15	0.057	0.10	0.022
22000	1262.0	0.42	0.624	0.26	0.196	0.16	0.059	0.11	0.023
22500	1290.6	0.43	0.650	0.26	0.204	0.16	0.061	0.11	0.024
23000	1319.3	0.44	0.676	0.27	0.212	0.16	0.064	0.11	0.025
23500	1348.0	0.45	0.702	0.28	0.221	0.17	0.066	0.11	0.026
24000	1376.7	0.46	0.729	0.28	0.229	0.17	0.069	0.12	0.027
24500	1405.4	0.46	0.756	0.29	0.238	0.17	0.071	0.12	0.028
25000	1434.0	0.47	0.784	0.29	0.246	0.18	0.074	0.12	0.029
25500	1462.7	0.48	0.812	0.30	0.255	0.18	0.077	0.12	0.030
26000	1491.4	0.49	0.841	0.30	0.264	0.18	0.079	0.12	0.031
26500	1520.1	0.50	0.870	0.31	0.273	0.19	0.082	0.13	0.032
27000	1548.8	0.51	0.900	0.32	0.282	0.19	0.085	0.13	0.033
27500	1577.4	0.52	0.930	0.32	0.292	0.19	0.088	0.13	0.035
28000	1606.1	0.53	0.960	0.33	0.301	0.20	0.090	0.13	0.036

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
28500	1634.8	0.54	0.991	0.33	0.311	0.20	0.093	0.14	0.037
29000	1663.5	0.55	1.023	0.34	0.321	0.21	0.096	0.14	0.038
29500	1692.2	0.56	1.055	0.35	0.331	0.21	0.099	0.14	0.039
30000	1720.8	0.57	1.087	0.35	0.341	0.21	0.102	0.14	0.040
32500	1864.2	0.62	1.255	0.38	0.393	0.23	0.118	0.16	0.046
35000	2007.6	0.66	1.434	0.41	0.448	0.25	0.134	0.17	0.053
37500	2151.1	0.71	1.624	0.44	0.507	0.27	0.152	0.18	0.060
40000	2294.5	0.76	1.824	0.47	0.569	0.28	0.170	0.19	0.067
42500	2437.9	0.81	2.035	0.50	0.635	0.30	0.190	0.20	0.075
45000	2581.3	0.85	2.257	0.53	0.703	0.32	0.210	0.22	0.083
47500	2724.7	0.90	2.490	0.56	0.775	0.34	0.231	0.23	0.091
50000	2868.1	0.95	2.732	0.59	0.850	0.35	0.253	0.24	0.100
52500	3011.5	1.00	2.986	0.61	0.928	0.37	0.277	0.25	0.109
55000	3154.9	1.04	3.249	0.64	1.009	0.39	0.301	0.26	0.118
57500	3298.3	1.09	3.523	0.67	1.094	0.41	0.325	0.28	0.128
60000	3441.7	1.14	3.807	0.70	1.181	0.43	0.351	0.29	0.138
62500	3585.1	1.19	4.102	0.73	1.272	0.44	0.378	0.30	0.148
65000	3728.5	1.23	4.406	0.76	1.365	0.46	0.405	0.31	0.159
67500	3871.9	1.28	4.721	0.79	1.462	0.48	0.434	0.32	0.170
70000	4015.3	1.33	5.046	0.82	1.561	0.50	0.463	0.34	0.182
72500	4158.7	1.38	5.381	0.85	1.664	0.51	0.493	0.35	0.193
75000	4302.1	1.42	5.726	0.88	1.769	0.53	0.524	0.36	0.205
77500	4445.5	1.47	6.081	0.91	1.878	0.55	0.556	0.37	0.218
80000	4588.9	1.52	6.446	0.94	1.990	0.57	0.589	0.38	0.231
82500	4732.3	1.57	6.820	0.97	2.104	0.58	0.623	0.40	0.244
85000	4875.7	1.61	7.205	1.00	2.222	0.60	0.657	0.41	0.257
87500	5019.1	1.66	7.600	1.02	2.342	0.62	0.693	0.42	0.271
90000	5162.5	1.71	8.005	1.05	2.466	0.64	0.729	0.43	0.285
92500	5305.9	1.76	8.419	1.08	2.592	0.66	0.766	0.44	0.299
95000	5449.3	1.80	8.844	1.11	2.721	0.67	0.804	0.46	0.314
97500	5592.7	1.85	9.278	1.14	2.854	0.69	0.842	0.47	0.329
100000	5736.1	1.90	9.722	1.17	2.989	0.71	0.882	0.48	0.344
105000	6022.9	1.99	10.640	1.23	3.268	0.74	0.963	0.50	0.376
110000	6309.8	2.09	11.597	1.29	3.558	0.78	1.048	0.53	0.409
115000	6596.6	2.18	12.592	1.35	3.860	0.81	1.136	0.55	0.443
120000	6883.4	2.28	13.627	1.41	4.174	0.85	1.228	0.58	0.479
125000	7170.2			1.46	4.499	0.89	1.322	0.60	0.515
130000	7457.0			1.52	4.835	0.92	1.420	0.62	0.553
135000	7743.8			1.58	5.183	0.96	1.521	0.65	0.592
140000	8030.6			1.64	5.542	0.99	1.626	0.67	0.633

d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
145000	8317.4			1.70	5.913	1.03	1.733	0.70	0.674
150000	8604.2			1.76	6.295	1.06	1.844	0.72	0.717
155000	8891.0			1.82	6.688	1.10	1.958	0.74	0.761
160000	9177.8			1.87	7.092	1.13	2.075	0.77	0.806
165000	9464.6			1.93	7.507	1.17	2.195	0.79	0.852
170000	9751.4			1.99	7.934	1.20	2.319	0.82	0.900
175000	10038.2			2.05	8.372	1.24	2.445	0.84	0.949
180000	10325.0			2.11	8.821	1.28	2.575	0.86	0.999
185000	10611.9			2.17	9.281	1.31	2.708	0.89	1.050
190000	10898.7			2.23	9.752	1.35	2.844	0.91	1.102
195000	11185.5			2.28	10.234	1.38	2.983	0.94	1.156
200000	11472.3			2.34	10.728	1.42	3.125	0.96	1.210
205000	11759.1			2.40	11.232	1.45	3.270	0.98	1.266
210000	12045.9			2.46	11.747	1.49	3.419	1.01	1.323
215000	12332.7			2.52	12.274	1.52	3.570	1.03	1.381
220000	12619.5			2.58	12.812	1.56	3.724	1.06	1.441
225000	12906.3			2.64	13.360	1.59	3.882	1.08	1.501
230000	13193.1			2.69	13.919	1.63	4.043	1.10	1.563
235000	13479.9			2.75	14.490	1.67	4.207	1.13	1.626
240000	13766.7			2.81	15.071	1.70	4.373	1.15	1.689
245000	14053.5			2.87	15.664	1.74	4.543	1.18	1.755
250000	14340.3					1.77	4.716	1.20	1.821
255000	14627.2					1.81	4.892	1.22	1.888
260000	14914.0					1.84	5.071	1.25	1.957
265000	15200.8					1.88	5.253	1.27	2.026
270000	15487.6					1.91	5.438	1.30	2.097
275000	15774.4					1.95	5.626	1.32	2.169
280000	16061.2					1.98	5.817	1.34	2.242
285000	16348.0					2.02	6.012	1.37	2.317
290000	16634.8					2.05	6.209	1.39	2.392
295000	16921.6					2.09	6.409	1.42	2.468
300000	17208.4					2.13	6.612	1.44	2.546
305000	17495.2					2.16	6.818	1.46	2.625
310000	17782.0					2.20	7.028	1.49	2.705
315000	18068.8					2.23	7.240	1.51	2.786
320000	18355.6					2.27	7.455	1.54	2.868
325000	18642.4					2.30	7.674	1.56	2.951
330000	18929.3					2.34	7.895	1.58	3.035
335000	19216.1					2.37	8.119	1.61	3.121
340000	19502.9					2.41	8.346	1.63	3.207

d [mm]		40		50		63		75	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
345000	19789.7					2.44	8.577	1.66	3.295
350000	20076.5					2.48	8.810	1.68	3.384
355000	20363.3					2.52	9.046	1.70	3.474
360000	20650.1					2.55	9.285	1.73	3.565
365000	20936.9					2.59	9.527	1.75	3.657
370000	21223.7					2.62	9.773	1.78	3.750
375000	21510.5					2.66	10.021	1.80	3.845
380000	21797.3					2.69	10.272	1.82	3.940
385000	22084.1					2.73	10.526	1.85	4.037
390000	22370.9					2.76	10.783	1.87	4.135
395000	22657.7					2.80	11.043	1.90	4.233
400000	22944.6					2.83	11.306	1.92	4.333
405000	23231.4					2.87	11.572	1.94	4.434
410000	23518.2					2.91	11.841	1.97	4.537
415000	23805.0					2.94	12.113	1.99	4.640
420000	24091.8					2.98	12.388	2.02	4.744
425000	24378.6							2.04	4.850
430000	24665.4							2.06	4.956
435000	24952.2							2.09	5.064
440000	25239.0							2.11	5.172
445000	25525.8							2.14	5.282
450000	25812.6							2.16	5.393
455000	26099.4							2.18	5.505
460000	26386.2							2.21	5.618
465000	26673.0							2.23	5.733
470000	26959.8							2.26	5.848
475000	27246.7							2.28	5.964
480000	27533.5							2.30	6.082
485000	27820.3							2.33	6.200
490000	28107.1							2.35	6.320
495000	28393.9							2.38	6.441
500000	28680.7							2.40	6.563
505000	28967.5							2.42	6.686
510000	29254.3							2.45	6.810
515000	29541.1							2.47	6.935
520000	29827.9							2.50	7.061
525000	30114.7							2.52	7.188
530000	30401.5							2.54	7.317
535000	30688.3							2.57	7.446
540000	30975.1							2.59	7.577

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d [mm]		40		50		63		75	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
545000	31262.0							2.62	7.709
550000	31548.8							2.64	7.841
555000	31835.6							2.66	7.975
560000	32122.4							2.69	8.110
565000	32409.2							2.71	8.246
570000	32696.0							2.74	8.383
575000	32982.8							2.76	8.521
580000	33269.6							2.78	8.660
585000	33556.4							2.81	8.801
590000	33843.2							2.83	8.942
595000	34130.0							2.86	9.085

5 Pressure loss in Geberit Mepla, compressed air

5.1 Compressed air, 3 bar

Medium:	Compressed air
Overpressure:	3 bar
Absolute pressure:	4 bar
Temperature:	20 °C
Density:	4.771 kg/m³
Viscosity:	0.0000182635 Pa•s
Surface roughness:	0.007 mm

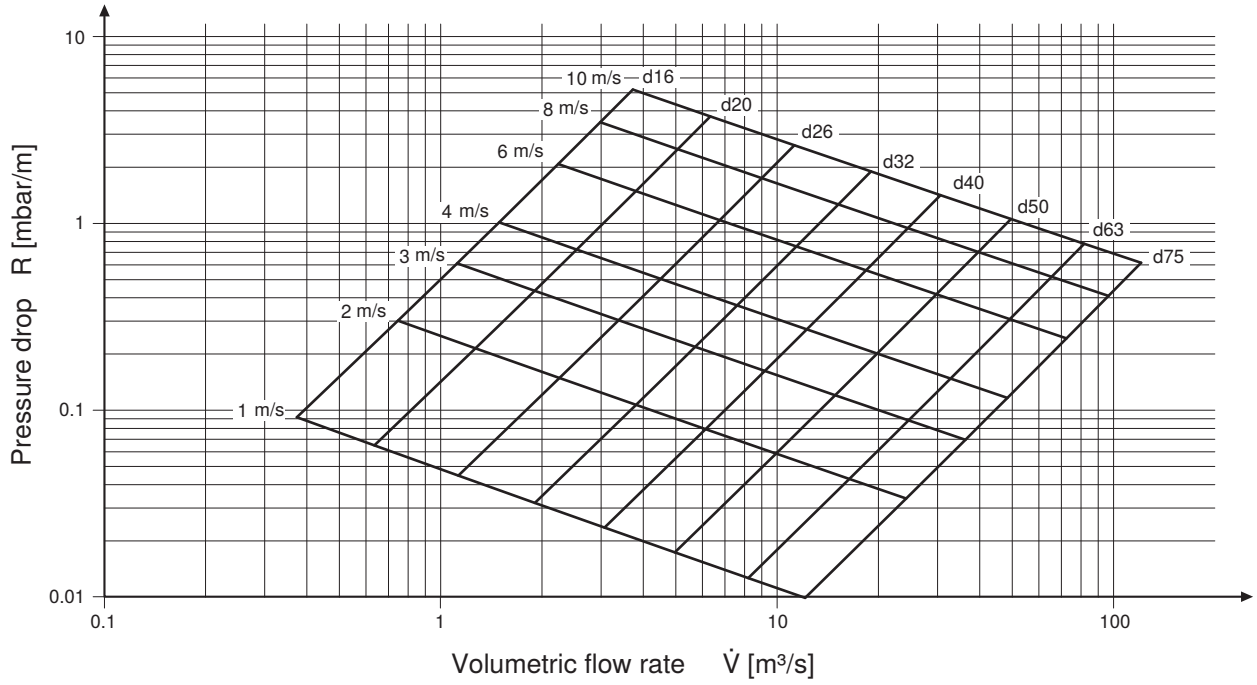

Table 23: Pressure loss in Geberit Mepla system pipes, compressed air, 3 bar, d16–32

d [mm]	16		20		26		32	
V̇ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.10	0.27	0.0118	0.16	0.0041	0.09	0.0013	0.05	0.0005
0.25	0.67	0.0295	0.39	0.0102	0.22	0.0032	0.13	0.0011
0.50	1.34	0.1503	0.79	0.0429	0.44	0.0111	0.26	0.0023
0.75	2.01	0.3024	1.18	0.0858	0.66	0.0221	0.39	0.0064
1.00	2.67	0.4988	1.57	0.1409	0.88	0.0361	0.52	0.0105
1.25	3.34	0.7374	1.96	0.2076	1.11	0.0530	0.65	0.0153
1.50	4.01	1.0164	2.36	0.2853	1.33	0.0726	0.78	0.0209
1.75	4.68	1.3350	2.75	0.3737	1.55	0.0949	0.92	0.0273
2.00	5.35	1.6920	3.14	0.4725	1.77	0.1197	1.05	0.0344
2.25	6.02	2.0870	3.54	0.5816	1.99	0.1471	1.18	0.0422
2.50	6.69	2.5193	3.93	0.7006	2.21	0.1769	1.31	0.0507
2.75	7.35	2.9884	4.32	0.8295	2.43	0.2091	1.44	0.0599

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d [mm]	16		20		26		32	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3.00	8.02	3.4939	4.72	0.9682	2.65	0.2436	1.57	0.0697
3.25	8.69	4.0356	5.11	1.1165	2.87	0.2805	1.70	0.0802
3.50	9.36	4.6130	5.50	1.2742	3.09	0.3198	1.83	0.0913
3.75			5.89	1.4414	3.32	0.3612	1.96	0.1030
4.00			6.29	1.6179	3.54	0.4050	2.09	0.1154
4.50			7.07	1.9987	3.98	0.4991	2.35	0.1420
5.00			7.86	2.4159	4.42	0.6021	2.62	0.1710
5.50			8.65	2.8693	4.86	0.7136	2.88	0.2023
6.00			9.43	3.3585	5.31	0.8337	3.14	0.2361
6.50					5.75	0.9623	3.40	0.2721
7.00					6.19	1.0991	3.66	0.3104
7.50					6.63	1.2443	3.92	0.3510
8.00					7.07	1.3976	4.19	0.3938
8.50					7.52	1.5591	4.45	0.4389
9.00					7.96	1.7287	4.71	0.4861
9.50					8.40	1.9063	4.97	0.5355
10.00					8.84	2.0919	5.23	0.5871
10.50					9.28	2.2855	5.49	0.6409
11.00					9.73	2.4870	5.76	0.6967
11.50							6.02	0.7547
12.00							6.28	0.8149
12.50							6.54	0.8771
13.00							6.80	0.9414
13.50							7.06	1.0078
14.00							7.32	1.0763
14.50							7.59	1.1468
15.00							7.85	1.2194
16.00							8.37	1.3708
17.00							8.89	1.5303
18.00							9.42	1.6979
19.00							9.94	1.8735

Table 24: Pressure loss in Geberit Mepla system pipes, compressed air, 3 bar, d40–75

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.10	0.03	0.0002	0.02	0.0001				
0.25	0.08	0.0004	0.05	0.0002	0.03	0.0001		
0.50	0.16	0.0009	0.10	0.0003	0.06	0.0001	0.04	0.0001
0.75	0.24	0.0013	0.15	0.0005	0.09	0.0002	0.06	0.0001

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1.00	0.32	0.0034	0.20	0.0007	0.12	0.0002	0.08	0.0001
1.25	0.41	0.0050	0.25	0.0016	0.15	0.0003	0.10	0.0001
1.50	0.49	0.0068	0.30	0.0022	0.18	0.0007	0.12	0.0002
1.75	0.57	0.0088	0.35	0.0028	0.21	0.0009	0.14	0.0003
2.00	0.65	0.0111	0.40	0.0036	0.24	0.0011	0.16	0.0004
2.25	0.73	0.0136	0.45	0.0044	0.27	0.0013	0.18	0.0005
2.50	0.81	0.0164	0.50	0.0052	0.30	0.0016	0.21	0.0006
2.75	0.89	0.0193	0.55	0.0062	0.33	0.0019	0.23	0.0008
3.00	0.97	0.0224	0.60	0.0072	0.36	0.0022	0.25	0.0009
3.25	1.06	0.0258	0.65	0.0082	0.39	0.0025	0.27	0.0010
3.50	1.14	0.0293	0.70	0.0093	0.42	0.0028	0.29	0.0011
3.75	1.22	0.0331	0.75	0.0105	0.45	0.0032	0.31	0.0013
4.00	1.30	0.0370	0.80	0.0118	0.49	0.0036	0.33	0.0014
4.50	1.46	0.0455	0.90	0.0145	0.55	0.0044	0.37	0.0017
5.00	1.62	0.0547	1.00	0.0174	0.61	0.0053	0.41	0.0021
5.50	1.79	0.0647	1.10	0.0205	0.67	0.0062	0.45	0.0025
6.00	1.95	0.0754	1.20	0.0239	0.73	0.0072	0.49	0.0029
6.50	2.11	0.0869	1.30	0.0275	0.79	0.0083	0.53	0.0033
7.00	2.27	0.0990	1.40	0.0313	0.85	0.0095	0.58	0.0038
7.50	2.44	0.1118	1.50	0.0353	0.91	0.0107	0.62	0.0042
8.00	2.60	0.1254	1.60	0.0396	0.97	0.0119	0.66	0.0047
8.50	2.76	0.1396	1.70	0.0440	1.03	0.0133	0.70	0.0053
9.00	2.92	0.1545	1.80	0.0487	1.09	0.0147	0.74	0.0058
9.50	3.09	0.1701	1.90	0.0536	1.15	0.0161	0.78	0.0064
10.00	3.25	0.1864	2.00	0.0587	1.21	0.0177	0.82	0.0070
10.50	3.41	0.2033	2.11	0.0640	1.27	0.0193	0.86	0.0076
11.00	3.57	0.2208	2.21	0.0695	1.33	0.0209	0.90	0.0083
11.50	3.73	0.2391	2.31	0.0751	1.39	0.0226	0.95	0.0089
12.00	3.90	0.2580	2.41	0.0810	1.46	0.0244	0.99	0.0096
12.50	4.06	0.2775	2.51	0.0871	1.52	0.0262	1.03	0.0103
13.00	4.22	0.2977	2.61	0.0934	1.58	0.0281	1.07	0.0111
13.50	4.38	0.3185	2.71	0.0999	1.64	0.0300	1.11	0.0118
14.00	4.55	0.3399	2.81	0.1066	1.70	0.0320	1.15	0.0126
14.50	4.71	0.3620	2.91	0.1135	1.76	0.0340	1.19	0.0134
15.00	4.87	0.3847	3.01	0.1205	1.82	0.0361	1.23	0.0143
16.00	5.20	0.4320	3.21	0.1352	1.94	0.0405	1.31	0.0160
17.00	5.52	0.4818	3.41	0.1507	2.06	0.0451	1.40	0.0178
18.00	5.85	0.5341	3.61	0.1669	2.18	0.0499	1.48	0.0197
19.00	6.17	0.5888	3.81	0.1839	2.30	0.0550	1.56	0.0217
20.00	6.50	0.6460	4.01	0.2016	2.43	0.0602	1.64	0.0237

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
21.00	6.82	0.7055	4.21	0.2200	2.55	0.0657	1.73	0.0259
22.00	7.15	0.7675	4.41	0.2392	2.67	0.0714	1.81	0.0281
23.00	7.47	0.8319	4.61	0.2590	2.79	0.0773	1.89	0.0304
24.00	7.79	0.8987	4.81	0.2797	2.91	0.0834	1.97	0.0328
25.00	8.12	0.9678	5.01	0.3010	3.03	0.0897	2.05	0.0352
30.00	9.74	1.3488	6.01	0.4183	3.64	0.1243	2.47	0.0488
35.00			7.02	0.5530	4.25	0.1640	2.88	0.0643
40.00			8.02	0.7048	4.85	0.2086	3.29	0.0816
45.00			9.02	0.8735	5.46	0.2581	3.70	0.1009
50.00					6.06	0.3123	4.11	0.1219
55.00					6.67	0.3713	4.52	0.1448
60.00					7.28	0.4349	4.93	0.1694
65.00					7.88	0.5031	5.34	0.1959
70.00					8.49	0.5760	5.75	0.2240
75.00					9.10	0.6534	6.16	0.2539
80.00					9.70	0.7353	6.57	0.2855
85.00							6.99	0.3188
90.00							7.40	0.3538
95.00							7.81	0.3904
100.00							8.22	0.4288
105.00							8.63	0.4688
110.00							9.04	0.5104
115.00							9.45	0.5537
120.00							9.86	0.5987

5.2 Compressed air, 6 bar

Medium:	Compressed air
Overpressure:	6 bar
Absolute pressure:	7 bar
Temperature:	20 °C
Density:	8.352 kg/m³
Viscosity:	0.000018302 Pa•s
Surface roughness:	0.007 mm

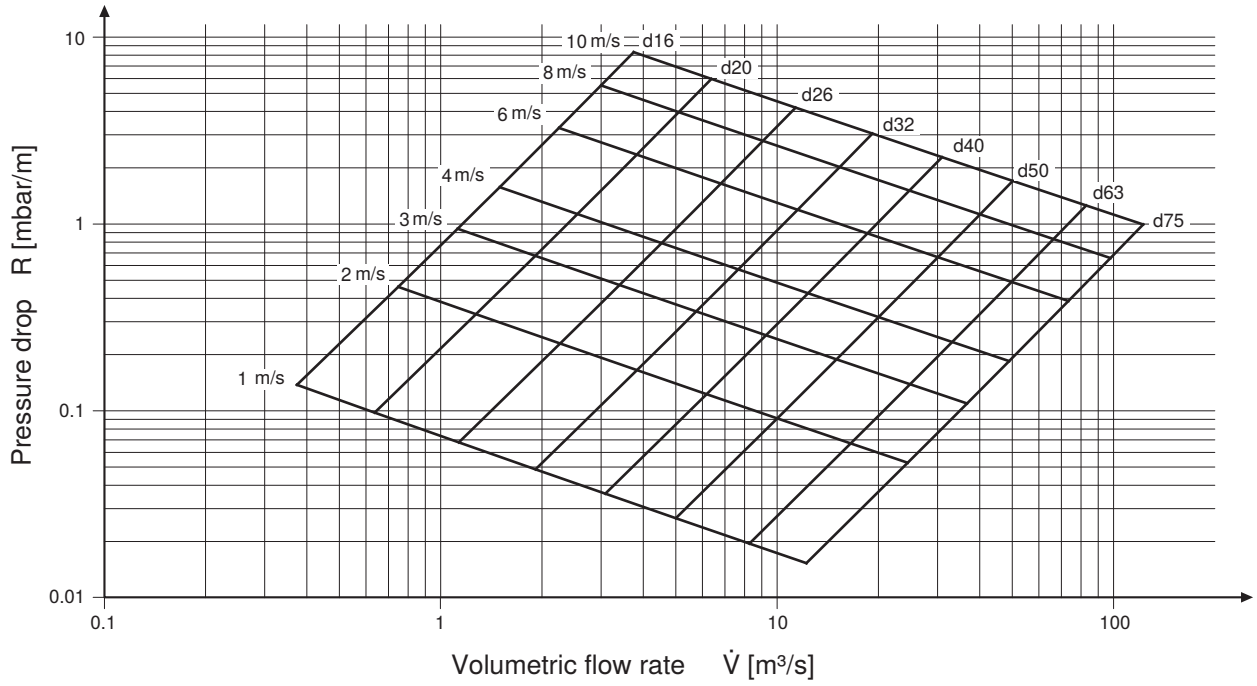

Table 25: Pressure loss in Geberit Mepla system pipes, compressed air, 6 bar, d16–32

d [mm]	16		20		26		32	
V̇ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.10	0.27	0.0118	0.16	0.0041	0.09	0.0013	0.05	0.0005
0.25	0.67	0.0684	0.39	0.0196	0.22	0.0032	0.13	0.0011
0.50	1.34	0.2260	0.79	0.0640	0.44	0.0164	0.26	0.0048
0.75	2.01	0.4594	1.18	0.1292	0.66	0.0330	0.39	0.0095
1.00	2.67	0.7634	1.57	0.2137	0.88	0.0543	0.52	0.0156
1.25	3.34	1.1349	1.96	0.3164	1.11	0.0801	0.65	0.0230
1.50	4.01	1.5721	2.36	0.4368	1.33	0.1102	0.78	0.0316
1.75	4.68	2.0734	2.75	0.5743	1.55	0.1445	0.92	0.0413
2.00	5.35	2.6377	3.14	0.7286	1.77	0.1828	1.05	0.0522
2.25	6.02	3.2643	3.54	0.8994	1.99	0.2252	1.18	0.0642
2.50	6.69	3.9524	3.93	1.0865	2.21	0.2715	1.31	0.0772
2.75	7.35	4.7015	4.32	1.2896	2.43	0.3216	1.44	0.0914
3.00	8.02	5.5110	4.72	1.5085	2.65	0.3756	1.57	0.1066
3.25	8.69	6.3807	5.11	1.7432	2.87	0.4333	1.70	0.1228
3.50	9.36	7.3102	5.50	1.9935	3.09	0.4947	1.83	0.1400

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d [mm]	16		20		26		32	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3.75	10.03	8.2991	5.89	2.2593	3.32	0.5598	1.96	0.1583
4.00			6.29	2.5404	3.54	0.6285	2.09	0.1775
4.50			7.07	3.1485	3.98	0.7768	2.35	0.2190
5.00			7.86	3.8173	4.42	0.9394	2.62	0.2643
5.50			8.65	4.5461	4.86	1.1161	2.88	0.3135
6.00			9.43	5.3346	5.31	1.3069	3.14	0.3665
6.50					5.75	1.5114	3.40	0.4232
7.00					6.19	1.7297	3.66	0.4836
7.50					6.63	1.9617	3.92	0.5477
8.00					7.07	2.2073	4.19	0.6154
8.50					7.52	2.4664	4.45	0.6868
9.00					7.96	2.7389	4.71	0.7617
9.50					8.40	3.0248	4.97	0.8403
10.00					8.84	3.3241	5.23	0.9223
10.50					9.28	3.6366	5.49	1.0080
11.00					9.73	3.9624	5.76	1.0971
11.50							6.02	1.1897
12.00							6.28	1.2859
12.50							6.54	1.3855
13.00							6.80	1.4886
13.50							7.06	1.5951
14.00							7.32	1.7051
14.50							7.59	1.8185
15.00							7.85	1.9353
16.00							8.37	2.1792
17.00							8.89	2.4368
18.00							9.42	2.7078
19.00							9.94	2.9924

Table 26: Pressure loss in Geberit Mepla system pipes, compressed air, 6 bar, d40–75

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.10	0.03	0.0002	0.02	0.0001				
0.25	0.08	0.0004	0.05	0.0002	0.03	0.0001		
0.50	0.16	0.0016	0.10	0.0003	0.06	0.0001	0.04	0.0001
0.75	0.24	0.0031	0.15	0.0010	0.09	0.0002	0.06	0.0001
1.00	0.32	0.0051	0.20	0.0016	0.12	0.0005	0.08	0.0002
1.25	0.41	0.0074	0.25	0.0024	0.15	0.0007	0.10	0.0003
1.50	0.49	0.0102	0.30	0.0033	0.18	0.0010	0.12	0.0004

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1.75	0.57	0.0133	0.35	0.0042	0.21	0.0013	0.14	0.0005
2.00	0.65	0.0168	0.40	0.0053	0.24	0.0016	0.16	0.0006
2.25	0.73	0.0206	0.45	0.0066	0.27	0.0020	0.18	0.0008
2.50	0.81	0.0248	0.50	0.0079	0.30	0.0024	0.21	0.0010
2.75	0.89	0.0293	0.55	0.0093	0.33	0.0028	0.23	0.0011
3.00	0.97	0.0341	0.60	0.0108	0.36	0.0033	0.25	0.0013
3.25	1.06	0.0393	0.65	0.0124	0.39	0.0038	0.27	0.0015
3.50	1.14	0.0447	0.70	0.0142	0.42	0.0043	0.29	0.0017
3.75	1.22	0.0505	0.75	0.0160	0.45	0.0048	0.31	0.0019
4.00	1.30	0.0566	0.80	0.0179	0.49	0.0054	0.33	0.0021
4.50	1.46	0.0697	0.90	0.0220	0.55	0.0066	0.37	0.0026
5.00	1.62	0.0840	1.00	0.0265	0.61	0.0080	0.41	0.0032
5.50	1.79	0.0996	1.10	0.0314	0.67	0.0094	0.45	0.0037
6.00	1.95	0.1162	1.20	0.0366	0.73	0.0110	0.49	0.0044
6.50	2.11	0.1341	1.30	0.0421	0.79	0.0127	0.53	0.0050
7.00	2.27	0.1530	1.40	0.0481	0.85	0.0144	0.58	0.0057
7.50	2.44	0.1732	1.50	0.0543	0.91	0.0163	0.62	0.0064
8.00	2.60	0.1944	1.60	0.0609	0.97	0.0183	0.66	0.0072
8.50	2.76	0.2167	1.70	0.0679	1.03	0.0204	0.70	0.0080
9.00	2.92	0.2401	1.80	0.0752	1.09	0.0225	0.74	0.0089
9.50	3.09	0.2647	1.90	0.0828	1.15	0.0248	0.78	0.0098
10.00	3.25	0.2903	2.00	0.0907	1.21	0.0272	0.82	0.0107
10.50	3.41	0.3170	2.11	0.0990	1.27	0.0296	0.86	0.0117
11.00	3.57	0.3447	2.21	0.1076	1.33	0.0322	0.90	0.0127
11.50	3.73	0.3735	2.31	0.1166	1.39	0.0348	0.95	0.0137
12.00	3.90	0.4034	2.41	0.1258	1.46	0.0376	0.99	0.0148
12.50	4.06	0.4344	2.51	0.1354	1.52	0.0404	1.03	0.0159
13.00	4.22	0.4664	2.61	0.1452	1.58	0.0433	1.07	0.0170
13.50	4.38	0.4994	2.71	0.1554	1.64	0.0464	1.11	0.0182
14.00	4.55	0.5335	2.81	0.1660	1.70	0.0495	1.15	0.0194
14.50	4.71	0.5686	2.91	0.1768	1.76	0.0527	1.19	0.0207
15.00	4.87	0.6047	3.01	0.1879	1.82	0.0560	1.23	0.0220
16.00	5.20	0.6801	3.21	0.2111	1.94	0.0628	1.31	0.0247
17.00	5.52	0.7596	3.41	0.2356	2.06	0.0700	1.40	0.0275
18.00	5.85	0.8431	3.61	0.2612	2.18	0.0776	1.48	0.0304
19.00	6.17	0.9307	3.81	0.2881	2.30	0.0855	1.56	0.0335
20.00	6.50	1.0223	4.01	0.3162	2.43	0.0938	1.64	0.0367
21.00	6.82	1.1179	4.21	0.3455	2.55	0.1024	1.73	0.0401
22.00	7.15	1.2175	4.41	0.3759	2.67	0.1113	1.81	0.0436
23.00	7.47	1.3211	4.61	0.4076	2.79	0.1206	1.89	0.0472

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
24.00	7.79	1.4287	4.81	0.4404	2.91	0.1303	1.97	0.0510
25.00	8.12	1.5402	5.01	0.4745	3.03	0.1402	2.05	0.0548
30.00	9.74	2.1567	6.01	0.6620	3.64	0.1951	2.47	0.0761
35.00			7.02	0.8784	4.25	0.2582	2.88	0.1006
40.00			8.02	1.1233	4.85	0.3293	3.29	0.1281
45.00			9.02	1.3962	5.46	0.4085	3.70	0.1586
50.00			10.02	1.6971	6.06	0.4955	4.11	0.1922
55.00					6.67	0.5903	4.52	0.2286
60.00					7.28	0.6928	4.93	0.2680
65.00					7.88	0.8030	5.34	0.3103
70.00					8.49	0.9209	5.75	0.3555
75.00					9.10	1.0463	6.16	0.4035
80.00					9.70	1.1793	6.57	0.4544
85.00							6.99	0.5081
90.00							7.40	0.5646
95.00							7.81	0.6238
100.00							8.22	0.6859
105.00							8.63	0.7507
110.00							9.04	0.8183
115.00							9.45	0.8887
120.00							9.86	0.9618

5.3 Compressed air, 9 bar

Medium:	Compressed air
Overpressure:	9 bar
Absolute pressure:	10 bar
Temperature:	20 °C
Density:	11.932 kg/m³
Viscosity:	0.000018344 Pa•s
Surface roughness:	0.007 mm

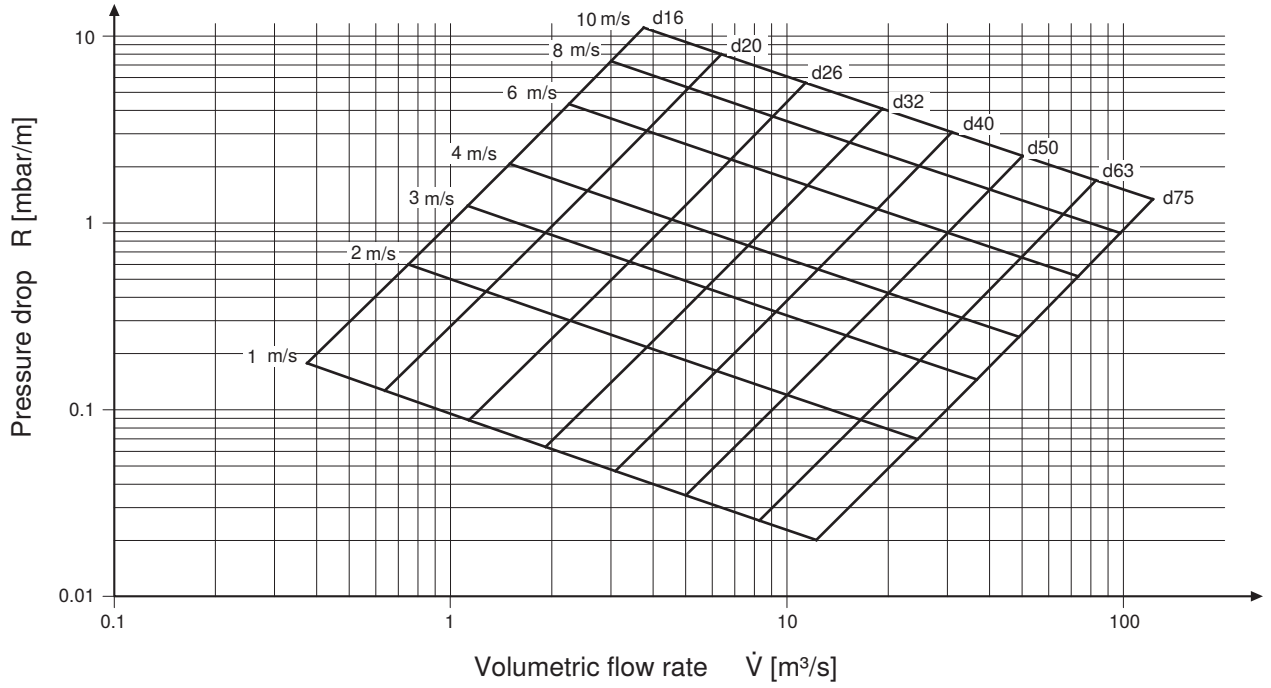

Table 27: Pressure loss in Geberit Mepla system pipes, compressed air, 9 bar, d16–32

d [mm]	16		20		26		32	
V̇ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.10	0.27	0.0119	0.16	0.0041	0.09	0.0013	0.05	0.0005
0.25	0.67	0.0884	0.39	0.0251	0.22	0.0065	0.13	0.0011
0.50	1.34	0.2954	0.79	0.0831	0.44	0.0212	0.26	0.0061
0.75	2.01	0.6043	1.18	0.1690	0.66	0.0429	0.39	0.0123
1.00	2.67	1.0090	1.57	0.2806	0.88	0.0708	0.52	0.0203
1.25	3.34	1.5059	1.96	0.4170	1.11	0.1049	0.65	0.0300
1.50	4.01	2.0928	2.36	0.5773	1.33	0.1447	0.78	0.0413
1.75	4.68	2.7681	2.75	0.7610	1.55	0.1902	0.92	0.0541
2.00	5.35	3.5304	3.14	0.9675	1.77	0.2411	1.05	0.0685
2.25	6.02	4.3790	3.54	1.1967	1.99	0.2975	1.18	0.0843
2.50	6.69	5.3131	3.93	1.4482	2.21	0.3592	1.31	0.1017
2.75	7.35	6.3320	4.32	1.7218	2.43	0.4262	1.44	0.1204
3.00	8.02	7.4354	4.72	2.0173	2.65	0.4983	1.57	0.1406
3.25	8.69	8.6228	5.11	2.3345	2.87	0.5756	1.70	0.1622
3.50	9.36	9.8939	5.50	2.6733	3.09	0.6579	1.83	0.1851

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d [mm]	16		20		26		32	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3.75	10.03	11.2483	5.89	3.0336	3.32	0.7453	1.96	0.2095
4.00			6.29	3.4153	3.54	0.8377	2.09	0.2351
4.50			7.07	4.2423	3.98	1.0375	2.35	0.2905
5.00			7.86	5.1539	4.42	1.2568	2.62	0.3513
5.50			8.65	6.1494	4.86	1.4957	2.88	0.4172
6.00			9.43	7.2284	5.31	1.7539	3.14	0.4883
6.50					5.75	2.0314	3.40	0.5646
7.00					6.19	2.3279	3.66	0.6460
7.50					6.63	2.6434	3.92	0.7324
8.00					7.07	2.9778	4.19	0.8238
8.50					7.52	3.3311	4.45	0.9202
9.00					7.96	3.7031	4.71	1.0216
9.50					8.40	4.0938	4.97	1.1280
10.00					8.84	4.5032	5.23	1.2392
10.50					9.28	4.9312	5.49	1.3554
11.00					9.73	5.3778	5.76	1.4764
11.50							6.02	1.6023
12.00							6.28	1.7330
12.50							6.54	1.8686
13.00							6.80	2.0090
13.50							7.06	2.1542
14.00							7.32	2.3043
14.50							7.59	2.4591
15.00							7.85	2.6187
16.00							8.37	2.9522
17.00							8.89	3.3047
18.00							9.42	3.6762
19.00							9.94	4.0666

Table 28: Pressure loss in Geberit Mepla system pipes, compressed air, 9 bar, d40–75

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
0.10	0.03	0.0002	0.02	0.0001				
0.25	0.08	0.0004	0.05	0.0002	0.03	0.0001		
0.50	0.16	0.0020	0.10	0.0006	0.06	0.0001	0.04	0.0001
0.75	0.24	0.0040	0.15	0.0013	0.09	0.0004	0.06	0.0002
1.00	0.32	0.0066	0.20	0.0021	0.12	0.0006	0.08	0.0003
1.25	0.41	0.0096	0.25	0.0031	0.15	0.0009	0.10	0.0004
1.50	0.49	0.0133	0.30	0.0042	0.18	0.0013	0.12	0.0005

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1.75	0.57	0.0174	0.35	0.0055	0.21	0.0017	0.14	0.0007
2.00	0.65	0.0219	0.40	0.0070	0.24	0.0021	0.16	0.0008
2.25	0.73	0.0270	0.45	0.0085	0.27	0.0026	0.18	0.0010
2.50	0.81	0.0325	0.50	0.0103	0.30	0.0031	0.21	0.0012
2.75	0.89	0.0384	0.55	0.0121	0.33	0.0037	0.23	0.0015
3.00	0.97	0.0448	0.60	0.0142	0.36	0.0043	0.25	0.0017
3.25	1.06	0.0516	0.65	0.0163	0.39	0.0049	0.27	0.0019
3.50	1.14	0.0589	0.70	0.0186	0.42	0.0056	0.29	0.0022
3.75	1.22	0.0665	0.75	0.0210	0.45	0.0063	0.31	0.0025
4.00	1.30	0.0746	0.80	0.0235	0.49	0.0071	0.33	0.0028
4.50	1.46	0.0921	0.90	0.0289	0.55	0.0087	0.37	0.0034
5.00	1.62	0.1111	1.00	0.0349	0.61	0.0105	0.41	0.0041
5.50	1.79	0.1318	1.10	0.0413	0.67	0.0124	0.45	0.0049
6.00	1.95	0.1541	1.20	0.0483	0.73	0.0145	0.49	0.0057
6.50	2.11	0.1779	1.30	0.0557	0.79	0.0167	0.53	0.0066
7.00	2.27	0.2033	1.40	0.0636	0.85	0.0190	0.58	0.0075
7.50	2.44	0.2302	1.50	0.0719	0.91	0.0215	0.62	0.0085
8.00	2.60	0.2587	1.60	0.0807	0.97	0.0241	0.66	0.0095
8.50	2.76	0.2887	1.70	0.0900	1.03	0.0269	0.70	0.0106
9.00	2.92	0.3201	1.80	0.0997	1.09	0.0298	0.74	0.0117
9.50	3.09	0.3531	1.90	0.1099	1.15	0.0328	0.78	0.0129
10.00	3.25	0.3876	2.00	0.1205	1.21	0.0359	0.82	0.0141
10.50	3.41	0.4235	2.11	0.1316	1.27	0.0392	0.86	0.0154
11.00	3.57	0.4609	2.21	0.1431	1.33	0.0426	0.90	0.0167
11.50	3.73	0.4998	2.31	0.1551	1.39	0.0461	0.95	0.0181
12.00	3.90	0.5401	2.41	0.1675	1.46	0.0498	0.99	0.0195
12.50	4.06	0.5819	2.51	0.1803	1.52	0.0536	1.03	0.0210
13.00	4.22	0.6251	2.61	0.1936	1.58	0.0575	1.07	0.0225
13.50	4.38	0.6698	2.71	0.2073	1.64	0.0615	1.11	0.0241
14.00	4.55	0.7159	2.81	0.2214	1.70	0.0657	1.15	0.0257
14.50	4.71	0.7635	2.91	0.2360	1.76	0.0700	1.19	0.0274
15.00	4.87	0.8124	3.01	0.2510	1.82	0.0744	1.23	0.0291
16.00	5.20	0.9147	3.21	0.2822	1.94	0.0835	1.31	0.0327
17.00	5.52	1.0226	3.41	0.3152	2.06	0.0932	1.40	0.0365
18.00	5.85	1.1361	3.61	0.3498	2.18	0.1034	1.48	0.0404
19.00	6.17	1.2552	3.81	0.3861	2.30	0.1140	1.56	0.0445
20.00	6.50	1.3800	4.01	0.4240	2.43	0.1251	1.64	0.0488
21.00	6.82	1.5103	4.21	0.4636	2.55	0.1366	1.73	0.0533
22.00	7.15	1.6462	4.41	0.5049	2.67	0.1487	1.81	0.0580
23.00	7.47	1.7877	4.61	0.5478	2.79	0.1612	1.89	0.0628

d [mm]	40		50		63		75	
$\dot{V}$ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
24.00	7.79	1.9346	4.81	0.5923	2.91	0.1742	1.97	0.0679
25.00	8.12	2.0871	5.01	0.6385	3.03	0.1876	2.05	0.0731
30.00	9.74	2.9321	6.01	0.8935	3.64	0.2616	2.47	0.1017
35.00			7.02	1.1885	4.25	0.3470	2.88	0.1346
40.00			8.02	1.5231	4.85	0.4435	3.29	0.1717
45.00			9.02	1.8971	5.46	0.5510	3.70	0.2130
50.00			10.02	2.3102	6.06	0.6694	4.11	0.2584
55.00					6.67	0.7987	4.52	0.3078
60.00					7.28	0.9388	4.93	0.3613
65.00					7.88	1.0895	5.34	0.4188
70.00					8.49	1.2510	5.75	0.4803
75.00					9.10	1.4230	6.16	0.5458
80.00					9.70	1.6057	6.57	0.6152
85.00							6.99	0.6885
90.00							7.40	0.7657
95.00							7.81	0.8469
100.00							8.22	0.9319
105.00							8.63	1.0208
110.00							9.04	1.1136
115.00							9.45	1.2102
120.00							9.86	1.3106

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