



DRUKVERLIESTABELLEN

**KNOW
HOW**
INSTALLED

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2 Pressure loss in Geberit FlowFit, potable water

2.1 Potable water 10 °C

Medium: Water
 Temperature: 10 °C
 Density: 999.7 kg/m³

Viscosity: 0.001306 Pa·s
 Surface roughness: 0.007 mm

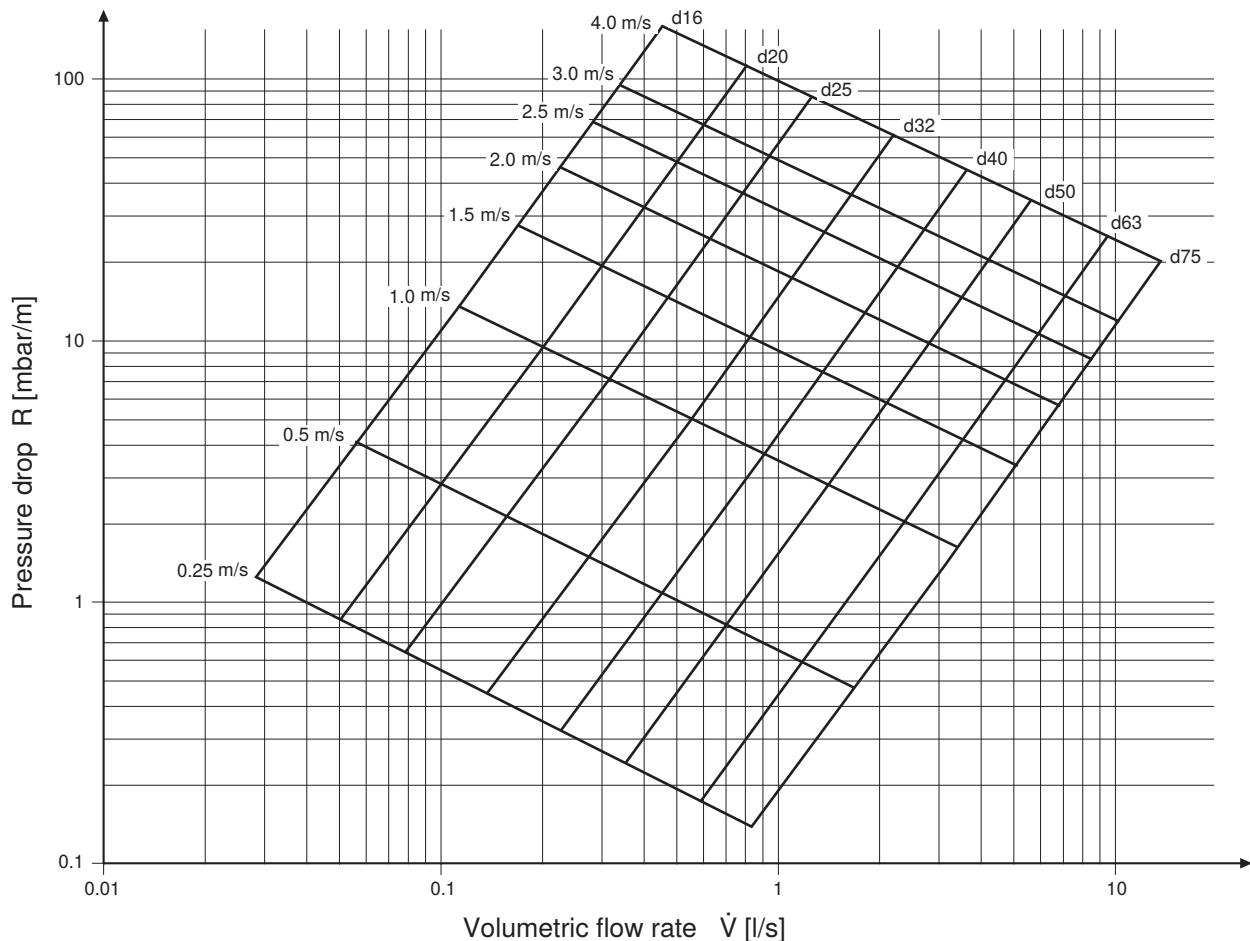


Table 1: Pressure loss in Geberit FlowFit system pipes, drinking water 10 °C, d16–32 mm

d [mm]	16		20		25		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]
0.01	0.09	0.26						
0.02	0.18	0.51						
0.03	0.27	1.38	0.15	0.24				
0.04	0.35	2.24	0.20	0.58	0.13	0.13		
0.05	0.44	3.29	0.25	0.85	0.16	0.30		
0.06	0.53	4.50	0.30	1.15	0.19	0.40		
0.07	0.62	5.87	0.35	1.50	0.22	0.52	0.13	0.14
0.08	0.71	7.40	0.40	1.89	0.25	0.66	0.15	0.18
0.09	0.80	9.08	0.45	2.31	0.29	0.81	0.16	0.22

d [mm]	16		20		25		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]
0.10	0.88	10.91	0.50	2.78	0.32	0.97	0.18	0.26
0.15	1.33	22.23	0.75	5.62	0.48	1.94	0.27	0.52
0.20	1.77	36.99	0.99	9.30	0.64	3.21	0.37	0.86
0.25	2.21	55.07	1.24	13.79	0.80	4.74	0.46	1.26
0.30	2.65	76.36	1.49	19.05	0.95	6.53	0.55	1.74
0.35	3.09	100.81	1.74	25.06	1.11	8.58	0.64	2.27
0.40	3.54	128.35	1.99	31.81	1.27	10.87	0.73	2.88
0.45	3.98	158.96	2.24	39.29	1.43	13.40	0.82	3.54
0.50	4.42	192.59	2.49	47.48	1.59	16.16	0.91	4.26
0.55	4.86	229.23	2.74	56.37	1.75	19.16	1.00	5.04
0.60	5.31	268.85	2.98	65.97	1.91	22.39	1.10	5.89
0.65	5.75	311.44	3.23	76.26	2.07	25.85	1.19	6.79
0.70	6.19	356.98	3.48	87.23	2.23	29.53	1.28	7.74
0.75	6.63	405.45	3.73	98.89	2.39	33.43	1.37	8.76
0.80			3.98	111.22	2.55	37.56	1.46	9.82
0.85			4.23	124.23	2.71	41.90	1.55	10.95
0.90			4.48	137.91	2.86	46.47	1.64	12.13
0.95			4.72	152.26	3.02	51.25	1.74	13.36
1.00			4.97	167.27	3.18	56.25	1.83	14.65
1.05			5.22	182.95	3.34	61.46	1.92	15.99
1.10			5.47	199.29	3.50	66.89	2.01	17.39
1.15			5.72	216.29	3.66	72.53	2.10	18.84
1.20			5.97	233.94	3.82	78.38	2.19	20.34
1.25			6.22	252.25	3.98	84.44	2.28	21.89
1.30			6.47	271.21	4.14	90.71	2.37	23.50
1.40			6.96	311.09	4.46	103.89	2.56	26.87
1.50					4.77	117.90	2.74	30.44
1.60					5.09	132.74	2.92	34.22
1.70					5.41	148.41	3.11	38.21
1.80					5.73	164.90	3.29	42.40
1.90					6.05	182.21	3.47	46.79
2.00					6.37	200.34	3.65	51.38
2.10							3.84	56.17
2.20							4.02	61.16
2.30							4.20	66.34
2.40							4.38	71.73
2.50							4.57	77.31
2.60							4.75	83.09
2.70							4.93	89.06

d [mm]	16		20		25		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]
2.80							5.12	95.23
2.90							5.30	101.59
3.00							5.48	108.15
3.10							5.66	114.90
3.20							5.85	121.84
3.30							6.03	128.98
3.40							6.21	136.31
3.50							6.39	143.83
3.60							6.58	151.54
3.70							6.76	159.45
3.80							6.94	167.54

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

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

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]
0.10	0.11	0.08						
0.15	0.17	0.16	0.11	0.06				
0.20	0.22	0.26	0.14	0.09				
0.25	0.28	0.38	0.18	0.13				
0.30	0.33	0.52	0.21	0.18	0.13	0.05	0.09	0.02
0.35	0.39	0.68	0.25	0.24	0.15	0.07	0.10	0.03
0.40	0.44	0.86	0.28	0.30	0.17	0.09	0.12	0.04
0.45	0.50	1.06	0.32	0.37	0.19	0.11	0.13	0.05
0.50	0.55	1.27	0.35	0.44	0.21	0.13	0.15	0.06
0.55	0.61	1.50	0.39	0.53	0.23	0.15	0.16	0.07
0.60	0.66	1.75	0.42	0.61	0.25	0.18	0.18	0.08
0.65	0.72	2.02	0.46	0.70	0.27	0.20	0.19	0.09
0.70	0.77	2.30	0.50	0.80	0.29	0.23	0.21	0.10
0.75	0.83	2.60	0.53	0.91	0.32	0.26	0.22	0.11
0.80	0.88	2.92	0.57	1.01	0.34	0.29	0.24	0.13
0.85	0.94	3.25	0.60	1.13	0.36	0.33	0.25	0.14
0.90	0.99	3.59	0.64	1.25	0.38	0.36	0.26	0.15
0.95	1.05	3.96	0.67	1.37	0.40	0.40	0.28	0.17
1.00	1.10	4.33	0.71	1.50	0.42	0.43	0.29	0.18
1.05	1.16	4.73	0.74	1.64	0.44	0.47	0.31	0.20
1.10	1.21	5.14	0.78	1.78	0.46	0.51	0.32	0.22
1.15	1.27	5.56	0.81	1.93	0.48	0.56	0.34	0.24

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]
1.20	1.32	6.00	0.85	2.08	0.51	0.60	0.35	0.25
1.25	1.38	6.45	0.89	2.23	0.53	0.64	0.37	0.27
1.30	1.43	6.92	0.92	2.40	0.55	0.69	0.38	0.29
1.40	1.54	7.91	0.99	2.73	0.59	0.79	0.41	0.33
1.50	1.65	8.95	1.06	3.09	0.63	0.89	0.44	0.38
1.60	1.76	10.05	1.13	3.47	0.67	1.00	0.47	0.42
1.70	1.87	11.21	1.20	3.87	0.72	1.11	0.50	0.47
1.80	1.98	12.42	1.27	4.28	0.76	1.23	0.53	0.52
1.90	2.09	13.70	1.35	4.72	0.80	1.35	0.56	0.57
2.00	2.20	15.03	1.42	5.17	0.84	1.48	0.59	0.63
2.10	2.31	16.41	1.49	5.65	0.88	1.61	0.62	0.68
2.20	2.42	17.85	1.56	6.14	0.93	1.75	0.65	0.74
2.30	2.53	19.35	1.63	6.65	0.97	1.90	0.68	0.80
2.40	2.64	20.90	1.70	7.18	1.01	2.05	0.71	0.87
2.50	2.75	22.51	1.77	7.73	1.05	2.20	0.74	0.93
2.60	2.86	24.18	1.84	8.29	1.09	2.37	0.76	1.00
2.70	2.97	25.89	1.91	8.88	1.14	2.53	0.79	1.07
2.80	3.08	27.67	1.98	9.48	1.18	2.70	0.82	1.14
2.90	3.19	29.50	2.05	10.10	1.22	2.88	0.85	1.21
3.00	3.30	31.38	2.12	10.74	1.26	3.06	0.88	1.29
3.10	3.41	33.31	2.20	11.40	1.30	3.24	0.91	1.37
3.20	3.52	35.30	2.27	12.07	1.35	3.43	0.94	1.45
3.30	3.63	37.34	2.34	12.76	1.39	3.63	0.97	1.53
3.40	3.74	39.44	2.41	13.47	1.43	3.83	1.00	1.61
3.50	3.85	41.59	2.48	14.20	1.47	4.03	1.03	1.70
3.60	3.97	43.79	2.55	14.95	1.52	4.24	1.06	1.79
3.70	4.08	46.05	2.62	15.71	1.56	4.46	1.09	1.88
3.80	4.19	48.36	2.69	16.49	1.60	4.68	1.12	1.97
3.90	4.30	50.72	2.76	17.29	1.64	4.90	1.15	2.06
4.00	4.41	53.14	2.83	18.10	1.68	5.13	1.18	2.16
4.10	4.52	55.61	2.90	18.94	1.73	5.36	1.21	2.26
4.20	4.63	58.13	2.97	19.79	1.77	5.60	1.24	2.36
4.30	4.74	60.70	3.05	20.65	1.81	5.85	1.26	2.46
4.40	4.85	63.33	3.12	21.54	1.85	6.10	1.29	2.56
4.50	4.96	66.00	3.19	22.44	1.89	6.35	1.32	2.67
4.60	5.07	68.73	3.26	23.36	1.94	6.61	1.35	2.78
4.70	5.18	71.52	3.33	24.30	1.98	6.87	1.38	2.89
4.80	5.29	74.35	3.40	25.25	2.02	7.14	1.41	3.00
4.90	5.40	77.24	3.47	26.22	2.06	7.41	1.44	3.11

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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]
5.00	5.51	80.18	3.54	27.21	2.10	7.68	1.47	3.23
5.50	6.06	95.65	3.90	32.40	2.31	9.13	1.62	3.83
6.00	6.61	112.40	4.25	38.02	2.53	10.70	1.76	4.49
6.50			4.60	44.06	2.74	12.38	1.91	5.19
7.00			4.96	50.51	2.95	14.17	2.06	5.94
7.50			5.31	57.38	3.16	16.08	2.21	6.73
8.00			5.67	64.65	3.37	18.10	2.35	7.57
8.50			6.02	72.35	3.58	20.22	2.50	8.45
9.00			6.37	80.44	3.79	22.46	2.65	9.38
9.50			6.73	88.95	4.00	24.81	2.79	10.35
10.00					4.21	27.26	2.94	11.37
10.50					4.42	29.83	3.09	12.43
11.00					4.63	32.50	3.23	13.54
11.50					4.84	35.28	3.38	14.69
12.00					5.05	38.17	3.53	15.88
12.50					5.26	41.16	3.68	17.12
13.00					5.47	44.27	3.82	18.39
13.50							3.97	19.72
14.00							4.12	21.08
14.50							4.26	22.49
15.00							4.41	23.94
15.50							4.56	25.44
16.00							4.71	26.98
16.50							4.85	28.56

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As a rule, the values highlighted in blue do not occur in drinking 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

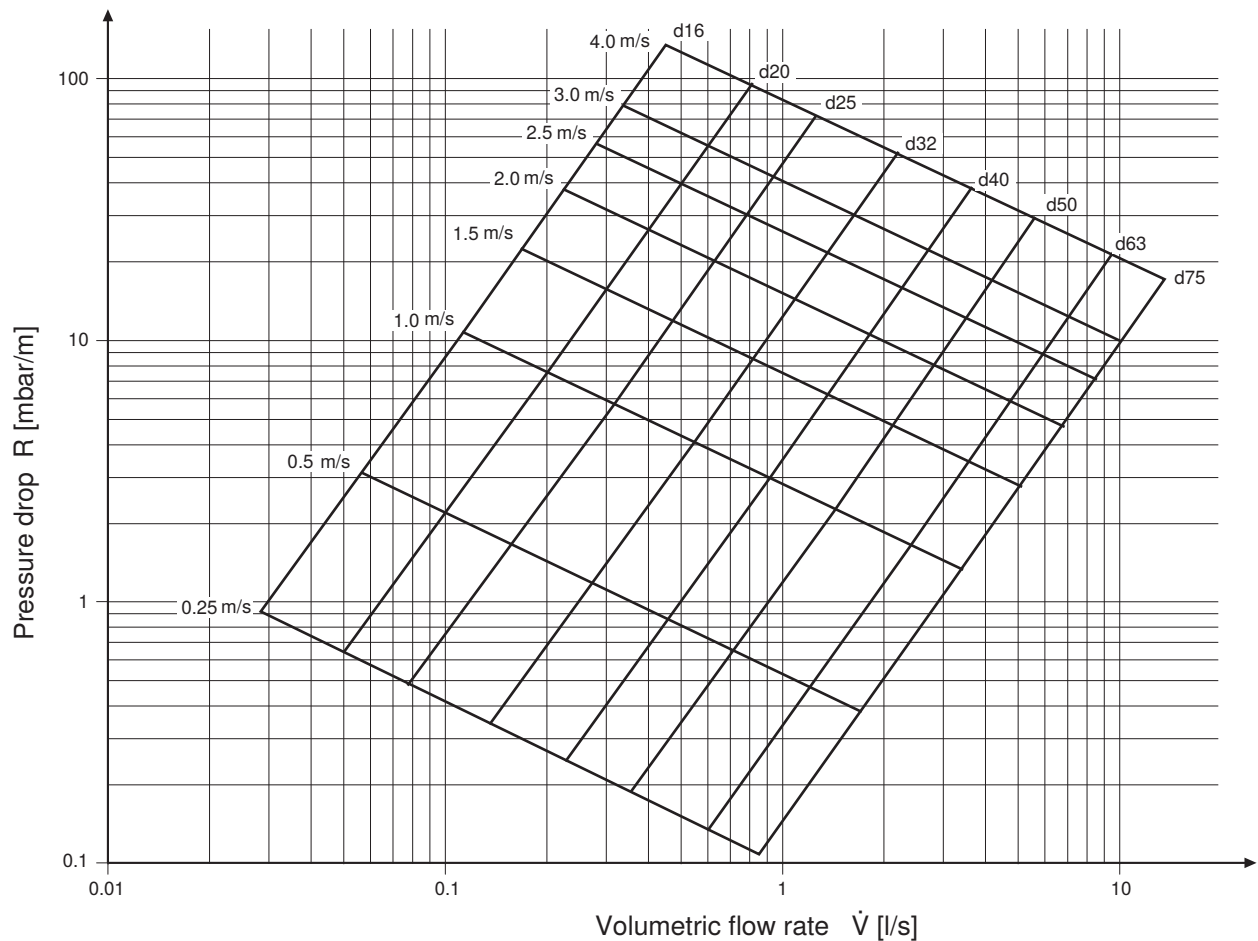


Table 3: Pressure loss in Geberit FlowFit system pipes, potable water 60 °C, d16–32 mm

d [mm]	16		20		25		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]
0.01	0.09	0.09						
0.02	0.18	0.50						
0.03	0.27	1.01	0.15	0.26				
0.04	0.35	1.68	0.20	0.43	0.13	0.15		
0.05	0.44	2.48	0.25	0.63	0.16	0.22		
0.06	0.53	3.42	0.30	0.86	0.19	0.30		
0.07	0.62	4.49	0.35	1.13	0.22	0.39	0.13	0.10
0.08	0.71	5.70	0.40	1.43	0.25	0.49	0.15	0.13
0.09	0.80	7.03	0.45	1.76	0.29	0.61	0.16	0.16
0.10	0.88	8.49	0.50	2.12	0.32	0.73	0.18	0.19
0.15	1.33	17.65	0.75	4.37	0.48	1.49	0.27	0.39

d [mm]	16		20		25		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]
0.20	1.77	29.81	0.99	7.33	0.64	2.49	0.37	0.66
0.25	2.21	44.90	1.24	10.98	0.80	3.72	0.46	0.97
0.30	2.65	62.89	1.49	15.30	0.95	5.16	0.55	1.35
0.35	3.09	83.74	1.74	20.28	1.11	6.82	0.64	1.78
0.40	3.54	107.43	1.99	25.91	1.27	8.70	0.73	2.26
0.45	3.98	133.95	2.24	32.20	1.43	10.78	0.82	2.80
0.50	4.42	163.30	2.49	39.12	1.59	13.07	0.91	3.38
0.55	4.86	195.45	2.74	46.69	1.75	15.57	1.00	4.02
0.60	5.31	230.41	2.98	54.89	1.91	18.27	1.10	4.71
0.65	5.75	268.16	3.23	63.73	2.07	21.17	1.19	5.44
0.70	6.19	308.71	3.48	73.19	2.23	24.27	1.28	6.23
0.75	6.63	352.05	3.73	83.29	2.39	27.58	1.37	7.07
0.80			3.98	94.02	2.55	31.08	1.46	7.95
0.85			4.23	105.37	2.71	34.79	1.55	8.89
0.90			4.48	117.35	2.86	38.69	1.64	9.87
0.95			4.72	129.96	3.02	42.79	1.74	10.90
1.00			4.97	143.19	3.18	47.09	1.83	11.98
1.05			5.22	157.04	3.34	51.59	1.92	13.10
1.10			5.47	171.52	3.50	56.28	2.01	14.28
1.15			5.72	186.62	3.66	61.18	2.10	15.50
1.20			5.97	202.34	3.82	66.26	2.19	16.77
1.25			6.22	218.68	3.98	71.55	2.28	18.09
1.30			6.47	235.64	4.14	77.03	2.37	19.45
1.40			6.96	271.43	4.46	88.57	2.56	22.32
1.50					4.77	100.90	2.74	25.38
1.60					5.09	114.00	2.92	28.62
1.70					5.41	127.88	3.11	32.05
1.80					5.73	142.54	3.29	35.67
1.90					6.05	157.98	3.47	39.47
2.00					6.37	174.19	3.65	43.46
2.10							3.84	47.63
2.20							4.02	51.99
2.30							4.20	56.53
2.40							4.38	61.26
2.50							4.57	66.17
2.60							4.75	71.26
2.70							4.93	76.53
2.80							5.12	81.99
2.90							5.30	87.64

d [mm]	16		20		25		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]
3.00							5.48	93.46
3.10							5.66	99.47
3.20							5.85	105.66
3.30							6.03	112.04
3.40							6.21	118.59
3.50							6.39	125.33
3.60							6.58	132.25
3.70							6.76	139.36
3.80							6.94	146.64

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

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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]
0.10	0.11	0.06						
0.15	0.17	0.12	0.11	0.04				
0.20	0.22	0.20	0.14	0.07				
0.25	0.28	0.29	0.18	0.10				
0.30	0.33	0.40	0.21	0.14	0.13	0.04	0.09	0.02
0.35	0.39	0.53	0.25	0.18	0.15	0.05	0.10	0.02
0.40	0.44	0.67	0.28	0.23	0.17	0.07	0.12	0.03
0.45	0.50	0.82	0.32	0.29	0.19	0.08	0.13	0.03
0.50	0.55	1.00	0.35	0.34	0.21	0.10	0.15	0.04
0.55	0.61	1.18	0.39	0.41	0.23	0.12	0.16	0.05
0.60	0.66	1.38	0.42	0.48	0.25	0.14	0.18	0.06
0.65	0.72	1.60	0.46	0.55	0.27	0.16	0.19	0.07
0.70	0.77	1.82	0.50	0.63	0.29	0.18	0.21	0.08
0.75	0.83	2.07	0.53	0.71	0.32	0.20	0.22	0.09
0.80	0.88	2.32	0.57	0.80	0.34	0.23	0.24	0.10
0.85	0.94	2.59	0.60	0.89	0.36	0.25	0.25	0.11
0.90	0.99	2.87	0.64	0.99	0.38	0.28	0.26	0.12
0.95	1.05	3.17	0.67	1.09	0.40	0.31	0.28	0.13
1.00	1.10	3.48	0.71	1.19	0.42	0.34	0.29	0.14
1.05	1.16	3.81	0.74	1.30	0.44	0.37	0.31	0.16
1.10	1.21	4.14	0.78	1.42	0.46	0.40	0.32	0.17
1.15	1.27	4.49	0.81	1.54	0.48	0.44	0.34	0.18
1.20	1.32	4.86	0.85	1.66	0.51	0.47	0.35	0.20
1.25	1.38	5.23	0.89	1.79	0.53	0.51	0.37	0.21
1.30	1.43	5.62	0.92	1.92	0.55	0.54	0.38	0.23

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]
1.40	1.54	6.44	0.99	2.20	0.59	0.62	0.41	0.26
1.50	1.65	7.31	1.06	2.49	0.63	0.71	0.44	0.30
1.60	1.76	8.23	1.13	2.80	0.67	0.79	0.47	0.33
1.70	1.87	9.21	1.20	3.13	0.72	0.88	0.50	0.37
1.80	1.98	10.23	1.27	3.47	0.76	0.98	0.53	0.41
1.90	2.09	11.31	1.35	3.84	0.80	1.08	0.56	0.45
2.00	2.20	12.44	1.42	4.21	0.84	1.19	0.59	0.50
2.10	2.31	13.61	1.49	4.61	0.88	1.30	0.62	0.54
2.20	2.42	14.84	1.56	5.02	0.93	1.41	0.65	0.59
2.30	2.53	16.12	1.63	5.45	0.97	1.53	0.68	0.64
2.40	2.64	17.45	1.70	5.89	1.01	1.66	0.71	0.69
2.50	2.75	18.83	1.77	6.35	1.05	1.78	0.74	0.75
2.60	2.86	20.26	1.84	6.83	1.09	1.92	0.76	0.80
2.70	2.97	21.74	1.91	7.32	1.14	2.05	0.79	0.86
2.80	3.08	23.27	1.98	7.83	1.18	2.19	0.82	0.92
2.90	3.19	24.85	2.05	8.36	1.22	2.34	0.85	0.98
3.00	3.30	26.48	2.12	8.90	1.26	2.49	0.88	1.04
3.10	3.41	28.16	2.20	9.46	1.30	2.64	0.91	1.10
3.20	3.52	29.89	2.27	10.03	1.35	2.80	0.94	1.17
3.30	3.63	31.66	2.34	10.62	1.39	2.97	0.97	1.24
3.40	3.74	33.49	2.41	11.23	1.43	3.13	1.00	1.31
3.50	3.85	35.37	2.48	11.85	1.47	3.30	1.03	1.38
3.60	3.97	37.30	2.55	12.49	1.52	3.48	1.06	1.45
3.70	4.08	39.27	2.62	13.14	1.56	3.66	1.09	1.53
3.80	4.19	41.30	2.69	13.81	1.60	3.84	1.12	1.60
3.90	4.30	43.37	2.76	14.50	1.64	4.03	1.15	1.68
4.00	4.41	45.50	2.83	15.20	1.68	4.23	1.18	1.76
4.10	4.52	47.67	2.90	15.92	1.73	4.42	1.21	1.84
4.20	4.63	49.89	2.97	16.65	1.77	4.62	1.24	1.92
4.30	4.74	52.16	3.05	17.40	1.81	4.83	1.26	2.01
4.40	4.85	54.49	3.12	18.17	1.85	5.04	1.29	2.10
4.50	4.96	56.86	3.19	18.95	1.89	5.25	1.32	2.18
4.60	5.07	59.28	3.26	19.75	1.94	5.47	1.35	2.27
4.70	5.18	61.74	3.33	20.56	1.98	5.69	1.38	2.37
4.80	5.29	64.26	3.40	21.39	2.02	5.92	1.41	2.46
4.90	5.40	66.83	3.47	22.23	2.06	6.15	1.44	2.56
5.00	5.51	69.44	3.54	23.09	2.10	6.39	1.47	2.65
5.50	6.06	83.25	3.90	27.63	2.31	7.62	1.62	3.16
6.00	6.61	98.29	4.25	32.56	2.53	8.97	1.76	3.71

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]
6.50			4.60	37.88	2.74	10.41	1.91	4.31
7.00			4.96	43.59	2.95	11.96	2.06	4.94
7.50			5.31	49.68	3.16	13.61	2.21	5.62
8.00			5.67	56.17	3.37	15.36	2.35	6.33
8.50			6.02	63.05	3.58	17.22	2.50	7.09
9.00			6.37	70.31	3.79	19.17	2.65	7.89
9.50			6.73	77.96	4.00	21.23	2.79	8.73
10.00					4.21	23.39	2.94	9.61
10.50					4.42	25.65	3.09	10.53
11.00					4.63	28.01	3.23	11.49
11.50					4.84	30.47	3.38	12.49
12.00					5.05	33.04	3.53	13.53
12.50					5.26	35.70	3.68	14.61
13.00					5.47	38.46	3.82	15.73
13.50							3.97	16.90
14.00							4.12	18.10
14.50							4.26	19.34
15.00							4.41	20.62
15.50							4.56	21.94
16.00							4.71	23.30
16.50							4.85	24.70

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

3 Pressure loss in Geberit FlowFit, cooling

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

Medium:	Water	Density:	999.70 kg/m ³
Inlet flow temperature:	10 °C	Viscosity:	0.0012891 Pa•s
Return temperature:	11 °C	Specific thermal capacity:	4188 J/(kg•K)
Range:	1 K	Surface roughness:	0.007 mm
Average temperature:	10.5 °C		

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

d [mm]		16		20		25		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	0.42	3.027	0.24	0.779	0.15	0.273		
300	257.9	0.63	6.087	0.36	1.557	0.23	0.543		
400	343.9	0.84	10.037	0.48	2.556	0.30	0.889		
500	429.8	1.06	14.830	0.59	3.763	0.38	1.305		
600	515.8	1.27	20.436	0.71	5.169	0.46	1.789	0.26	0.480
700	601.8	1.48	26.832	0.83	6.768	0.53	2.338	0.31	0.626
800	687.7	1.69	33.999	0.95	8.555	0.61	2.951	0.35	0.789
900	773.7	1.90	41.924	1.07	10.526	0.68	3.625	0.39	0.968
1000	859.7	2.11	50.596	1.19	12.677	0.76	4.360	0.44	1.162
1100	945.6	2.32	60.004	1.31	15.005	0.84	5.154	0.48	1.372
1200	1031.6	2.53	70.139	1.43	17.508	0.91	6.007	0.52	1.597
1300	1117.6	2.74	80.995	1.54	20.183	0.99	6.917	0.57	1.837
1400	1203.6	2.96	92.567	1.66	23.029	1.06	7.885	0.61	2.092
1500	1289.5	3.17	104.847	1.78	26.044	1.14	8.908	0.65	2.361
1600	1375.5			1.90	29.226	1.22	9.987	0.70	2.644
1700	1461.5			2.02	32.575	1.29	11.122	0.74	2.942
1800	1547.4			2.14	36.088	1.37	12.311	0.79	3.254
1900	1633.4			2.26	39.765	1.44	13.554	0.83	3.579
2000	1719.4			2.38	43.604	1.52	14.850	0.87	3.918
2500	2149.2			2.97	65.208	1.90	22.128	1.09	5.817
3000	2579.0					2.28	30.703	1.31	8.045
3500	3008.9					2.66	40.545	1.53	10.594
4000	3438.7					3.04	51.633	1.75	13.457
4500	3868.6							1.96	16.627
5000	4298.4							2.18	20.102
5500	4728.2							2.40	23.876
6000	5158.1							2.62	27.947
6500	5587.9							2.84	32.311
7000	6017.8							3.05	36.967

Table 6: Pressure loss in Geberit FlowFit 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	0.29	0.413						
1200	1031.6	0.32	0.480						
1300	1117.6	0.34	0.552						
1400	1203.6	0.37	0.627						
1500	1289.5	0.39	0.708						
1600	1375.5	0.42	0.792						
1700	1461.5	0.45	0.880						
1800	1547.4	0.47	0.973						
1900	1633.4	0.50	1.070						
2000	1719.4	0.53	1.170						
2500	2149.2	0.66	1.733	0.42	0.604				
3000	2579.0	0.79	2.391	0.51	0.832				
3500	3008.9	0.92	3.141	0.59	1.092				
4000	3438.7	1.05	3.983	0.68	1.383				
4500	3868.6	1.18	4.912	0.76	1.703				
5000	4298.4	1.32	5.929	0.85	2.054	0.50	0.591	0.35	0.251
5500	4728.2	1.45	7.032	0.93	2.433	0.55	0.700	0.39	0.297
6000	5158.1	1.58	8.219	1.01	2.841	0.60	0.816	0.42	0.347
6500	5587.9	1.71	9.490	1.10	3.277	0.65	0.941	0.46	0.399
7000	6017.8	1.84	10.844	1.18	3.741	0.70	1.073	0.49	0.455
7500	6447.6	1.97	12.279	1.27	4.232	0.75	1.213	0.53	0.514
8000	6877.4	2.10	13.796	1.35	4.751	0.80	1.361	0.56	0.576
8500	7307.3	2.24	15.394	1.44	5.297	0.85	1.516	0.60	0.642
9000	7737.1	2.37	17.071	1.52	5.870	0.90	1.678	0.63	0.710
9500	8167.0	2.50	18.829	1.61	6.469	0.95	1.848	0.67	0.782
10000	8596.8	2.63	20.665	1.69	7.095	1.01	2.026	0.70	0.857
10500	9026.7	2.76	22.580	1.78	7.747	1.06	2.211	0.74	0.935
11000	9456.5	2.89	24.573	1.86	8.425	1.11	2.402	0.77	1.015
11500	9886.3	3.02	26.644	1.94	9.129	1.16	2.602	0.81	1.099
12000	10316.2			2.03	9.859	1.21	2.808	0.84	1.186
12500	10746.0			2.11	10.615	1.26	3.021	0.88	1.276
13000	11175.9			2.20	11.396	1.31	3.242	0.91	1.368
13500	11605.7			2.28	12.203	1.36	3.469	0.95	1.464
14000	12035.5			2.37	13.035	1.41	3.704	0.98	1.562
14500	12465.4			2.45	13.892	1.46	3.946	1.02	1.664
15000	12895.2			2.54	14.775	1.51	4.194	1.05	1.768
15500	13325.1			2.62	15.682	1.56	4.449	1.09	1.875
16000	13754.9			2.71	16.615	1.61	4.711	1.12	1.985

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]
16500	14184.7			2.79	17.572	1.66	4.981	1.16	2.098
17000	14614.6			2.88	18.554	1.71	5.256	1.19	2.213
17500	15044.4			2.96	19.561	1.76	5.539	1.23	2.331
18000	15474.3			3.04	20.593	1.81	5.828	1.26	2.453
18500	15904.1					1.86	6.125	1.30	2.577
19000	16333.9					1.91	6.427	1.33	2.703
19500	16763.8					1.96	6.737	1.37	2.833
20000	17193.6					2.01	7.053	1.40	2.965
20500	17623.5					2.06	7.376	1.44	3.100
21000	18053.3					2.11	7.705	1.47	3.238
21500	18483.1					2.16	8.042	1.51	3.378
22000	18913.0					2.21	8.384	1.54	3.521
22500	19342.8					2.26	8.734	1.58	3.667
23000	19772.7					2.31	9.089	1.62	3.816
23500	20202.5					2.36	9.452	1.65	3.967
24000	20632.3					2.41	9.821	1.69	4.121
24500	21062.2					2.46	10.196	1.72	4.277
25000	21492.0					2.51	10.578	1.76	4.437
25500	21921.9					2.56	10.967	1.79	4.599
26000	22351.7					2.61	11.362	1.83	4.763
26500	22781.5					2.66	11.763	1.86	4.931
27000	23211.4					2.71	12.171	1.90	5.101
27500	23641.2					2.76	12.585	1.93	5.273
28000	24071.1					2.81	13.006	1.97	5.448
28500	24500.9					2.86	13.433	2.00	5.626
29000	24930.7					2.91	13.866	2.04	5.807
29500	25360.6					2.97	14.306	2.07	5.990
30000	25790.4					3.02	14.753	2.11	6.175
32500	27939.6							2.28	7.143
35000	30088.8							2.46	8.175
37500	32238.0							2.63	9.271
40000	34387.2							2.81	10.431
42500	36536.4							2.98	11.654
45000	38685.6							3.16	12.940

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

Medium:	Water containing 30 % glycol	Density:	1033.8 kg/m ³
Inlet flow temperature:	5 °C	Viscosity:	0.00289947 Pa·s
Return temperature:	12 °C	Specific thermal capacity:	3654 J/(kg·K)
Range:	7 K	Surface roughness:	0.007 mm
Average temperature:	8.5 °C		

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

d [mm]		16		20		25		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	0.446	0.04	0.141	0.02	0.058		
300	42.2	0.10	0.668	0.06	0.211	0.04	0.087		
400	56.3	0.13	0.891	0.08	0.282	0.05	0.115		
500	70.4	0.17	1.114	0.09	0.352	0.06	0.144		
600	84.4	0.20	1.337	0.11	0.423	0.07	0.173	0.04	0.057
700	98.5	0.23	1.559	0.13	0.493	0.08	0.202	0.05	0.067
800	112.6	0.27	1.782	0.15	0.564	0.10	0.231	0.06	0.076
900	126.7	0.30	2.005	0.17	0.634	0.11	0.260	0.06	0.086
1000	140.7	0.33	2.228	0.19	0.705	0.12	0.289	0.07	0.095
1100	154.8	0.37	2.450	0.21	0.775	0.13	0.318	0.08	0.105
1200	168.9	0.40	2.673	0.23	0.846	0.14	0.346	0.08	0.114
1300	183.0	0.43	2.896	0.24	0.916	0.16	0.375	0.09	0.124
1400	197.0	0.47	3.119	0.26	0.987	0.17	0.404	0.10	0.133
1500	211.1	0.50	3.342	0.28	1.057	0.18	0.433	0.10	0.143
1600	225.2	0.54	3.564	0.30	1.128	0.19	0.462	0.11	0.152
1700	239.3	0.57	6.611	0.32	1.198	0.20	0.491	0.12	0.162
1800	253.3	0.60	7.282	0.34	1.269	0.22	0.520	0.12	0.171
1900	267.4	0.64	7.980	0.36	1.339	0.23	0.549	0.13	0.181
2000	281.5	0.67	8.705	0.38	1.410	0.24	0.577	0.14	0.190
2500	351.9	0.84	12.729	0.47	3.283	0.30	0.722	0.17	0.238
3000	422.2	1.00	17.393	0.56	4.473	0.36	1.566	0.21	0.285
3500	492.6	1.17	22.672	0.66	5.818	0.42	2.033	0.24	0.333
4000	563.0	1.34	28.549	0.75	7.311	0.48	2.552	0.28	0.692
4500	633.3	1.50	35.007	0.85	8.948	0.54	3.119	0.31	0.844
5000	703.7	1.67	42.036	0.94	10.727	0.60	3.735	0.35	1.009
5500	774.1			1.03	12.644	0.66	4.397	0.38	1.187
6000	844.4			1.13	14.696	0.72	5.106	0.41	1.377
6500	914.8			1.22	16.882	0.78	5.861	0.45	1.579
7000	985.2			1.32	19.200	0.84	6.659	0.48	1.792
7500	1055.6			1.41	21.646	0.90	7.502	0.52	2.017
8000	1125.9			1.50	24.221	0.96	8.388	0.55	2.253
8500	1196.3			1.60	26.922	1.02	9.317	0.59	2.501

d [mm]		16		20		25		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]
9000	1266.7			1.69	29.749	1.08	10.288	0.62	2.759
9500	1337.0					1.14	11.302	0.66	3.029
10000	1407.4					1.20	12.356	0.69	3.309
10500	1477.8					1.26	13.451	0.73	3.600
11000	1548.2					1.32	14.588	0.76	3.902
11500	1618.5					1.38	15.764	0.79	4.214
12000	1688.9					1.44	16.981	0.83	4.537
12500	1759.3					1.50	18.237	0.86	4.870
13000	1829.6					1.56	19.532	0.90	5.213
13500	1900.0					1.63	20.867	0.93	5.566
14000	1970.4					1.69	22.240	0.97	5.930
14500	2040.7							1.00	6.303
15000	2111.1							1.04	6.687
15500	2181.5							1.07	7.080
16000	2251.9							1.11	7.483
16500	2322.2							1.14	7.896
17000	2392.6							1.17	8.318
17500	2463.0							1.21	8.751
18000	2533.3							1.24	9.193
18500	2603.7							1.28	9.644
19000	2674.1							1.31	10.105
19500	2744.5							1.35	10.576
20000	2814.8							1.38	11.055
20500	2885.2							1.42	11.545
21000	2955.6							1.45	12.043
21500	3025.9							1.49	12.551
22000	3096.3							1.52	13.068
22500	3166.7							1.55	13.595
23000	3237.1							1.59	14.130
23500	3307.4							1.62	14.675
24000	3377.8							1.66	15.229

Table 8: Pressure loss in Geberit FlowFit system pipes, cold water replacement containing 30 % glycol, inlet flow 5 °C^{2/2}, 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]
1100	154.8	0.05	0.038						
1200	168.9	0.05	0.041						
1300	183.0	0.05	0.045						

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]
1400	197.0	0.06	0.048						
1500	211.1	0.06	0.052						
1600	225.2	0.07	0.055						
1700	239.3	0.07	0.059						
1800	253.3	0.07	0.062						
1900	267.4	0.08	0.066						
2000	281.5	0.08	0.069						
2500	351.9	0.10	0.086	0.07	0.036				
3000	422.2	0.12	0.104	0.08	0.043				
3500	492.6	0.15	0.121	0.09	0.050				
4000	563.0	0.17	0.138	0.11	0.057				
4500	633.3	0.19	0.156	0.12	0.064				
5000	703.7	0.21	0.308	0.13	0.071	0.08	0.025	0.06	0.012
5500	774.1	0.23	0.361	0.15	0.079	0.09	0.028	0.06	0.014
6000	844.4	0.25	0.419	0.16	0.149	0.10	0.030	0.07	0.015
6500	914.8	0.27	0.480	0.17	0.170	0.10	0.033	0.07	0.016
7000	985.2	0.29	0.544	0.19	0.193	0.11	0.035	0.08	0.017
7500	1055.6	0.31	0.612	0.20	0.217	0.12	0.038	0.08	0.018
8000	1125.9	0.33	0.683	0.21	0.242	0.13	0.071	0.09	0.020
8500	1196.3	0.35	0.757	0.23	0.268	0.14	0.079	0.09	0.021
9000	1266.7	0.37	0.835	0.24	0.295	0.14	0.087	0.10	0.022
9500	1337.0	0.40	0.916	0.25	0.324	0.15	0.095	0.11	0.041
10000	1407.4	0.42	1.000	0.27	0.353	0.16	0.104	0.11	0.045
10500	1477.8	0.44	1.088	0.28	0.384	0.17	0.113	0.12	0.049
11000	1548.2	0.46	1.178	0.29	0.416	0.18	0.122	0.12	0.053
11500	1618.5	0.48	1.272	0.31	0.448	0.18	0.132	0.13	0.057
12000	1688.9	0.50	1.369	0.32	0.482	0.19	0.142	0.13	0.061
12500	1759.3	0.52	1.468	0.33	0.517	0.20	0.152	0.14	0.065
13000	1829.6	0.54	1.571	0.35	0.553	0.21	0.162	0.14	0.070
13500	1900.0	0.56	1.677	0.36	0.590	0.21	0.173	0.15	0.074
14000	1970.4	0.58	1.786	0.37	0.628	0.22	0.184	0.16	0.079
14500	2040.7	0.60	1.898	0.39	0.668	0.23	0.196	0.16	0.084
15000	2111.1	0.62	2.012	0.40	0.708	0.24	0.207	0.17	0.089
15500	2181.5	0.65	2.130	0.42	0.749	0.25	0.219	0.17	0.094
16000	2251.9	0.67	2.250	0.43	0.791	0.25	0.231	0.18	0.099
16500	2322.2	0.69	2.374	0.44	0.834	0.26	0.244	0.18	0.105
17000	2392.6	0.71	2.500	0.46	0.878	0.27	0.257	0.19	0.110
17500	2463.0	0.73	2.629	0.47	0.923	0.28	0.270	0.19	0.116
18000	2533.3	0.75	2.761	0.48	0.969	0.29	0.283	0.20	0.122

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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]
18500	2603.7	0.77	2.895	0.50	1.016	0.29	0.297	0.21	0.127
19000	2674.1	0.79	3.033	0.51	1.064	0.30	0.311	0.21	0.133
19500	2744.5	0.81	3.173	0.52	1.113	0.31	0.325	0.22	0.139
20000	2814.8	0.83	3.316	0.54	1.163	0.32	0.340	0.22	0.146
20500	2885.2	0.85	3.462	0.55	1.214	0.33	0.354	0.23	0.152
21000	2955.6	0.87	3.610	0.56	1.266	0.33	0.369	0.23	0.158
21500	3025.9	0.90	3.761	0.58	1.318	0.34	0.385	0.24	0.165
22000	3096.3	0.92	3.915	0.59	1.372	0.35	0.400	0.24	0.171
22500	3166.7	0.94	4.072	0.60	1.427	0.36	0.416	0.25	0.178
23000	3237.1	0.96	4.231	0.62	1.482	0.37	0.432	0.26	0.185
23500	3307.4	0.98	4.393	0.63	1.539	0.37	0.448	0.26	0.192
24000	3377.8	1.00	4.558	0.64	1.596	0.38	0.465	0.27	0.199
24500	3448.2	1.02	4.725	0.66	1.654	0.39	0.482	0.27	0.206
25000	3518.5	1.04	4.895	0.67	1.713	0.40	0.499	0.28	0.214
25500	3588.9	1.06	5.068	0.68	1.774	0.41	0.516	0.28	0.221
26000	3659.3	1.08	5.243	0.70	1.835	0.41	0.534	0.29	0.229
26500	3729.6	1.10	5.421	0.71	1.896	0.42	0.552	0.29	0.236
27000	3800.0	1.12	5.602	0.72	1.959	0.43	0.570	0.30	0.244
27500	3870.4	1.15	5.785	0.74	2.023	0.44	0.589	0.31	0.252
28000	3940.8	1.17	5.970	0.75	2.088	0.45	0.607	0.31	0.260
28500	4011.1	1.19	6.159	0.76	2.153	0.45	0.626	0.32	0.268
29000	4081.5	1.21	6.349	0.78	2.219	0.46	0.645	0.32	0.276
29500	4151.9	1.23	6.543	0.79	2.287	0.47	0.665	0.33	0.284
30000	4222.2	1.25	6.739	0.80	2.355	0.48	0.684	0.33	0.293
32500	4574.1	1.35	7.757	0.87	2.708	0.52	0.787	0.36	0.336
35000	4925.9	1.46	8.838	0.94	3.083	0.56	0.895	0.39	0.382
37500	5277.8	1.56	9.981	1.00	3.480	0.60	1.009	0.42	0.431
40000	5629.7	1.67	11.185	1.07	3.897	0.64	1.129	0.44	0.482
42500	5981.5	1.77	12.451	1.14	4.336	0.68	1.256	0.47	0.536
45000	6333.4			1.21	4.794	0.72	1.388	0.50	0.592
47500	6685.2			1.27	5.274	0.76	1.525	0.53	0.650
50000	7037.1			1.34	5.773	0.80	1.669	0.56	0.711
52500	7388.9			1.41	6.292	0.84	1.818	0.58	0.775
55000	7740.8			1.47	6.831	0.88	1.973	0.61	0.840
57500	8092.6			1.54	7.389	0.92	2.133	0.64	0.908
60000	8444.5			1.61	7.967	0.96	2.299	0.67	0.979
62500	8796.3			1.67	8.565	0.99	2.470	0.70	1.051
65000	9148.2			1.74	9.182	1.03	2.647	0.72	1.126
67500	9500.0					1.07	2.829	0.75	1.203

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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]
70000	9851.9					1.11	3.016	0.78	1.283
72500	10203.7					1.15	3.209	0.81	1.364
75000	10555.6					1.19	3.407	0.83	1.448
77500	10907.5					1.23	3.610	0.86	1.534
80000	11259.3					1.27	3.819	0.89	1.622
82500	11611.2					1.31	4.033	0.92	1.713
85000	11963.0					1.35	4.251	0.95	1.805
87500	12314.9					1.39	4.475	0.97	1.900
90000	12666.7					1.43	4.705	1.00	1.997
92500	13018.6					1.47	4.939	1.03	2.096
95000	13370.4					1.51	5.178	1.06	2.197
97500	13722.3					1.55	5.422	1.08	2.300
100000	14074.1					1.59	5.672	1.11	2.405
105000	14777.8					1.67	6.185	1.17	2.622
110000	15481.5					1.75	6.719	1.22	2.847
115000	16185.3							1.28	3.081
120000	16889.0							1.33	3.322
125000	17592.7							1.39	3.572
130000	18296.4							1.45	3.830
135000	19000.1							1.50	4.095
140000	19703.8							1.56	4.369
145000	20407.5							1.61	4.651
150000	21111.2							1.67	4.940
155000	21814.9							1.72	5.237

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

Medium:	Water containing 50% glycol	Density:	1056.4 kg/m ³
Inlet flow temperature:	5 °C	Viscosity:	0.0059989 Pa·s
Return temperature:	12 °C	Specific thermal capacity:	3296 J/(kg·K)
Range:	7 K	Surface roughness:	0.007 mm
Average temperature:	8.5 °C		

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

d [mm]		16		20		25		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	0.07	1.022	0.04	0.323	0.03	0.132		
300	46.8	0.11	1.533	0.06	0.485	0.04	0.199		
400	62.4	0.15	2.044	0.08	0.647	0.05	0.265		
500	78.0	0.18	2.555	0.10	0.808	0.07	0.331		
600	93.6	0.22	3.066	0.12	0.970	0.08	0.397	0.04	0.131
700	109.2	0.25	3.577	0.14	1.132	0.09	0.464	0.05	0.153
800	124.8	0.29	4.088	0.16	1.293	0.10	0.530	0.06	0.175
900	140.4	0.33	4.599	0.18	1.455	0.12	0.596	0.07	0.196
1000	156.0	0.36	5.110	0.20	1.617	0.13	0.662	0.07	0.218
1100	171.6	0.40	5.621	0.22	1.779	0.14	0.728	0.08	0.240
1200	187.3	0.44	6.132	0.24	1.940	0.16	0.795	0.09	0.262
1300	202.9	0.47	6.643	0.27	2.102	0.17	0.861	0.10	0.284
1400	218.5	0.51	7.154	0.29	2.264	0.18	0.927	0.10	0.305
1500	234.1	0.54	7.665	0.31	2.425	0.20	0.993	0.11	0.327
1600	249.7	0.58	8.176	0.33	2.587	0.21	1.060	0.12	0.349
1700	265.3	0.62	8.687	0.35	2.749	0.22	1.126	0.13	0.371
1800	280.9	0.65	9.198	0.37	2.910	0.24	1.192	0.13	0.393
1900	296.5	0.69	9.709	0.39	3.072	0.25	1.258	0.14	0.414
2000	312.1	0.73	10.220	0.41	3.234	0.26	1.325	0.15	0.436
2500	390.1	0.91	12.775	0.51	4.042	0.33	1.656	0.19	0.545
3000	468.1	1.09	15.330	0.61	4.851	0.39	1.987	0.22	0.654
3500	546.1	1.27	32.920	0.71	5.659	0.46	2.318	0.26	0.763
4000	624.2	1.45	41.291	0.82	6.467	0.52	2.649	0.30	0.873
4500	702.2	1.63	50.460	0.92	13.026	0.59	2.980	0.34	0.982
5000	780.2	1.81	60.407	1.02	15.568	0.65	3.311	0.37	1.091
5500	858.2			1.12	18.302	0.72	6.411	0.41	1.200
6000	936.3			1.22	21.222	0.78	7.426	0.45	1.309
6500	1014.3			1.33	24.324	0.85	8.505	0.49	1.418
7000	1092.3			1.43	27.607	0.91	9.645	0.52	2.617
7500	1170.3			1.53	31.067	0.98	10.845	0.56	2.940
8000	1248.3			1.63	34.701	1.04	12.105	0.60	3.279
8500	1326.4			1.73	38.507	1.11	13.424	0.64	3.634

d [mm]		16		20		25		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]
9000	1404.4			1.84	42.484	1.18	14.801	0.67	4.003
9500	1482.4					1.24	16.235	0.71	4.388
10000	1560.4					1.31	17.726	0.75	4.788
10500	1638.4					1.37	19.273	0.79	5.202
11000	1716.5					1.44	20.875	0.82	5.631
11500	1794.5					1.50	22.533	0.86	6.075
12000	1872.5					1.57	24.245	0.90	6.533
12500	1950.5					1.63	26.011	0.94	7.005
13000	2028.6					1.70	27.830	0.97	7.491
13500	2106.6					1.76	29.703	1.01	7.991
14000	2184.6					1.83	31.628	1.05	8.505
14500	2262.6							1.09	9.033
15000	2340.6							1.12	9.575
15500	2418.7							1.16	10.129
16000	2496.7							1.20	10.698
16500	2574.7							1.24	11.279
17000	2652.7							1.27	11.874
17500	2730.7							1.31	12.483
18000	2808.8							1.35	13.104
18500	2886.8							1.39	13.738
19000	2964.8							1.42	14.385
19500	3042.8							1.46	15.045
20000	3120.9							1.50	15.718
20500	3198.9							1.54	16.404
21000	3276.9							1.57	17.102
21500	3354.9							1.61	17.813
22000	3432.9							1.65	18.537
22500	3511.0							1.69	19.273
23000	3589.0							1.72	20.022
23500	3667.0							1.76	20.783
24000	3745.0							1.80	21.556

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Table 10: Pressure loss in Geberit FlowFit 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]
1100	171.6	0.05	0.087						
1200	187.3	0.05	0.095						
1300	202.9	0.06	0.103						
1400	218.5	0.06	0.111						
1500	234.1	0.07	0.119						
1600	249.7	0.07	0.127						
1700	265.3	0.08	0.135						
1800	280.9	0.08	0.143						
1900	296.5	0.09	0.151						
2000	312.1	0.09	0.159						
2500	390.1	0.11	0.198	0.07	0.082				
3000	468.1	0.14	0.238	0.09	0.098				
3500	546.1	0.16	0.278	0.10	0.115				
4000	624.2	0.18	0.317	0.12	0.131				
4500	702.2	0.20	0.357	0.13	0.148				
5000	780.2	0.23	0.396	0.15	0.164	0.09	0.058	0.06	0.028
5500	858.2	0.25	0.436	0.16	0.180	0.09	0.064	0.07	0.031
6000	936.3	0.27	0.476	0.17	0.197	0.10	0.069	0.07	0.034
6500	1014.3	0.29	0.515	0.19	0.213	0.11	0.075	0.08	0.037
7000	1092.3	0.32	0.555	0.20	0.230	0.12	0.081	0.08	0.040
7500	1170.3	0.34	0.595	0.22	0.246	0.13	0.087	0.09	0.042
8000	1248.3	0.36	0.634	0.23	0.262	0.14	0.093	0.10	0.045
8500	1326.4	0.38	0.674	0.25	0.279	0.15	0.098	0.10	0.048
9000	1404.4	0.41	1.221	0.26	0.295	0.16	0.104	0.11	0.051
9500	1482.4	0.43	1.337	0.28	0.311	0.16	0.110	0.11	0.054
10000	1560.4	0.45	1.458	0.29	0.328	0.17	0.116	0.12	0.057
10500	1638.4	0.47	1.583	0.31	0.344	0.18	0.122	0.13	0.059
11000	1716.5	0.50	1.713	0.32	0.361	0.19	0.127	0.13	0.062
11500	1794.5	0.52	1.847	0.33	0.655	0.20	0.133	0.14	0.065
12000	1872.5	0.54	1.985	0.35	0.704	0.21	0.139	0.14	0.068
12500	1950.5	0.56	2.128	0.36	0.754	0.22	0.145	0.15	0.071
13000	2028.6	0.59	2.274	0.38	0.806	0.22	0.151	0.16	0.073
13500	2106.6	0.61	2.425	0.39	0.859	0.23	0.156	0.16	0.076
14000	2184.6	0.63	2.580	0.41	0.914	0.24	0.162	0.17	0.079
14500	2262.6	0.66	2.739	0.42	0.970	0.25	0.168	0.17	0.082
15000	2340.6	0.68	2.902	0.44	1.027	0.26	0.303	0.18	0.085
15500	2418.7	0.70	3.069	0.45	1.086	0.27	0.320	0.19	0.088
16000	2496.7	0.72	3.240	0.46	1.146	0.28	0.338	0.19	0.090

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]
16500	2574.7	0.75	3.415	0.48	1.207	0.28	0.356	0.20	0.093
17000	2652.7	0.77	3.594	0.49	1.270	0.29	0.374	0.21	0.096
17500	2730.7	0.79	3.777	0.51	1.334	0.30	0.393	0.21	0.169
18000	2808.8	0.81	3.964	0.52	1.400	0.31	0.412	0.22	0.178
18500	2886.8	0.84	4.154	0.54	1.467	0.32	0.432	0.22	0.186
19000	2964.8	0.86	4.349	0.55	1.535	0.33	0.452	0.23	0.195
19500	3042.8	0.88	4.547	0.57	1.605	0.34	0.472	0.24	0.203
20000	3120.9	0.90	4.749	0.58	1.676	0.35	0.493	0.24	0.212
20500	3198.9	0.93	4.955	0.60	1.748	0.35	0.514	0.25	0.221
21000	3276.9	0.95	5.164	0.61	1.821	0.36	0.535	0.25	0.230
21500	3354.9	0.97	5.378	0.62	1.896	0.37	0.557	0.26	0.240
22000	3432.9	0.99	5.595	0.64	1.972	0.38	0.579	0.27	0.249
22500	3511.0	1.02	5.815	0.65	2.050	0.39	0.602	0.27	0.259
23000	3589.0	1.04	6.040	0.67	2.128	0.40	0.625	0.28	0.269
23500	3667.0	1.06	6.268	0.68	2.208	0.41	0.648	0.28	0.279
24000	3745.0	1.08	6.500	0.70	2.290	0.41	0.672	0.29	0.289
24500	3823.0	1.11	6.735	0.71	2.372	0.42	0.696	0.30	0.299
25000	3901.1	1.13	6.974	0.73	2.456	0.43	0.720	0.30	0.310
25500	3979.1	1.15	7.216	0.74	2.541	0.44	0.745	0.31	0.320
26000	4057.1	1.17	7.463	0.76	2.627	0.45	0.770	0.31	0.331
26500	4135.1	1.20	7.712	0.77	2.714	0.46	0.795	0.32	0.342
27000	4213.2	1.22	7.965	0.78	2.803	0.47	0.821	0.33	0.353
27500	4291.2	1.24	8.222	0.80	2.893	0.47	0.847	0.33	0.364
28000	4369.2	1.27	8.483	0.81	2.984	0.48	0.874	0.34	0.376
28500	4447.2	1.29	8.746	0.83	3.076	0.49	0.901	0.34	0.387
29000	4525.2	1.31	9.014	0.84	3.170	0.50	0.928	0.35	0.399
29500	4603.3	1.33	9.285	0.86	3.264	0.51	0.955	0.36	0.411
30000	4681.3	1.36	9.559	0.87	3.360	0.52	0.983	0.36	0.422
32500	5071.4	1.47	10.983	0.94	3.858	0.56	1.128	0.39	0.484
35000	5461.5	1.58	12.492	1.02	4.385	0.60	1.281	0.42	0.550
37500	5851.6	1.69	14.085	1.09	4.941	0.65	1.443	0.45	0.619
40000	6241.7	1.81	15.761	1.16	5.526	0.69	1.612	0.48	0.691
42500	6631.8			1.24	6.139	0.73	1.790	0.51	0.767
45000	7021.9			1.31	6.780	0.78	1.976	0.54	0.846
47500	7412.0			1.38	7.448	0.82	2.169	0.57	0.929
50000	7802.1			1.45	8.144	0.86	2.370	0.60	1.015
52500	8192.2			1.53	8.866	0.91	2.580	0.63	1.104
55000	8582.4			1.60	9.616	0.95	2.796	0.66	1.196
57500	8972.5			1.67	10.392	0.99	3.021	0.69	1.292

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]
60000	9362.6			1.74	11.194	1.04	3.252	0.72	1.390
62500	9752.7			1.82	12.023	1.08	3.492	0.75	1.492
65000	10142.8			1.89	12.877	1.12	3.738	0.78	1.597
67500	10532.9					1.17	3.992	0.81	1.705
70000	10923.0					1.21	4.253	0.84	1.816
72500	11313.1					1.25	4.522	0.87	1.931
75000	11703.2					1.30	4.797	0.90	2.048
77500	12093.3					1.34	5.080	0.94	2.168
80000	12483.4					1.38	5.370	0.97	2.291
82500	12873.5					1.42	5.666	1.00	2.417
85000	13263.6					1.47	5.970	1.03	2.546
87500	13653.7					1.51	6.281	1.06	2.678
90000	14043.8					1.55	6.598	1.09	2.813
92500	14434.0					1.60	6.923	1.12	2.951
95000	14824.1					1.64	7.254	1.15	3.092
97500	15214.2					1.68	7.592	1.18	3.235
100000	15604.3					1.73	7.937	1.21	3.381
105000	16384.5					1.81	8.647	1.27	3.683
110000	17164.7							1.33	3.995
115000	17944.9							1.39	4.319
120000	18725.1							1.45	4.653
125000	19505.3							1.51	4.999
130000	20285.6							1.57	5.355
135000	21065.8							1.63	5.722
140000	21846.0							1.69	6.100
145000	22626.2							1.75	6.489
150000	23406.4							1.81	6.888

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

Medium:	Water containing 30 % glycol	Density:	1033.9 kg/m ³
Inlet flow temperature:	-2 °C	Viscosity:	0.0041 Pa·s
Return temperature:	1 °C	Specific thermal capacity:	3646 J/(kg·K)
Range:	3 K	Surface roughness:	0.007 mm
Average temperature:	-0.5 °C		

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

d [mm]		16		20		25		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	0.16	1.473	0.09	0.466	0.06	0.191		
300	98.7	0.23	2.210	0.13	0.699	0.08	0.286		
400	131.7	0.31	2.946	0.18	0.932	0.11	0.382		
500	164.6	0.39	3.683	0.22	1.165	0.14	0.477		
600	197.5	0.47	4.419	0.26	1.398	0.17	0.573	0.10	0.189
700	230.4	0.55	5.156	0.31	1.631	0.20	0.668	0.11	0.220
800	263.3	0.63	5.892	0.35	1.864	0.23	0.764	0.13	0.252
900	296.2	0.70	6.629	0.40	2.097	0.25	0.859	0.15	0.283
1000	329.1	0.78	7.365	0.44	2.330	0.28	0.955	0.16	0.314
1100	362.0	0.86	14.821	0.48	2.563	0.31	1.050	0.18	0.346
1200	395.0	0.94	17.177	0.53	2.796	0.34	1.145	0.19	0.377
1300	427.9	1.02	19.679	0.57	3.029	0.37	1.241	0.21	0.409
1400	460.8	1.09	22.326	0.62	5.765	0.39	1.336	0.23	0.440
1500	493.7	1.17	25.114	0.66	6.478	0.42	1.432	0.24	0.472
1600	526.6	1.25	28.043	0.70	7.226	0.45	1.527	0.26	0.503
1700	559.5	1.33	31.110	0.75	8.009	0.48	2.806	0.27	0.534
1800	592.4	1.41	34.313	0.79	8.826	0.51	3.091	0.29	0.566
1900	625.3	1.49	37.651	0.84	9.677	0.53	3.387	0.31	0.597
2000	658.3	1.56	41.122	0.88	10.561	0.56	3.694	0.32	0.629
2500	822.8	1.95	60.435	1.10	15.468	0.70	5.397	0.40	1.462
3000	987.4	2.35	82.914	1.32	21.161	0.84	7.368	0.48	1.992
3500	1151.9	2.74	108.453	1.54	27.611	0.99	9.597	0.57	2.589
4000	1316.5	3.13	136.974	1.76	34.795	1.13	12.077	0.65	3.252
4500	1481.1			1.98	42.696	1.27	14.799	0.73	3.979
5000	1645.6			2.20	51.297	1.41	17.759	0.81	4.768
5500	1810.2			2.42	60.586	1.55	20.951	0.89	5.618
6000	1974.8			2.64	70.550	1.69	24.371	0.97	6.528
6500	2139.3			2.86	81.180	1.83	28.017	1.05	7.497
7000	2303.9			3.08	92.468	1.97	31.883	1.13	8.523
7500	2468.5					2.11	35.968	1.21	9.606
8000	2633.0					2.25	40.269	1.29	10.745
8500	2797.6					2.39	44.783	1.37	11.939

d [mm]		16		20		25		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]
9000	2962.2					2.53	49.508	1.45	13.189
9500	3126.7					2.67	54.441	1.53	14.492
10000	3291.3					2.81	59.583	1.62	15.849
10500	3455.8					2.96	64.929	1.70	17.259
11000	3620.4					3.10	70.479	1.78	18.722
11500	3785.0							1.86	20.237
12000	3949.5							1.94	21.804
12500	4114.1							2.02	23.422
13000	4278.7							2.10	25.091
13500	4443.2							2.18	26.811
14000	4607.8							2.26	28.581
14500	4772.4							2.34	30.402
15000	4936.9							2.42	32.272
15500	5101.5							2.50	34.191
16000	5266.0							2.58	36.159
16500	5430.6							2.67	38.177
17000	5595.2							2.75	40.243
17500	5759.7							2.83	42.358
18000	5924.3							2.91	44.521
18500	6088.9							2.99	46.732
19000	6253.4							3.07	48.990

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

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	362.0	0.11	0.126						
1200	395.0	0.12	0.137						
1300	427.9	0.13	0.149						
1400	460.8	0.14	0.160						
1500	493.7	0.15	0.171						
1600	526.6	0.16	0.183						
1700	559.5	0.17	0.194						
1800	592.4	0.18	0.206						
1900	625.3	0.19	0.217						
2000	658.3	0.19	0.229						
2500	822.8	0.24	0.286	0.16	0.118				
3000	987.4	0.29	0.607	0.19	0.142				
3500	1151.9	0.34	0.787	0.22	0.165				

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]
4000	1316.5	0.39	0.988	0.25	0.350				
4500	1481.1	0.44	1.207	0.28	0.427				
5000	1645.6	0.49	1.444	0.31	0.511	0.19	0.151	0.13	0.041
5500	1810.2	0.54	1.700	0.34	0.601	0.20	0.177	0.14	0.045
6000	1974.8	0.58	1.974	0.38	0.697	0.22	0.205	0.16	0.088
6500	2139.3	0.63	2.264	0.41	0.799	0.24	0.235	0.17	0.101
7000	2303.9	0.68	2.572	0.44	0.907	0.26	0.266	0.18	0.115
7500	2468.5	0.73	2.897	0.47	1.021	0.28	0.299	0.20	0.129
8000	2633.0	0.78	3.238	0.50	1.140	0.30	0.334	0.21	0.144
8500	2797.6	0.83	3.595	0.53	1.265	0.32	0.371	0.22	0.159
9000	2962.2	0.88	3.969	0.56	1.396	0.33	0.409	0.23	0.176
9500	3126.7	0.93	4.359	0.59	1.532	0.35	0.448	0.25	0.193
10000	3291.3	0.97	4.764	0.63	1.674	0.37	0.490	0.26	0.210
10500	3455.8	1.02	5.185	0.66	1.821	0.39	0.532	0.27	0.229
11000	3620.4	1.07	5.622	0.69	1.974	0.41	0.577	0.29	0.247
11500	3785.0	1.12	6.073	0.72	2.131	0.43	0.622	0.30	0.267
12000	3949.5	1.17	6.540	0.75	2.294	0.45	0.670	0.31	0.287
12500	4114.1	1.22	7.023	0.78	2.462	0.47	0.719	0.33	0.308
13000	4278.7	1.27	7.520	0.81	2.636	0.48	0.769	0.34	0.330
13500	4443.2	1.31	8.031	0.85	2.814	0.50	0.821	0.35	0.352
14000	4607.8	1.36	8.558	0.88	2.998	0.52	0.874	0.36	0.374
14500	4772.4	1.41	9.099	0.91	3.186	0.54	0.928	0.38	0.398
15000	4936.9	1.46	9.655	0.94	3.380	0.56	0.984	0.39	0.422
15500	5101.5	1.51	10.225	0.97	3.578	0.58	1.042	0.40	0.446
16000	5266.0	1.56	10.810	1.00	3.782	0.60	1.101	0.42	0.471
16500	5430.6	1.61	11.409	1.03	3.990	0.61	1.161	0.43	0.497
17000	5595.2	1.66	12.022	1.06	4.203	0.63	1.223	0.44	0.523
17500	5759.7	1.70	12.649	1.10	4.421	0.65	1.286	0.46	0.550
18000	5924.3	1.75	13.290	1.13	4.644	0.67	1.350	0.47	0.577
18500	6088.9	1.80	13.946	1.16	4.872	0.69	1.416	0.48	0.605
19000	6253.4	1.85	14.615	1.19	5.104	0.71	1.483	0.49	0.634
19500	6418.0	1.90	15.298	1.22	5.342	0.73	1.551	0.51	0.663
20000	6582.6	1.95	15.994	1.25	5.584	0.74	1.621	0.52	0.693
20500	6747.1	2.00	16.705	1.28	5.830	0.76	1.693	0.53	0.723
21000	6911.7	2.05	17.429	1.32	6.082	0.78	1.765	0.55	0.754
21500	7076.2	2.09	18.167	1.35	6.337	0.80	1.839	0.56	0.785
22000	7240.8	2.14	18.918	1.38	6.598	0.82	1.914	0.57	0.817
22500	7405.4	2.19	19.683	1.41	6.863	0.84	1.990	0.59	0.850
23000	7569.9	2.24	20.461	1.44	7.133	0.86	2.068	0.60	0.883

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]
23500	7734.5	2.29	21.253	1.47	7.408	0.87	2.147	0.61	0.917
24000	7899.1	2.34	22.058	1.50	7.686	0.89	2.228	0.62	0.951
24500	8063.6	2.39	22.876	1.53	7.970	0.91	2.309	0.64	0.986
25000	8228.2	2.43	23.708	1.57	8.258	0.93	2.392	0.65	1.021
25500	8392.8	2.48	24.552	1.60	8.551	0.95	2.477	0.66	1.057
26000	8557.3	2.53	25.410	1.63	8.848	0.97	2.562	0.68	1.093
26500	8721.9	2.58	26.282	1.66	9.149	0.99	2.649	0.69	1.130
27000	8886.5	2.63	27.166	1.69	9.455	1.00	2.737	0.70	1.167
27500	9051.0	2.68	28.063	1.72	9.766	1.02	2.826	0.72	1.205
28000	9215.6	2.73	28.973	1.75	10.081	1.04	2.917	0.73	1.244
28500	9380.1	2.78	29.896	1.78	10.400	1.06	3.009	0.74	1.283
29000	9544.7	2.82	30.832	1.82	10.724	1.08	3.102	0.75	1.322
29500	9709.3	2.87	31.781	1.85	11.052	1.10	3.196	0.77	1.362
30000	9873.8	2.92	32.744	1.88	11.384	1.12	3.292	0.78	1.403
32500	10696.7	3.17	37.745	2.04	13.112	1.21	3.788	0.85	1.613
35000	11519.5			2.19	14.948	1.30	4.315	0.91	1.837
37500	12342.3			2.35	16.890	1.40	4.872	0.98	2.073
40000	13165.1			2.51	18.937	1.49	5.458	1.04	2.322
42500	13987.9			2.66	21.088	1.58	6.074	1.11	2.582
45000	14810.8			2.82	23.343	1.67	6.719	1.17	2.856
47500	15633.6			2.97	25.699	1.77	7.393	1.24	3.141
50000	16456.4			3.13	28.157	1.86	8.095	1.30	3.438
52500	17279.2					1.95	8.825	1.37	3.747
55000	18102.0					2.05	9.584	1.43	4.067
57500	18924.8					2.14	10.370	1.50	4.399
60000	19747.7					2.23	11.184	1.56	4.743
62500	20570.5					2.33	12.025	1.63	5.098
65000	21393.3					2.42	12.893	1.69	5.465
67500	22216.1					2.51	13.789	1.76	5.843
70000	23038.9					2.61	14.711	1.82	6.232
72500	23861.8					2.70	15.660	1.89	6.632
75000	24684.6					2.79	16.636	1.95	7.044
77500	25507.4					2.88	17.638	2.02	7.466
80000	26330.2					2.98	18.666	2.08	7.899
82500	27153.0					3.07	19.721	2.15	8.344
85000	27975.9							2.21	8.799
87500	28798.7							2.28	9.265
90000	29621.5							2.34	9.741
92500	30444.3							2.41	10.229

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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]
95000	31267.1							2.47	10.726
97500	32090.0							2.54	11.235
100000	32912.8							2.60	11.754
105000	34558.4							2.73	12.824
110000	36204.1							2.86	13.936
115000	37849.7							2.99	15.089
120000	39495.3							3.12	16.283

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

Medium:	Water containing 38% glycol	Density:	1042.9 kg/m ³
Inlet flow temperature:	-8 °C	Viscosity:	0.0069 Pa•s
Return temperature:	-4 °C	Specific thermal capacity:	3504 J/(kg•K)
Range:	4 K	Surface roughness:	0.007 mm
Average temperature:	-6 °C		

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

d [mm]		16		20		25		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	0.12	1.935	0.07	0.612	0.04	0.251		
300	77.1	0.18	2.902	0.10	0.918	0.07	0.376		
400	102.8	0.24	3.870	0.14	1.224	0.09	0.502		
500	128.4	0.30	4.837	0.17	1.530	0.11	0.627		
600	154.1	0.36	5.804	0.20	1.837	0.13	0.752	0.07	0.248
700	179.8	0.42	6.772	0.24	2.143	0.15	0.878	0.09	0.289
800	205.5	0.48	7.739	0.27	2.449	0.17	1.003	0.10	0.330
900	231.2	0.54	8.707	0.31	2.755	0.20	1.128	0.11	0.372
1000	256.9	0.60	9.674	0.34	3.061	0.22	1.254	0.12	0.413
1100	282.6	0.67	10.641	0.37	3.367	0.24	1.379	0.14	0.454
1200	308.3	0.73	11.609	0.41	3.673	0.26	1.505	0.15	0.496
1300	333.9	0.79	12.576	0.44	3.979	0.28	1.630	0.16	0.537
1400	359.6	0.85	13.544	0.48	4.285	0.30	1.755	0.17	0.578
1500	385.3	0.91	14.511	0.51	4.591	0.33	1.881	0.19	0.619
1600	411.0	0.97	15.479	0.54	4.898	0.35	2.006	0.20	0.661
1700	436.7	1.03	16.446	0.58	5.204	0.37	2.131	0.21	0.702
1800	462.4	1.09	17.413	0.61	5.510	0.39	2.257	0.22	0.743
1900	488.1	1.15	18.381	0.65	5.816	0.41	2.382	0.24	0.785
2000	513.8	1.21	19.348	0.68	6.122	0.44	2.508	0.25	0.826
2500	642.2	1.51	45.613	0.85	7.652	0.54	3.134	0.31	1.032
3000	770.6	1.81	62.182	1.02	16.060	0.65	3.761	0.37	1.239
3500	899.1	2.12	80.901	1.19	20.846	0.76	4.388	0.44	1.445
4000	1027.5	2.42	101.704	1.36	26.153	0.87	9.156	0.50	1.652
4500	1156.0	2.72	124.535	1.53	31.966	0.98	11.176	0.56	1.858
5000	1284.4	3.02	149.344	1.70	38.273	1.09	13.366	0.62	3.625
5500	1412.8			1.87	45.063	1.20	15.720	0.69	4.259
6000	1541.3			2.04	52.326	1.31	18.236	0.75	4.935
6500	1669.7			2.21	60.053	1.42	20.911	0.81	5.652
7000	1798.2			2.38	68.237	1.52	23.741	0.87	6.411
7500	1926.6			2.55	76.873	1.63	26.725	0.94	7.211
8000	2055.0			2.72	85.953	1.74	29.860	1.00	8.050
8500	2183.5			2.89	95.473	1.85	33.145	1.06	8.928

d [mm]		16		20		25		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]
9000	2311.9			3.06	105.426	1.96	36.576	1.12	9.845
9500	2440.3					2.07	40.154	1.19	10.801
10000	2568.8					2.18	43.876	1.25	11.794
10500	2697.2					2.29	47.741	1.31	12.824
11000	2825.7					2.40	51.746	1.37	13.892
11500	2954.1					2.50	55.892	1.44	14.996
12000	3082.5					2.61	60.177	1.50	16.137
12500	3211.0					2.72	64.600	1.56	17.314
13000	3339.4					2.83	69.160	1.62	18.526
13500	3467.9					2.94	73.854	1.69	19.774
14000	3596.3					3.05	78.684	1.75	21.057
14500	3724.7							1.81	22.375
15000	3853.2							1.87	23.727
15500	3981.6							1.94	25.114
16000	4110.1							2.00	26.535
16500	4238.5							2.06	27.991
17000	4366.9							2.12	29.480
17500	4495.4							2.19	31.002
18000	4623.8							2.25	32.559
18500	4752.3							2.31	34.148
19000	4880.7							2.37	35.770
19500	5009.1							2.44	37.426
20000	5137.6							2.50	39.113
20500	5266.0							2.56	40.834
21000	5394.5							2.62	42.587
21500	5522.9							2.69	44.372
22000	5651.3							2.75	46.190
22500	5779.8							2.81	48.039
23000	5908.2							2.87	49.920
23500	6036.6							2.94	51.833
24000	6165.1							3.00	53.778
24500	6293.5							3.06	55.754

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Table 14: Pressure loss in Geberit FlowFit system pipes, cold water replacement containing 30 % glycol, inlet flow -8 °C / return flow -4 °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	282.6	0.08	0.165						
1200	308.3	0.09	0.180						
1300	333.9	0.10	0.195						
1400	359.6	0.11	0.210						
1500	385.3	0.11	0.225						
1600	411.0	0.12	0.240						
1700	436.7	0.13	0.255						
1800	462.4	0.14	0.270						
1900	488.1	0.14	0.285						
2000	513.8	0.15	0.300						
2500	642.2	0.19	0.375	0.12	0.155				
3000	770.6	0.23	0.450	0.15	0.186				
3500	899.1	0.26	0.525	0.17	0.217				
4000	1027.5	0.30	0.600	0.19	0.248				
4500	1156.0	0.34	0.676	0.22	0.279				
5000	1284.4	0.38	0.751	0.24	0.310	0.14	0.110	0.10	0.054
5500	1412.8	0.41	0.826	0.27	0.341	0.16	0.121	0.11	0.059
6000	1541.3	0.45	0.901	0.29	0.372	0.17	0.132	0.12	0.064
6500	1669.7	0.49	1.722	0.31	0.403	0.19	0.142	0.13	0.070
7000	1798.2	0.53	1.952	0.34	0.434	0.20	0.153	0.14	0.075
7500	1926.6	0.57	2.194	0.36	0.466	0.22	0.164	0.15	0.080
8000	2055.0	0.60	2.447	0.39	0.868	0.23	0.175	0.16	0.086
8500	2183.5	0.64	2.712	0.41	0.962	0.24	0.186	0.17	0.091
9000	2311.9	0.68	2.989	0.44	1.059	0.26	0.197	0.18	0.096
9500	2440.3	0.72	3.277	0.46	1.160	0.27	0.208	0.19	0.102
10000	2568.8	0.75	3.576	0.48	1.266	0.29	0.219	0.20	0.107
10500	2697.2	0.79	3.887	0.51	1.375	0.30	0.405	0.21	0.112
11000	2825.7	0.83	4.208	0.53	1.488	0.32	0.438	0.22	0.118
11500	2954.1	0.87	4.540	0.56	1.605	0.33	0.473	0.23	0.123
12000	3082.5	0.90	4.883	0.58	1.725	0.35	0.508	0.24	0.219
12500	3211.0	0.94	5.237	0.61	1.850	0.36	0.544	0.25	0.235
13000	3339.4	0.98	5.601	0.63	1.978	0.37	0.582	0.26	0.251
13500	3467.9	1.02	5.976	0.65	2.109	0.39	0.620	0.27	0.267
14000	3596.3	1.05	6.361	0.68	2.244	0.40	0.660	0.28	0.284
14500	3724.7	1.09	6.756	0.70	2.383	0.42	0.700	0.29	0.302
15000	3853.2	1.13	7.162	0.73	2.525	0.43	0.742	0.30	0.319
15500	3981.6	1.17	7.578	0.75	2.671	0.45	0.784	0.31	0.338
16000	4110.1	1.21	8.004	0.78	2.820	0.46	0.828	0.32	0.356

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]
16500	4238.5	1.24	8.440	0.80	2.973	0.48	0.872	0.33	0.375
17000	4366.9	1.28	8.886	0.82	3.129	0.49	0.918	0.34	0.395
17500	4495.4	1.32	9.342	0.85	3.289	0.50	0.964	0.35	0.415
18000	4623.8	1.36	9.808	0.87	3.452	0.52	1.012	0.36	0.435
18500	4752.3	1.39	10.283	0.90	3.619	0.53	1.060	0.37	0.456
19000	4880.7	1.43	10.769	0.92	3.789	0.55	1.110	0.38	0.477
19500	5009.1	1.47	11.264	0.94	3.962	0.56	1.160	0.39	0.499
20000	5137.6	1.51	11.768	0.97	4.138	0.58	1.211	0.40	0.521
20500	5266.0	1.54	12.283	0.99	4.318	0.59	1.264	0.41	0.543
21000	5394.5	1.58	12.806	1.02	4.501	0.60	1.317	0.42	0.566
21500	5522.9	1.62	13.340	1.04	4.688	0.62	1.371	0.43	0.589
22000	5651.3	1.66	13.882	1.07	4.877	0.63	1.426	0.44	0.613
22500	5779.8	1.70	14.435	1.09	5.070	0.65	1.482	0.45	0.636
23000	5908.2	1.73	14.996	1.11	5.266	0.66	1.539	0.46	0.661
23500	6036.6	1.77	15.567	1.14	5.466	0.68	1.597	0.47	0.686
24000	6165.1	1.81	16.147	1.16	5.668	0.69	1.656	0.48	0.711
24500	6293.5	1.85	16.736	1.19	5.874	0.71	1.716	0.49	0.736
25000	6422.0	1.88	17.335	1.21	6.083	0.72	1.777	0.50	0.762
25500	6550.4	1.92	17.943	1.24	6.295	0.73	1.838	0.51	0.789
26000	6678.8	1.96	18.560	1.26	6.511	0.75	1.901	0.52	0.815
26500	6807.3	2.00	19.186	1.28	6.729	0.76	1.964	0.53	0.842
27000	6935.7	2.03	19.821	1.31	6.951	0.78	2.028	0.54	0.870
27500	7064.2	2.07	20.465	1.33	7.175	0.79	2.093	0.55	0.898
28000	7192.6	2.11	21.118	1.36	7.403	0.81	2.160	0.56	0.926
28500	7321.0	2.15	21.781	1.38	7.634	0.82	2.226	0.57	0.954
29000	7449.5	2.19	22.452	1.41	7.868	0.84	2.294	0.58	0.983
29500	7577.9	2.22	23.132	1.43	8.105	0.85	2.363	0.59	1.013
30000	7706.4	2.26	23.820	1.45	8.345	0.86	2.433	0.60	1.042
32500	8348.6	2.45	27.398	1.57	9.591	0.94	2.793	0.65	1.196
35000	8990.8	2.64	31.193	1.70	10.912	1.01	3.176	0.70	1.359
37500	9632.9	2.83	35.203	1.82	12.307	1.08	3.579	0.75	1.531
40000	10275.1	3.01	39.426	1.94	13.774	1.15	4.003	0.80	1.712
42500	10917.3			2.06	15.315	1.22	4.448	0.86	1.901
45000	11559.5			2.18	16.926	1.30	4.913	0.91	2.099
47500	12201.7			2.30	18.608	1.37	5.398	0.96	2.306
50000	12843.9			2.42	20.359	1.44	5.903	1.01	2.521
52500	13486.1			2.54	22.181	1.51	6.428	1.06	2.744
55000	14128.3			2.67	24.070	1.58	6.972	1.11	2.975
57500	14770.5			2.79	26.027	1.66	7.536	1.16	3.214

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]
60000	15412.7			2.91	28.052	1.73	8.118	1.21	3.462
62500	16054.9			3.03	30.144	1.80	8.720	1.26	3.717
65000	16697.1					1.87	9.340	1.31	3.981
67500	17339.3					1.94	9.979	1.36	4.252
70000	17981.5					2.02	10.637	1.41	4.531
72500	18623.7					2.09	11.313	1.46	4.818
75000	19265.9					2.16	12.008	1.51	5.113
77500	19908.1					2.23	12.720	1.56	5.415
80000	20550.3					2.30	13.451	1.61	5.725
82500	21192.5					2.38	14.200	1.66	6.042
85000	21834.7					2.45	14.966	1.71	6.367
87500	22476.9					2.52	15.751	1.76	6.699
90000	23119.1					2.59	16.553	1.81	7.039
92500	23761.3					2.66	17.373	1.86	7.386
95000	24403.5					2.74	18.210	1.91	7.741
97500	25045.7					2.81	19.065	1.96	8.103
100000	25687.9					2.88	19.937	2.01	8.472
105000	26972.3					3.02	21.733	2.11	9.232
110000	28256.7							2.21	10.020
115000	29541.0							2.31	10.838
120000	30825.4							2.41	11.683
125000	32109.8							2.51	12.557
130000	33394.2							2.62	13.458
135000	34678.6							2.72	14.388
140000	35963.0							2.82	15.344
145000	37247.4							2.92	16.328
150000	38531.8							3.02	17.340

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4 Pressure loss in Geberit FlowFit, 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 45 °C / return flow 35 °C

Medium:	Water	Density:	992.2 kg/m ³
Inlet flow temperature:	45 °C	Viscosity:	0.0006533 Pa•s
Return temperature:	35 °C	Specific thermal capacity:	4182 J/(kg•K)
Range:	10 K	Surface roughness:	0.007 mm
Average temperature:	40 °C		

Table 15: Pressure loss in Geberit FlowFit system pipes, heating, inlet flow 45 °C / return flow 35 °C, d16–32

d [mm]		16		20		25		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	0.04	0.062	0.02	0.020	0.02	0.008		
300	25.8	0.06	0.093	0.04	0.029	0.02	0.012		
400	34.4	0.09	0.124	0.05	0.039	0.03	0.016		
500	43.0	0.11	0.155	0.06	0.049	0.04	0.020	0.02	0.007
600	51.6	0.13	0.322	0.07	0.059	0.05	0.024	0.03	0.008
700	60.3	0.15	0.418	0.08	0.069	0.05	0.028	0.03	0.009
800	68.9	0.17	0.524	0.10	0.135	0.06	0.032	0.04	0.011
900	77.5	0.19	0.641	0.11	0.165	0.07	0.036	0.04	0.012
1000	86.1	0.21	0.768	0.12	0.198	0.08	0.069	0.04	0.013
1100	94.7	0.23	0.904	0.13	0.232	0.08	0.081	0.05	0.015
1200	103.3	0.26	1.050	0.14	0.270	0.09	0.094	0.05	0.016
1300	111.9	0.28	1.205	0.16	0.309	0.10	0.108	0.06	0.017
1400	120.5	0.30	1.370	0.17	0.351	0.11	0.122	0.06	0.033
1500	129.1	0.32	1.543	0.18	0.395	0.12	0.138	0.07	0.037
1600	137.7	0.34	1.726	0.19	0.441	0.12	0.154	0.07	0.042
1700	146.3	0.36	1.917	0.20	0.490	0.13	0.171	0.07	0.046
1800	154.9	0.38	2.118	0.22	0.540	0.14	0.188	0.08	0.051
1900	163.6	0.40	2.327	0.23	0.593	0.15	0.206	0.08	0.056
2000	172.2	0.43	2.544	0.24	0.648	0.15	0.225	0.09	0.061
2500	215.2	0.53	3.759	0.30	0.954	0.19	0.331	0.11	0.089
3000	258.2	0.64	5.179	0.36	1.310	0.23	0.454	0.13	0.122
3500	301.3	0.75	6.799	0.42	1.716	0.27	0.593	0.15	0.159
4000	344.3	0.85	8.615	0.48	2.168	0.31	0.748	0.18	0.200
4500	387.4	0.96	10.623	0.54	2.668	0.35	0.919	0.20	0.245

d [mm]		16		20		25		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]
5000	430.4	1.07	12.819	0.60	3.213	0.38	1.105	0.22	0.295
5500	473.5	1.17	15.202	0.66	3.802	0.42	1.306	0.24	0.348
6000	516.5	1.28	17.769	0.72	4.436	0.46	1.522	0.26	0.405
6500	559.5	1.39	20.518	0.78	5.114	0.50	1.753	0.29	0.466
7000	602.6	1.49	23.448	0.84	5.835	0.54	1.998	0.31	0.530
7500	645.6	1.60	26.558	0.90	6.599	0.58	2.257	0.33	0.598
8000	688.7	1.70	29.846	0.96	7.405	0.61	2.531	0.35	0.670
8500	731.7	1.81	33.311	1.02	8.253	0.65	2.818	0.37	0.746
9000	774.7	1.92	36.952	1.08	9.143	0.69	3.119	0.40	0.825
9500	817.8	2.02	40.769	1.14	10.074	0.73	3.434	0.42	0.907
10000	860.8	2.13	44.760	1.20	11.046	0.77	3.763	0.44	0.993
10500	903.9	2.24	48.924	1.26	12.059	0.81	4.105	0.46	1.082
11000	946.9	2.34	53.262	1.32	13.113	0.84	4.460	0.48	1.175
11500	990.0	2.45	57.772	1.38	14.208	0.88	4.829	0.51	1.271
12000	1033.0	2.56	62.454	1.44	15.342	0.92	5.211	0.53	1.371
12500	1076.0	2.66	67.308	1.50	16.517	0.96	5.606	0.55	1.474
13000	1119.1	2.77	72.333	1.56	17.732	1.00	6.014	0.57	1.580
13500	1162.1	2.88	77.527	1.62	18.986	1.04	6.436	0.59	1.690
14000	1205.2	2.98	82.892	1.68	20.280	1.07	6.870	0.62	1.803
14500	1248.2	3.09	88.428	1.74	21.614	1.11	7.317	0.64	1.919
15000	1291.2			1.80	22.987	1.15	7.778	0.66	2.039
15500	1334.3			1.86	24.399	1.19	8.251	0.68	2.161
16000	1377.3			1.92	25.850	1.23	8.736	0.70	2.287
16500	1420.4			1.98	27.341	1.27	9.235	0.73	2.416
17000	1463.4			2.04	28.870	1.30	9.746	0.75	2.549
17500	1506.5			2.10	30.438	1.34	10.270	0.77	2.684
18000	1549.5			2.16	32.045	1.38	10.806	0.79	2.823
18500	1592.5			2.22	33.690	1.42	11.355	0.81	2.965
19000	1635.6			2.28	35.374	1.46	11.917	0.84	3.110
19500	1678.6			2.34	37.097	1.50	12.491	0.86	3.258
20000	1721.7			2.40	38.858	1.53	13.078	0.88	3.409
20500	1764.7			2.46	40.657	1.57	13.677	0.90	3.564
21000	1807.7			2.52	42.494	1.61	14.288	0.92	3.721
21500	1850.8			2.58	44.370	1.65	14.912	0.95	3.882
22000	1893.8			2.64	46.284	1.69	15.548	0.97	4.045
22500	1936.9			2.70	48.236	1.73	16.197	0.99	4.212
23000	1979.9			2.76	50.226	1.76	16.857	1.01	4.382
23500	2023.0			2.82	52.254	1.80	17.530	1.03	4.555
24000	2066.0			2.88	54.320	1.84	18.216	1.06	4.731

d [mm]		16		20		25		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]
24500	2109.0			2.94	56.424	1.88	18.913	1.08	4.910
25000	2152.1			3.00	58.565	1.92	19.623	1.10	5.092
25500	2195.1					1.96	20.345	1.12	5.277
26000	2238.2					1.99	21.079	1.14	5.465
26500	2281.2					2.03	21.825	1.17	5.656
27000	2324.2					2.07	22.583	1.19	5.851
27500	2367.3					2.11	23.354	1.21	6.048
28000	2410.3					2.15	24.136	1.23	6.248
28500	2453.4					2.19	24.931	1.25	6.451
29000	2496.4					2.22	25.738	1.28	6.657
29500	2539.5					2.26	26.556	1.30	6.866
30000	2582.5					2.30	27.387	1.32	7.079
32500	2797.7					2.49	31.721	1.43	8.184
35000	3012.9					2.68	36.353	1.54	9.363
37500	3228.1					2.88	41.282	1.65	10.615
40000	3443.3					3.07	46.506	1.76	11.939
42500	3658.5							1.87	13.336
45000	3873.7							1.98	14.805
47500	4089.0							2.09	16.346
50000	4304.2							2.20	17.957
52500	4519.4							2.31	19.640
55000	4734.6							2.42	21.393
57500	4949.8							2.53	23.216
60000	5165.0							2.64	25.110
62500	5380.2							2.75	27.074
65000	5595.4							2.86	29.107
67500	5810.6							2.97	31.210
70000	6025.8							3.08	33.383

Table 16: Pressure loss in Geberit FlowFit system pipes, heating, inlet flow 45 °C / return flow 35 °C, d40–75

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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]
900	77.5	0.02	0.004						
1000	86.1	0.03	0.005						
1100	94.7	0.03	0.005						
1200	103.3	0.03	0.006						
1300	111.9	0.03	0.006						
1400	120.5	0.04	0.007						

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]
1500	129.1	0.04	0.007						
1600	137.7	0.04	0.008						
1700	146.3	0.05	0.014	0.03	0.003				
1800	154.9	0.05	0.015	0.03	0.004				
1900	163.6	0.05	0.017	0.03	0.004				
2000	172.2	0.05	0.019	0.03	0.004				
2500	215.2	0.07	0.027	0.04	0.010				
3000	258.2	0.08	0.037	0.05	0.013				
3500	301.3	0.09	0.048	0.06	0.017	0.04	0.005		
4000	344.3	0.11	0.060	0.07	0.021	0.04	0.006		
4500	387.4	0.12	0.074	0.08	0.026	0.05	0.008		
5000	430.4	0.13	0.089	0.09	0.031	0.05	0.009		
5500	473.5	0.15	0.105	0.09	0.037	0.06	0.011	0.04	0.005
6000	516.5	0.16	0.122	0.10	0.043	0.06	0.012	0.04	0.005
6500	559.5	0.17	0.140	0.11	0.049	0.07	0.014	0.05	0.006
7000	602.6	0.19	0.159	0.12	0.056	0.07	0.016	0.05	0.007
7500	645.6	0.20	0.179	0.13	0.063	0.08	0.018	0.05	0.008
8000	688.7	0.21	0.201	0.14	0.070	0.08	0.021	0.06	0.009
8500	731.7	0.23	0.223	0.15	0.078	0.09	0.023	0.06	0.010
9000	774.7	0.24	0.247	0.15	0.086	0.09	0.025	0.06	0.011
9500	817.8	0.25	0.271	0.16	0.095	0.10	0.028	0.07	0.012
10000	860.8	0.27	0.297	0.17	0.104	0.10	0.030	0.07	0.013
10500	903.9	0.28	0.323	0.18	0.113	0.11	0.033	0.07	0.014
11000	946.9	0.29	0.351	0.19	0.122	0.11	0.036	0.08	0.015
11500	990.0	0.31	0.379	0.20	0.132	0.12	0.038	0.08	0.016
12000	1033.0	0.32	0.409	0.20	0.143	0.12	0.041	0.09	0.018
12500	1076.0	0.33	0.439	0.21	0.153	0.13	0.044	0.09	0.019
13000	1119.1	0.35	0.471	0.22	0.164	0.13	0.048	0.09	0.020
13500	1162.1	0.36	0.503	0.23	0.175	0.14	0.051	0.10	0.022
14000	1205.2	0.37	0.536	0.24	0.187	0.14	0.054	0.10	0.023
14500	1248.2	0.38	0.571	0.25	0.199	0.15	0.058	0.10	0.025
15000	1291.2	0.40	0.606	0.26	0.211	0.15	0.061	0.11	0.026
15500	1334.3	0.41	0.642	0.26	0.224	0.16	0.065	0.11	0.028
16000	1377.3	0.42	0.679	0.27	0.236	0.16	0.068	0.11	0.029
16500	1420.4	0.44	0.717	0.28	0.250	0.17	0.072	0.12	0.031
17000	1463.4	0.45	0.756	0.29	0.263	0.17	0.076	0.12	0.032
17500	1506.5	0.46	0.796	0.30	0.277	0.18	0.080	0.12	0.034
18000	1549.5	0.48	0.837	0.31	0.291	0.18	0.084	0.13	0.036
18500	1592.5	0.49	0.879	0.32	0.305	0.19	0.088	0.13	0.038

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]
19000	1635.6	0.50	0.921	0.32	0.320	0.19	0.092	0.13	0.039
19500	1678.6	0.52	0.965	0.33	0.335	0.20	0.097	0.14	0.041
20000	1721.7	0.53	1.009	0.34	0.350	0.20	0.101	0.14	0.043
20500	1764.7	0.54	1.054	0.35	0.366	0.21	0.106	0.15	0.045
21000	1807.7	0.56	1.101	0.36	0.382	0.21	0.110	0.15	0.047
21500	1850.8	0.57	1.148	0.37	0.398	0.22	0.115	0.15	0.049
22000	1893.8	0.58	1.196	0.38	0.415	0.22	0.120	0.16	0.051
22500	1936.9	0.60	1.245	0.38	0.432	0.23	0.124	0.16	0.053
23000	1979.9	0.61	1.294	0.39	0.449	0.23	0.129	0.16	0.055
23500	2023.0	0.62	1.345	0.40	0.466	0.24	0.134	0.17	0.057
24000	2066.0	0.64	1.397	0.41	0.484	0.24	0.139	0.17	0.059
24500	2109.0	0.65	1.449	0.42	0.502	0.25	0.145	0.17	0.062
25000	2152.1	0.66	1.502	0.43	0.520	0.25	0.150	0.18	0.064
25500	2195.1	0.68	1.556	0.44	0.539	0.26	0.155	0.18	0.066
26000	2238.2	0.69	1.611	0.44	0.558	0.26	0.161	0.18	0.068
26500	2281.2	0.70	1.667	0.45	0.577	0.27	0.166	0.19	0.071
27000	2324.2	0.72	1.724	0.46	0.597	0.27	0.172	0.19	0.073
27500	2367.3	0.73	1.782	0.47	0.616	0.28	0.177	0.19	0.075
28000	2410.3	0.74	1.840	0.48	0.637	0.28	0.183	0.20	0.078
28500	2453.4	0.76	1.899	0.49	0.657	0.29	0.189	0.20	0.080
29000	2496.4	0.77	1.959	0.49	0.678	0.29	0.195	0.21	0.083
29500	2539.5	0.78	2.020	0.50	0.698	0.30	0.201	0.21	0.085
30000	2582.5	0.80	2.082	0.51	0.720	0.30	0.207	0.21	0.088
32500	2797.7	0.86	2.404	0.55	0.830	0.33	0.238	0.23	0.101
35000	3012.9	0.93	2.747	0.60	0.948	0.36	0.272	0.25	0.115
37500	3228.1	1.00	3.110	0.64	1.072	0.38	0.307	0.27	0.130
40000	3443.3	1.06	3.495	0.68	1.204	0.41	0.345	0.28	0.146
42500	3658.5	1.13	3.899	0.73	1.342	0.43	0.384	0.30	0.163
45000	3873.7	1.19	4.324	0.77	1.487	0.46	0.425	0.32	0.180
47500	4089.0	1.26	4.769	0.81	1.639	0.48	0.468	0.34	0.198
50000	4304.2	1.33	5.234	0.85	1.797	0.51	0.513	0.35	0.217
52500	4519.4	1.39	5.719	0.90	1.962	0.53	0.560	0.37	0.237
55000	4734.6	1.46	6.223	0.94	2.134	0.56	0.609	0.39	0.257
57500	4949.8	1.53	6.748	0.98	2.312	0.58	0.659	0.41	0.278
60000	5165.0	1.59	7.292	1.02	2.497	0.61	0.711	0.43	0.300
62500	5380.2	1.66	7.855	1.07	2.689	0.63	0.765	0.44	0.323
65000	5595.4	1.73	8.439	1.11	2.887	0.66	0.821	0.46	0.347
67500	5810.6	1.79	9.041	1.15	3.091	0.68	0.879	0.48	0.371
70000	6025.8	1.86	9.663	1.19	3.302	0.71	0.938	0.50	0.396

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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]
72500	6241.0	1.92	10.304	1.24	3.519	0.74	0.999	0.51	0.421
75000	6456.2	1.99	10.964	1.28	3.742	0.76	1.062	0.53	0.448
77500	6671.4	2.06	11.644	1.32	3.972	0.79	1.127	0.55	0.475
80000	6886.7	2.12	12.342	1.37	4.208	0.81	1.193	0.57	0.503
82500	7101.9	2.19	13.060	1.41	4.450	0.84	1.262	0.58	0.531
85000	7317.1	2.26	13.796	1.45	4.699	0.86	1.331	0.60	0.561
87500	7532.3	2.32	14.552	1.49	4.954	0.89	1.403	0.62	0.591
90000	7747.5	2.39	15.326	1.54	5.215	0.91	1.476	0.64	0.621
92500	7962.7	2.46	16.120	1.58	5.482	0.94	1.551	0.66	0.653
95000	8177.9	2.52	16.932	1.62	5.756	0.96	1.628	0.67	0.685
97500	8393.1	2.59	17.763	1.66	6.036	0.99	1.706	0.69	0.718
100000	8608.3	2.65	18.613	1.71	6.322	1.01	1.786	0.71	0.751
105000	9038.7	2.79	20.369	1.79	6.912	1.07	1.952	0.74	0.820
110000	9469.2	2.92	22.200	1.88	7.527	1.12	2.124	0.78	0.892
115000	9899.6	3.05	24.105	1.96	8.167	1.17	2.302	0.82	0.967
120000	10330.0			2.05	8.830	1.22	2.487	0.85	1.044
125000	10760.4			2.13	9.518	1.27	2.679	0.89	1.124
130000	11190.8			2.22	10.230	1.32	2.877	0.92	1.207
135000	11621.2			2.30	10.967	1.37	3.082	0.96	1.292
140000	12051.6			2.39	11.727	1.42	3.294	0.99	1.380
145000	12482.1			2.47	12.511	1.47	3.512	1.03	1.471
150000	12912.5			2.56	13.319	1.52	3.736	1.06	1.564
155000	13342.9			2.65	14.151	1.57	3.967	1.10	1.660
160000	13773.3			2.73	15.007	1.62	4.204	1.13	1.759
165000	14203.7			2.82	15.887	1.67	4.448	1.17	1.860
170000	14634.1			2.90	16.790	1.72	4.698	1.20	1.964
175000	15064.6			2.99	17.717	1.78	4.954	1.24	2.070
180000	15495.0			3.07	18.668	1.83	5.217	1.28	2.179
185000	15925.4					1.88	5.486	1.31	2.291
190000	16355.8					1.93	5.761	1.35	2.405
195000	16786.2					1.98	6.043	1.38	2.522
200000	17216.6					2.03	6.331	1.42	2.642
205000	17647.1					2.08	6.625	1.45	2.763
210000	18077.5					2.13	6.926	1.49	2.888
215000	18507.9					2.18	7.233	1.52	3.015
220000	18938.3					2.23	7.546	1.56	3.145
225000	19368.7					2.28	7.865	1.59	3.277
230000	19799.1					2.33	8.191	1.63	3.411
235000	20229.6					2.38	8.523	1.67	3.549

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]
240000	20660.0					2.43	8.861	1.70	3.688
245000	21090.4					2.49	9.205	1.74	3.830
250000	21520.8					2.54	9.555	1.77	3.975
255000	21951.2					2.59	9.912	1.81	4.122
260000	22381.6					2.64	10.274	1.84	4.272
265000	22812.1					2.69	10.643	1.88	4.424
270000	23242.5					2.74	11.018	1.91	4.579
275000	23672.9					2.79	11.399	1.95	4.736
280000	24103.3					2.84	11.787	1.98	4.896
285000	24533.7					2.89	12.180	2.02	5.058
290000	24964.1					2.94	12.580	2.06	5.223
295000	25394.5					2.99	12.985	2.09	5.390
300000	25825.0					3.04	13.397	2.13	5.560
305000	26255.4							2.16	5.732
310000	26685.8							2.20	5.906
315000	27116.2							2.23	6.083
320000	27546.6							2.27	6.263
325000	27977.0							2.30	6.445
330000	28407.5							2.34	6.629
335000	28837.9							2.37	6.816
340000	29268.3							2.41	7.005
345000	29698.7							2.45	7.197
350000	30129.1							2.48	7.391
355000	30559.5							2.52	7.587
360000	30990.0							2.55	7.786
365000	31420.4							2.59	7.988
370000	31850.8							2.62	8.192
375000	32281.2							2.66	8.398
380000	32711.6							2.69	8.607
385000	33142.0							2.73	8.818
390000	33572.5							2.76	9.032
395000	34002.9							2.80	9.248
400000	34433.3							2.83	9.466
405000	34863.7							2.87	9.687
410000	35294.1							2.91	9.910
415000	35724.5							2.94	10.136
420000	36154.9							2.98	10.364
425000	36585.4							3.01	10.595

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

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

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

d [mm]		16		20		25		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	0.04	0.052	0.02	0.016	0.02	0.007		
300	25.8	0.06	0.078	0.04	0.025	0.02	0.010		
400	34.4	0.09	0.104	0.05	0.033	0.03	0.014		
500	43.1	0.11	0.225	0.06	0.041	0.04	0.017	0.02	0.006
600	51.7	0.13	0.306	0.07	0.049	0.05	0.020	0.03	0.007
700	60.3	0.15	0.398	0.08	0.103	0.05	0.024	0.03	0.008
800	68.9	0.17	0.500	0.10	0.129	0.06	0.027	0.04	0.009
900	77.5	0.19	0.612	0.11	0.157	0.07	0.055	0.04	0.010
1000	86.1	0.21	0.734	0.12	0.188	0.08	0.066	0.04	0.011
1100	94.7	0.24	0.865	0.13	0.222	0.08	0.077	0.05	0.021
1200	103.3	0.26	1.005	0.14	0.257	0.09	0.090	0.05	0.024
1300	111.9	0.28	1.154	0.16	0.295	0.10	0.103	0.06	0.028
1400	120.5	0.30	1.313	0.17	0.335	0.11	0.117	0.06	0.032
1500	129.2	0.32	1.480	0.18	0.378	0.12	0.131	0.07	0.036
1600	137.8	0.34	1.656	0.19	0.422	0.12	0.147	0.07	0.040
1700	146.4	0.36	1.840	0.20	0.469	0.13	0.163	0.08	0.044
1800	155.0	0.39	2.033	0.22	0.517	0.14	0.180	0.08	0.048
1900	163.6	0.41	2.235	0.23	0.568	0.15	0.197	0.08	0.053
2000	172.2	0.43	2.445	0.24	0.621	0.15	0.215	0.09	0.058
2500	215.3	0.54	3.619	0.30	0.916	0.19	0.317	0.11	0.085
3000	258.3	0.64	4.993	0.36	1.259	0.23	0.435	0.13	0.116
3500	301.4	0.75	6.564	0.42	1.651	0.27	0.569	0.15	0.152
4000	344.4	0.86	8.326	0.48	2.088	0.31	0.719	0.18	0.192
4500	387.5	0.96	10.276	0.54	2.572	0.35	0.884	0.20	0.235
5000	430.5	1.07	12.412	0.60	3.099	0.39	1.064	0.22	0.283
5500	473.6	1.18	14.731	0.66	3.671	0.42	1.258	0.24	0.334
6000	516.6	1.28	17.233	0.72	4.286	0.46	1.467	0.27	0.389
6500	559.7	1.39	19.913	0.78	4.944	0.50	1.691	0.29	0.448
7000	602.7	1.50	22.773	0.84	5.644	0.54	1.928	0.31	0.510
7500	645.8	1.61	25.809	0.90	6.387	0.58	2.179	0.33	0.576
8000	688.8	1.71	29.022	0.96	7.171	0.62	2.444	0.35	0.646
8500	731.9	1.82	32.410	1.02	7.996	0.65	2.723	0.38	0.718
9000	774.9	1.93	35.973	1.08	8.862	0.69	3.015	0.40	0.795

d [mm]		16		20		25		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]
9500	818.0	2.03	39.709	1.14	9.769	0.73	3.321	0.42	0.875
10000	861.0	2.14	43.618	1.20	10.717	0.77	3.640	0.44	0.958
10500	904.1	2.25	47.699	1.26	11.704	0.81	3.973	0.46	1.044
11000	947.1	2.35	51.952	1.32	12.732	0.85	4.318	0.49	1.134
11500	990.2	2.46	56.376	1.38	13.800	0.89	4.677	0.51	1.228
12000	1033.2	2.57	60.971	1.44	14.908	0.92	5.048	0.53	1.324
12500	1076.3	2.68	65.736	1.50	16.055	0.96	5.433	0.55	1.424
13000	1119.3	2.78	70.671	1.57	17.242	1.00	5.830	0.57	1.527
13500	1162.4	2.89	75.776	1.63	18.468	1.04	6.241	0.60	1.634
14000	1205.5	3.00	81.050	1.69	19.733	1.08	6.664	0.62	1.743
14500	1248.5	3.10	86.492	1.75	21.037	1.12	7.100	0.64	1.856
15000	1291.6			1.81	22.381	1.16	7.548	0.66	1.972
15500	1334.6			1.87	23.763	1.19	8.009	0.69	2.091
16000	1377.7			1.93	25.184	1.23	8.483	0.71	2.213
16500	1420.7			1.99	26.643	1.27	8.969	0.73	2.339
17000	1463.8			2.05	28.141	1.31	9.468	0.75	2.468
17500	1506.8			2.11	29.677	1.35	9.980	0.77	2.599
18000	1549.9			2.17	31.252	1.39	10.503	0.80	2.734
18500	1592.9			2.23	32.865	1.43	11.040	0.82	2.872
19000	1636.0			2.29	34.517	1.46	11.588	0.84	3.013
19500	1679.0			2.35	36.207	1.50	12.149	0.86	3.157
20000	1722.1			2.41	37.934	1.54	12.722	0.88	3.305
20500	1765.1			2.47	39.700	1.58	13.308	0.91	3.455
21000	1808.2			2.53	41.504	1.62	13.906	0.93	3.608
21500	1851.2			2.59	43.346	1.66	14.516	0.95	3.765
22000	1894.3			2.65	45.225	1.70	15.138	0.97	3.924
22500	1937.3			2.71	47.143	1.73	15.772	1.00	4.087
23000	1980.4			2.77	49.098	1.77	16.419	1.02	4.252
23500	2023.4			2.83	51.091	1.81	17.078	1.04	4.421
24000	2066.5			2.89	53.122	1.85	17.749	1.06	4.592
24500	2109.5			2.95	55.191	1.89	18.432	1.08	4.767
25000	2152.6			3.01	57.297	1.93	19.127	1.11	4.944
25500	2195.6					1.96	19.834	1.13	5.125
26000	2238.7					2.00	20.553	1.15	5.308
26500	2281.8					2.04	21.284	1.17	5.495
27000	2324.8					2.08	22.028	1.19	5.684
27500	2367.9					2.12	22.783	1.22	5.877
28000	2410.9					2.16	23.550	1.24	6.072
28500	2454.0					2.20	24.330	1.26	6.270

d [mm]		16		20		25		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]
29000	2497.0					2.23	25.121	1.28	6.472
29500	2540.1					2.27	25.924	1.30	6.676
30000	2583.1					2.31	26.739	1.33	6.883
32500	2798.4					2.50	30.993	1.44	7.963
35000	3013.6					2.70	35.543	1.55	9.115
37500	3228.9					2.89	40.389	1.66	10.340
40000	3444.2					3.08	45.528	1.77	11.637
42500	3659.4							1.88	13.005
45000	3874.7							1.99	14.444
47500	4089.9							2.10	15.955
50000	4305.2							2.21	17.536
52500	4520.4							2.32	19.187
55000	4735.7							2.43	20.908
57500	4951.0							2.54	22.699
60000	5166.2							2.65	24.560
62500	5381.5							2.76	26.491
65000	5596.7							2.87	28.490
67500	5812.0							2.99	30.560
70000	6027.3							3.10	32.698

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

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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]
900	77.5	0.02	0.004						
1000	86.1	0.03	0.004						
1100	94.7	0.03	0.004						
1200	103.3	0.03	0.005						
1300	111.9	0.03	0.005						
1400	120.5	0.04	0.006						
1500	129.2	0.04	0.011						
1600	137.8	0.04	0.012						
1700	146.4	0.05	0.013	0.03	0.003				
1800	155.0	0.05	0.015	0.03	0.005				
1900	163.6	0.05	0.016	0.03	0.006				
2000	172.2	0.05	0.018	0.03	0.006				
2500	215.3	0.07	0.026	0.04	0.009				
3000	258.3	0.08	0.035	0.05	0.012				
3500	301.4	0.09	0.046	0.06	0.016	0.04	0.005		

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]
4000	344.4	0.11	0.058	0.07	0.020	0.04	0.006		
4500	387.5	0.12	0.071	0.08	0.025	0.05	0.007		
5000	430.5	0.13	0.085	0.09	0.030	0.05	0.009		
5500	473.6	0.15	0.100	0.09	0.035	0.06	0.010	0.04	0.004
6000	516.6	0.16	0.117	0.10	0.041	0.06	0.012	0.04	0.005
6500	559.7	0.17	0.134	0.11	0.047	0.07	0.014	0.05	0.006
7000	602.7	0.19	0.153	0.12	0.053	0.07	0.016	0.05	0.007
7500	645.8	0.20	0.172	0.13	0.060	0.08	0.018	0.05	0.008
8000	688.8	0.21	0.193	0.14	0.067	0.08	0.020	0.06	0.008
8500	731.9	0.23	0.215	0.15	0.075	0.09	0.022	0.06	0.009
9000	774.9	0.24	0.237	0.15	0.083	0.09	0.024	0.06	0.010
9500	818.0	0.25	0.261	0.16	0.091	0.10	0.026	0.07	0.011
10000	861.0	0.27	0.286	0.17	0.100	0.10	0.029	0.07	0.012
10500	904.1	0.28	0.311	0.18	0.109	0.11	0.032	0.07	0.013
11000	947.1	0.29	0.338	0.19	0.118	0.11	0.034	0.08	0.015
11500	990.2	0.31	0.365	0.20	0.127	0.12	0.037	0.08	0.016
12000	1033.2	0.32	0.394	0.21	0.137	0.12	0.040	0.09	0.017
12500	1076.3	0.33	0.423	0.21	0.147	0.13	0.043	0.09	0.018
13000	1119.3	0.35	0.454	0.22	0.158	0.13	0.046	0.09	0.020
13500	1162.4	0.36	0.485	0.23	0.169	0.14	0.049	0.10	0.021
14000	1205.5	0.37	0.517	0.24	0.180	0.14	0.052	0.10	0.022
14500	1248.5	0.39	0.551	0.25	0.191	0.15	0.055	0.10	0.024
15000	1291.6	0.40	0.585	0.26	0.203	0.15	0.059	0.11	0.025
15500	1334.6	0.41	0.620	0.27	0.215	0.16	0.062	0.11	0.027
16000	1377.7	0.43	0.656	0.27	0.228	0.16	0.066	0.11	0.028
16500	1420.7	0.44	0.693	0.28	0.240	0.17	0.069	0.12	0.030
17000	1463.8	0.45	0.730	0.29	0.254	0.17	0.073	0.12	0.031
17500	1506.8	0.47	0.769	0.30	0.267	0.18	0.077	0.12	0.033
18000	1549.9	0.48	0.808	0.31	0.281	0.18	0.081	0.13	0.034
18500	1592.9	0.49	0.849	0.32	0.294	0.19	0.085	0.13	0.036
19000	1636.0	0.51	0.890	0.33	0.309	0.19	0.089	0.14	0.038
19500	1679.0	0.52	0.933	0.33	0.323	0.20	0.093	0.14	0.040
20000	1722.1	0.53	0.976	0.34	0.338	0.20	0.097	0.14	0.041
20500	1765.1	0.55	1.020	0.35	0.353	0.21	0.102	0.15	0.043
21000	1808.2	0.56	1.064	0.36	0.369	0.21	0.106	0.15	0.045
21500	1851.2	0.57	1.110	0.37	0.384	0.22	0.111	0.15	0.047
22000	1894.3	0.59	1.157	0.38	0.400	0.22	0.115	0.16	0.049
22500	1937.3	0.60	1.204	0.39	0.417	0.23	0.120	0.16	0.051
23000	1980.4	0.61	1.253	0.39	0.433	0.23	0.125	0.16	0.053

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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]
23500	2023.4	0.63	1.302	0.40	0.450	0.24	0.130	0.17	0.055
24000	2066.5	0.64	1.352	0.41	0.468	0.24	0.134	0.17	0.057
24500	2109.5	0.65	1.403	0.42	0.485	0.25	0.139	0.17	0.059
25000	2152.6	0.67	1.455	0.43	0.503	0.25	0.145	0.18	0.061
25500	2195.6	0.68	1.507	0.44	0.521	0.26	0.150	0.18	0.064
26000	2238.7	0.69	1.561	0.45	0.539	0.26	0.155	0.19	0.066
26500	2281.8	0.71	1.615	0.45	0.558	0.27	0.160	0.19	0.068
27000	2324.8	0.72	1.670	0.46	0.577	0.28	0.166	0.19	0.070
27500	2367.9	0.73	1.726	0.47	0.596	0.28	0.171	0.20	0.073
28000	2410.9	0.75	1.783	0.48	0.615	0.29	0.177	0.20	0.075
28500	2454.0	0.76	1.841	0.49	0.635	0.29	0.182	0.20	0.077
29000	2497.0	0.77	1.899	0.50	0.655	0.30	0.188	0.21	0.080
29500	2540.1	0.79	1.958	0.51	0.676	0.30	0.194	0.21	0.082
30000	2583.1	0.80	2.019	0.51	0.696	0.31	0.200	0.21	0.085
32500	2798.4	0.87	2.332	0.56	0.803	0.33	0.230	0.23	0.098
35000	3013.6	0.93	2.666	0.60	0.918	0.36	0.263	0.25	0.111
37500	3228.9	1.00	3.020	0.64	1.039	0.38	0.297	0.27	0.126
40000	3444.2	1.07	3.395	0.69	1.166	0.41	0.333	0.28	0.141
42500	3659.4	1.13	3.789	0.73	1.301	0.43	0.371	0.30	0.157
45000	3874.7	1.20	4.204	0.77	1.442	0.46	0.411	0.32	0.174
47500	4089.9	1.27	4.639	0.81	1.590	0.48	0.453	0.34	0.192
50000	4305.2	1.33	5.093	0.86	1.744	0.51	0.497	0.36	0.210
52500	4520.4	1.40	5.567	0.90	1.905	0.53	0.542	0.37	0.229
55000	4735.7	1.47	6.060	0.94	2.073	0.56	0.590	0.39	0.249
57500	4951.0	1.53	6.573	0.99	2.247	0.59	0.639	0.41	0.269
60000	5166.2	1.60	7.106	1.03	2.427	0.61	0.690	0.43	0.291
62500	5381.5	1.67	7.657	1.07	2.614	0.64	0.742	0.44	0.313
65000	5596.7	1.73	8.228	1.11	2.807	0.66	0.796	0.46	0.336
67500	5812.0	1.80	8.818	1.16	3.006	0.69	0.853	0.48	0.359
70000	6027.3	1.87	9.428	1.20	3.212	0.71	0.910	0.50	0.383
72500	6242.5	1.93	10.056	1.24	3.424	0.74	0.970	0.52	0.408
75000	6457.8	2.00	10.703	1.29	3.642	0.76	1.031	0.53	0.434
77500	6673.0	2.07	11.370	1.33	3.867	0.79	1.094	0.55	0.460
80000	6888.3	2.13	12.055	1.37	4.098	0.82	1.159	0.57	0.487
82500	7103.6	2.20	12.759	1.41	4.335	0.84	1.225	0.59	0.515
85000	7318.8	2.27	13.482	1.46	4.578	0.87	1.293	0.61	0.544
87500	7534.1	2.33	14.224	1.50	4.828	0.89	1.363	0.62	0.573
90000	7749.3	2.40	14.985	1.54	5.083	0.92	1.435	0.64	0.603
92500	7964.6	2.47	15.764	1.59	5.345	0.94	1.508	0.66	0.633

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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]
95000	8179.9	2.53	16.562	1.63	5.613	0.97	1.583	0.68	0.665
97500	8395.1	2.60	17.379	1.67	5.887	0.99	1.659	0.69	0.696
100000	8610.4	2.67	18.215	1.71	6.167	1.02	1.737	0.71	0.729
105000	9040.9	2.80	19.942	1.80	6.745	1.07	1.898	0.75	0.796
110000	9471.4	2.93	21.743	1.89	7.348	1.12	2.066	0.78	0.866
115000	9901.9	3.07	23.618	1.97	7.975	1.17	2.241	0.82	0.939
120000	10332.5			2.06	8.626	1.22	2.422	0.85	1.014
125000	10763.0			2.14	9.301	1.27	2.609	0.89	1.092
130000	11193.5			2.23	10.001	1.32	2.803	0.93	1.173
135000	11624.0			2.31	10.724	1.38	3.004	0.96	1.256
140000	12054.5			2.40	11.470	1.43	3.210	1.00	1.342
145000	12485.1			2.49	12.241	1.48	3.424	1.03	1.431
150000	12915.6			2.57	13.036	1.53	3.643	1.07	1.522
155000	13346.1			2.66	13.854	1.58	3.869	1.10	1.616
160000	13776.6			2.74	14.696	1.63	4.102	1.14	1.712
165000	14207.1			2.83	15.561	1.68	4.340	1.17	1.811
170000	14637.6			2.91	16.450	1.73	4.585	1.21	1.913
175000	15068.2			3.00	17.362	1.78	4.837	1.25	2.017
180000	15498.7			3.09	18.298	1.83	5.094	1.28	2.124
185000	15929.2					1.88	5.358	1.32	2.233
190000	16359.7					1.94	5.629	1.35	2.345
195000	16790.2					1.99	5.905	1.39	2.459
200000	17220.8					2.04	6.188	1.42	2.576
205000	17651.3					2.09	6.476	1.46	2.695
210000	18081.8					2.14	6.772	1.49	2.817
215000	18512.3					2.19	7.073	1.53	2.941
220000	18942.8					2.24	7.380	1.57	3.068
225000	19373.4					2.29	7.694	1.60	3.198
230000	19803.9					2.34	8.014	1.64	3.330
235000	20234.4					2.39	8.340	1.67	3.464
240000	20664.9					2.45	8.672	1.71	3.601
245000	21095.4					2.50	9.011	1.74	3.741
250000	21526.0					2.55	9.355	1.78	3.883
255000	21956.5					2.60	9.706	1.82	4.027
260000	22387.0					2.65	10.063	1.85	4.174
265000	22817.5					2.70	10.425	1.89	4.323
270000	23248.0					2.75	10.794	1.92	4.475
275000	23678.5					2.80	11.169	1.96	4.629
280000	24109.1					2.85	11.551	1.99	4.786

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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]
285000	24539.6					2.90	11.938	2.03	4.945
290000	24970.1					2.95	12.331	2.06	5.107
295000	25400.6					3.01	12.731	2.10	5.271
300000	25831.1					3.06	13.136	2.14	5.437
305000	26261.7							2.17	5.606
310000	26692.2							2.21	5.778
315000	27122.7							2.24	5.952
320000	27553.2							2.28	6.128
325000	27983.7							2.31	6.307
330000	28414.3							2.35	6.488
335000	28844.8							2.38	6.672
340000	29275.3							2.42	6.858
345000	29705.8							2.46	7.046
350000	30136.3							2.49	7.237
355000	30566.9							2.53	7.430
360000	30997.4							2.56	7.626
365000	31427.9							2.60	7.824
370000	31858.4							2.63	8.025
375000	32288.9							2.67	8.228
380000	32719.4							2.71	8.433
385000	33150.0							2.74	8.641
390000	33580.5							2.78	8.851
395000	34011.0							2.81	9.064
400000	34441.5							2.85	9.279
405000	34872.0							2.88	9.497
410000	35302.6							2.92	9.716
415000	35733.1							2.95	9.939
420000	36163.6							2.99	10.163

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

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

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

d [mm]		16		20		25		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	8.6	0.02	0.022						
300	12.9	0.03	0.033	0.02	0.011				
400	17.2	0.04	0.045	0.02	0.014	0.02	0.006		
500	21.5	0.05	0.056	0.03	0.018	0.02	0.007		
600	25.8	0.06	0.067	0.04	0.021	0.02	0.009		
700	30.1	0.08	0.078	0.04	0.025	0.03	0.010		
800	34.4	0.09	0.089	0.05	0.028	0.03	0.012		
900	38.7	0.10	0.180	0.05	0.032	0.03	0.013	0.02	0.004
1000	43.0	0.11	0.215	0.06	0.035	0.04	0.014	0.02	0.005
1100	47.3	0.12	0.253	0.07	0.039	0.04	0.016	0.02	0.005
1200	51.6	0.13	0.293	0.07	0.076	0.05	0.017	0.03	0.006
1300	55.9	0.14	0.336	0.08	0.087	0.05	0.019	0.03	0.006
1400	60.2	0.15	0.382	0.08	0.098	0.05	0.020	0.03	0.007
1500	64.5	0.16	0.430	0.09	0.111	0.06	0.039	0.03	0.007
1600	68.9	0.17	0.480	0.10	0.123	0.06	0.043	0.04	0.008
1700	73.2	0.18	0.533	0.10	0.137	0.07	0.048	0.04	0.008
1800	77.5	0.19	0.588	0.11	0.151	0.07	0.053	0.04	0.009
1900	81.8	0.20	0.645	0.11	0.165	0.07	0.058	0.04	0.016
2000	86.1	0.21	0.705	0.12	0.181	0.08	0.063	0.04	0.017
2500	107.6	0.27	1.038	0.15	0.265	0.10	0.092	0.06	0.025
3000	129.1	0.32	1.426	0.18	0.363	0.12	0.126	0.07	0.034
3500	150.6	0.38	1.867	0.21	0.474	0.14	0.164	0.08	0.044
4000	172.1	0.43	2.361	0.24	0.598	0.15	0.207	0.09	0.056
4500	193.6	0.48	2.905	0.27	0.734	0.17	0.254	0.10	0.068
5000	215.2	0.54	3.499	0.30	0.883	0.19	0.305	0.11	0.082
5500	236.7	0.59	4.143	0.33	1.044	0.21	0.360	0.12	0.096
6000	258.2	0.64	4.835	0.36	1.216	0.23	0.419	0.13	0.112
6500	279.7	0.70	5.576	0.39	1.400	0.25	0.482	0.14	0.129
7000	301.2	0.75	6.364	0.42	1.595	0.27	0.549	0.16	0.146
7500	322.7	0.81	7.199	0.45	1.802	0.29	0.620	0.17	0.165
8000	344.3	0.86	8.080	0.48	2.020	0.31	0.694	0.18	0.185
8500	365.8	0.91	9.008	0.51	2.250	0.33	0.772	0.19	0.205
9000	387.3	0.97	9.983	0.54	2.490	0.35	0.854	0.20	0.227

d [mm]		16		20		25		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]
9500	408.8	1.02	11.002	0.57	2.741	0.37	0.939	0.21	0.249
10000	430.3	1.07	12.068	0.60	3.003	0.39	1.028	0.22	0.273
10500	451.8			0.63	3.276	0.41	1.121	0.23	0.297
11000	473.3			0.67	3.559	0.43	1.217	0.24	0.323
11500	494.9			0.70	3.854	0.45	1.317	0.26	0.349
12000	516.4			0.73	4.158	0.46	1.420	0.27	0.376
12500	537.9			0.76	4.474	0.48	1.527	0.28	0.404
13000	559.4			0.79	4.799	0.50	1.637	0.29	0.433
13500	580.9			0.82	5.136	0.52	1.751	0.30	0.463
14000	602.4			0.85	5.482	0.54	1.868	0.31	0.493
14500	624.0			0.88	5.839	0.56	1.989	0.32	0.525
15000	645.5			0.91	6.206	0.58	2.113	0.33	0.557
15500	667.0			0.94	6.584	0.60	2.240	0.34	0.590
16000	688.5			0.97	6.972	0.62	2.371	0.36	0.624
16500	710.0			1.00	7.369	0.64	2.505	0.37	0.659
17000	731.5			1.03	7.778	0.66	2.642	0.38	0.695
17500	753.0			1.06	8.196	0.68	2.783	0.39	0.732
18000	774.6			1.09	8.624	0.70	2.927	0.40	0.769
18500	796.1					0.72	3.074	0.41	0.808
19000	817.6					0.74	3.225	0.42	0.847
19500	839.1					0.75	3.379	0.43	0.887
20000	860.6					0.77	3.536	0.44	0.928
20500	882.1					0.79	3.696	0.46	0.970
21000	903.7					0.81	3.860	0.47	1.012
21500	925.2					0.83	4.027	0.48	1.055
22000	946.7					0.85	4.197	0.49	1.100
22500	968.2					0.87	4.370	0.50	1.144
23000	989.7					0.89	4.547	0.51	1.190
23500	1011.2					0.91	4.727	0.52	1.237
24000	1032.8					0.93	4.910	0.53	1.284
24500	1054.3					0.95	5.096	0.54	1.332
25000	1075.8					0.97	5.285	0.56	1.381
25500	1097.3					0.99	5.478	0.57	1.431
26000	1118.8					1.01	5.674	0.58	1.482
26500	1140.3					1.03	5.873	0.59	1.533
27000	1161.8					1.04	6.075	0.60	1.585
27500	1183.4					1.06	6.280	0.61	1.638
28000	1204.9					1.08	6.488	0.62	1.692
28500	1226.4					1.10	6.700	0.63	1.747

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d [mm]		16		20		25		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]
29000	1247.9					1.12	6.915	0.64	1.802
29500	1269.4					1.14	7.133	0.66	1.858
30000	1290.9					1.16	7.353	0.67	1.915
32500	1398.5							0.72	2.211
35000	1506.1							0.78	2.527
37500	1613.7							0.83	2.862
40000	1721.3							0.89	3.216
42500	1828.8							0.94	3.588
45000	1936.4							1.00	3.980
47500	2044.0							1.05	4.390
50000	2151.6							1.11	4.818
52500	2259.1							1.17	5.266
55000	2366.7							1.22	5.731
57500	2474.3							1.28	6.215
60000	2581.9							1.33	6.717
62500	2689.5							1.39	7.237
65000	2797.0							1.44	7.775
67500	2904.6							1.50	8.331
70000	3012.2							1.55	8.906

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Table 20: Pressure loss in Geberit FlowFit 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]
1900	81.8	0.03	0.003						
2000	86.1	0.03	0.003						
2500	107.6	0.03	0.008						
3000	129.1	0.04	0.010						
3500	150.6	0.05	0.013	0.03	0.005				
4000	172.1	0.05	0.017	0.03	0.006				
4500	193.6	0.06	0.021	0.04	0.007				
5000	215.2	0.07	0.025	0.04	0.009				
5500	236.7	0.07	0.029	0.05	0.010				
6000	258.2	0.08	0.034	0.05	0.012				
6500	279.7	0.09	0.039	0.06	0.014				
7000	301.2	0.09	0.044	0.06	0.016	0.04	0.005		
7500	322.7	0.10	0.050	0.06	0.017	0.04	0.005		
8000	344.3	0.11	0.056	0.07	0.020	0.04	0.006		
8500	365.8	0.11	0.062	0.07	0.022	0.04	0.006		

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]
9000	387.3	0.12	0.068	0.08	0.024	0.05	0.007		
9500	408.8	0.13	0.075	0.08	0.026	0.05	0.008		
10000	430.3	0.13	0.082	0.09	0.029	0.05	0.008		
10500	451.8	0.14	0.089	0.09	0.031	0.05	0.009		
11000	473.3	0.15	0.097	0.09	0.034	0.06	0.010		
11500	494.9	0.15	0.104	0.10	0.037	0.06	0.011		
12000	516.4	0.16	0.113	0.10	0.039	0.06	0.011	0.04	0.005
12500	537.9	0.17	0.121	0.11	0.042	0.06	0.012	0.04	0.005
13000	559.4	0.17	0.129	0.11	0.045	0.07	0.013	0.05	0.006
13500	580.9	0.18	0.138	0.12	0.048	0.07	0.014	0.05	0.006
14000	602.4	0.19	0.147	0.12	0.052	0.07	0.015	0.05	0.006
14500	624.0	0.19	0.157	0.12	0.055	0.07	0.016	0.05	0.007
15000	645.5	0.20	0.166	0.13	0.058	0.08	0.017	0.05	0.007
15500	667.0	0.21	0.176	0.13	0.062	0.08	0.018	0.06	0.008
16000	688.5	0.21	0.186	0.14	0.065	0.08	0.019	0.06	0.008
16500	710.0	0.22	0.197	0.14	0.069	0.08	0.020	0.06	0.009
17000	731.5	0.23	0.207	0.15	0.072	0.09	0.021	0.06	0.009
17500	753.0	0.23	0.218	0.15	0.076	0.09	0.022	0.06	0.009
18000	774.6	0.24	0.229	0.15	0.080	0.09	0.023	0.06	0.010
18500	796.1	0.25	0.241	0.16	0.084	0.09	0.024	0.07	0.010
19000	817.6	0.25	0.252	0.16	0.088	0.10	0.025	0.07	0.011
19500	839.1	0.26	0.264	0.17	0.092	0.10	0.027	0.07	0.011
20000	860.6	0.27	0.276	0.17	0.096	0.10	0.028	0.07	0.012
20500	882.1	0.27	0.288	0.18	0.100	0.10	0.029	0.07	0.012
21000	903.7	0.28	0.301	0.18	0.105	0.11	0.030	0.08	0.013
21500	925.2	0.29	0.314	0.19	0.109	0.11	0.032	0.08	0.013
22000	946.7	0.29	0.327	0.19	0.114	0.11	0.033	0.08	0.014
22500	968.2	0.30	0.340	0.19	0.118	0.12	0.034	0.08	0.015
23000	989.7	0.31	0.353	0.20	0.123	0.12	0.036	0.08	0.015
23500	1011.2	0.31	0.367	0.20	0.128	0.12	0.037	0.08	0.016
24000	1032.8	0.32	0.381	0.21	0.133	0.12	0.038	0.09	0.016
24500	1054.3	0.33	0.395	0.21	0.137	0.13	0.040	0.09	0.017
25000	1075.8	0.33	0.410	0.22	0.142	0.13	0.041	0.09	0.018
25500	1097.3	0.34	0.424	0.22	0.148	0.13	0.043	0.09	0.018
26000	1118.8	0.35	0.439	0.22	0.153	0.13	0.044	0.09	0.019
26500	1140.3	0.35	0.454	0.23	0.158	0.14	0.046	0.09	0.019
27000	1161.8	0.36	0.470	0.23	0.163	0.14	0.047	0.10	0.020
27500	1183.4	0.37	0.485	0.24	0.169	0.14	0.049	0.10	0.021
28000	1204.9	0.37	0.501	0.24	0.174	0.14	0.050	0.10	0.021

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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]
28500	1226.4	0.38	0.517	0.25	0.180	0.15	0.052	0.10	0.022
29000	1247.9	0.39	0.533	0.25	0.185	0.15	0.053	0.10	0.023
29500	1269.4	0.40	0.550	0.25	0.191	0.15	0.055	0.11	0.023
30000	1290.9	0.40	0.566	0.26	0.197	0.15	0.057	0.11	0.024
32500	1398.5	0.44	0.653	0.28	0.227	0.17	0.065	0.12	0.028
35000	1506.1	0.47	0.746	0.30	0.258	0.18	0.074	0.13	0.032
37500	1613.7	0.50	0.844	0.32	0.292	0.19	0.084	0.13	0.036
40000	1721.3	0.54	0.947	0.34	0.328	0.20	0.094	0.14	0.040
42500	1828.8	0.57	1.056	0.37	0.365	0.22	0.105	0.15	0.045
45000	1936.4	0.60	1.170	0.39	0.404	0.23	0.116	0.16	0.049
47500	2044.0	0.64	1.289	0.41	0.445	0.24	0.128	0.17	0.054
50000	2151.6	0.67	1.414	0.43	0.488	0.26	0.140	0.18	0.059
52500	2259.1	0.70	1.544	0.45	0.532	0.27	0.153	0.19	0.065
55000	2366.7	0.74	1.679	0.47	0.578	0.28	0.166	0.20	0.070
57500	2474.3	0.77	1.819	0.50	0.626	0.29	0.179	0.21	0.076
60000	2581.9	0.80	1.964	0.52	0.676	0.31	0.194	0.21	0.082
62500	2689.5	0.84	2.115	0.54	0.727	0.32	0.208	0.22	0.088
65000	2797.0	0.87	2.270	0.56	0.781	0.33	0.223	0.23	0.094
67500	2904.6	0.90	2.431	0.58	0.835	0.35	0.239	0.24	0.101
70000	3012.2	0.94	2.597	0.60	0.892	0.36	0.255	0.25	0.108
72500	3119.8	0.97	2.767	0.62	0.950	0.37	0.271	0.26	0.115
75000	3227.3	1.00	2.943	0.65	1.010	0.38	0.288	0.27	0.122
77500	3334.9	1.04	3.124	0.67	1.071	0.40	0.306	0.28	0.129
80000	3442.5	1.07	3.310	0.69	1.135	0.41	0.324	0.29	0.137
82500	3550.1	1.10	3.500	0.71	1.199	0.42	0.342	0.29	0.144
85000	3657.7	1.14	3.696	0.73	1.266	0.43	0.361	0.30	0.152
87500	3765.2	1.17	3.897	0.75	1.334	0.45	0.380	0.31	0.160
90000	3872.8	1.21	4.102	0.77	1.404	0.46	0.400	0.32	0.169
92500	3980.4	1.24	4.312	0.80	1.475	0.47	0.420	0.33	0.177
95000	4088.0	1.27	4.528	0.82	1.548	0.49	0.440	0.34	0.186
97500	4195.6	1.31	4.748	0.84	1.623	0.50	0.461	0.35	0.195
100000	4303.1	1.34	4.973	0.86	1.699	0.51	0.483	0.36	0.204
105000	4518.3	1.41	5.438	0.90	1.856	0.54	0.527	0.38	0.222
110000	4733.4	1.47	5.922	0.95	2.020	0.56	0.573	0.39	0.242
115000	4948.6	1.54	6.425	0.99	2.190	0.59	0.621	0.41	0.262
120000	5163.8	1.61	6.948	1.03	2.367	0.61	0.671	0.43	0.282
125000	5378.9	1.67	7.489	1.08	2.550	0.64	0.722	0.45	0.304
130000	5594.1	1.74	8.050	1.12	2.739	0.67	0.775	0.46	0.326
135000	5809.2			1.16	2.934	0.69	0.830	0.48	0.349

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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]
140000	6024.4			1.21	3.136	0.72	0.886	0.50	0.373
145000	6239.5			1.25	3.343	0.74	0.945	0.52	0.397
150000	6454.7			1.29	3.557	0.77	1.004	0.54	0.422
155000	6669.9			1.33	3.778	0.79	1.066	0.55	0.448
160000	6885.0			1.38	4.004	0.82	1.129	0.57	0.474
165000	7100.2			1.42	4.237	0.84	1.194	0.59	0.501
170000	7315.3			1.46	4.475	0.87	1.261	0.61	0.529
175000	7530.5			1.51	4.720	0.90	1.329	0.63	0.558
180000	7745.6			1.55	4.971	0.92	1.399	0.64	0.587
185000	7960.8			1.59	5.228	0.95	1.470	0.66	0.617
190000	8176.0			1.64	5.491	0.97	1.544	0.68	0.647
195000	8391.1			1.68	5.760	1.00	1.619	0.70	0.678
200000	8606.3			1.72	6.035	1.02	1.695	0.72	0.710
205000	8821.4			1.77	6.317	1.05	1.773	0.73	0.743
210000	9036.6			1.81	6.604	1.07	1.853	0.75	0.776
215000	9251.7			1.85	6.897	1.10	1.934	0.77	0.810
220000	9466.9			1.89	7.196	1.13	2.017	0.79	0.844
225000	9682.0			1.94	7.502	1.15	2.102	0.80	0.880
230000	9897.2			1.98	7.813	1.18	2.188	0.82	0.915
235000	10112.4			2.02	8.130	1.20	2.276	0.84	0.952
240000	10327.5			2.07	8.454	1.23	2.366	0.86	0.989
245000	10542.7			2.11	8.783	1.25	2.457	0.88	1.027
250000	10757.8			2.15	9.118	1.28	2.550	0.89	1.066
255000	10973.0					1.30	2.644	0.91	1.105
260000	11188.1					1.33	2.740	0.93	1.144
265000	11403.3					1.36	2.837	0.95	1.185
270000	11618.5					1.38	2.936	0.97	1.226
275000	11833.6					1.41	3.037	0.98	1.268
280000	12048.8					1.43	3.139	1.00	1.310
285000	12263.9					1.46	3.243	1.02	1.353
290000	12479.1					1.48	3.349	1.04	1.397
295000	12694.2					1.51	3.456	1.05	1.441
300000	12909.4					1.54	3.564	1.07	1.486
305000	13124.6					1.56	3.675	1.09	1.532
310000	13339.7					1.59	3.786	1.11	1.578
315000	13554.9					1.61	3.900	1.13	1.625
320000	13770.0					1.64	4.015	1.14	1.673
325000	13985.2					1.66	4.131	1.16	1.721
330000	14200.3					1.69	4.249	1.18	1.770

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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]
335000	14415.5					1.71	4.369	1.20	1.819
340000	14630.6					1.74	4.490	1.22	1.869
345000	14845.8					1.77	4.613	1.23	1.920
350000	15061.0					1.79	4.737	1.25	1.971
355000	15276.1					1.82	4.863	1.27	2.023
360000	15491.3					1.84	4.991	1.29	2.076
365000	15706.4					1.87	5.120	1.30	2.129
370000	15921.6					1.89	5.250	1.32	2.183
375000	16136.7					1.92	5.382	1.34	2.238
380000	16351.9					1.94	5.516	1.36	2.293
385000	16567.1					1.97	5.651	1.38	2.349
390000	16782.2					2.00	5.788	1.39	2.405
395000	16997.4					2.02	5.926	1.41	2.462
400000	17212.5					2.05	6.066	1.43	2.520
405000	17427.7					2.07	6.207	1.45	2.578
410000	17642.8					2.10	6.350	1.47	2.637
415000	17858.0					2.12	6.495	1.48	2.696
420000	18073.2					2.15	6.641	1.50	2.757
425000	18288.3					2.17	6.788	1.52	2.817
430000	18503.5					2.20	6.938	1.54	2.879
435000	18718.6					2.23	7.088	1.56	2.941
440000	18933.8					2.25	7.240	1.57	3.004
445000	19148.9					2.28	7.394	1.59	3.067
450000	19364.1					2.30	7.549	1.61	3.131
455000	19579.2					2.33	7.706	1.63	3.195
460000	19794.4					2.35	7.865	1.64	3.260
465000	20009.6					2.38	8.024	1.66	3.326
470000	20224.7					2.41	8.186	1.68	3.392
475000	20439.9					2.43	8.349	1.70	3.459
480000	20655.0					2.46	8.513	1.72	3.527
485000	20870.2					2.48	8.679	1.73	3.595
490000	21085.3					2.51	8.847	1.75	3.664
495000	21300.5					2.53	9.016	1.77	3.734
500000	21515.7					2.56	9.186	1.79	3.804
505000	21730.8					2.58	9.358	1.81	3.874

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

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

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

d [mm]		16		20		25		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	0.029						
300	17.2	0.04	0.043	0.02	0.014				
400	22.9	0.06	0.058	0.03	0.018	0.02	0.007		
500	28.7	0.07	0.072	0.04	0.023	0.03	0.009		
600	34.4	0.09	0.086	0.05	0.027	0.03	0.011		
700	40.2	0.10	0.190	0.06	0.032	0.04	0.013		
800	45.9	0.11	0.238	0.06	0.036	0.04	0.015		
900	51.6	0.13	0.291	0.07	0.075	0.05	0.017	0.03	0.006
1000	57.4	0.14	0.348	0.08	0.090	0.05	0.019	0.03	0.006
1100	63.1	0.16	0.410	0.09	0.105	0.06	0.037	0.03	0.007
1200	68.8	0.17	0.476	0.10	0.122	0.06	0.043	0.04	0.007
1300	74.6	0.19	0.546	0.10	0.140	0.07	0.049	0.04	0.008
1400	80.3	0.20	0.621	0.11	0.159	0.07	0.056	0.04	0.015
1500	86.0	0.22	0.699	0.12	0.179	0.08	0.062	0.04	0.017
1600	91.8	0.23	0.782	0.13	0.200	0.08	0.070	0.05	0.019
1700	97.5	0.24	0.868	0.14	0.222	0.09	0.077	0.05	0.021
1800	103.3	0.26	0.959	0.15	0.245	0.09	0.085	0.05	0.023
1900	109.0	0.27	1.054	0.15	0.269	0.10	0.094	0.06	0.025
2000	114.7	0.29	1.152	0.16	0.294	0.10	0.102	0.06	0.028
2500	143.4	0.36	1.701	0.20	0.432	0.13	0.150	0.07	0.040
3000	172.1	0.43	2.343	0.24	0.593	0.15	0.205	0.09	0.055
3500	200.8	0.50	3.076	0.28	0.777	0.18	0.268	0.10	0.072
4000	229.4	0.57	3.896	0.32	0.981	0.21	0.339	0.12	0.091
4500	258.1	0.65	4.803	0.36	1.207	0.23	0.416	0.13	0.111
5000	286.8	0.72	5.796	0.40	1.453	0.26	0.500	0.15	0.133
5500	315.5	0.79	6.872	0.44	1.720	0.28	0.591	0.16	0.157
6000	344.2	0.86	8.031	0.48	2.007	0.31	0.689	0.18	0.183
6500	372.8	0.93	9.272	0.52	2.313	0.34	0.793	0.19	0.211
7000	401.5	1.00	10.595	0.56	2.639	0.36	0.904	0.21	0.240
7500	430.2	1.08	11.998	0.61	2.984	0.39	1.021	0.22	0.271
8000	458.9	1.15	13.482	0.65	3.348	0.41	1.145	0.24	0.303
8500	487.6	1.22	15.045	0.69	3.731	0.44	1.275	0.25	0.337
9000	516.3	1.29	16.688	0.73	4.133	0.46	1.411	0.27	0.373

d [mm]		16		20		25		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]
9500	544.9	1.36	18.410	0.77	4.553	0.49	1.553	0.28	0.410
10000	573.6	1.43	20.210	0.81	4.992	0.52	1.701	0.30	0.449
10500	602.3			0.85	5.449	0.54	1.856	0.31	0.490
11000	631.0			0.89	5.925	0.57	2.016	0.33	0.532
11500	659.7			0.93	6.419	0.59	2.183	0.34	0.575
12000	688.3			0.97	6.931	0.62	2.356	0.36	0.620
12500	717.0			1.01	7.462	0.65	2.534	0.37	0.667
13000	745.7			1.05	8.010	0.67	2.718	0.39	0.715
13500	774.4			1.09	8.576	0.70	2.909	0.40	0.764
14000	803.1			1.13	9.160	0.72	3.105	0.42	0.815
14500	831.7			1.17	9.762	0.75	3.307	0.43	0.868
15000	860.4			1.21	10.381	0.77	3.515	0.44	0.922
15500	889.1			1.25	11.018	0.80	3.728	0.46	0.977
16000	917.8			1.29	11.673	0.83	3.947	0.47	1.034
16500	946.5			1.33	12.345	0.85	4.172	0.49	1.092
17000	975.1			1.37	13.035	0.88	4.403	0.50	1.152
17500	1003.8			1.41	13.742	0.90	4.640	0.52	1.213
18000	1032.5			1.45	14.467	0.93	4.882	0.53	1.276
18500	1061.2					0.96	5.130	0.55	1.340
19000	1089.9					0.98	5.383	0.56	1.406
19500	1118.5					1.01	5.642	0.58	1.473
20000	1147.2					1.03	5.907	0.59	1.541
20500	1175.9					1.06	6.177	0.61	1.611
21000	1204.6					1.08	6.453	0.62	1.682
21500	1233.3					1.11	6.734	0.64	1.754
22000	1262.0					1.14	7.022	0.65	1.828
22500	1290.6					1.16	7.314	0.67	1.904
23000	1319.3					1.19	7.612	0.68	1.980
23500	1348.0					1.21	7.916	0.70	2.058
24000	1376.7					1.24	8.225	0.71	2.138
24500	1405.4					1.27	8.540	0.73	2.219
25000	1434.0					1.29	8.860	0.74	2.301
25500	1462.7					1.32	9.185	0.76	2.384
26000	1491.4					1.34	9.517	0.77	2.469
26500	1520.1					1.37	9.853	0.79	2.556
27000	1548.8					1.39	10.195	0.80	2.643
27500	1577.4					1.42	10.543	0.82	2.732
28000	1606.1					1.45	10.895	0.83	2.823
28500	1634.8					1.47	11.254	0.84	2.914

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d [mm]		16		20		25		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]
29000	1663.5					1.50	11.618	0.86	3.007
29500	1692.2					1.52	11.987	0.87	3.102
30000	1720.8					1.55	12.361	0.89	3.197
32500	1864.2							0.96	3.696
35000	2007.6							1.04	4.228
37500	2151.1							1.11	4.793
40000	2294.5							1.19	5.391
42500	2437.9							1.26	6.021
45000	2581.3							1.33	6.683
47500	2724.7							1.41	7.378
50000	2868.1							1.48	8.105
52500	3011.5							1.56	8.863
55000	3154.9							1.63	9.654
57500	3298.3							1.70	10.476
60000	3441.7							1.78	11.329
62500	3585.1							1.85	12.214
65000	3728.5							1.93	13.131
67500	3871.9							2.00	14.079
70000	4015.3							2.08	15.058

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Table 22: Pressure loss in Geberit 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]
1900	109.0	0.03	0.008						
2000	114.7	0.04	0.008						
2500	143.4	0.04	0.012						
3000	172.1	0.05	0.017						
3500	200.8	0.06	0.022	0.04	0.008				
4000	229.4	0.07	0.027	0.05	0.010				
4500	258.1	0.08	0.034	0.05	0.012				
5000	286.8	0.09	0.040	0.06	0.014				
5500	315.5	0.10	0.047	0.06	0.017				
6000	344.2	0.11	0.055	0.07	0.019				
6500	372.8	0.12	0.063	0.07	0.022				
7000	401.5	0.13	0.072	0.08	0.025	0.05	0.007		
7500	430.2	0.13	0.081	0.09	0.028	0.05	0.008		
8000	458.9	0.14	0.091	0.09	0.032	0.05	0.009		
8500	487.6	0.15	0.101	0.10	0.035	0.06	0.010		

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]
9000	516.3	0.16	0.112	0.10	0.039	0.06	0.011		
9500	544.9	0.17	0.123	0.11	0.043	0.06	0.013		
10000	573.6	0.18	0.134	0.11	0.047	0.07	0.014		
10500	602.3	0.19	0.146	0.12	0.051	0.07	0.015		
11000	631.0	0.20	0.159	0.13	0.055	0.08	0.016		
11500	659.7	0.21	0.172	0.13	0.060	0.08	0.017		
12000	688.3	0.21	0.185	0.14	0.065	0.08	0.019	0.06	0.008
12500	717.0	0.22	0.199	0.14	0.069	0.09	0.020	0.06	0.009
13000	745.7	0.23	0.213	0.15	0.074	0.09	0.022	0.06	0.009
13500	774.4	0.24	0.228	0.16	0.079	0.09	0.023	0.06	0.010
14000	803.1	0.25	0.243	0.16	0.085	0.10	0.025	0.07	0.010
14500	831.7	0.26	0.258	0.17	0.090	0.10	0.026	0.07	0.011
15000	860.4	0.27	0.274	0.17	0.095	0.10	0.028	0.07	0.012
15500	889.1	0.28	0.290	0.18	0.101	0.11	0.029	0.07	0.013
16000	917.8	0.29	0.307	0.18	0.107	0.11	0.031	0.08	0.013
16500	946.5	0.29	0.324	0.19	0.113	0.11	0.033	0.08	0.014
17000	975.1	0.30	0.342	0.20	0.119	0.12	0.034	0.08	0.015
17500	1003.8	0.31	0.360	0.20	0.125	0.12	0.036	0.08	0.015
18000	1032.5	0.32	0.378	0.21	0.132	0.12	0.038	0.09	0.016
18500	1061.2	0.33	0.397	0.21	0.138	0.13	0.040	0.09	0.017
19000	1089.9	0.34	0.417	0.22	0.145	0.13	0.042	0.09	0.018
19500	1118.5	0.35	0.436	0.22	0.152	0.13	0.044	0.09	0.019
20000	1147.2	0.36	0.456	0.23	0.159	0.14	0.046	0.10	0.020
20500	1175.9	0.37	0.477	0.24	0.166	0.14	0.048	0.10	0.020
21000	1204.6	0.38	0.498	0.24	0.173	0.14	0.050	0.10	0.021
21500	1233.3	0.38	0.519	0.25	0.180	0.15	0.052	0.10	0.022
22000	1262.0	0.39	0.541	0.25	0.188	0.15	0.054	0.10	0.023
22500	1290.6	0.40	0.563	0.26	0.195	0.15	0.056	0.11	0.024
23000	1319.3	0.41	0.585	0.26	0.203	0.16	0.059	0.11	0.025
23500	1348.0	0.42	0.608	0.27	0.211	0.16	0.061	0.11	0.026
24000	1376.7	0.43	0.631	0.28	0.219	0.16	0.063	0.11	0.027
24500	1405.4	0.44	0.655	0.28	0.227	0.17	0.065	0.12	0.028
25000	1434.0	0.45	0.679	0.29	0.235	0.17	0.068	0.12	0.029
25500	1462.7	0.46	0.704	0.29	0.244	0.17	0.070	0.12	0.030
26000	1491.4	0.46	0.728	0.30	0.252	0.18	0.073	0.12	0.031
26500	1520.1	0.47	0.754	0.30	0.261	0.18	0.075	0.13	0.032
27000	1548.8	0.48	0.779	0.31	0.270	0.18	0.078	0.13	0.033
27500	1577.4	0.49	0.805	0.32	0.279	0.19	0.080	0.13	0.034
28000	1606.1	0.50	0.832	0.32	0.288	0.19	0.083	0.13	0.035

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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]
28500	1634.8	0.51	0.858	0.33	0.297	0.19	0.085	0.14	0.036
29000	1663.5	0.52	0.886	0.33	0.306	0.20	0.088	0.14	0.037
29500	1692.2	0.53	0.913	0.34	0.316	0.20	0.091	0.14	0.039
30000	1720.8	0.54	0.941	0.34	0.325	0.20	0.094	0.14	0.040
32500	1864.2	0.58	1.086	0.37	0.375	0.22	0.108	0.16	0.046
35000	2007.6	0.63	1.241	0.40	0.428	0.24	0.123	0.17	0.052
37500	2151.1	0.67	1.405	0.43	0.485	0.26	0.139	0.18	0.059
40000	2294.5	0.71	1.579	0.46	0.544	0.27	0.156	0.19	0.066
42500	2437.9	0.76	1.761	0.49	0.606	0.29	0.174	0.20	0.074
45000	2581.3	0.80	1.953	0.52	0.672	0.31	0.192	0.21	0.081
47500	2724.7	0.85	2.154	0.55	0.741	0.32	0.212	0.23	0.090
50000	2868.1	0.89	2.364	0.57	0.812	0.34	0.232	0.24	0.098
52500	3011.5	0.94	2.583	0.60	0.887	0.36	0.253	0.25	0.107
55000	3154.9	0.98	2.810	0.63	0.964	0.38	0.275	0.26	0.116
57500	3298.3	1.03	3.047	0.66	1.045	0.39	0.298	0.27	0.126
60000	3441.7	1.07	3.292	0.69	1.128	0.41	0.322	0.29	0.136
62500	3585.1	1.12	3.547	0.72	1.215	0.43	0.346	0.30	0.146
65000	3728.5	1.16	3.810	0.75	1.304	0.44	0.371	0.31	0.157
67500	3871.9	1.21	4.081	0.78	1.396	0.46	0.397	0.32	0.168
70000	4015.3	1.25	4.362	0.80	1.491	0.48	0.424	0.33	0.179
72500	4158.7	1.30	4.651	0.83	1.589	0.50	0.452	0.35	0.191
75000	4302.1	1.34	4.949	0.86	1.690	0.51	0.480	0.36	0.202
77500	4445.5	1.39	5.255	0.89	1.794	0.53	0.509	0.37	0.215
80000	4588.9	1.43	5.570	0.92	1.900	0.55	0.539	0.38	0.227
82500	4732.3	1.47	5.894	0.95	2.010	0.56	0.570	0.39	0.240
85000	4875.7	1.52	6.226	0.98	2.122	0.58	0.602	0.41	0.253
87500	5019.1	1.56	6.566	1.01	2.237	0.60	0.634	0.42	0.267
90000	5162.5	1.61	6.916	1.03	2.355	0.61	0.667	0.43	0.281
92500	5305.9	1.65	7.273	1.06	2.475	0.63	0.701	0.44	0.295
95000	5449.3	1.70	7.639	1.09	2.599	0.65	0.735	0.45	0.309
97500	5592.7	1.74	8.014	1.12	2.725	0.67	0.771	0.47	0.324
100000	5736.1	1.79	8.397	1.15	2.854	0.68	0.807	0.48	0.339
105000	6022.9	1.88	9.189	1.21	3.120	0.72	0.881	0.50	0.371
110000	6309.8	1.97	10.014	1.26	3.397	0.75	0.959	0.52	0.403
115000	6596.6	2.06	10.872	1.32	3.686	0.79	1.040	0.55	0.437
120000	6883.4	2.14	11.764	1.38	3.985	0.82	1.123	0.57	0.472
125000	7170.2	2.23	12.689	1.44	4.295	0.85	1.210	0.60	0.508
130000	7457.0	2.32	13.648	1.49	4.616	0.89	1.299	0.62	0.545
135000	7743.8			1.55	4.948	0.92	1.392	0.64	0.584

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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]
140000	8030.6			1.61	5.291	0.96	1.487	0.67	0.623
145000	8317.4			1.67	5.645	0.99	1.585	0.69	0.664
150000	8604.2			1.72	6.009	1.02	1.687	0.72	0.706
155000	8891.0			1.78	6.384	1.06	1.791	0.74	0.750
160000	9177.8			1.84	6.770	1.09	1.898	0.76	0.794
165000	9464.6			1.90	7.166	1.13	2.008	0.79	0.840
170000	9751.4			1.95	7.573	1.16	2.120	0.81	0.887
175000	10038.2			2.01	7.991	1.20	2.236	0.84	0.935
180000	10325.0			2.07	8.419	1.23	2.354	0.86	0.984
185000	10611.9			2.13	8.858	1.26	2.476	0.88	1.034
190000	10898.7			2.18	9.307	1.30	2.600	0.91	1.086
195000	11185.5			2.24	9.767	1.33	2.727	0.93	1.139
200000	11472.3			2.30	10.238	1.37	2.857	0.95	1.192
205000	11759.1			2.36	10.719	1.40	2.990	0.98	1.248
210000	12045.9			2.41	11.211	1.43	3.125	1.00	1.304
215000	12332.7			2.47	11.713	1.47	3.263	1.03	1.361
220000	12619.5			2.53	12.226	1.50	3.405	1.05	1.419
225000	12906.3			2.59	12.749	1.54	3.549	1.07	1.479
230000	13193.1			2.64	13.283	1.57	3.695	1.10	1.540
235000	13479.9			2.70	13.827	1.61	3.845	1.12	1.602
240000	13766.7			2.76	14.381	1.64	3.997	1.15	1.665
245000	14053.5			2.82	14.946	1.67	4.152	1.17	1.729
250000	14340.3			2.87	15.522	1.71	4.310	1.19	1.794
255000	14627.2					1.74	4.471	1.22	1.860
260000	14914.0					1.78	4.634	1.24	1.928
265000	15200.8					1.81	4.801	1.26	1.997
270000	15487.6					1.84	4.970	1.29	2.066
275000	15774.4					1.88	5.141	1.31	2.137
280000	16061.2					1.91	5.316	1.34	2.209
285000	16348.0					1.95	5.493	1.36	2.282
290000	16634.8					1.98	5.673	1.38	2.357
295000	16921.6					2.01	5.856	1.41	2.432
300000	17208.4					2.05	6.042	1.43	2.508
305000	17495.2					2.08	6.230	1.46	2.586
310000	17782.0					2.12	6.421	1.48	2.665
315000	18068.8					2.15	6.615	1.50	2.744
320000	18355.6					2.19	6.811	1.53	2.825
325000	18642.4					2.22	7.010	1.55	2.907
330000	18929.3					2.25	7.212	1.57	2.990

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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]
335000	19216.1					2.29	7.417	1.60	3.075
340000	19502.9					2.32	7.624	1.62	3.160
345000	19789.7					2.36	7.835	1.65	3.246
350000	20076.5					2.39	8.047	1.67	3.334
355000	20363.3					2.42	8.263	1.69	3.422
360000	20650.1					2.46	8.481	1.72	3.512
365000	20936.9					2.49	8.702	1.74	3.603
370000	21223.7					2.53	8.926	1.77	3.695
375000	21510.5					2.56	9.153	1.79	3.788
380000	21797.3					2.60	9.382	1.81	3.882
385000	22084.1					2.63	9.614	1.84	3.977
390000	22370.9					2.66	9.848	1.86	4.073
395000	22657.7					2.70	10.086	1.88	4.171
400000	22944.6					2.73	10.326	1.91	4.269
405000	23231.4					2.77	10.568	1.93	4.369
410000	23518.2					2.80	10.814	1.96	4.469
415000	23805.0					2.83	11.062	1.98	4.571
420000	24091.8					2.87	11.313	2.00	4.674
425000	24378.6					2.90	11.566	2.03	4.778
430000	24665.4					2.94	11.822	2.05	4.882
435000	24952.2					2.97	12.081	2.08	4.989
440000	25239.0					3.01	12.343	2.10	5.096
445000	25525.8					3.04	12.607	2.12	5.204
450000	25812.6					3.07	12.874	2.15	5.313
455000	26099.4					3.11	13.144	2.17	5.423
460000	26386.2					3.14	13.416	2.20	5.535
465000	26673.0					3.18	13.691	2.22	5.647
470000	26959.8					3.21	13.969	2.24	5.761
475000	27246.7					3.24	14.249	2.27	5.876
480000	27533.5					3.28	14.532	2.29	5.991
485000	27820.3					3.31	14.818	2.31	6.108
490000	28107.1					3.35	15.106	2.34	6.226
495000	28393.9					3.38	15.397	2.36	6.345
500000	28680.7					3.42	15.691	2.39	6.465
505000	28967.5					3.45	15.988	2.41	6.586

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5 Pressure loss in Geberit FlowFit, compressed air

5.1 Compressed air, 3 bar

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

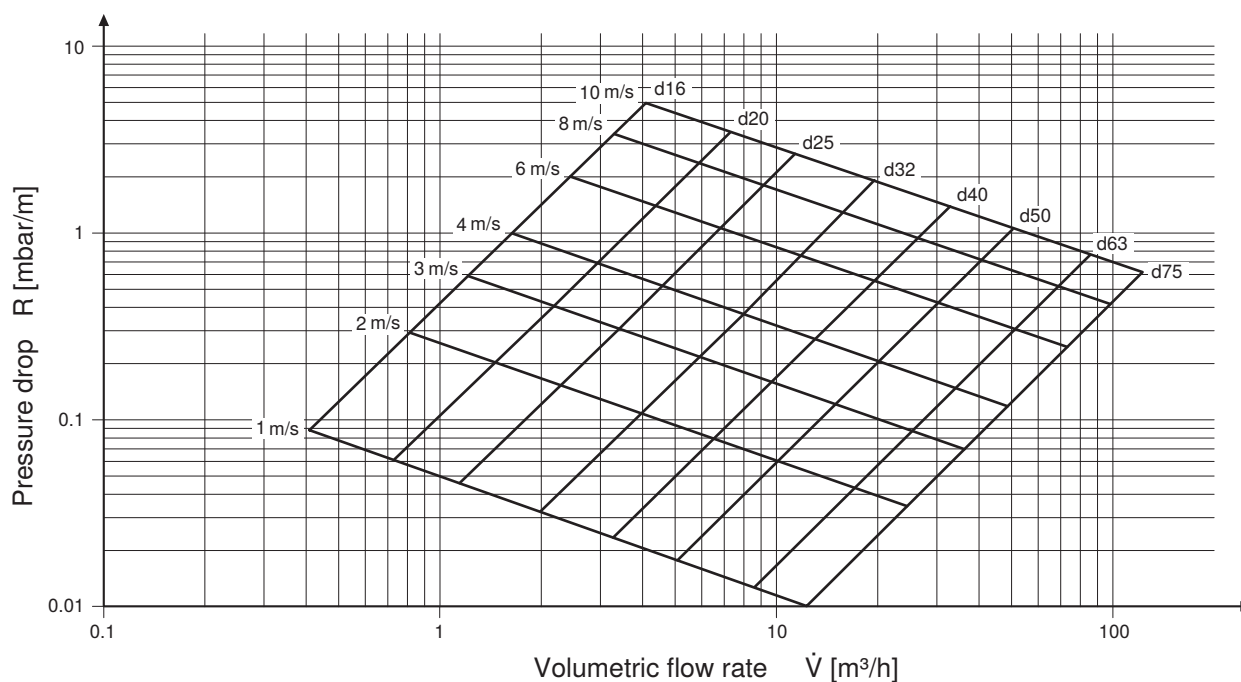


Table 23: Pressure loss in Geberit FlowFit system pipes, compressed air 3 bar, d16-32 mm

d [mm]	16		20		25		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]
0.10	0.25	0.0100	0.14	0.0032	0.09	0.0013	0.05	0.0004
0.25	0.61	0.0249	0.35	0.0079	0.22	0.0032	0.13	0.0011
0.50	1.23	0.1229	0.69	0.0316	0.44	0.0111	0.25	0.0021
0.75	1.84	0.2471	1.04	0.0632	0.66	0.0221	0.38	0.0060
1.00	2.46	0.4072	1.38	0.1037	0.88	0.0361	0.51	0.0097
1.25	3.07	0.6016	1.73	0.1527	1.11	0.0530	0.63	0.0143
1.50	3.68	0.8288	2.07	0.2097	1.33	0.0726	0.76	0.0195
1.75	4.30	1.0881	2.42	0.2746	1.55	0.0949	0.89	0.0254
2.00	4.91	1.3785	2.76	0.3470	1.77	0.1197	1.01	0.0320
2.25	5.53	1.6997	3.11	0.4269	1.99	0.1471	1.14	0.0393
2.50	6.14	2.0510	3.45	0.5141	2.21	0.1769	1.27	0.0472
2.75	6.75	2.4321	3.80	0.6085	2.43	0.2091	1.40	0.0557
3.00	7.37	2.8427	4.14	0.7099	2.65	0.2436	1.52	0.0648
3.25	7.98	3.2825	4.49	0.8183	2.87	0.2805	1.65	0.0745

d [mm]	16		20		25		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]
3.50	8.60	3.7511	4.84	0.9337	3.09	0.3198	1.78	0.0849
3.75	9.21	4.2485	5.18	1.0558	3.32	0.3612	1.90	0.0958
4.00	9.82	4.7743	5.53	1.1848	3.54	0.4050	2.03	0.1073
4.50			6.22	1.4627	3.98	0.4991	2.28	0.1320
5.00			6.91	1.7672	4.42	0.6021	2.54	0.1589
5.50			7.60	2.0978	4.86	0.7136	2.79	0.1881
6.00			8.29	2.4543	5.31	0.8337	3.04	0.2194
6.50			8.98	2.8365	5.75	0.9623	3.30	0.2529
7.00			9.67	3.2440	6.19	1.0991	3.55	0.2885
7.50					6.63	1.2443	3.81	0.3262
8.00					7.07	1.3976	4.06	0.3659
8.50					7.52	1.5591	4.31	0.4078
9.00					7.96	1.7287	4.57	0.4516
9.50					8.40	1.9063	4.82	0.4975
10.00					8.84	2.0919	5.07	0.5454
10.50					9.28	2.2855	5.33	0.5953
11.00					9.73	2.4870	5.58	0.6472
11.50							5.84	0.7010
12.00							6.09	0.7568
12.50							6.34	0.8146
13.00							6.60	0.8743
13.50							6.85	0.9359
14.00							7.10	0.9995
14.50							7.36	1.0650
15.00							7.61	1.1323
16.00							8.12	1.2728
17.00							8.63	1.4208
18.00							9.13	1.5763
19.00							9.64	1.7393

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

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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	0.01	0.0000	0.01	0.0000
0.25	0.08	0.0004	0.05	0.0002	0.03	0.0001	0.02	0.0000
0.50	0.15	0.0008	0.10	0.0003	0.06	0.0001	0.04	0.0001
0.75	0.23	0.0012	0.15	0.0005	0.09	0.0002	0.06	0.0001
1.00	0.31	0.0030	0.20	0.0006	0.12	0.0002	0.08	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]
1.25	0.38	0.0043	0.25	0.0015	0.15	0.0003	0.10	0.0001
1.50	0.46	0.0059	0.30	0.0021	0.18	0.0006	0.12	0.0002
1.75	0.54	0.0077	0.34	0.0027	0.20	0.0008	0.14	0.0003
2.00	0.61	0.0097	0.39	0.0034	0.23	0.0010	0.16	0.0004
2.25	0.69	0.0118	0.44	0.0042	0.26	0.0012	0.18	0.0005
2.50	0.76	0.0142	0.49	0.0050	0.29	0.0015	0.20	0.0006
2.75	0.84	0.0167	0.54	0.0059	0.32	0.0017	0.22	0.0007
3.00	0.92	0.0195	0.59	0.0068	0.35	0.0020	0.25	0.0009
3.25	0.99	0.0224	0.64	0.0079	0.38	0.0023	0.27	0.0010
3.50	1.07	0.0255	0.69	0.0089	0.41	0.0026	0.29	0.0011
3.75	1.15	0.0287	0.74	0.0101	0.44	0.0029	0.31	0.0013
4.00	1.22	0.0321	0.79	0.0113	0.47	0.0033	0.33	0.0014
4.50	1.38	0.0395	0.89	0.0138	0.53	0.0040	0.37	0.0017
5.00	1.53	0.0475	0.98	0.0166	0.58	0.0048	0.41	0.0021
5.50	1.68	0.0561	1.08	0.0196	0.64	0.0057	0.45	0.0024
6.00	1.84	0.0654	1.18	0.0228	0.70	0.0066	0.49	0.0028
6.50	1.99	0.0753	1.28	0.0263	0.76	0.0076	0.53	0.0033
7.00	2.14	0.0858	1.38	0.0299	0.82	0.0087	0.57	0.0037
7.50	2.29	0.0969	1.48	0.0338	0.88	0.0098	0.61	0.0042
8.00	2.45	0.1087	1.57	0.0378	0.94	0.0109	0.65	0.0047
8.50	2.60	0.1210	1.67	0.0421	0.99	0.0122	0.69	0.0052
9.00	2.75	0.1339	1.77	0.0466	1.05	0.0135	0.74	0.0057
9.50	2.91	0.1474	1.87	0.0512	1.11	0.0148	0.78	0.0063
10.00	3.06	0.1615	1.97	0.0561	1.17	0.0162	0.82	0.0069
10.50	3.21	0.1761	2.07	0.0611	1.23	0.0176	0.86	0.0075
11.00	3.37	0.1913	2.16	0.0664	1.29	0.0191	0.90	0.0081
11.50	3.52	0.2071	2.26	0.0718	1.34	0.0207	0.94	0.0088
12.00	3.67	0.2235	2.36	0.0774	1.40	0.0223	0.98	0.0095
12.50	3.82	0.2404	2.46	0.0833	1.46	0.0240	1.02	0.0102
13.00	3.98	0.2578	2.56	0.0893	1.52	0.0257	1.06	0.0109
13.50	4.13	0.2758	2.66	0.0955	1.58	0.0275	1.10	0.0117
14.00	4.28	0.2944	2.75	0.1018	1.64	0.0293	1.14	0.0124
14.50	4.44	0.3135	2.85	0.1084	1.70	0.0312	1.18	0.0132
15.00	4.59	0.3331	2.95	0.1152	1.75	0.0331	1.23	0.0141
16.00	4.90	0.3741	3.15	0.1292	1.87	0.0371	1.31	0.0158
17.00	5.20	0.4171	3.34	0.1440	1.99	0.0413	1.39	0.0175
18.00	5.51	0.4623	3.54	0.1595	2.10	0.0457	1.47	0.0194
19.00	5.81	0.5096	3.74	0.1757	2.22	0.0503	1.55	0.0213
20.00	6.12	0.5590	3.93	0.1926	2.34	0.0552	1.63	0.0234

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	6.42	0.6105	4.13	0.2102	2.46	0.0602	1.72	0.0255
22.00	6.73	0.6641	4.33	0.2285	2.57	0.0654	1.80	0.0277
23.00	7.04	0.7198	4.52	0.2475	2.69	0.0708	1.88	0.0300
24.00	7.34	0.7775	4.72	0.2672	2.81	0.0763	1.96	0.0323
25.00	7.65	0.8372	4.92	0.2875	2.92	0.0821	2.04	0.0347
30.00	9.18	1.1663	5.90	0.3995	3.51	0.1138	2.45	0.0481
35.00			6.89	0.5281	4.09	0.1501	2.86	0.0633
40.00			7.87	0.6731	4.68	0.1909	3.27	0.0804
45.00			8.85	0.8341	5.26	0.2362	3.68	0.0994
50.00			9.84	1.0111	5.85	0.2858	4.08	0.1202
55.00					6.43	0.3397	4.49	0.1427
60.00					7.02	0.3978	4.90	0.1670
65.00					7.60	0.4602	5.31	0.1930
70.00					8.18	0.5268	5.72	0.2207
75.00					8.77	0.5975	6.13	0.2502
80.00					9.35	0.6724	6.54	0.2813
85.00					9.94	0.7513	6.94	0.3141
90.00							7.35	0.3486
95.00							7.76	0.3847
100.00							8.17	0.4225
105.00							8.58	0.4619
110.00							8.99	0.5029
115.00							9.39	0.5456
120.00							9.80	0.5899
125.00							10.21	0.6357

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5.2 Compressed air, 6 bar

The diagram refers to the operating volumetric flow rate $\dot{V}$.

Medium:	Compressed air	Density:	8.352 kg/m ³
Temperature:	6 bar	Viscosity:	0.000018302 Pa·s
Density:	7 bar	Surface roughness:	0.007 mm
Temperature:	20°C		

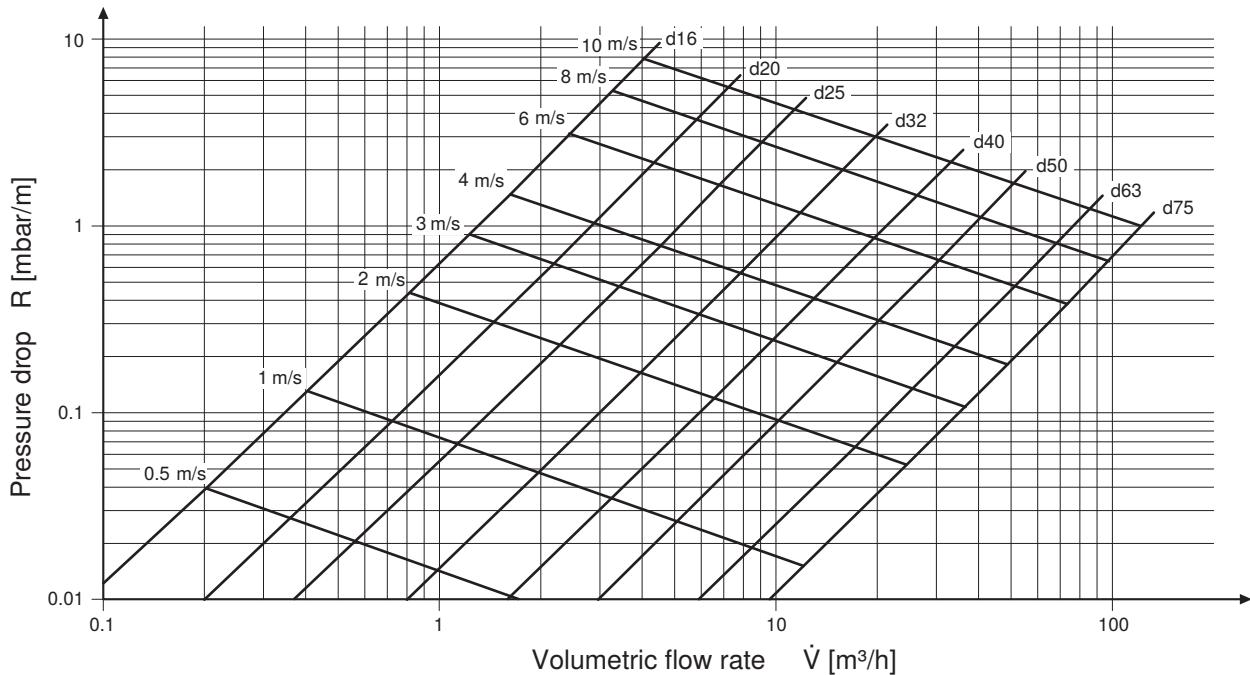


Table 25: Pressure loss in Geberit system pipes, compressed air 6 bar, d16-32 mm

d [mm]	16		20		25		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]
0.10	0.25	0.0100	0.14	0.0032	0.09	0.0013	0.05	0.0004
0.25	0.61	0.0559	0.35	0.0144	0.22	0.0032	0.13	0.0011
0.50	1.23	0.1846	0.69	0.0471	0.44	0.0164	0.25	0.0044
0.75	1.84	0.3748	1.04	0.0950	0.66	0.0330	0.38	0.0089
1.00	2.46	0.6222	1.38	0.1570	0.88	0.0543	0.51	0.0145
1.25	3.07	0.9244	1.73	0.2323	1.11	0.0801	0.63	0.0214
1.50	3.68	1.2797	2.07	0.3205	1.33	0.1102	0.76	0.0294
1.75	4.30	1.6868	2.42	0.4211	1.55	0.1445	0.89	0.0384
2.00	4.91	2.1449	2.76	0.5339	1.77	0.1828	1.01	0.0485
2.25	5.53	2.6533	3.11	0.6587	1.99	0.2252	1.14	0.0597
2.50	6.14	3.2113	3.45	0.7953	2.21	0.2715	1.27	0.0718
2.75	6.75	3.8184	3.80	0.9435	2.43	0.3216	1.40	0.0849
3.00	7.37	4.4743	4.14	1.1032	2.65	0.3756	1.52	0.0991
3.25	7.98	5.1787	4.49	1.2743	2.87	0.4333	1.65	0.1141
3.50	8.60	5.9312	4.84	1.4567	3.09	0.4947	1.78	0.1301

d [mm]	16		20		25		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	9.21	6.7316	5.18	1.6502	3.32	0.5598	1.90	0.1471
4.00	9.82	7.5796	5.53	1.8549	3.54	0.6285	2.03	0.1650
4.50			6.22	2.2975	3.98	0.7768	2.28	0.2035
5.00			6.91	2.7837	4.42	0.9394	2.54	0.2456
5.50			7.60	3.3133	4.86	1.1161	2.79	0.2912
6.00			8.29	3.8859	5.31	1.3069	3.04	0.3404
6.50			8.98	4.5013	5.75	1.5114	3.30	0.3931
7.00			9.67	5.1592	6.19	1.7297	3.55	0.4492
7.50					6.63	1.9617	3.81	0.5086
8.00					7.07	2.2073	4.06	0.5715
8.50					7.52	2.4664	4.31	0.6377
9.00					7.96	2.7389	4.57	0.7073
9.50					8.40	3.0248	4.82	0.7802
10.00					8.84	3.3241	5.07	0.8563
10.50					9.28	3.6366	5.33	0.9358
11.00					9.73	3.9624	5.58	1.0185
11.50							5.84	1.1044
12.00							6.09	1.1936
12.50							6.34	1.2860
13.00							6.60	1.3816
13.50							6.85	1.4804
14.00							7.10	1.5824
14.50							7.36	1.6876
15.00							7.61	1.7959
16.00							8.12	2.0221
17.00							8.63	2.2609
18.00							9.13	2.5121
19.00							9.64	2.7759

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

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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	0.01	0.0000	0.01	0.0000
0.25	0.08	0.0004	0.05	0.0002	0.03	0.0001	0.02	0.0000
0.50	0.15	0.0014	0.10	0.0003	0.06	0.0001	0.04	0.0001
0.75	0.23	0.0027	0.15	0.0010	0.09	0.0002	0.06	0.0001
1.00	0.31	0.0044	0.20	0.0016	0.12	0.0005	0.08	0.0002
1.25	0.38	0.0065	0.25	0.0023	0.15	0.0007	0.10	0.0003

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]
1.50	0.46	0.0088	0.30	0.0031	0.18	0.0009	0.12	0.0004
1.75	0.54	0.0115	0.34	0.0041	0.20	0.0012	0.14	0.0005
2.00	0.61	0.0146	0.39	0.0051	0.23	0.0015	0.16	0.0006
2.25	0.69	0.0179	0.44	0.0063	0.26	0.0018	0.18	0.0008
2.50	0.76	0.0215	0.49	0.0075	0.29	0.0022	0.20	0.0009
2.75	0.84	0.0254	0.54	0.0089	0.32	0.0026	0.22	0.0011
3.00	0.92	0.0296	0.59	0.0103	0.35	0.0030	0.25	0.0013
3.25	0.99	0.0340	0.64	0.0119	0.38	0.0035	0.27	0.0015
3.50	1.07	0.0388	0.69	0.0135	0.41	0.0039	0.29	0.0017
3.75	1.15	0.0438	0.74	0.0153	0.44	0.0044	0.31	0.0019
4.00	1.22	0.0491	0.79	0.0171	0.47	0.0050	0.33	0.0021
4.50	1.38	0.0604	0.89	0.0210	0.53	0.0061	0.37	0.0026
5.00	1.53	0.0728	0.98	0.0253	0.58	0.0073	0.41	0.0031
5.50	1.68	0.0863	1.08	0.0300	0.64	0.0087	0.45	0.0037
6.00	1.84	0.1007	1.18	0.0350	0.70	0.0101	0.49	0.0043
6.50	1.99	0.1161	1.28	0.0403	0.76	0.0116	0.53	0.0049
7.00	2.14	0.1326	1.38	0.0459	0.82	0.0132	0.57	0.0056
7.50	2.29	0.1500	1.48	0.0519	0.88	0.0149	0.61	0.0064
8.00	2.45	0.1683	1.57	0.0582	0.94	0.0168	0.65	0.0071
8.50	2.60	0.1877	1.67	0.0649	0.99	0.0187	0.69	0.0079
9.00	2.75	0.2079	1.77	0.0718	1.05	0.0206	0.74	0.0088
9.50	2.91	0.2291	1.87	0.0791	1.11	0.0227	0.78	0.0096
10.00	3.06	0.2513	1.97	0.0867	1.17	0.0249	0.82	0.0106
10.50	3.21	0.2744	2.07	0.0946	1.23	0.0271	0.86	0.0115
11.00	3.37	0.2984	2.16	0.1028	1.29	0.0295	0.90	0.0125
11.50	3.52	0.3233	2.26	0.1113	1.34	0.0319	0.94	0.0135
12.00	3.67	0.3491	2.36	0.1202	1.40	0.0344	0.98	0.0146
12.50	3.82	0.3759	2.46	0.1293	1.46	0.0370	1.02	0.0157
13.00	3.98	0.4035	2.56	0.1388	1.52	0.0397	1.06	0.0168
13.50	4.13	0.4320	2.66	0.1485	1.58	0.0424	1.10	0.0180
14.00	4.28	0.4615	2.75	0.1585	1.64	0.0453	1.14	0.0192
14.50	4.44	0.4918	2.85	0.1689	1.70	0.0482	1.18	0.0204
15.00	4.59	0.5231	2.95	0.1795	1.75	0.0512	1.23	0.0217
16.00	4.90	0.5882	3.15	0.2017	1.87	0.0575	1.31	0.0243
17.00	5.20	0.6568	3.34	0.2250	1.99	0.0641	1.39	0.0271
18.00	5.51	0.7289	3.54	0.2495	2.10	0.0710	1.47	0.0300
19.00	5.81	0.8046	3.74	0.2752	2.22	0.0783	1.55	0.0330
20.00	6.12	0.8837	3.93	0.3020	2.34	0.0858	1.63	0.0362
21.00	6.42	0.9662	4.13	0.3299	2.46	0.0937	1.72	0.0395

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]
22.00	6.73	1.0522	4.33	0.3590	2.57	0.1019	1.80	0.0430
23.00	7.04	1.1416	4.52	0.3892	2.69	0.1104	1.88	0.0465
24.00	7.34	1.2344	4.72	0.4206	2.81	0.1192	1.96	0.0502
25.00	7.65	1.3306	4.92	0.4531	2.92	0.1283	2.04	0.0540
30.00	9.18	1.8624	5.90	0.6321	3.51	0.1785	2.45	0.0750
35.00			6.89	0.8386	4.09	0.2362	2.86	0.0991
40.00			7.87	1.0723	4.68	0.3012	3.27	0.1262
45.00			8.85	1.3327	5.26	0.3735	3.68	0.1563
50.00			9.84	1.6198	5.85	0.4530	4.08	0.1893
55.00					6.43	0.5396	4.49	0.2253
60.00					7.02	0.6333	4.90	0.2641
65.00					7.60	0.7340	5.31	0.3058
70.00					8.18	0.8416	5.72	0.3503
75.00					8.77	0.9562	6.13	0.3976
80.00					9.35	1.0776	6.54	0.4477
85.00					9.94	1.2059	6.94	0.5006
90.00							7.35	0.5562
95.00							7.76	0.6146
100.00							8.17	0.6757
105.00							8.58	0.7396
110.00							8.99	0.8062
115.00							9.39	0.8755
120.00							9.80	0.9475
125.00							10.21	1.0222

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5.3 Compressed air, 9 bar

Medium:	Compressed air	Density:	11.932 kg/m ³
Temperature:	9 bar	Viscosity:	0.000018344 Pa•s
Density:	10 bar	Surface roughness:	0.007 mm
Temperature:	20 °C		

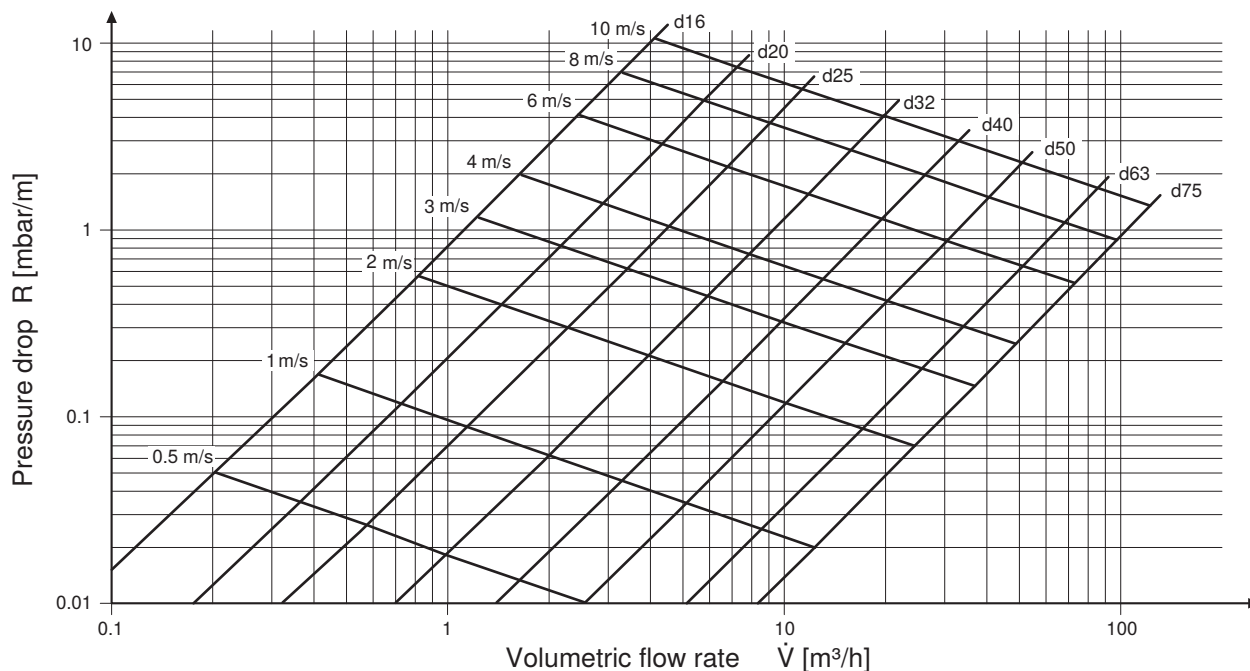


Figure 1:

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

d [mm]	16		20		25		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]
0.10	0.25	0.0100	0.14	0.0032	0.09	0.0013	0.05	0.0004
0.25	0.61	0.0722	0.35	0.0185	0.22	0.0065	0.13	0.0011
0.50	1.23	0.2410	0.69	0.0612	0.44	0.0212	0.25	0.0057
0.75	1.84	0.4924	1.04	0.1241	0.66	0.0429	0.38	0.0115
1.00	2.46	0.8215	1.38	0.2059	0.88	0.0708	0.51	0.0189
1.25	3.07	1.2251	1.73	0.3057	1.11	0.1049	0.63	0.0279
1.50	3.68	1.7014	2.07	0.4229	1.33	0.1447	0.76	0.0384
1.75	4.30	2.2490	2.42	0.5570	1.55	0.1902	0.89	0.0503
2.00	4.91	2.8669	2.76	0.7078	1.77	0.2411	1.01	0.0636
2.25	5.53	3.5543	3.11	0.8749	1.99	0.2975	1.14	0.0784
2.50	6.14	4.3105	3.45	1.0581	2.21	0.3592	1.27	0.0945
2.75	6.75	5.1351	3.80	1.2574	2.43	0.4262	1.40	0.1119
3.00	7.37	6.0275	4.14	1.4724	2.65	0.4983	1.52	0.1306
3.25	7.98	6.9876	4.49	1.7032	2.87	0.5756	1.65	0.1507
3.50	8.60	8.0150	4.84	1.9495	3.09	0.6579	1.78	0.1720

d [mm]	16		20		25		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	9.21	9.1093	5.18	2.2113	3.32	0.7453	1.90	0.1946
4.00	9.82	10.2705	5.53	2.4886	3.54	0.8377	2.03	0.2184
4.50			6.22	3.0890	3.98	1.0375	2.28	0.2699
5.00			6.91	3.7501	4.42	1.2568	2.54	0.3262
5.50			7.60	4.4717	4.86	1.4957	2.79	0.3874
6.00			8.29	5.2534	5.31	1.7539	3.04	0.4535
6.50			8.98	6.0948	5.75	2.0314	3.30	0.5242
7.00			9.67	6.9958	6.19	2.3279	3.55	0.5997
7.50					6.63	2.6434	3.81	0.6799
8.00					7.07	2.9778	4.06	0.7647
8.50					7.52	3.3311	4.31	0.8542
9.00					7.96	3.7031	4.57	0.9482
9.50					8.40	4.0938	4.82	1.0468
10.00					8.84	4.5032	5.07	1.1500
10.50					9.28	4.9312	5.33	1.2577
11.00					9.73	5.3778	5.58	1.3699
11.50							5.84	1.4867
12.00							6.09	1.6079
12.50							6.34	1.7336
13.00							6.60	1.8638
13.50							6.85	1.9984
14.00							7.10	2.1374
14.50							7.36	2.2809
15.00							7.61	2.4288
16.00							8.12	2.7379
17.00							8.63	3.0646
18.00							9.13	3.4088
19.00							9.64	3.7704

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

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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	0.01	0.0000	0.01	0.0000
0.25	0.08	0.0004	0.05	0.0002	0.03	0.0001	0.02	0.0000
0.50	0.15	0.0017	0.10	0.0006	0.06	0.0001	0.04	0.0001
0.75	0.23	0.0035	0.15	0.0012	0.09	0.0004	0.06	0.0002
1.00	0.31	0.0057	0.20	0.0020	0.12	0.0006	0.08	0.0003
1.25	0.38	0.0084	0.25	0.0029	0.15	0.0009	0.10	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]
1.50	0.46	0.0115	0.30	0.0040	0.18	0.0012	0.12	0.0005
1.75	0.54	0.0151	0.34	0.0053	0.20	0.0015	0.14	0.0007
2.00	0.61	0.0190	0.39	0.0066	0.23	0.0019	0.16	0.0008
2.25	0.69	0.0234	0.44	0.0082	0.26	0.0024	0.18	0.0010
2.50	0.76	0.0281	0.49	0.0098	0.29	0.0029	0.20	0.0012
2.75	0.84	0.0333	0.54	0.0116	0.32	0.0034	0.22	0.0014
3.00	0.92	0.0388	0.59	0.0135	0.35	0.0039	0.25	0.0017
3.25	0.99	0.0447	0.64	0.0156	0.38	0.0045	0.27	0.0019
3.50	1.07	0.0510	0.69	0.0177	0.41	0.0051	0.29	0.0022
3.75	1.15	0.0577	0.74	0.0200	0.44	0.0058	0.31	0.0025
4.00	1.22	0.0647	0.79	0.0225	0.47	0.0065	0.33	0.0028
4.50	1.38	0.0798	0.89	0.0277	0.53	0.0080	0.37	0.0034
5.00	1.53	0.0963	0.98	0.0333	0.58	0.0096	0.41	0.0041
5.50	1.68	0.1142	1.08	0.0395	0.64	0.0114	0.45	0.0048
6.00	1.84	0.1334	1.18	0.0461	0.70	0.0133	0.49	0.0056
6.50	1.99	0.1540	1.28	0.0532	0.76	0.0153	0.53	0.0065
7.00	2.14	0.1760	1.38	0.0607	0.82	0.0174	0.57	0.0074
7.50	2.29	0.1993	1.48	0.0687	0.88	0.0197	0.61	0.0084
8.00	2.45	0.2239	1.57	0.0771	0.94	0.0221	0.65	0.0094
8.50	2.60	0.2498	1.67	0.0860	0.99	0.0246	0.69	0.0104
9.00	2.75	0.2770	1.77	0.0953	1.05	0.0273	0.74	0.0115
9.50	2.91	0.3055	1.87	0.1050	1.11	0.0300	0.78	0.0127
10.00	3.06	0.3353	1.97	0.1151	1.17	0.0329	0.82	0.0139
10.50	3.21	0.3663	2.07	0.1257	1.23	0.0359	0.86	0.0152
11.00	3.37	0.3986	2.16	0.1367	1.29	0.0390	0.90	0.0165
11.50	3.52	0.4322	2.26	0.1481	1.34	0.0422	0.94	0.0178
12.00	3.67	0.4671	2.36	0.1600	1.40	0.0456	0.98	0.0193
12.50	3.82	0.5031	2.46	0.1722	1.46	0.0490	1.02	0.0207
13.00	3.98	0.5405	2.56	0.1849	1.52	0.0526	1.06	0.0222
13.50	4.13	0.5791	2.66	0.1980	1.58	0.0563	1.10	0.0238
14.00	4.28	0.6189	2.75	0.2115	1.64	0.0601	1.14	0.0254
14.50	4.44	0.6599	2.85	0.2254	1.70	0.0640	1.18	0.0270
15.00	4.59	0.7022	2.95	0.2397	1.75	0.0681	1.23	0.0287
16.00	4.90	0.7904	3.15	0.2695	1.87	0.0765	1.31	0.0322
17.00	5.20	0.8835	3.34	0.3010	1.99	0.0853	1.39	0.0359
18.00	5.51	0.9814	3.54	0.3340	2.10	0.0946	1.47	0.0398
19.00	5.81	1.0842	3.74	0.3687	2.22	0.1043	1.55	0.0439
20.00	6.12	1.1918	3.93	0.4049	2.34	0.1144	1.63	0.0481
21.00	6.42	1.3042	4.13	0.4427	2.46	0.1250	1.72	0.0525

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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]
22.00	6.73	1.4214	4.33	0.4821	2.57	0.1360	1.80	0.0571
23.00	7.04	1.5434	4.52	0.5230	2.69	0.1475	1.88	0.0619
24.00	7.34	1.6700	4.72	0.5655	2.81	0.1593	1.96	0.0669
25.00	7.65	1.8015	4.92	0.6095	2.92	0.1716	2.04	0.0720
30.00	9.18	2.5295	5.90	0.8529	3.51	0.2393	2.45	0.1002
35.00			6.89	1.1343	4.09	0.3173	2.86	0.1326
40.00			7.87	1.4536	4.68	0.4054	3.27	0.1692
45.00			8.85	1.8103	5.26	0.5036	3.68	0.2099
50.00			9.84	2.2043	5.85	0.6118	4.08	0.2546
55.00					6.43	0.7299	4.49	0.3033
60.00					7.02	0.8577	4.90	0.3560
65.00					7.60	0.9953	5.31	0.4126
70.00					8.18	1.1427	5.72	0.4732
75.00					8.77	1.2997	6.13	0.5377
80.00					9.35	1.4664	6.54	0.6061
85.00					9.94	1.6427	6.94	0.6783
90.00							7.35	0.7544
95.00							7.76	0.8343
100.00							8.17	0.9180
105.00							8.58	1.0056
110.00							8.99	1.0969
115.00							9.39	1.1921
120.00							9.80	1.2910
125.00							10.21	1.3938

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