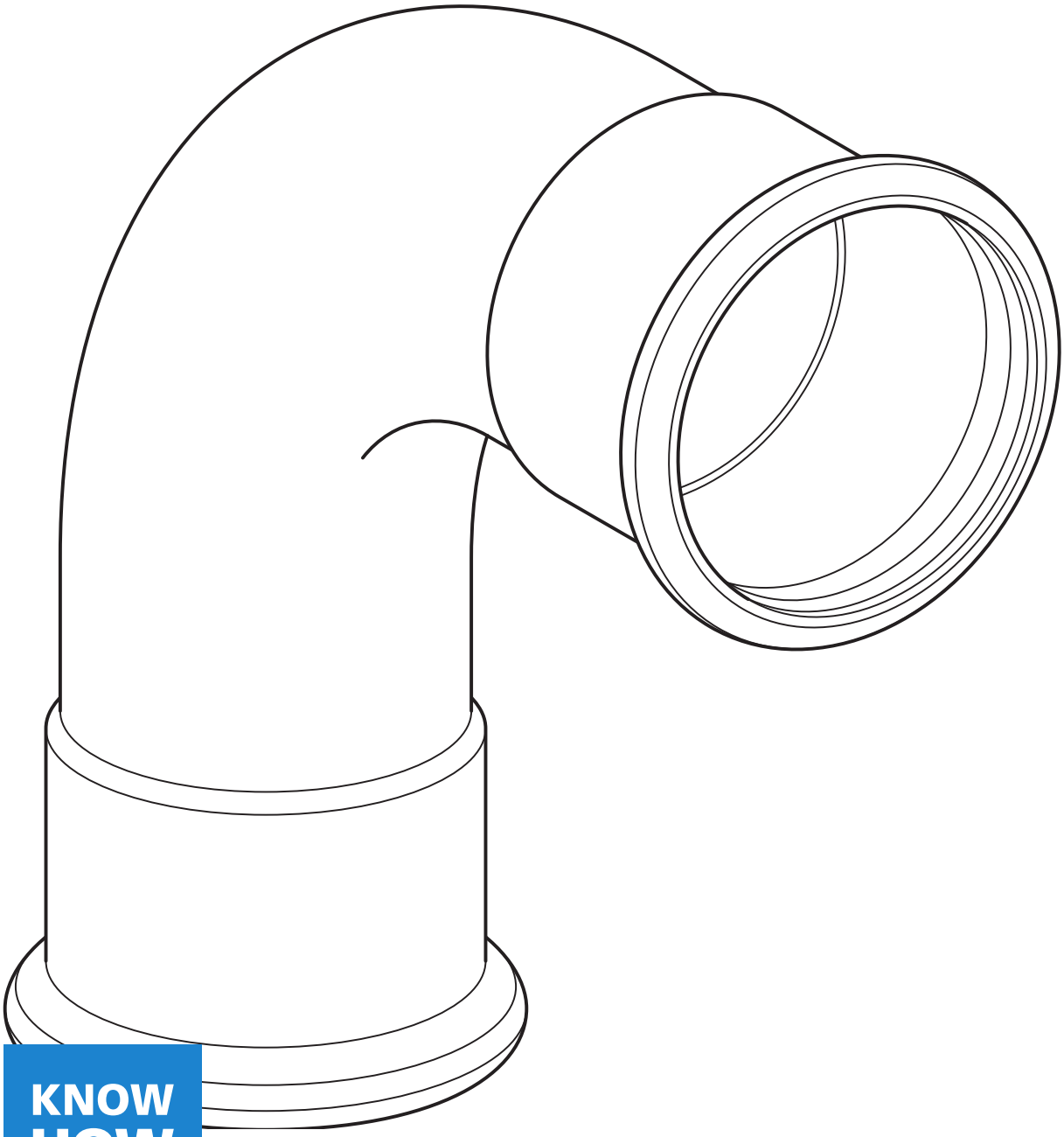
GEBERIT

GEBERIT MAPRESS THERM
PRESSURE LOSS

VALID FROM 1 JANUARY 2026



KNOW HOW INSTALLED

1	**TOTAL PRESSURE LOSS IN AN INSTALLATION**	
1.1	Pressure loss from individual resistances	4
1.1.1	Pressure loss coefficients	5
1.2	Equivalent pipe length	7
1.2.1	Equivalent pipe lengths	7
2	**PRESSURE LOSS COOLING**	
2.1	Recommended flow velocities	9
2.2	Cooling, inlet flow 10 °C / return flow 11 °C	9
2.3	Cooling, inlet flow 8 °C / return flow 12 °C	14
3	**HEATING PRESSURE LOSS**	
3.1	Recommended flow velocities	21
3.2	Heating, inlet flow 61 °C / return flow 60 °C	21
3.3	Heating, inlet flow 70 °C / return flow 55 °C	26
3.4	Heating, inlet flow 35 °C / return flow 30 °C	35
3.5	Heating, inlet flow 45 °C / return flow 35 °C	42
3.6	Heating, inlet flow 55 °C / return flow 45 °C	50
4	**COMPRESSED AIR PRESSURE LOSS**	
4.1	Compressed air, 3 bar	58
4.2	Compressed air, 6 bar	62
4.3	Compressed air, 8 bar	66
4.4	Compressed air, 10 bar	70
4.5	Compressed air, 16 bar	74
5	**GENERAL INFORMATION**	
5.1	Disclaimer	78

1 TOTAL PRESSURE LOSS IN AN INSTALLATION

The total pressure loss in an installation is derived from the sum of the

- pressure losses through pipe friction in pipes
- pressure losses from the individual resistances of fittings

$$\Delta p_{tot} = \Delta p_R + \Delta p_E$$

Δp_{tot}	Total pressure loss
Δp_R	Pressure loss through pipe friction [Pa]
Δp_E	Pressure loss from individual resistances [Pa]

100,000 PA = 100 kPa = 1 bar = 1000 mbar

1.1 PRESSURE LOSS FROM INDIVIDUAL RESISTANCES

Changes in direction and/or velocity that occur in fittings such as bends and T-pieces cause pressure losses due to individual resistances.

The essential size for determining pressure losses from individual resistances is the pressure loss coefficient ζ (Zeta value), a dimensionless size which represents the resistance against the dynamic pressure of the water.

Since a theoretical determination of the flow losses of these individual resistances is only possible in certain cases, the pressure loss coefficients are determined in accordance with the procedures outlined in the Technical Test Specification W 575 of the DVGW.

The pressure loss from individual resistances Δp_E is derived from the sum of the pressure loss coefficients ζ (Zeta values) multiplied by the dynamic pressure:

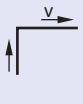
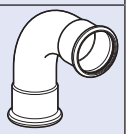
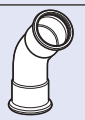
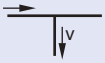
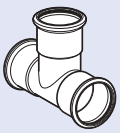
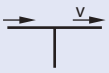
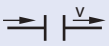
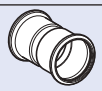
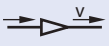
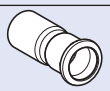
$$\Delta p_E = Z = \sum \zeta \cdot \frac{\rho}{2} \cdot v^2 \qquad \left[\frac{kg \cdot m^2}{m^3 \cdot s^2} = \frac{N}{m^2} = Pa \right]$$

Δp_E	Pressure loss from individual resistances [Pa]
$\sum \zeta$	Sum of the pressure loss coefficients [factor]
ρ	Density [kg/m^3]
v	Velocity in the pipe with the reference diameter [m/s]

1.1.1 Pressure loss coefficients

The pressure loss coefficients were calculated based on SVGW (SN EN 1267) and DVGW (W 575) specifications.

Table 1: Pressure loss coefficients ζ (Zeta values) for Geberit Mapress Therm fittings, d15–35 mm

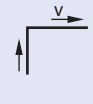
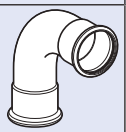
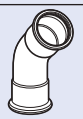
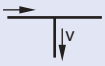
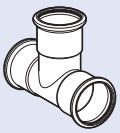
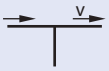
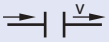
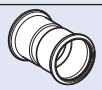
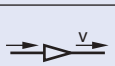
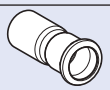
			d [mm]				
			15	**18**	**22**	**28**	**35**
Bend 90° (W90)			0.45	0.42	0.39	0.34	0.34
Bend 45° (W45)			0.34	0.30	0.29	0.26	0.21
T-piece[1)] Branch fitting (TA)			1.17	1.19	1.15	1.18	1.15
T-piece[1)] Through-flow (TD)			0.20	0.16	0.16	0.12	0.13
Threaded socket (K)			0.17	0.14	0.14	0.10	0.11
Reducer (RED)			22/15 0.13	22/18 0.12	35/22 0.11	42/28 0.09	54/35 0.09

v The symbol v marks the reference cross-section.

→ The arrow marks the cross-sections flowed through during the measurement.

1) In the case of reduced T-pieces, the resistance value of the equal T-piece is set to the smallest dimension of the reduced T-piece for the flow path to be calculated.

Table 2: Pressure loss coefficients ζ (Zeta values) for Geberit Mapress Therm fittings, d42–108 mm

			d [mm]				
			42	**54**	**76.1**	**88.9**	**108**
Bend 90° (W90)			0.33	0.31	0.29	0.28	0.26
Bend 45° (W45)			0.20	0.19	0.18	0.17	0.16
T-piece[1] Branch fitting (TA)			1.17	1.20	1.35	1.35	1.35
T-piece[1] Through-flow (TD)			0.11	0.09	0.05	0.05	0.05
Threaded socket (K)			0.09	0.07	0.03	0.03	0.03
Reducer (RED)			54/42 0.08	76.1/54 0.07	108/76.1 0.03	108/88.9 0.03	–

v The symbol v marks the reference cross-section.

→ The arrow marks the cross-sections flowed through during the measurement.

– Flow situation does not apply to any application.

1) In the case of reduced T-pieces, the resistance value of the equal T-piece is set to the smallest dimension of the reduced T-piece for the flow path to be calculated.

1.2 EQUIVALENT PIPE LENGTH

The individual resistances can be taken into account in a simplified manner with the equivalent pipe length instead of the pressure loss coefficient (Zeta value). The equivalent pipe length indicates which length of a straight pipe corresponds to the pressure loss of a fitting or valve with a known individual resistance number.

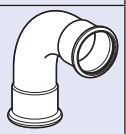
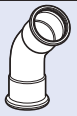
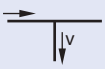
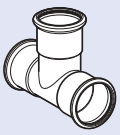
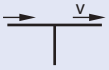
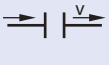
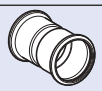
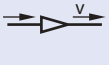
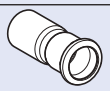
The equivalent pipe length must be added to the pipe length and multiplied by the corresponding pipe friction pressure drop.

The equivalent pipe lengths corresponding to the individual resistances can be found in the tables entitled "Equivalent pipe lengths".

1.2.1 Equivalent pipe lengths

The equivalent pipe lengths were determined based on the guidelines of the SVGW (SN EN 1267) and DVGW (W 575).

Table 3: Equivalent pipe lengths [m] for Geberit Mapress Therm fittings, d15–35 mm

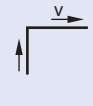
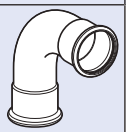
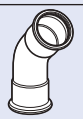
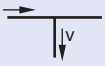
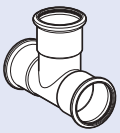
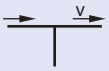
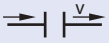
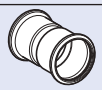
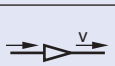
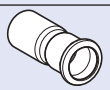
			d [mm]				
			15	**18**	**22**	**28**	**35**
Bend 90° (W90)			0.45	0.42	0.39	0.34	0.34
Bend 45° (W45)			0.34	0.30	0.29	0.26	0.21
T-piece[1)] Branch fitting (TA)			1.17	1.19	1.15	1.18	1.15
T-piece[1)] Through-flow (TD)			0.20	0.16	0.16	0.12	0.13
Threaded socket (K)			0.17	0.14	0.14	0.10	0.11
Reducer (RED)			22/15 0.13	22/18 0.12	35/22 0.11	42/28 0.09	54/35 0.09

v The symbol v marks the reference cross-section.

→ The arrow marks the cross-sections flowed through during the measurement.

1) In the case of reduced T-pieces, the equivalent pipe length of the equal T-piece is set to the smallest dimension of the reduced T-piece for the flow path to be calculated.

Table 4: Equivalent pipe lengths [m] for Geberit Mapress Therm fittings, d42–108 mm

			d [mm]				
			42	**54**	**76.1**	**88.9**	**108**
Bend 90° (W90)			0.66	0.86	1.11	1.33	1.68
Bend 45° (W45)			0.47	0.60	0.66	0.78	0.99
T-piece[1)] Branch fitting (TA)			2.43	3.47	5.74	7.06	9.14
T-piece[1)] Through-flow (TD)			0.30	0.37	0.33	0.39	0.47
Threaded socket (K)			0.18	0.19	0.12	0.15	0.19
Reducer (RED)			54/42 0.16	76.1/54 0.19	108/76.1 0.12	108/88.9 0.15	–

v The symbol v marks the reference cross-section.

→ The arrow marks the cross-sections flowed through during the measurement.

– Flow situation does not apply to any application.

1) In the case of reduced T-pieces, the equivalent pipe length of the equal T-piece is set to the smallest dimension of the reduced T-piece for the flow path to be calculated.

2 PRESSURE LOSS COOLING

2.1 RECOMMENDED FLOW VELOCITIES

The following recommendations apply for the cooling pressure loss tables:

- Heat sink connection lines: 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

2.2 COOLING, INLET FLOW 10 °C / RETURN FLOW 11 °C

Medium:	Water	Density:	999.7 kg/m^3
Inlet flow temperature:	10 °C	Viscosity:	0.0012891 Pa•s
Return temperature:	11 °C	Specific thermal capacity:	4 187.6 J/(kg•K)
Range:	1 K	Surface roughness:	0.0015 mm
Average temperature:	10.5 °C		

Table 5: Pressure loss for Geberit Mapress Therm system pipes, cooling, inlet flow 10 °C / return flow 11 °C, d15–28 mm

d [mm]		15		18		22		28	
$\dot{Q}$ [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]
50	43.0	0.09	0.220	0.06	0.096	–	–	–	–
100	86.0	0.18	0.439	0.12	0.191	0.08	0.085	–	–
150	129.0	0.27	1.261	0.18	0.287	0.12	0.128	0.07	0.044
200	171.9	0.36	2.055	0.24	0.774	0.16	0.299	0.09	0.058
250	214.9	0.45	3.008	0.30	1.131	0.20	0.436	0.12	0.125
300	257.9	0.54	4.111	0.36	1.544	0.24	0.594	0.14	0.169
350	300.9	0.63	5.360	0.42	2.010	0.28	0.772	0.16	0.220
400	343.9	0.72	6.749	0.48	2.529	0.32	0.970	0.19	0.276
450	386.9	0.81	8.275	0.53	3.097	0.36	1.188	0.21	0.337
500	429.8	0.90	9.934	0.59	3.715	0.40	1.423	0.23	0.404
550	472.8	0.99	11.723	0.65	4.381	0.44	1.677	0.26	0.475
600	515.8	1.08	13.640	0.71	5.094	0.48	1.949	0.28	0.552
700	601.8	1.26	17.849	0.83	6.658	0.55	2.545	0.32	0.719
800	687.7	1.44	22.546	0.95	8.402	0.63	3.208	0.37	0.906
900	773.7	1.62	27.718	1.07	10.320	0.71	3.937	0.42	1.110
1 000	859.7	1.80	33.355	1.19	12.408	0.79	4.730	0.46	1.333
1 100	945.6	1.98	39.448	1.31	14.664	0.87	5.586	0.51	1.573
1 200	1 031.6	2.16	45.989	1.43	17.084	0.95	6.503	0.56	1.830
1 300	1 117.6	2.34	52.972	1.54	19.665	1.03	7.482	0.60	2.103
1 400	1 203.6	2.52	60.389	1.66	22.406	1.11	8.520	0.65	2.393

d [mm]		15		18		22		28	
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]
1 500	1 289.5	2.70	68.237	1.78	25.303	1.19	9.617	0.70	2.700
1 600	1 375.5	2.88	76.508	1.90	28.356	1.27	10.772	0.74	3.022
1 700	1 461.5	3.06	85.200	2.02	31.561	1.35	11.984	0.79	3.361
1 800	1 547.4	–	–	2.14	34.918	1.43	13.253	0.84	3.715
1 900	1 633.4	–	–	2.26	38.425	1.50	14.578	0.88	4.084
2 000	1 719.4	–	–	2.38	42.081	1.58	15.959	0.93	4.469
2 500	2 149.2	–	–	2.97	62.546	1.98	23.680	1.16	6.617
3 000	2 579.0	–	–	–	–	2.38	32.726	1.39	9.130
3 500	3 008.9	–	–	–	–	2.77	43.055	1.62	11.994
4 000	3 438.7	–	–	–	–	–	–	1.86	15.199
4 500	3 868.6	–	–	–	–	–	–	2.09	18.739
5 000	4 298.4	–	–	–	–	–	–	2.32	22.607
5 500	4 728.2	–	–	–	–	–	–	2.55	26.796
6 000	5 158.1	–	–	–	–	–	–	2.78	31.301
6 500	5 587.9	–	–	–	–	–	–	3.02	36.119

Table 6: Pressure loss for Geberit Mapress Therm system pipes, cooling, inlet flow 10 °C / return flow 11 °C, d35–54 mm

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	171.9	0.06	0.024	–	–	–	–
250	214.9	0.07	0.030	–	–	–	–
300	257.9	0.09	0.036	0.06	0.016	–	–
350	300.9	0.10	0.077	0.07	0.019	–	–
400	343.9	0.12	0.097	0.08	0.038	–	–
450	386.9	0.13	0.118	0.09	0.047	0.05	0.008
500	429.8	0.15	0.141	0.10	0.056	0.06	0.016
550	472.8	0.16	0.166	0.11	0.066	0.06	0.019
600	515.8	0.18	0.193	0.12	0.076	0.07	0.022
700	601.8	0.21	0.251	0.14	0.099	0.08	0.028
800	687.7	0.24	0.316	0.16	0.124	0.09	0.035
900	773.7	0.27	0.387	0.18	0.152	0.11	0.043
1 000	859.7	0.30	0.464	0.20	0.182	0.12	0.051
1 100	945.6	0.33	0.547	0.22	0.214	0.13	0.060
1 200	1 031.6	0.36	0.635	0.24	0.249	0.14	0.070
1 300	1 117.6	0.39	0.730	0.26	0.286	0.15	0.081
1 400	1 203.6	0.42	0.830	0.28	0.325	0.16	0.092
1 500	1 289.5	0.45	0.936	0.30	0.367	0.18	0.103
1 600	1 375.5	0.48	1.047	0.32	0.410	0.19	0.115
1 700	1 461.5	0.50	1.164	0.34	0.456	0.20	0.128
1 800	1 547.4	0.53	1.286	0.36	0.503	0.21	0.141
1 900	1 633.4	0.56	1.414	0.38	0.553	0.22	0.155
2 000	1 719.4	0.59	1.546	0.40	0.604	0.23	0.169
2 500	2 149.2	0.74	2.286	0.50	0.892	0.29	0.250
3 000	2 579.0	0.89	3.150	0.60	1.228	0.35	0.343
3 500	3 008.9	1.04	4.133	0.70	1.610	0.41	0.449
4 000	3 438.7	1.19	5.233	0.80	2.037	0.47	0.568
4 500	3 868.6	1.34	6.446	0.90	2.507	0.53	0.698

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
5 000	4 298.4	1.49	7.770	1.00	3.020	0.58	0.840
5 500	4 728.2	1.63	9.203	1.10	3.575	0.64	0.994
6 000	5 158.1	1.78	10.743	1.20	4.171	0.70	1.159
6 500	5 587.9	1.93	12.389	1.30	4.808	0.76	1.335
7 000	6 017.8	2.08	14.139	1.40	5.484	0.82	1.522
7 500	6 447.6	2.23	15.992	1.50	6.200	0.88	1.720
8 000	6 877.4	2.38	17.947	1.60	6.955	0.94	1.928
8 500	7 307.3	2.52	20.002	1.70	7.748	0.99	2.147
9 000	7 737.1	2.67	22.156	1.80	8.580	1.05	2.376
9 500	8 167.0	2.82	24.410	1.90	9.449	1.11	2.616
10 000	8 596.8	2.97	26.761	2.00	10.356	1.17	2.866
10 500	9 026.7	–	–	2.10	11.299	1.23	3.126
11 000	9 456.5	–	–	2.20	12.280	1.29	3.396
11 500	9 886.3	–	–	2.30	13.297	1.34	3.676
12 000	10 316.2	–	–	2.40	14.350	1.40	3.965
12 500	10 746.0	–	–	2.50	15.439	1.46	4.265
13 000	11 175.9	–	–	2.60	16.565	1.52	4.574
13 500	11 605.7	–	–	2.70	17.725	1.58	4.893
14 000	12 035.5	–	–	2.80	18.921	1.64	5.222
14 500	12 465.4	–	–	2.90	20.152	1.70	5.560
15 000	12 895.2	–	–	3.00	21.418	1.75	5.907
15 500	13 325.1	–	–	3.10	22.718	1.81	6.264
16 000	13 754.9	–	–	–	–	1.87	6.631
16 500	14 184.7	–	–	–	–	1.93	7.006
17 000	14 614.6	–	–	–	–	1.99	7.391
17 500	15 044.4	–	–	–	–	2.05	7.785
18 000	15 474.3	–	–	–	–	2.10	8.189
18 500	15 904.1	–	–	–	–	2.16	8.601
19 000	16 333.9	–	–	–	–	2.22	9.023
19 500	16 763.8	–	–	–	–	2.28	9.454
20 000	17 193.6	–	–	–	–	2.34	9.893
20 500	17 623.5	–	–	–	–	2.40	10.342
21 000	18 053.3	–	–	–	–	2.46	10.800
21 500	18 483.1	–	–	–	–	2.51	11.266
22 000	18 913.0	–	–	–	–	2.57	11.742
22 500	19 342.8	–	–	–	–	2.63	12.226
23 000	19 772.7	–	–	–	–	2.69	12.720
23 500	20 202.5	–	–	–	–	2.75	13.222
24 000	20 632.3	–	–	–	–	2.81	13.732
24 500	21 062.2	–	–	–	–	2.86	14.252
25 000	21 492.0	–	–	–	–	2.92	14.780
25 500	21 921.9	–	–	–	–	2.98	15.317
26 000	22 351.7	–	–	–	–	3.04	15.862
26 500	22 781.5	–	–	–	–	3.10	16.417

Table 7: Pressure loss for Geberit Mapress Therm system pipes, cooling, inlet flow 10 °C / return flow 11 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
900	773.7	0.05	0.008	–	–	–	–
1 000	859.7	0.06	0.009	–	–	–	–
1 100	945.6	0.06	0.011	–	–	–	–
1 200	1 031.6	0.07	0.013	–	–	–	–
1 300	1 117.6	0.07	0.015	0.05	0.007	–	–
1 400	1 203.6	0.08	0.017	0.06	0.008	–	–
1 500	1 289.5	0.09	0.019	0.06	0.009	–	–
1 600	1 375.5	0.09	0.021	0.07	0.010	–	–
1 700	1 461.5	0.10	0.023	0.07	0.011	–	–
1 800	1 547.4	0.10	0.026	0.07	0.012	0.05	0.005
1 900	1 633.4	0.11	0.028	0.08	0.013	0.05	0.005
2 000	1 719.4	0.11	0.031	0.08	0.014	0.06	0.006
2 500	2 149.2	0.14	0.045	0.10	0.021	0.07	0.009
3 000	2 579.0	0.17	0.062	0.12	0.029	0.08	0.012
3 500	3 008.9	0.20	0.081	0.14	0.038	0.10	0.015
4 000	3 438.7	0.23	0.103	0.16	0.048	0.11	0.019
4 500	3 868.6	0.26	0.126	0.19	0.059	0.13	0.024
5 000	4 298.4	0.28	0.152	0.21	0.070	0.14	0.028
5 500	4 728.2	0.31	0.179	0.23	0.083	0.15	0.034
6 000	5 158.1	0.34	0.209	0.25	0.097	0.17	0.039
6 500	5 587.9	0.37	0.240	0.27	0.111	0.18	0.045
7 000	6 017.8	0.40	0.274	0.29	0.127	0.20	0.051
7 500	6 447.6	0.43	0.309	0.31	0.143	0.21	0.058
8 000	6 877.4	0.46	0.346	0.33	0.161	0.22	0.065
8 500	7 307.3	0.48	0.385	0.35	0.179	0.24	0.072
9 000	7 737.1	0.51	0.426	0.37	0.197	0.25	0.079
9 500	8 167.0	0.54	0.469	0.39	0.217	0.27	0.087
10 000	8 596.8	0.57	0.513	0.41	0.238	0.28	0.096
10 500	9 026.7	0.60	0.560	0.43	0.259	0.30	0.104
11 000	9 456.5	0.63	0.608	0.45	0.281	0.31	0.113
11 500	9 886.3	0.65	0.657	0.47	0.304	0.32	0.122
12 000	10 316.2	0.68	0.709	0.49	0.328	0.34	0.132
12 500	10 746.0	0.71	0.762	0.52	0.353	0.35	0.142
13 000	11 175.9	0.74	0.817	0.54	0.378	0.37	0.152
13 500	11 605.7	0.77	0.874	0.56	0.404	0.38	0.162
14 000	12 035.5	0.80	0.932	0.58	0.431	0.39	0.173
14 500	12 465.4	0.83	0.992	0.60	0.459	0.41	0.184
15 000	12 895.2	0.85	1.054	0.62	0.487	0.42	0.196
15 500	13 325.1	0.88	1.117	0.64	0.516	0.44	0.207
16 000	13 754.9	0.91	1.182	0.66	0.546	0.45	0.219
16 500	14 184.7	0.94	1.248	0.68	0.577	0.46	0.232
17 000	14 614.6	0.97	1.317	0.70	0.609	0.48	0.244
17 500	15 044.4	1.00	1.386	0.72	0.641	0.49	0.257
18 000	15 474.3	1.02	1.458	0.74	0.674	0.51	0.270
18 500	15 904.1	1.05	1.531	0.76	0.707	0.52	0.284
19 000	16 333.9	1.08	1.606	0.78	0.742	0.53	0.297
19 500	16 763.8	1.11	1.682	0.80	0.777	0.55	0.311
20 000	17 193.6	1.14	1.759	0.82	0.813	0.56	0.326

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
20 500	17 623.5	1.17	1.839	0.85	0.849	0.58	0.340
21 000	18 053.3	1.20	1.920	0.87	0.886	0.59	0.355
21 500	18 483.1	1.22	2.002	0.89	0.924	0.60	0.370
22 000	18 913.0	1.25	2.086	0.91	0.963	0.62	0.386
22 500	19 342.8	1.28	2.172	0.93	1.003	0.63	0.402
23 000	19 772.7	1.31	2.259	0.95	1.043	0.65	0.418
23 500	20 202.5	1.34	2.347	0.97	1.083	0.66	0.434
24 000	20 632.3	1.37	2.438	0.99	1.125	0.67	0.450
24 500	21 062.2	1.39	2.529	1.01	1.167	0.69	0.467
25 000	21 492.0	1.42	2.622	1.03	1.210	0.70	0.484
25 500	21 921.9	1.45	2.717	1.05	1.254	0.72	0.502
26 000	22 351.7	1.48	2.813	1.07	1.298	0.73	0.520
26 500	22 781.5	1.51	2.911	1.09	1.343	0.75	0.537
27 000	23 211.4	1.54	3.010	1.11	1.389	0.76	0.556
27 500	23 641.2	1.57	3.111	1.13	1.435	0.77	0.574
28 000	24 071.1	1.59	3.213	1.15	1.482	0.79	0.593
28 500	24 500.9	1.62	3.317	1.17	1.530	0.80	0.612
29 000	24 930.7	1.65	3.422	1.20	1.578	0.82	0.631
29 500	25 360.6	1.68	3.528	1.22	1.627	0.83	0.651
30 000	25 790.4	1.71	3.636	1.24	1.677	0.84	0.671
32 500	27 939.6	1.85	4.199	1.34	1.935	0.91	0.774
35 000	30 088.8	1.99	4.797	1.44	2.210	0.98	0.883
37 500	32 238.0	2.13	5.431	1.55	2.502	1.05	1.000
40 000	34 387.2	2.28	6.101	1.65	2.809	1.12	1.122
42 500	36 536.4	2.42	6.806	1.75	3.133	1.20	1.251
45 000	38 685.6	2.56	7.545	1.85	3.472	1.27	1.386
47 500	40 834.8	2.70	8.318	1.96	3.827	1.34	1.527
50 000	42 984.0	2.85	9.126	2.06	4.198	1.41	1.675
52 500	45 133.3	2.99	9.968	2.16	4.584	1.48	1.828
55 000	47 282.5	–	–	2.27	4.985	1.55	1.988
57 500	49 431.7	–	–	2.37	5.402	1.62	2.154
60 000	51 580.9	–	–	2.47	5.834	1.69	2.325
62 500	53 730.1	–	–	2.58	6.280	1.76	2.503
65 000	55 879.3	–	–	2.68	6.742	1.83	2.686
67 500	58 028.5	–	–	2.78	7.218	1.90	2.875
70 000	60 177.7	–	–	2.89	7.709	1.97	3.070
72 500	62 326.9	–	–	2.99	8.215	2.04	3.271
75 000	64 476.1	–	–	3.09	8.735	2.11	3.478
77 500	66 625.3	–	–	–	–	2.18	3.690
80 000	68 774.5	–	–	–	–	2.25	3.908
82 500	70 923.7	–	–	–	–	2.32	4.131
85 000	73 072.9	–	–	–	–	2.39	4.361
87 500	75 222.1	–	–	–	–	2.46	4.595
90 000	77 371.3	–	–	–	–	2.53	4.836
92 500	79 520.5	–	–	–	–	2.60	5.082
95 000	81 669.7	–	–	–	–	2.67	5.333
97 500	83 818.9	–	–	–	–	2.74	5.590
100 000	85 968.1	–	–	–	–	2.81	5.853
102 500	88 117.3	–	–	–	–	2.88	6.121

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
105 000	90 266.5	–	–	–	–	2.95	6.394
107 500	92 415.7	–	–	–	–	3.02	6.673
110 000	94 564.9	–	–	–	–	3.09	6.957

2.3 COOLING, INLET FLOW 8 °C / RETURN FLOW 12 °C

Medium:	Water	Density:	999.7 kg/m^3
Inlet flow temperature:	8 °C	Viscosity:	0.001306 Pa•s
Return temperature:	12 °C	Specific thermal capacity:	4,188 J/(kg•K)
Range:	4 K	Surface roughness:	0.0015 mm
Average temperature:	10 °C		

Table 8: Pressure loss for Geberit Mapress Therm system pipes, cooling, inlet flow 8 °C / return flow 12 °C, d15–28 mm

d [mm]		15		18		22		28	
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]
150	32.2	0.07	0.167	–	–	–	–	–	–
200	43.0	0.09	0.222	0.06	0.097	–	–	–	–
250	53.7	0.11	0.278	0.07	0.121	–	–	–	–
300	64.5	0.13	0.334	0.09	0.145	0.06	0.065	–	–
350	75.2	0.16	0.389	0.10	0.170	0.07	0.075	–	–
400	86.0	0.18	0.445	0.12	0.194	0.08	0.086	–	–
450	96.7	0.20	0.501	0.13	0.218	0.09	0.097	0.05	0.033
500	107.4	0.22	0.556	0.15	0.242	0.10	0.108	0.06	0.037
550	118.2	0.25	1.093	0.16	0.267	0.11	0.118	0.06	0.041
600	128.9	0.27	1.266	0.18	0.291	0.12	0.129	0.07	0.044
700	150.4	0.31	1.644	0.21	0.620	0.14	0.151	0.08	0.052
800	171.9	0.36	2.063	0.24	0.777	0.16	0.300	0.09	0.059
900	193.4	0.40	2.521	0.27	0.949	0.18	0.366	0.10	0.067
1 000	214.9	0.45	3.018	0.30	1.135	0.20	0.437	0.12	0.074
1 100	236.4	0.49	3.553	0.33	1.336	0.22	0.514	0.13	0.147
1 200	257.9	0.54	4.126	0.36	1.549	0.24	0.596	0.14	0.170
1 300	279.4	0.58	4.734	0.39	1.777	0.26	0.683	0.15	0.195
1 400	300.9	0.63	5.378	0.42	2.017	0.28	0.775	0.16	0.221
1 500	322.3	0.67	6.058	0.45	2.271	0.30	0.872	0.17	0.248
1 600	343.8	0.72	6.772	0.48	2.537	0.32	0.974	0.19	0.277
1 700	365.3	0.76	7.520	0.50	2.816	0.34	1.081	0.20	0.307
1 800	386.8	0.81	8.302	0.53	3.108	0.36	1.192	0.21	0.338
1 900	408.3	0.85	9.117	0.56	3.412	0.38	1.308	0.22	0.371
2 000	429.8	0.90	9.966	0.59	3.728	0.40	1.428	0.23	0.405
2 500	537.2	1.12	14.692	0.74	5.486	0.49	2.098	0.29	0.594
3 000	644.7	1.35	20.199	0.89	7.532	0.59	2.877	0.35	0.813
3 500	752.1	1.57	26.460	1.04	9.854	0.69	3.760	0.41	1.061

d [mm]		15		18		22		28	
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]
4 000	859.6	1.80	33.453	1.19	12.446	0.79	4.745	0.46	1.337
4 500	967.0	2.02	41.160	1.34	15.299	0.89	5.827	0.52	1.641
5 000	1 074.5	2.25	49.567	1.48	18.409	0.99	7.006	0.58	1.970
5 500	1 181.9	2.47	58.658	1.63	21.769	1.09	8.280	0.64	2.327
6 000	1 289.4	2.70	68.425	1.78	25.376	1.19	9.645	0.70	2.708
6 500	1 396.8	2.92	78.856	1.93	29.225	1.29	11.102	0.75	3.115
7 000	1 504.3	–	–	2.08	33.314	1.39	12.648	0.81	3.546
7 500	1 611.7	–	–	2.23	37.639	1.48	14.283	0.87	4.002
8 000	1 719.2	–	–	2.38	42.197	1.58	16.005	0.93	4.482
8 500	1 826.6	–	–	2.52	46.985	1.68	17.813	0.99	4.986
9 000	1 934.1	–	–	2.67	52.003	1.78	19.706	1.04	5.513
9 500	2 041.5	–	–	2.82	57.246	1.88	21.685	1.10	6.063
10 000	2 149.0	–	–	2.97	62.713	1.98	23.746	1.16	6.636
10 500	2 256.4	–	–	–	–	2.08	25.890	1.22	7.232
11 000	2 363.9	–	–	–	–	2.18	28.117	1.28	7.851
11 500	2 471.3	–	–	–	–	2.28	30.425	1.33	8.492
12 000	2 578.8	–	–	–	–	2.37	32.814	1.39	9.155
12 500	2 686.2	–	–	–	–	2.47	35.283	1.45	9.840
13 000	2 793.7	–	–	–	–	2.57	37.832	1.51	10.548
13 500	2 901.1	–	–	–	–	2.67	40.461	1.57	11.276
14 000	3 008.6	–	–	–	–	2.77	43.168	1.62	12.027
14 500	3 116.0	–	–	–	–	2.87	45.953	1.68	12.798
15 000	3 223.5	–	–	–	–	2.97	48.816	1.74	13.591
15 500	3 330.9	–	–	–	–	3.07	51.756	1.80	14.405
16 000	3 438.4	–	–	–	–	–	–	1.86	15.241
16 500	3 545.8	–	–	–	–	–	–	1.91	16.097
17 000	3 653.3	–	–	–	–	–	–	1.97	16.973
17 500	3 760.7	–	–	–	–	–	–	2.03	17.871
18 000	3 868.2	–	–	–	–	–	–	2.09	18.789
18 500	3 975.6	–	–	–	–	–	–	2.15	19.728
19 000	4 083.1	–	–	–	–	–	–	2.20	20.687
19 500	4 190.5	–	–	–	–	–	–	2.26	21.666
20 000	4 298.0	–	–	–	–	–	–	2.32	22.666
20 500	4 405.4	–	–	–	–	–	–	2.38	23.686
21 000	4 512.9	–	–	–	–	–	–	2.44	24.726
21 500	4 620.3	–	–	–	–	–	–	2.49	25.785
22 000	4 727.8	–	–	–	–	–	–	2.55	26.865
22 500	4 835.2	–	–	–	–	–	–	2.61	27.964
23 000	4 942.7	–	–	–	–	–	–	2.67	29.084
23 500	5 050.1	–	–	–	–	–	–	2.73	30.223
24 000	5 157.6	–	–	–	–	–	–	2.78	31.381
24 500	5 265.0	–	–	–	–	–	–	2.84	32.559
25 000	5 372.5	–	–	–	–	–	–	2.90	33.757
25 500	5 479.9	–	–	–	–	–	–	2.96	34.974
26 000	5 587.4	–	–	–	–	–	–	3.02	36.210
26 500	5 694.8	–	–	–	–	–	–	3.07	37.466

Table 9: Pressure loss for Geberit Mapress Therm system pipes, cooling, inlet flow 8 °C / return flow 12 °C, d35–54 mm

d [mm]		35		42		54	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
700	150.4	0.05	0.021	–	–	–	–
800	171.9	0.06	0.024	–	–	–	–
900	193.4	0.07	0.027	–	–	–	–
1 000	214.9	0.07	0.030	–	–	–	–
1 100	236.4	0.08	0.033	0.05	0.015	–	–
1 200	257.9	0.09	0.036	0.06	0.016	–	–
1 300	279.4	0.10	0.068	0.06	0.018	–	–
1 400	300.9	0.10	0.077	0.07	0.019	–	–
1 500	322.3	0.11	0.087	0.07	0.021	–	–
1 600	343.8	0.12	0.097	0.08	0.038	–	–
1 700	365.3	0.13	0.108	0.08	0.043	–	–
1 800	386.8	0.13	0.119	0.09	0.047	0.05	0.008
1 900	408.3	0.14	0.130	0.09	0.051	0.06	0.009
2 000	429.8	0.15	0.142	0.10	0.056	0.06	0.009
2 500	537.2	0.19	0.207	0.12	0.082	0.07	0.023
3 000	644.7	0.22	0.283	0.15	0.112	0.09	0.032
3 500	752.1	0.26	0.369	0.17	0.145	0.10	0.041
4 000	859.6	0.30	0.465	0.20	0.183	0.12	0.052
4 500	967.0	0.33	0.570	0.22	0.224	0.13	0.063
5 000	1 074.5	0.37	0.684	0.25	0.268	0.15	0.076
5 500	1 181.9	0.41	0.807	0.27	0.316	0.16	0.089
6 000	1 289.4	0.45	0.939	0.30	0.368	0.18	0.103
6 500	1 396.8	0.48	1.080	0.32	0.423	0.19	0.119
7 000	1 504.3	0.52	1.228	0.35	0.481	0.20	0.135
7 500	1 611.7	0.56	1.386	0.37	0.542	0.22	0.152
8 000	1 719.2	0.59	1.551	0.40	0.606	0.23	0.170
8 500	1 826.6	0.63	1.724	0.42	0.674	0.25	0.189
9 000	1 934.1	0.67	1.906	0.45	0.745	0.26	0.209
9 500	2 041.5	0.71	2.095	0.47	0.818	0.28	0.229
10 000	2 149.0	0.74	2.293	0.50	0.895	0.29	0.251
10 500	2 256.4	0.78	2.498	0.52	0.975	0.31	0.273
11 000	2 363.9	0.82	2.711	0.55	1.058	0.32	0.296
11 500	2 471.3	0.85	2.931	0.57	1.143	0.34	0.320
12 000	2 578.8	0.89	3.159	0.60	1.232	0.35	0.344
12 500	2 686.2	0.93	3.394	0.62	1.323	0.37	0.370
13 000	2 793.7	0.97	3.637	0.65	1.418	0.38	0.396
13 500	2 901.1	1.00	3.887	0.67	1.515	0.39	0.423
14 000	3 008.6	1.04	4.145	0.70	1.615	0.41	0.451
14 500	3 116.0	1.08	4.410	0.72	1.717	0.42	0.479
15 000	3 223.5	1.11	4.682	0.75	1.823	0.44	0.509
15 500	3 330.9	1.15	4.961	0.77	1.931	0.45	0.539
16 000	3 438.4	1.19	5.247	0.80	2.043	0.47	0.569
16 500	3 545.8	1.23	5.541	0.82	2.156	0.48	0.601
17 000	3 653.3	1.26	5.841	0.85	2.273	0.50	0.633
17 500	3 760.7	1.30	6.149	0.87	2.392	0.51	0.666
18 000	3 868.2	1.34	6.464	0.90	2.514	0.53	0.700
18 500	3 975.6	1.37	6.785	0.92	2.639	0.54	0.735
19 000	4 083.1	1.41	7.114	0.95	2.766	0.56	0.770

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
19 500	4 190.5	1.45	7.449	0.97	2.896	0.57	0.806
20 000	4 298.0	1.48	7.791	1.00	3.029	0.58	0.843
20 500	4 405.4	1.52	8.140	1.02	3.164	0.60	0.880
21 000	4 512.9	1.56	8.496	1.05	3.301	0.61	0.919
21 500	4 620.3	1.60	8.859	1.07	3.442	0.63	0.957
22 000	4 727.8	1.63	9.228	1.10	3.585	0.64	0.997
22 500	4 835.2	1.67	9.604	1.12	3.730	0.66	1.037
23 000	4 942.7	1.71	9.987	1.15	3.879	0.67	1.078
23 500	5 050.1	1.74	10.376	1.17	4.029	0.69	1.120
24 000	5 157.6	1.78	10.772	1.20	4.182	0.70	1.162
24 500	5 265.0	1.82	11.175	1.22	4.338	0.72	1.205
25 000	5 372.5	1.86	11.584	1.25	4.497	0.73	1.249
25 500	5 479.9	1.89	12.000	1.27	4.657	0.75	1.294
26 000	5 587.4	1.93	12.422	1.30	4.821	0.76	1.339
26 500	5 694.8	1.97	12.851	1.32	4.986	0.77	1.385
27 000	5 802.3	2.00	13.286	1.35	5.155	0.79	1.431
27 500	5 909.7	2.04	13.728	1.37	5.326	0.80	1.478
28 000	6 017.2	2.08	14.176	1.40	5.499	0.82	1.526
28 500	6 124.6	2.12	14.631	1.42	5.675	0.83	1.575
29 000	6 232.1	2.15	15.092	1.45	5.853	0.85	1.624
29 500	6 339.5	2.19	15.559	1.47	6.034	0.86	1.674
30 000	6 447.0	2.23	16.033	1.50	6.217	0.88	1.725
32 500	6 984.2	2.41	18.498	1.62	7.169	0.95	1.987
35 000	7 521.5	2.60	21.120	1.75	8.181	1.02	2.267
37 500	8 058.7	2.78	23.897	1.87	9.252	1.10	2.562
40 000	8 596.0	2.97	26.827	2.00	10.382	1.17	2.874
42 500	9 133.2	–	–	2.12	11.571	1.24	3.201
45 000	9 670.5	–	–	2.25	12.816	1.32	3.544
47 500	10 207.7	–	–	2.37	14.119	1.39	3.902
50 000	10 745.0	–	–	2.50	15.478	1.46	4.276
52 500	11 282.2	–	–	2.62	16.893	1.53	4.665
55 000	11 819.5	–	–	2.75	18.363	1.61	5.069
57 500	12 356.7	–	–	2.87	19.889	1.68	5.488
60 000	12 894.0	–	–	3.00	21.470	1.75	5.922
62 500	13 431.2	–	–	–	–	1.83	6.371
65 000	13 968.5	–	–	–	–	1.90	6.834
67 500	14 505.7	–	–	–	–	1.97	7.312
70 000	15 043.0	–	–	–	–	2.05	7.805
72 500	15 580.2	–	–	–	–	2.12	8.312
75 000	16 117.5	–	–	–	–	2.19	8.833
77 500	16 654.7	–	–	–	–	2.27	9.368
80 000	17 192.0	–	–	–	–	2.34	9.918
82 500	17 729.2	–	–	–	–	2.41	10.481
85 000	18 266.5	–	–	–	–	2.48	11.059
87 500	18 803.7	–	–	–	–	2.56	11.650
90 000	19 341.0	–	–	–	–	2.63	12.256
92 500	19 878.2	–	–	–	–	2.70	12.875
95 000	20 415.5	–	–	–	–	2.78	13.508
97 500	20 952.7	–	–	–	–	2.85	14.155

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
100 000	21 490.0	–	–	–	–	2.92	14.815
105 000	22 564.5	–	–	–	–	3.07	16.177

Table 10: Pressure loss for Geberit Mapress Therm system pipes, cooling, inlet flow 8 °C / return flow 12 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
4 000	859.6	0.06	0.009	–	–	–	–
4 500	967.0	0.06	0.012	–	–	–	–
5 000	1 074.5	0.07	0.014	0.05	0.006	–	–
5 500	1 181.9	0.08	0.016	0.06	0.008	–	–
6 000	1 289.4	0.09	0.019	0.06	0.009	–	–
6 500	1 396.8	0.09	0.022	0.07	0.010	–	–
7 000	1 504.3	0.10	0.025	0.07	0.012	–	–
7 500	1 611.7	0.11	0.028	0.08	0.013	0.05	0.005
8 000	1 719.2	0.11	0.031	0.08	0.014	0.06	0.006
8 500	1 826.6	0.12	0.034	0.09	0.016	0.06	0.007
9 000	1 934.1	0.13	0.038	0.09	0.018	0.06	0.007
9 500	2 041.5	0.14	0.042	0.10	0.019	0.07	0.008
10 000	2 149.0	0.14	0.046	0.10	0.021	0.07	0.009
10 500	2 256.4	0.15	0.050	0.11	0.023	0.07	0.009
11 000	2 363.9	0.16	0.054	0.11	0.025	0.08	0.010
11 500	2 471.3	0.16	0.058	0.12	0.027	0.08	0.011
12 000	2 578.8	0.17	0.062	0.12	0.029	0.08	0.012
12 500	2 686.2	0.18	0.067	0.13	0.031	0.09	0.013
13 000	2 793.7	0.18	0.072	0.13	0.033	0.09	0.014
13 500	2 901.1	0.19	0.077	0.14	0.036	0.09	0.014
14 000	3 008.6	0.20	0.082	0.14	0.038	0.10	0.015
14 500	3 116.0	0.21	0.087	0.15	0.040	0.10	0.016
15 000	3 223.5	0.21	0.092	0.15	0.043	0.11	0.017
15 500	3 330.9	0.22	0.097	0.16	0.045	0.11	0.018
16 000	3 438.4	0.23	0.103	0.16	0.048	0.11	0.019
16 500	3 545.8	0.23	0.109	0.17	0.051	0.12	0.020
17 000	3 653.3	0.24	0.114	0.18	0.053	0.12	0.022
17 500	3 760.7	0.25	0.120	0.18	0.056	0.12	0.023
18 000	3 868.2	0.26	0.126	0.19	0.059	0.13	0.024
18 500	3 975.6	0.26	0.133	0.19	0.062	0.13	0.025
19 000	4 083.1	0.27	0.139	0.20	0.065	0.13	0.026
19 500	4 190.5	0.28	0.145	0.20	0.068	0.14	0.027
20 000	4 298.0	0.28	0.152	0.21	0.071	0.14	0.029
20 500	4 405.4	0.29	0.159	0.21	0.074	0.14	0.030
21 000	4 512.9	0.30	0.166	0.22	0.077	0.15	0.031
21 500	4 620.3	0.31	0.173	0.22	0.080	0.15	0.032
22 000	4 727.8	0.31	0.180	0.23	0.083	0.15	0.034
22 500	4 835.2	0.32	0.187	0.23	0.087	0.16	0.035
23 000	4 942.7	0.33	0.194	0.24	0.090	0.16	0.036
23 500	5 050.1	0.33	0.202	0.24	0.094	0.17	0.038
24 000	5 157.6	0.34	0.209	0.25	0.097	0.17	0.039

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
24 500	5 265.0	0.35	0.217	0.25	0.101	0.17	0.041
25 000	5 372.5	0.36	0.225	0.26	0.104	0.18	0.042
25 500	5 479.9	0.36	0.233	0.26	0.108	0.18	0.044
26 000	5 587.4	0.37	0.241	0.27	0.112	0.18	0.045
26 500	5 694.8	0.38	0.249	0.27	0.116	0.19	0.047
27 000	5 802.3	0.38	0.257	0.28	0.119	0.19	0.048
27 500	5 909.7	0.39	0.266	0.28	0.123	0.19	0.050
28 000	6 017.2	0.40	0.274	0.29	0.127	0.20	0.051
28 500	6 124.6	0.41	0.283	0.29	0.131	0.20	0.053
29 000	6 232.1	0.41	0.292	0.30	0.135	0.20	0.055
29 500	6 339.5	0.42	0.301	0.30	0.140	0.21	0.056
30 000	6 447.0	0.43	0.310	0.31	0.144	0.21	0.058
32 500	6 984.2	0.46	0.357	0.33	0.165	0.23	0.067
35 000	7 521.5	0.50	0.407	0.36	0.188	0.25	0.076
37 500	8 058.7	0.53	0.459	0.39	0.213	0.26	0.086
40 000	8 596.0	0.57	0.515	0.41	0.238	0.28	0.096
42 500	9 133.2	0.60	0.573	0.44	0.265	0.30	0.107
45 000	9 670.5	0.64	0.634	0.46	0.294	0.32	0.118
47 500	10 207.7	0.68	0.698	0.49	0.323	0.33	0.130
50 000	10 745.0	0.71	0.764	0.52	0.354	0.35	0.142
52 500	11 282.2	0.75	0.833	0.54	0.386	0.37	0.155
55 000	11 819.5	0.78	0.905	0.57	0.419	0.39	0.168
57 500	12 356.7	0.82	0.980	0.59	0.453	0.40	0.182
60 000	12 894.0	0.85	1.057	0.62	0.489	0.42	0.196
62 500	13 431.2	0.89	1.136	0.64	0.525	0.44	0.211
65 000	13 968.5	0.92	1.218	0.67	0.563	0.46	0.226
67 500	14 505.7	0.96	1.303	0.70	0.602	0.47	0.242
70 000	15 043.0	1.00	1.390	0.72	0.642	0.49	0.258
72 500	15 580.2	1.03	1.480	0.75	0.684	0.51	0.274
75 000	16 117.5	1.07	1.572	0.77	0.726	0.53	0.291
77 500	16 654.7	1.10	1.667	0.80	0.770	0.54	0.309
80 000	17 192.0	1.14	1.764	0.82	0.815	0.56	0.327
82 500	17 729.2	1.17	1.864	0.85	0.861	0.58	0.345
85 000	18 266.5	1.21	1.966	0.88	0.908	0.60	0.364
87 500	18 803.7	1.24	2.070	0.90	0.956	0.62	0.383
90 000	19 341.0	1.28	2.177	0.93	1.005	0.63	0.403
92 500	19 878.2	1.32	2.287	0.95	1.056	0.65	0.423
95 000	20 415.5	1.35	2.398	0.98	1.107	0.67	0.443
97 500	20 952.7	1.39	2.512	1.00	1.160	0.69	0.464
100 000	21 490.0	1.42	2.629	1.03	1.213	0.70	0.486
105 000	22 564.5	1.49	2.869	1.08	1.324	0.74	0.530
110 000	23 639.0	1.57	3.119	1.13	1.438	0.77	0.576
115 000	24 713.5	1.64	3.377	1.18	1.558	0.81	0.623
120 000	25 788.0	1.71	3.645	1.24	1.681	0.84	0.672
130 000	27 937.0	1.85	4.209	1.34	1.940	0.91	0.776
140 000	30 086.0	1.99	4.809	1.44	2.216	0.98	0.886
150 000	32 235.0	2.13	5.444	1.55	2.508	1.05	1.002
175 000	37 607.4	2.49	7.188	1.80	3.309	1.23	1.321
200 000	42 979.9	2.85	9.147	2.06	4.208	1.41	1.679

d [mm]		76.1		88.9		108	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
225 000	48 352.4	–	–	2.32	5.204	1.58	2.075
250 000	53 724.9	–	–	2.58	6.295	1.76	2.509
275 000	59 097.4	–	–	2.83	7.479	1.93	2.979
300 000	64 469.9	–	–	3.09	8.755	2.11	3.486
325 000	69 842.4	–	–	–	–	2.28	4.028

3 HEATING PRESSURE LOSS

3.1 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

3.2 HEATING, INLET FLOW 61 °C / RETURN FLOW 60 °C

Medium:	Water	Density:	982.9 kg/m^3
Inlet flow temperature:	61 °C	Viscosity:	0.000463475 Pa•s
Return temperature:	60 °C	Specific thermal capacity:	4,183.2 J/(kg•K)
Range:	1 K	Surface roughness:	0.0015 mm
Average temperature:	60.5 °C		

Table 11: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 61 °C / return flow 60 °C, d15–28 mm

d [mm]		**15**		**18**		**22**		**28**	
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]**
50	43.0	0.09	0.146	0.06	0.035	–	–	–	–
100	86.1	0.18	0.476	0.12	0.179	0.08	0.069	–	–
150	129.1	0.27	0.956	0.18	0.358	0.12	0.137	0.07	0.039
200	172.1	0.37	1.575	0.24	0.588	0.16	0.225	0.09	0.064
250	215.1	0.46	2.324	0.30	0.867	0.20	0.331	0.12	0.094
300	258.2	0.55	3.197	0.36	1.191	0.24	0.455	0.14	0.128
350	301.2	0.64	4.190	0.42	1.559	0.28	0.594	0.17	0.168
400	344.2	0.73	5.301	0.48	1.970	0.32	0.750	0.19	0.211
450	387.3	0.82	6.525	0.54	2.423	0.36	0.922	0.21	0.259
500	430.3	0.92	7.860	0.60	2.917	0.40	1.109	0.24	0.312
550	473.3	1.01	9.306	0.67	3.450	0.44	1.311	0.26	0.368
600	516.4	1.10	10.859	0.73	4.023	0.48	1.528	0.28	0.429
700	602.4	1.28	14.282	0.85	5.285	0.56	2.005	0.33	0.561
800	688.5	1.47	18.120	0.97	6.697	0.64	2.538	0.38	0.710
900	774.5	1.65	22.364	1.09	8.257	0.73	3.126	0.43	0.874
1 000	860.6	1.83	27.006	1.21	9.961	0.81	3.768	0.47	1.052
1 100	946.6	2.02	32.040	1.33	11.808	0.89	4.463	0.52	1.245
1 200	1 032.7	2.20	37.461	1.45	13.795	0.97	5.211	0.57	1.452
1 300	1 118.8	2.38	43.265	1.57	15.919	1.05	6.009	0.61	1.673
1 400	1 204.8	2.57	49.446	1.69	18.180	1.13	6.859	0.66	1.909

d [mm]		15		18		22		28	
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]
1 500	1 290.9	2.75	56.001	1.81	20.576	1.21	7.758	0.71	2.157
1 600	1 376.9	2.93	62.929	1.94	23.106	1.29	8.707	0.76	2.420
1 700	1 463.0	–	–	2.06	25.768	1.37	9.705	0.80	2.695
1 800	1 549.1	–	–	2.18	28.561	1.45	10.751	0.85	2.984
1 900	1 635.1	–	–	2.30	31.484	1.53	11.846	0.90	3.286
2 000	1 721.2	–	–	2.42	34.537	1.61	12.988	0.94	3.601
2 500	2 151.5	–	–	3.02	51.709	2.02	19.404	1.18	5.368
3 000	2 581.8	–	–	–	–	2.42	26.969	1.42	7.445
3 500	3 012.0	–	–	–	–	2.82	35.652	1.65	9.824
4 000	3 442.3	–	–	–	–	–	–	1.89	12.499
4 500	3 872.6	–	–	–	–	–	–	2.13	15.463
5 000	4 302.9	–	–	–	–	–	–	2.36	18.713
5 500	4 733.2	–	–	–	–	–	–	2.60	22.244
6 000	5 163.5	–	–	–	–	–	–	2.83	26.052
6 500	5 593.8	–	–	–	–	–	–	3.07	30.135

Table 12: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 61 °C / return flow 60 °C, d35–54 mm

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
200	172.1	0.06	0.022	–	–	–	–
250	215.1	0.08	0.033	0.05	0.013	–	–
300	258.2	0.09	0.045	0.06	0.018	–	–
350	301.2	0.11	0.058	0.07	0.023	–	–
400	344.2	0.12	0.073	0.08	0.029	–	–
450	387.3	0.14	0.090	0.09	0.035	0.05	0.010
500	430.3	0.15	0.108	0.10	0.042	0.06	0.012
550	473.3	0.17	0.128	0.11	0.050	0.07	0.014
600	516.4	0.18	0.148	0.12	0.058	0.07	0.016
700	602.4	0.21	0.194	0.14	0.076	0.08	0.021
800	688.5	0.24	0.245	0.16	0.096	0.10	0.027
900	774.5	0.27	0.302	0.18	0.118	0.11	0.033
1 000	860.6	0.30	0.363	0.20	0.142	0.12	0.040
1 100	946.6	0.33	0.429	0.22	0.167	0.13	0.047
1 200	1 032.7	0.36	0.501	0.24	0.195	0.14	0.054
1 300	1 118.8	0.39	0.577	0.26	0.225	0.15	0.063
1 400	1 204.8	0.42	0.657	0.29	0.256	0.17	0.071
1 500	1 290.9	0.45	0.743	0.31	0.289	0.18	0.081
1 600	1 376.9	0.48	0.832	0.33	0.324	0.19	0.090
1 700	1 463.0	0.51	0.927	0.35	0.360	0.20	0.100
1 800	1 549.1	0.54	1.026	0.37	0.399	0.21	0.111
1 900	1 635.1	0.57	1.129	0.39	0.439	0.23	0.122
2 000	1 721.2	0.60	1.237	0.41	0.480	0.24	0.134
2 500	2 151.5	0.76	1.840	0.51	0.714	0.30	0.198
3 000	2 581.8	0.91	2.549	0.61	0.987	0.36	0.274
3 500	3 012.0	1.06	3.359	0.71	1.300	0.42	0.360
4 000	3 442.3	1.21	4.268	0.81	1.651	0.48	0.456
4 500	3 872.6	1.36	5.275	0.92	2.038	0.54	0.563

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
5 000	4 302.9	1.51	6.378	1.02	2.462	0.60	0.680
5 500	4 733.2	1.66	7.574	1.12	2.922	0.65	0.806
6 000	5 163.5	1.81	8.863	1.22	3.418	0.71	0.942
6 500	5 593.8	1.97	10.244	1.32	3.948	0.77	1.087
7 000	6 024.1	2.12	11.716	1.43	4.512	0.83	1.242
7 500	6 454.4	2.27	13.277	1.53	5.111	0.89	1.406
8 000	6 884.7	2.42	14.928	1.63	5.743	0.95	1.578
8 500	7 315.0	2.57	16.666	1.73	6.409	1.01	1.760
9 000	7 745.3	2.72	18.492	1.83	7.107	1.07	1.951
9 500	8 175.6	2.87	20.405	1.93	7.839	1.13	2.151
10 000	8 605.9	3.02	22.404	2.04	8.603	1.19	2.360
10 500	9 036.1	–	–	2.14	9.400	1.25	2.577
11 000	9 466.4	–	–	2.24	10.229	1.31	2.803
11 500	9 896.7	–	–	2.34	11.089	1.37	3.037
12 000	10 327.0	–	–	2.44	11.982	1.43	3.280
12 500	10 757.3	–	–	2.54	12.906	1.49	3.532
13 000	11 187.6	–	–	2.65	13.862	1.55	3.791
13 500	11 617.9	–	–	2.75	14.848	1.61	4.060
14 000	12 048.2	–	–	2.85	15.866	1.67	4.336
14 500	12 478.5	–	–	2.95	16.916	1.73	4.621
15 000	12 908.8	–	–	3.05	17.996	1.79	4.915
15 500	13 339.1	–	–	–	–	1.85	5.216
16 000	13 769.4	–	–	–	–	1.90	5.526
16 500	14 199.7	–	–	–	–	1.96	5.843
17 000	14 629.9	–	–	–	–	2.02	6.169
17 500	15 060.2	–	–	–	–	2.08	6.503
18 000	15 490.5	–	–	–	–	2.14	6.845
18 500	15 920.8	–	–	–	–	2.20	7.195
19 000	16 351.1	–	–	–	–	2.26	7.553
19 500	16 781.4	–	–	–	–	2.32	7.919
20 000	17 211.7	–	–	–	–	2.38	8.293
20 500	17 642.0	–	–	–	–	2.44	8.675
21 000	18 072.3	–	–	–	–	2.50	9.064
21 500	18 502.6	–	–	–	–	2.56	9.462
22 000	18 932.9	–	–	–	–	2.62	9.868
22 500	19 363.2	–	–	–	–	2.68	10.281
23 000	19 793.5	–	–	–	–	2.74	10.702
23 500	20 223.8	–	–	–	–	2.80	11.131
24 000	20 654.0	–	–	–	–	2.86	11.567
24 500	21 084.3	–	–	–	–	2.92	12.012
25 000	21 514.6	–	–	–	–	2.98	12.464
25 500	21 944.9	–	–	–	–	3.04	12.923
26 000	22 375.2	–	–	–	–	3.10	13.391

Table 13: Pressure loss for Geberit Mapress Therm system pipes, heating, inlet flow 61 °C/return flow 60 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
900	774.5	0.05	0.006	–	–	–	–
1 000	860.6	0.06	0.007	–	–	–	–
1 100	946.6	0.06	0.008	–	–	–	–
1 200	1 032.7	0.07	0.010	0.05	0.005	–	–
1 300	1 118.8	0.08	0.011	0.05	0.005	–	–
1 400	1 204.8	0.08	0.013	0.06	0.006	–	–
1 500	1 290.9	0.09	0.015	0.06	0.007	–	–
1 600	1 376.9	0.09	0.016	0.07	0.008	–	–
1 700	1 463.0	0.10	0.018	0.07	0.008	–	–
1 800	1 549.1	0.10	0.020	0.08	0.009	0.05	0.004
1 900	1 635.1	0.11	0.022	0.08	0.010	0.05	0.004
2 000	1 721.2	0.12	0.024	0.08	0.011	0.06	0.005
2 500	2 151.5	0.14	0.036	0.10	0.017	0.07	0.007
3 000	2 581.8	0.17	0.049	0.13	0.023	0.09	0.009
3 500	3 012.0	0.20	0.064	0.15	0.030	0.10	0.012
4 000	3 442.3	0.23	0.082	0.17	0.038	0.11	0.015
4 500	3 872.6	0.26	0.101	0.19	0.047	0.13	0.019
5 000	4 302.9	0.29	0.121	0.21	0.056	0.14	0.023
5 500	4 733.2	0.32	0.144	0.23	0.066	0.16	0.027
6 000	5 163.5	0.35	0.168	0.25	0.078	0.17	0.031
6 500	5 593.8	0.38	0.194	0.27	0.089	0.19	0.036
7 000	6 024.1	0.41	0.221	0.29	0.102	0.20	0.041
7 500	6 454.4	0.43	0.250	0.31	0.115	0.21	0.046
8 000	6 884.7	0.46	0.280	0.34	0.129	0.23	0.052
8 500	7 315.0	0.49	0.313	0.36	0.144	0.24	0.058
9 000	7 745.3	0.52	0.346	0.38	0.160	0.26	0.064
9 500	8 175.6	0.55	0.381	0.40	0.176	0.27	0.070
10 000	8 605.9	0.58	0.418	0.42	0.193	0.29	0.077
10 500	9 036.1	0.61	0.456	0.44	0.210	0.30	0.084
11 000	9 466.4	0.64	0.496	0.46	0.229	0.31	0.091
11 500	9 896.7	0.67	0.537	0.48	0.248	0.33	0.099
12 000	10 327.0	0.70	0.580	0.50	0.267	0.34	0.107
12 500	10 757.3	0.72	0.624	0.52	0.288	0.36	0.115
13 000	11 187.6	0.75	0.670	0.55	0.309	0.37	0.123
13 500	11 617.9	0.78	0.717	0.57	0.330	0.39	0.132
14 000	12 048.2	0.81	0.766	0.59	0.353	0.40	0.141
14 500	12 478.5	0.84	0.816	0.61	0.376	0.42	0.150
15 000	12 908.8	0.87	0.867	0.63	0.399	0.43	0.159
15 500	13 339.1	0.90	0.920	0.65	0.423	0.44	0.169
16 000	13 769.4	0.93	0.974	0.67	0.448	0.46	0.179
16 500	14 199.7	0.96	1.030	0.69	0.474	0.47	0.189
17 000	14 629.9	0.99	1.087	0.71	0.500	0.49	0.200

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
17 500	15 060.2	1.01	1.145	0.73	0.527	0.50	0.210
18 000	15 490.5	1.04	1.205	0.76	0.554	0.52	0.221
18 500	15 920.8	1.07	1.266	0.78	0.582	0.53	0.232
19 000	16 351.1	1.10	1.329	0.80	0.611	0.54	0.244
19 500	16 781.4	1.13	1.392	0.82	0.640	0.56	0.255
20 000	17 211.7	1.16	1.458	0.84	0.670	0.57	0.267
20 500	17 642.0	1.19	1.524	0.86	0.701	0.59	0.279
21 000	18 072.3	1.22	1.592	0.88	0.732	0.60	0.292
21 500	18 502.6	1.25	1.662	0.90	0.764	0.62	0.304
22 000	18 932.9	1.27	1.732	0.92	0.796	0.63	0.317
22 500	19 363.2	1.30	1.804	0.94	0.829	0.64	0.330
23 000	19 793.5	1.33	1.878	0.97	0.863	0.66	0.344
23 500	20 223.8	1.36	1.952	0.99	0.897	0.67	0.357
24 000	20 654.0	1.39	2.028	1.01	0.932	0.69	0.371
24 500	21 084.3	1.42	2.106	1.03	0.967	0.70	0.385
25 000	21 514.6	1.45	2.184	1.05	1.003	0.72	0.400
25 500	21 944.9	1.48	2.264	1.07	1.040	0.73	0.414
26 000	22 375.2	1.51	2.346	1.09	1.077	0.74	0.429
26 500	22 805.5	1.54	2.428	1.11	1.115	0.76	0.444
27 000	23 235.8	1.56	2.512	1.13	1.153	0.77	0.459
27 500	23 666.1	1.59	2.597	1.15	1.192	0.79	0.475
28 000	24 096.4	1.62	2.684	1.18	1.232	0.80	0.490
28 500	24 526.7	1.65	2.772	1.20	1.272	0.82	0.506
29 000	24 957.0	1.68	2.861	1.22	1.313	0.83	0.522
29 500	25 387.3	1.71	2.951	1.24	1.354	0.84	0.539
30 000	25 817.6	1.74	3.043	1.26	1.396	0.86	0.555
32 500	27 969.0	1.88	3.520	1.36	1.614	0.93	0.642
35 000	30 120.5	2.03	4.029	1.47	1.847	1.00	0.734
37 500	32 271.9	2.17	4.569	1.57	2.094	1.07	0.832
40 000	34 423.4	2.32	5.141	1.68	2.355	1.15	0.935
42 500	36 574.9	2.46	5.743	1.78	2.630	1.22	1.044
45 000	38 726.3	2.61	6.376	1.89	2.919	1.29	1.159
47 500	40 877.8	2.75	7.040	1.99	3.222	1.36	1.278
50 000	43 029.3	2.90	7.733	2.10	3.538	1.43	1.403
52 500	45 180.7	3.04	8.457	2.20	3.868	1.50	1.534
55 000	47 332.2	–	–	2.31	4.211	1.57	1.669
57 500	49 483.6	–	–	2.41	4.568	1.65	1.810
60 000	51 635.1	–	–	2.52	4.938	1.72	1.956
62 500	53 786.6	–	–	2.62	5.321	1.79	2.108
65 000	55 938.0	–	–	2.73	5.718	1.86	2.264
67 500	58 089.5	–	–	2.83	6.128	1.93	2.426
70 000	60 241.0	–	–	2.94	6.551	2.00	2.593
72 500	62 392.4	–	–	3.04	6.987	2.08	2.764
75 000	64 543.9	–	–	–	–	2.15	2.941
77 500	66 695.4	–	–	–	–	2.22	3.123
80 000	68 846.8	–	–	–	–	2.29	3.310
82 500	70 998.3	–	–	–	–	2.36	3.502
85 000	73 149.7	–	–	–	–	2.43	3.699
87 500	75 301.2	–	–	–	–	2.51	3.901

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
90 000	77 452.7	–	–	–	–	2.58	4.108
92 500	79 604.1	–	–	–	–	2.65	4.319
95 000	81 755.6	–	–	–	–	2.72	4.536
97 500	83 907.1	–	–	–	–	2.79	4.758
100 000	86 058.5	–	–	–	–	2.86	4.984
102 500	88 210.0	–	–	–	–	2.93	5.216
105 000	90 361.4	–	–	–	–	3.01	5.452
107 500	92 512.9	–	–	–	–	3.08	5.693

3.3 HEATING, INLET FLOW 70 °C / RETURN FLOW 55 °C

Medium:	Water	Density:	981.9 kg/m^3
Inlet flow temperature:	70 °C	Viscosity:	0.000450975 Pa•s
Return temperature:	55 °C	Specific thermal capacity:	4,184 J/(kg•K)
Range:	15 K	Surface roughness:	0.0015 mm
Average temperature:	32.5 °C		

Table 14: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 70 °C / return flow 55 °C, d15–28 mm

d [mm]		15		18		22		28	
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]
400	22.9	0.05	0.042	–	–	–	–	–	–
500	28.7	0.06	0.052	0.04	0.023	–	–	–	–
600	34.4	0.07	0.063	0.05	0.027	–	–	–	–
700	40.2	0.09	0.129	0.06	0.032	–	–	–	–
800	45.9	0.10	0.162	0.06	0.036	0.04	0.016	–	–
900	51.6	0.11	0.197	0.07	0.075	0.05	0.018	–	–
1 000	57.4	0.12	0.236	0.08	0.089	0.05	0.020	–	–
1 100	63.1	0.13	0.278	0.09	0.105	0.06	0.040	–	–
1 200	68.8	0.15	0.322	0.10	0.121	0.06	0.047	–	–
1 300	74.6	0.16	0.370	0.10	0.139	0.07	0.054	0.04	0.009
1 400	80.3	0.17	0.419	0.11	0.158	0.08	0.061	0.04	0.017
1 500	86.0	0.18	0.472	0.12	0.177	0.08	0.068	0.05	0.019
1 600	91.8	0.20	0.528	0.13	0.198	0.09	0.076	0.05	0.022
1 700	97.5	0.21	0.585	0.14	0.220	0.09	0.084	0.05	0.024
1 800	103.3	0.22	0.646	0.15	0.242	0.10	0.093	0.06	0.027
1 900	109.0	0.23	0.709	0.15	0.266	0.10	0.102	0.06	0.029
2 000	114.7	0.24	0.775	0.16	0.290	0.11	0.111	0.06	0.032
2 500	143.4	0.31	1.140	0.20	0.426	0.13	0.163	0.08	0.046
3 000	172.1	0.37	1.565	0.24	0.585	0.16	0.224	0.09	0.063
3 500	200.8	0.43	2.047	0.28	0.764	0.19	0.292	0.11	0.083

d [mm]		15		18		22		28	
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]
4 000	229.4	0.49	2.585	0.32	0.964	0.22	0.368	0.13	0.104
4 500	258.1	0.55	3.178	0.36	1.184	0.24	0.452	0.14	0.127
5 000	286.8	0.61	3.823	0.40	1.423	0.27	0.543	0.16	0.153
5 500	315.5	0.67	4.521	0.44	1.681	0.30	0.641	0.17	0.180
6 000	344.2	0.73	5.270	0.48	1.958	0.32	0.746	0.19	0.210
6 500	372.8	0.79	6.070	0.52	2.254	0.35	0.858	0.20	0.241
7 000	401.5	0.86	6.919	0.56	2.568	0.38	0.977	0.22	0.275
7 500	430.2	0.92	7.817	0.61	2.900	0.40	1.102	0.24	0.310
8 000	458.9	0.98	8.763	0.65	3.249	0.43	1.235	0.25	0.347
8 500	487.6	1.04	9.758	0.69	3.616	0.46	1.374	0.27	0.385
9 000	516.3	1.10	10.800	0.73	4.001	0.48	1.519	0.28	0.426
9 500	544.9	1.16	11.889	0.77	4.402	0.51	1.671	0.30	0.468
10 000	573.6	1.22	13.025	0.81	4.820	0.54	1.829	0.32	0.512
10 500	602.3	1.28	14.207	0.85	5.256	0.56	1.993	0.33	0.558
11 000	631.0	1.34	15.435	0.89	5.708	0.59	2.164	0.35	0.606
11 500	659.7	1.41	16.708	0.93	6.176	0.62	2.341	0.36	0.655
12 000	688.3	1.47	18.027	0.97	6.661	0.65	2.524	0.38	0.706
12 500	717.0	1.53	19.390	1.01	7.162	0.67	2.713	0.39	0.758
13 000	745.7	1.59	20.798	1.05	7.680	0.70	2.908	0.41	0.813
13 500	774.4	1.65	22.251	1.09	8.213	0.73	3.109	0.43	0.869
14 000	803.1	1.71	23.747	1.13	8.763	0.75	3.316	0.44	0.926
14 500	831.7	1.77	25.288	1.17	9.328	0.78	3.529	0.46	0.985
15 000	860.4	1.83	26.872	1.21	9.910	0.81	3.748	0.47	1.046
15 500	889.1	1.90	28.500	1.25	10.507	0.83	3.973	0.49	1.108
16 000	917.8	1.96	30.170	1.29	11.119	0.86	4.203	0.50	1.172
16 500	946.5	2.02	31.884	1.33	11.748	0.89	4.440	0.52	1.238
17 000	975.1	2.08	33.641	1.37	12.391	0.91	4.682	0.54	1.305
17 500	1 003.8	2.14	35.440	1.41	13.050	0.94	4.930	0.55	1.374
18 000	1 032.5	2.20	37.282	1.45	13.725	0.97	5.183	0.57	1.444
18 500	1 061.2	2.26	39.166	1.49	14.415	1.00	5.443	0.58	1.516
19 000	1 089.9	2.32	41.093	1.53	15.120	1.02	5.708	0.60	1.589
19 500	1 118.5	2.38	43.061	1.57	15.840	1.05	5.978	0.61	1.664
20 000	1 147.2	2.45	45.071	1.61	16.575	1.08	6.254	0.63	1.741
20 500	1 175.9	2.51	47.123	1.65	17.326	1.10	6.536	0.65	1.819
21 000	1 204.6	2.57	49.217	1.69	18.091	1.13	6.823	0.66	1.898
21 500	1 233.3	2.63	51.352	1.74	18.871	1.16	7.116	0.68	1.979
22 000	1 262.0	2.69	53.528	1.78	19.667	1.18	7.415	0.69	2.062
22 500	1 290.6	2.75	55.746	1.82	20.477	1.21	7.719	0.71	2.146
23 000	1 319.3	2.81	58.005	1.86	21.301	1.24	8.028	0.73	2.231
23 500	1 348.0	2.87	60.304	1.90	22.141	1.26	8.343	0.74	2.318
24 000	1 376.7	2.93	62.645	1.94	22.995	1.29	8.663	0.76	2.407
24 500	1 405.4	3.00	65.027	1.98	23.864	1.32	8.989	0.77	2.497
25 000	1 434.0	3.06	67.449	2.02	24.748	1.34	9.320	0.79	2.588
25 500	1 462.7	–	–	2.06	25.646	1.37	9.657	0.80	2.681
26 000	1 491.4	–	–	2.10	26.558	1.40	9.998	0.82	2.776
26 500	1 520.1	–	–	2.14	27.486	1.43	10.346	0.84	2.872
27 000	1 548.8	–	–	2.18	28.427	1.45	10.698	0.85	2.969
27 500	1 577.4	–	–	2.22	29.383	1.48	11.056	0.87	3.068
28 000	1 606.1	–	–	2.26	30.353	1.51	11.419	0.88	3.168

d [mm]		15		18		22		28	
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]
28 500	1 634.8	–	–	2.30	31.338	1.53	11.788	0.90	3.269
29 000	1 663.5	–	–	2.34	32.337	1.56	12.162	0.91	3.373
29 500	1 692.2	–	–	2.38	33.351	1.59	12.541	0.93	3.477
30 000	1 720.8	–	–	2.42	34.378	1.61	12.925	0.95	3.583
32 500	1 864.2	–	–	2.62	39.729	1.75	14.926	1.02	4.134
35 000	2 007.6	–	–	2.82	45.431	1.88	17.056	1.10	4.720
37 500	2 151.1	–	–	3.03	51.482	2.02	19.314	1.18	5.341
40 000	2 294.5	–	–	–	–	2.15	21.699	1.26	5.997
42 500	2 437.9	–	–	–	–	2.29	24.211	1.34	6.686
45 000	2 581.3	–	–	–	–	2.42	26.847	1.42	7.409
47 500	2 724.7	–	–	–	–	2.55	29.608	1.50	8.166
50 000	2 868.1	–	–	–	–	2.69	32.491	1.58	8.955
52 500	3 011.5	–	–	–	–	2.82	35.497	1.66	9.778
55 000	3 154.9	–	–	–	–	2.96	38.624	1.73	10.634
57 500	3 298.3	–	–	–	–	3.09	41.873	1.81	11.521
60 000	3 441.7	–	–	–	–	–	–	1.89	12.442
62 500	3 585.1	–	–	–	–	–	–	1.97	13.394
65 000	3 728.5	–	–	–	–	–	–	2.05	14.378
67 500	3 871.9	–	–	–	–	–	–	2.13	15.394
70 000	4 015.3	–	–	–	–	–	–	2.21	16.442
72 500	4 158.7	–	–	–	–	–	–	2.29	17.520
75 000	4 302.1	–	–	–	–	–	–	2.36	18.631
77 500	4 445.5	–	–	–	–	–	–	2.44	19.772
80 000	4 588.9	–	–	–	–	–	–	2.52	20.944
82 500	4 732.3	–	–	–	–	–	–	2.60	22.148
85 000	4 875.7	–	–	–	–	–	–	2.68	23.382
87 500	5 019.1	–	–	–	–	–	–	2.76	24.646
90 000	5 162.5	–	–	–	–	–	–	2.84	25.942
92 500	5 305.9	–	–	–	–	–	–	2.92	27.267
95 000	5 449.3	–	–	–	–	–	–	3.00	28.623
97 500	5 592.7	–	–	–	–	–	–	3.07	30.009

3 / 3

Table 15: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 70 °C / return flow 55 °C, d35–54 mm

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
2 000	114.7	0.04	0.011	–	–	–	–
2 500	143.4	0.05	0.016	–	–	–	–
3 000	172.1	0.06	0.022	0.04	0.009	–	–
3 500	200.8	0.07	0.029	0.05	0.011	–	–
4 000	229.4	0.08	0.036	0.05	0.014	–	–
4 500	258.1	0.09	0.044	0.06	0.017	–	–
5 000	286.8	0.10	0.053	0.07	0.021	–	–
5 500	315.5	0.11	0.063	0.07	0.025	0.04	0.007
6 000	344.2	0.12	0.073	0.08	0.029	0.05	0.008
6 500	372.8	0.13	0.084	0.09	0.033	0.05	0.009
7 000	401.5	0.14	0.095	0.10	0.037	0.06	0.011
7 500	430.2	0.15	0.107	0.10	0.042	0.06	0.012

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
8 000	458.9	0.16	0.120	0.11	0.047	0.06	0.013
8 500	487.6	0.17	0.134	0.12	0.052	0.07	0.015
9 000	516.3	0.18	0.148	0.12	0.058	0.07	0.016
9 500	544.9	0.19	0.162	0.13	0.063	0.08	0.018
10 000	573.6	0.20	0.177	0.14	0.069	0.08	0.019
10 500	602.3	0.21	0.193	0.14	0.075	0.08	0.021
11 000	631.0	0.22	0.209	0.15	0.082	0.09	0.023
11 500	659.7	0.23	0.226	0.16	0.088	0.09	0.025
12 000	688.3	0.24	0.244	0.16	0.095	0.10	0.027
12 500	717.0	0.25	0.262	0.17	0.102	0.10	0.029
13 000	745.7	0.26	0.281	0.18	0.110	0.10	0.031
13 500	774.4	0.27	0.300	0.18	0.117	0.11	0.033
14 000	803.1	0.28	0.320	0.19	0.125	0.11	0.035
14 500	831.7	0.29	0.340	0.20	0.133	0.12	0.037
15 000	860.4	0.30	0.361	0.20	0.141	0.12	0.039
15 500	889.1	0.31	0.382	0.21	0.149	0.12	0.042
16 000	917.8	0.32	0.404	0.22	0.158	0.13	0.044
16 500	946.5	0.33	0.427	0.22	0.166	0.13	0.046
17 000	975.1	0.34	0.450	0.23	0.175	0.14	0.049
17 500	1 003.8	0.35	0.474	0.24	0.185	0.14	0.052
18 000	1 032.5	0.36	0.498	0.24	0.194	0.14	0.054
18 500	1 061.2	0.37	0.522	0.25	0.203	0.15	0.057
19 000	1 089.9	0.38	0.548	0.26	0.213	0.15	0.060
19 500	1 118.5	0.39	0.573	0.26	0.223	0.15	0.062
20 000	1 147.2	0.40	0.600	0.27	0.233	0.16	0.065
20 500	1 175.9	0.41	0.626	0.28	0.244	0.16	0.068
21 000	1 204.6	0.42	0.654	0.29	0.254	0.17	0.071
21 500	1 233.3	0.43	0.681	0.29	0.265	0.17	0.074
22 000	1 262.0	0.44	0.710	0.30	0.276	0.17	0.077
22 500	1 290.6	0.45	0.738	0.31	0.287	0.18	0.080
23 000	1 319.3	0.46	0.768	0.31	0.299	0.18	0.083
23 500	1 348.0	0.47	0.798	0.32	0.310	0.19	0.086
24 000	1 376.7	0.48	0.828	0.33	0.322	0.19	0.090
24 500	1 405.4	0.49	0.859	0.33	0.334	0.19	0.093
25 000	1 434.0	0.50	0.890	0.34	0.346	0.20	0.096
25 500	1 462.7	0.51	0.922	0.35	0.358	0.20	0.100
26 000	1 491.4	0.52	0.954	0.35	0.371	0.21	0.103
26 500	1 520.1	0.53	0.987	0.36	0.384	0.21	0.107
27 000	1 548.8	0.54	1.020	0.37	0.396	0.21	0.110
27 500	1 577.4	0.55	1.054	0.37	0.410	0.22	0.114
28 000	1 606.1	0.56	1.088	0.38	0.423	0.22	0.118
28 500	1 634.8	0.58	1.123	0.39	0.436	0.23	0.121
29 000	1 663.5	0.59	1.158	0.39	0.450	0.23	0.125
29 500	1 692.2	0.60	1.194	0.40	0.464	0.23	0.129
30 000	1 720.8	0.61	1.230	0.41	0.478	0.24	0.133
32 500	1 864.2	0.66	1.419	0.44	0.551	0.26	0.153
35 000	2 007.6	0.71	1.619	0.48	0.628	0.28	0.174
37 500	2 151.1	0.76	1.831	0.51	0.710	0.30	0.197
40 000	2 294.5	0.81	2.054	0.54	0.796	0.32	0.221

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
42 500	2 437.9	0.86	2.289	0.58	0.887	0.34	0.246
45 000	2 581.3	0.91	2.536	0.61	0.982	0.36	0.272
47 500	2 724.7	0.96	2.794	0.65	1.082	0.38	0.300
50 000	2 868.1	1.01	3.062	0.68	1.185	0.40	0.328
52 500	3 011.5	1.06	3.342	0.71	1.293	0.42	0.358
55 000	3 154.9	1.11	3.633	0.75	1.406	0.44	0.389
57 500	3 298.3	1.16	3.935	0.78	1.522	0.46	0.421
60 000	3 441.7	1.21	4.248	0.82	1.642	0.48	0.454
62 500	3 585.1	1.26	4.571	0.85	1.767	0.50	0.488
65 000	3 728.5	1.31	4.905	0.88	1.896	0.52	0.524
67 500	3 871.9	1.36	5.250	0.92	2.028	0.54	0.560
70 000	4 015.3	1.41	5.606	0.95	2.165	0.56	0.598
72 500	4 158.7	1.46	5.972	0.98	2.306	0.58	0.636
75 000	4 302.1	1.51	6.348	1.02	2.450	0.60	0.676
77 500	4 445.5	1.56	6.735	1.05	2.599	0.62	0.717
80 000	4 588.9	1.61	7.132	1.09	2.752	0.64	0.759
82 500	4 732.3	1.66	7.540	1.12	2.908	0.66	0.802
85 000	4 875.7	1.72	7.957	1.15	3.069	0.68	0.846
87 500	5 019.1	1.77	8.385	1.19	3.233	0.70	0.891
90 000	5 162.5	1.82	8.823	1.22	3.402	0.71	0.937
92 500	5 305.9	1.87	9.272	1.26	3.574	0.73	0.984
95 000	5 449.3	1.92	9.730	1.29	3.750	0.75	1.032
97 500	5 592.7	1.97	10.199	1.32	3.929	0.77	1.082
100 000	5 736.1	2.02	10.677	1.36	4.113	0.79	1.132
105 000	6 022.9	2.12	11.665	1.43	4.491	0.83	1.236
110 000	6 309.8	2.22	12.691	1.49	4.885	0.87	1.343
115 000	6 596.6	2.32	13.758	1.56	5.294	0.91	1.455
120 000	6 883.4	2.42	14.864	1.63	5.717	0.95	1.571
125 000	7 170.2	2.52	16.008	1.70	6.155	0.99	1.691
130 000	7 457.0	2.62	17.192	1.77	6.608	1.03	1.814
135 000	7 743.8	2.72	18.415	1.83	7.076	1.07	1.942
140 000	8 030.6	2.82	19.675	1.90	7.558	1.11	2.074
145 000	8 317.4	2.93	20.975	1.97	8.055	1.15	2.209
150 000	8 604.2	3.03	22.312	2.04	8.566	1.19	2.349
155 000	8 891.0	–	–	2.11	9.091	1.23	2.492
160 000	9 177.8	–	–	2.17	9.631	1.27	2.639
165 000	9 464.6	–	–	2.24	10.185	1.31	2.790
170 000	9 751.4	–	–	2.31	10.753	1.35	2.945
175 000	10 038.2	–	–	2.38	11.335	1.39	3.103
180 000	10 325.0	–	–	2.45	11.931	1.43	3.265
185 000	10 611.9	–	–	2.51	12.542	1.47	3.431
190 000	10 898.7	–	–	2.58	13.166	1.51	3.601
195 000	11 185.5	–	–	2.65	13.804	1.55	3.775
200 000	11 472.3	–	–	2.72	14.456	1.59	3.952
205 000	11 759.1	–	–	2.78	15.122	1.63	4.133
210 000	12 045.9	–	–	2.85	15.802	1.67	4.317
215 000	12 332.7	–	–	2.92	16.495	1.71	4.506
220 000	12 619.5	–	–	2.99	17.202	1.75	4.698
225 000	12 906.3	–	–	3.06	17.923	1.79	4.893

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
230 000	13 193.1	–	–	–	–	1.83	5.093
235 000	13 479.9	–	–	–	–	1.87	5.295
240 000	13 766.7	–	–	–	–	1.91	5.502
245 000	14 053.5	–	–	–	–	1.95	5.712
250 000	14 340.3	–	–	–	–	1.99	5.926
255 000	14 627.2	–	–	–	–	2.03	6.143
260 000	14 914.0	–	–	–	–	2.07	6.364
265 000	15 200.8	–	–	–	–	2.11	6.588
270 000	15 487.6	–	–	–	–	2.14	6.816
275 000	15 774.4	–	–	–	–	2.18	7.048
280 000	16 061.2	–	–	–	–	2.22	7.283
285 000	16 348.0	–	–	–	–	2.26	7.522
290 000	16 634.8	–	–	–	–	2.30	7.764
295 000	16 921.6	–	–	–	–	2.34	8.010
300 000	17 208.4	–	–	–	–	2.38	8.259
310 000	17 782.0	–	–	–	–	2.46	8.768
320 000	18 355.6	–	–	–	–	2.54	9.291
330 000	18 929.3	–	–	–	–	2.62	9.828
340 000	19 502.9	–	–	–	–	2.70	10.378
350 000	20 076.5	–	–	–	–	2.78	10.943
360 000	20 650.1	–	–	–	–	2.86	11.521
370 000	21 223.7	–	–	–	–	2.94	12.113
380 000	21 797.3	–	–	–	–	3.02	12.719
390 000	22 370.9	–	–	–	–	3.10	13.339

4 / 4

Table 16: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 70 °C/return flow 55 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
10 500	602.3	0.04	0.004	–	–	–	–
11 000	631.0	0.04	0.004	–	–	–	–
11 500	659.7	0.04	0.005	–	–	–	–
12 000	688.3	0.05	0.005	–	–	–	–
12 500	717.0	0.05	0.005	–	–	–	–
13 000	745.7	0.05	0.006	–	–	–	–
13 500	774.4	0.05	0.006	–	–	–	–
14 000	803.1	0.05	0.006	–	–	–	–
14 500	831.7	0.06	0.007	0.04	0.003	–	–
15 000	860.4	0.06	0.007	0.04	0.003	–	–
15 500	889.1	0.06	0.008	0.04	0.004	–	–
16 000	917.8	0.06	0.008	0.04	0.004	–	–
16 500	946.5	0.06	0.008	0.05	0.004	–	–
17 000	975.1	0.07	0.009	0.05	0.004	–	–
17 500	1 003.8	0.07	0.009	0.05	0.004	–	–
18 000	1 032.5	0.07	0.010	0.05	0.005	–	–
18 500	1 061.2	0.07	0.010	0.05	0.005	–	–
19 000	1 089.9	0.07	0.011	0.05	0.005	–	–
19 500	1 118.5	0.08	0.011	0.05	0.005	–	–

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
20 000	1 147.2	0.08	0.012	0.06	0.005	–	–
20 500	1 175.9	0.08	0.012	0.06	0.006	–	–
21 000	1 204.6	0.08	0.013	0.06	0.006	0.04	0.002
21 500	1 233.3	0.08	0.013	0.06	0.006	0.04	0.003
22 000	1 262.0	0.09	0.014	0.06	0.006	0.04	0.003
22 500	1 290.6	0.09	0.014	0.06	0.007	0.04	0.003
23 000	1 319.3	0.09	0.015	0.06	0.007	0.04	0.003
23 500	1 348.0	0.09	0.016	0.07	0.007	0.04	0.003
24 000	1 376.7	0.09	0.016	0.07	0.008	0.05	0.003
24 500	1 405.4	0.09	0.017	0.07	0.008	0.05	0.003
25 000	1 434.0	0.10	0.017	0.07	0.008	0.05	0.003
25 500	1 462.7	0.10	0.018	0.07	0.008	0.05	0.003
26 000	1 491.4	0.10	0.019	0.07	0.009	0.05	0.003
26 500	1 520.1	0.10	0.019	0.07	0.009	0.05	0.004
27 000	1 548.8	0.10	0.020	0.08	0.009	0.05	0.004
27 500	1 577.4	0.11	0.021	0.08	0.010	0.05	0.004
28 000	1 606.1	0.11	0.021	0.08	0.010	0.05	0.004
28 500	1 634.8	0.11	0.022	0.08	0.010	0.05	0.004
29 000	1 663.5	0.11	0.023	0.08	0.010	0.06	0.004
29 500	1 692.2	0.11	0.023	0.08	0.011	0.06	0.004
30 000	1 720.8	0.12	0.024	0.08	0.011	0.06	0.004
32 500	1 864.2	0.13	0.028	0.09	0.013	0.06	0.005
35 000	2 007.6	0.14	0.031	0.10	0.015	0.07	0.006
37 500	2 151.1	0.14	0.035	0.11	0.016	0.07	0.007
40 000	2 294.5	0.15	0.040	0.11	0.018	0.08	0.007
42 500	2 437.9	0.16	0.044	0.12	0.020	0.08	0.008
45 000	2 581.3	0.17	0.049	0.13	0.023	0.09	0.009
47 500	2 724.7	0.18	0.054	0.13	0.025	0.09	0.010
50 000	2 868.1	0.19	0.059	0.14	0.027	0.10	0.011
52 500	3 011.5	0.20	0.064	0.15	0.030	0.10	0.012
55 000	3 154.9	0.21	0.070	0.15	0.032	0.11	0.013
57 500	3 298.3	0.22	0.075	0.16	0.035	0.11	0.014
60 000	3 441.7	0.23	0.081	0.17	0.038	0.11	0.015
62 500	3 585.1	0.24	0.087	0.18	0.040	0.12	0.016
65 000	3 728.5	0.25	0.094	0.18	0.043	0.12	0.017
67 500	3 871.9	0.26	0.100	0.19	0.046	0.13	0.019
70 000	4 015.3	0.27	0.107	0.20	0.049	0.13	0.020
72 500	4 158.7	0.28	0.114	0.20	0.053	0.14	0.021
75 000	4 302.1	0.29	0.121	0.21	0.056	0.14	0.022
77 500	4 445.5	0.30	0.128	0.22	0.059	0.15	0.024
80 000	4 588.9	0.31	0.135	0.22	0.063	0.15	0.025
82 500	4 732.3	0.32	0.143	0.23	0.066	0.16	0.027
85 000	4 875.7	0.33	0.151	0.24	0.070	0.16	0.028
87 500	5 019.1	0.34	0.159	0.25	0.073	0.17	0.029
90 000	5 162.5	0.35	0.167	0.25	0.077	0.17	0.031
92 500	5 305.9	0.36	0.175	0.26	0.081	0.18	0.032
95 000	5 449.3	0.37	0.184	0.27	0.085	0.18	0.034
97 500	5 592.7	0.38	0.193	0.27	0.089	0.19	0.036
100 000	5 736.1	0.39	0.201	0.28	0.093	0.19	0.037

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
105 000	6 022.9	0.41	0.220	0.29	0.101	0.20	0.041
110 000	6 309.8	0.43	0.239	0.31	0.110	0.21	0.044
115 000	6 596.6	0.44	0.259	0.32	0.119	0.22	0.048
120 000	6 883.4	0.46	0.279	0.34	0.129	0.23	0.052
125 000	7 170.2	0.48	0.300	0.35	0.139	0.24	0.055
130 000	7 457.0	0.50	0.322	0.36	0.149	0.25	0.059
135 000	7 743.8	0.52	0.344	0.38	0.159	0.26	0.064
140 000	8 030.6	0.54	0.368	0.39	0.170	0.27	0.068
145 000	8 317.4	0.56	0.392	0.41	0.181	0.28	0.072
150 000	8 604.2	0.58	0.416	0.42	0.192	0.29	0.077
155 000	8 891.0	0.60	0.441	0.43	0.203	0.30	0.081
160 000	9 177.8	0.62	0.467	0.45	0.215	0.31	0.086
165 000	9 464.6	0.64	0.494	0.46	0.228	0.32	0.091
170 000	9 751.4	0.66	0.521	0.48	0.240	0.32	0.096
175 000	10 038.2	0.68	0.549	0.49	0.253	0.33	0.101
180 000	10 325.0	0.70	0.577	0.50	0.266	0.34	0.106
185 000	10 611.9	0.72	0.607	0.52	0.279	0.35	0.112
190 000	10 898.7	0.73	0.636	0.53	0.293	0.36	0.117
195 000	11 185.5	0.75	0.667	0.55	0.307	0.37	0.123
200 000	11 472.3	0.77	0.698	0.56	0.321	0.38	0.128
205 000	11 759.1	0.79	0.730	0.57	0.336	0.39	0.134
210 000	12 045.9	0.81	0.762	0.59	0.351	0.40	0.140
215 000	12 332.7	0.83	0.795	0.60	0.366	0.41	0.146
220 000	12 619.5	0.85	0.829	0.62	0.381	0.42	0.152
225 000	12 906.3	0.87	0.863	0.63	0.397	0.43	0.159
230 000	13 193.1	0.89	0.898	0.64	0.413	0.44	0.165
235 000	13 479.9	0.91	0.933	0.66	0.430	0.45	0.171
240 000	13 766.7	0.93	0.969	0.67	0.446	0.46	0.178
245 000	14 053.5	0.95	1.006	0.69	0.463	0.47	0.185
250 000	14 340.3	0.97	1.044	0.70	0.480	0.48	0.192
255 000	14 627.2	0.99	1.082	0.71	0.498	0.49	0.199
260 000	14 914.0	1.01	1.120	0.73	0.515	0.50	0.206
265 000	15 200.8	1.02	1.160	0.74	0.533	0.51	0.213
270 000	15 487.6	1.04	1.199	0.76	0.552	0.52	0.220
275 000	15 774.4	1.06	1.240	0.77	0.570	0.53	0.227
280 000	16 061.2	1.08	1.281	0.78	0.589	0.53	0.235
285 000	16 348.0	1.10	1.323	0.80	0.608	0.54	0.243
290 000	16 634.8	1.12	1.365	0.81	0.628	0.55	0.250
295 000	16 921.6	1.14	1.408	0.83	0.647	0.56	0.258
300 000	17 208.4	1.16	1.451	0.84	0.667	0.57	0.266
310 000	17 782.0	1.20	1.540	0.87	0.708	0.59	0.282
320 000	18 355.6	1.24	1.631	0.90	0.750	0.61	0.299
330 000	18 929.3	1.28	1.725	0.92	0.793	0.63	0.316
340 000	19 502.9	1.31	1.821	0.95	0.836	0.65	0.333
350 000	20 076.5	1.35	1.919	0.98	0.881	0.67	0.351
360 000	20 650.1	1.39	2.020	1.01	0.928	0.69	0.369
370 000	21 223.7	1.43	2.123	1.04	0.975	0.71	0.388
380 000	21 797.3	1.47	2.228	1.06	1.023	0.73	0.407
390 000	22 370.9	1.51	2.336	1.09	1.072	0.75	0.427

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
400 000	22 944.6	1.55	2.446	1.12	1.123	0.76	0.447
410 000	23 518.2	1.59	2.558	1.15	1.174	0.78	0.467
420 000	24 091.8	1.62	2.672	1.18	1.226	0.80	0.488
430 000	24 665.4	1.66	2.789	1.20	1.280	0.82	0.509
440 000	25 239.0	1.70	2.908	1.23	1.334	0.84	0.531
450 000	25 812.6	1.74	3.030	1.26	1.390	0.86	0.553
460 000	26 386.2	1.78	3.153	1.29	1.447	0.88	0.575
470 000	26 959.8	1.82	3.279	1.32	1.504	0.90	0.598
480 000	27 533.5	1.86	3.408	1.34	1.563	0.92	0.621
490 000	28 107.1	1.89	3.538	1.37	1.622	0.94	0.645
500 000	28 680.7	1.93	3.671	1.40	1.683	0.96	0.669
550 000	31 548.8	2.13	4.368	1.54	2.002	1.05	0.795
600 000	34 416.8	2.32	5.120	1.68	2.345	1.15	0.931
650 000	37 284.9	2.51	5.927	1.82	2.714	1.24	1.077
700 000	40 153.0	2.71	6.789	1.96	3.107	1.34	1.233
750 000	43 021.0	2.90	7.704	2.10	3.524	1.43	1.398
800 000	45 889.1	3.09	8.672	2.24	3.965	1.53	1.572
850 000	48 757.2	–	–	2.38	4.430	1.62	1.756
900 000	51 625.2	–	–	2.52	4.919	1.72	1.948
950 000	54 493.3	–	–	2.66	5.431	1.81	2.151
1,000,000	57 361.4	–	–	2.80	5.967	1.91	2.362
1,050,000	60 229.4	–	–	2.94	6.526	2.01	2.582
1,100,000	63 097.5	–	–	3.08	7.108	2.10	2.812
1,150,000	65 965.6	–	–	–	–	2.20	3.050
1,200,000	68 833.7	–	–	–	–	2.29	3.297
1,250,000	71 701.7	–	–	–	–	2.39	3.553
1,300,000	74 569.8	–	–	–	–	2.48	3.818
1,350,000	77 437.9	–	–	–	–	2.58	4.092
1,400,000	80 305.9	–	–	–	–	2.67	4.375
1,450,000	83 174.0	–	–	–	–	2.77	4.666
1,500,000	86 042.1	–	–	–	–	2.87	4.966
1,550,000	88 910.1	–	–	–	–	2.96	5.274
1,600,000	91 778.2	–	–	–	–	3.06	5.591

3.4 HEATING, INLET FLOW 35 °C / RETURN FLOW 30 °C

Medium:	Water	Density:	994.9 kg/m^3
Inlet flow temperature:	35 °C	Viscosity:	0.00075865 Pa•s
Return temperature:	30 °C	Specific thermal capacity:	4,183 J/(kg•K)
Range:	5 K	Surface roughness:	0.0015 mm
Average temperature:	32.5 °C		

Table 17: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 35 °C / return flow 30 °C, d15–28 mm

d [mm]		**15**		**18**		**22**		**28**	
Q̇ [W]	**ṁ [kg/h]**	**v [m/s]**	**R [mbar/m]**	**v [m/s]**	**R [mbar/m]**	**v [m/s]**	**R [mbar/m]**	**v [m/s]**	**R [mbar/m]**
200	34.4	0.07	0.104	0.05	0.045	–	–	–	–
300	51.6	0.11	0.156	0.07	0.068	0.05	0.030	–	–
400	68.9	0.14	0.372	0.10	0.091	0.06	0.040	–	–
500	86.1	0.18	0.543	0.12	0.205	0.08	0.050	0.05	0.017
600	103.3	0.22	0.741	0.14	0.279	0.10	0.108	0.06	0.021
700	120.5	0.25	0.963	0.17	0.362	0.11	0.140	0.07	0.024
800	137.7	0.29	1.211	0.19	0.455	0.13	0.175	0.07	0.050
900	154.9	0.33	1.482	0.22	0.556	0.14	0.214	0.08	0.061
1 000	172.1	0.36	1.776	0.24	0.666	0.16	0.256	0.09	0.073
1 100	189.3	0.40	2.094	0.26	0.785	0.18	0.301	0.10	0.086
1 200	206.6	0.43	2.433	0.29	0.912	0.19	0.350	0.11	0.099
1 300	223.8	0.47	2.795	0.31	1.046	0.21	0.401	0.12	0.114
1 400	241.0	0.51	3.178	0.33	1.189	0.22	0.456	0.13	0.129
1 500	258.2	0.54	3.582	0.36	1.339	0.24	0.513	0.14	0.146
1 600	275.4	0.58	4.007	0.38	1.498	0.25	0.573	0.15	0.163
1 700	292.6	0.62	4.453	0.41	1.663	0.27	0.637	0.16	0.180
1 800	309.8	0.65	4.919	0.43	1.837	0.29	0.703	0.17	0.199
1 900	327.0	0.69	5.405	0.45	2.018	0.30	0.771	0.18	0.218
2 000	344.3	0.72	5.911	0.48	2.206	0.32	0.843	0.19	0.238
2 500	430.3	0.91	8.735	0.60	3.254	0.40	1.242	0.23	0.350
3 000	516.4	1.09	12.033	0.72	4.476	0.48	1.706	0.28	0.481
3 500	602.4	1.27	15.788	0.84	5.865	0.56	2.233	0.33	0.628
4 000	688.5	1.45	19.988	0.96	7.418	0.64	2.821	0.37	0.793
4 500	774.6	1.63	24.623	1.08	9.129	0.72	3.469	0.42	0.974
5 000	860.6	1.81	29.684	1.20	10.996	0.80	4.175	0.47	1.171
5 500	946.7	1.99	35.163	1.31	13.016	0.88	4.939	0.51	1.384
6 000	1 032.8	2.17	41.055	1.43	15.185	0.96	5.758	0.56	1.612
6 500	1 118.8	2.35	47.353	1.55	17.502	1.04	6.633	0.61	1.856
7 000	1 204.9	2.53	54.052	1.67	19.966	1.11	7.562	0.65	2.114
7 500	1 290.9	2.72	61.148	1.79	22.573	1.19	8.545	0.70	2.387
8 000	1 377.0	2.90	68.636	1.91	25.323	1.27	9.581	0.75	2.675
8 500	1 463.1	3.08	76.514	2.03	28.213	1.35	10.670	0.79	2.978
9 000	1 549.1	–	–	2.15	31.244	1.43	11.810	0.84	3.294
9 500	1 635.2	–	–	2.27	34.412	1.51	13.002	0.89	3.625
10 000	1 721.3	–	–	2.39	37.718	1.59	14.245	0.93	3.969
10 500	1 807.3	–	–	2.51	41.159	1.67	15.539	0.98	4.328

d [mm]		15		18		22		28	
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]
11 000	1 893.4	–	–	2.63	44.736	1.75	16.883	1.03	4.700
11 500	1 979.4	–	–	2.75	48.447	1.83	18.277	1.07	5.086
12 000	2 065.5	–	–	2.87	52.291	1.91	19.720	1.12	5.485
12 500	2 151.6	–	–	2.99	56.268	1.99	21.212	1.17	5.898
13 000	2 237.6	–	–	–	–	2.07	22.753	1.21	6.324
13 500	2 323.7	–	–	–	–	2.15	24.342	1.26	6.763
14 000	2 409.8	–	–	–	–	2.23	25.980	1.31	7.215
14 500	2 495.8	–	–	–	–	2.31	27.666	1.35	7.681
15 000	2 581.9	–	–	–	–	2.39	29.399	1.40	8.159
15 500	2 667.9	–	–	–	–	2.47	31.180	1.45	8.651
16 000	2 754.0	–	–	–	–	2.55	33.008	1.49	9.155
16 500	2 840.1	–	–	–	–	2.63	34.883	1.54	9.672
17 000	2 926.1	–	–	–	–	2.71	36.804	1.59	10.201
17 500	3 012.2	–	–	–	–	2.79	38.773	1.63	10.744
18 000	3 098.3	–	–	–	–	2.87	40.787	1.68	11.298
18 500	3 184.3	–	–	–	–	2.95	42.848	1.73	11.866
19 000	3 270.4	–	–	–	–	3.03	44.954	1.77	12.446
19 500	3 356.4	–	–	–	–	–	–	1.82	13.038
20 000	3 442.5	–	–	–	–	–	–	1.87	13.643
20 500	3 528.6	–	–	–	–	–	–	1.91	14.260
21 000	3 614.6	–	–	–	–	–	–	1.96	14.889
21 500	3 700.7	–	–	–	–	–	–	2.01	15.530
22 000	3 786.8	–	–	–	–	–	–	2.05	16.184
22 500	3 872.8	–	–	–	–	–	–	2.10	16.850
23 000	3 958.9	–	–	–	–	–	–	2.15	17.528
23 500	4 044.9	–	–	–	–	–	–	2.19	18.218
24 000	4 131.0	–	–	–	–	–	–	2.24	18.920
24 500	4 217.1	–	–	–	–	–	–	2.29	19.633
25 000	4 303.1	–	–	–	–	–	–	2.33	20.359
25 500	4 389.2	–	–	–	–	–	–	2.38	21.097
26 000	4 475.3	–	–	–	–	–	–	2.43	21.847
26 500	4 561.3	–	–	–	–	–	–	2.47	22.608
27 000	4 647.4	–	–	–	–	–	–	2.52	23.382
27 500	4 733.4	–	–	–	–	–	–	2.57	24.167
28 000	4 819.5	–	–	–	–	–	–	2.61	24.964
28 500	4 905.6	–	–	–	–	–	–	2.66	25.772
29 000	4 991.6	–	–	–	–	–	–	2.71	26.592
29 500	5 077.7	–	–	–	–	–	–	2.75	27.424
30 000	5 163.8	–	–	–	–	–	–	2.80	28.267
32 500	5 594.1	–	–	–	–	–	–	3.03	32.658

Table 18: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 35 °C / return flow 30 °C, d35–54 mm

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
700	120.5	0.04	0.010	–	–	–	–
800	137.7	0.05	0.011	–	–	–	–
900	154.9	0.05	0.013	–	–	–	–

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1 000	172.1	0.06	0.026	0.04	0.006	–	–
1 100	189.3	0.07	0.030	0.04	0.007	–	–
1 200	206.6	0.07	0.035	0.05	0.014	–	–
1 300	223.8	0.08	0.040	0.05	0.016	–	–
1 400	241.0	0.08	0.045	0.06	0.018	–	–
1 500	258.2	0.09	0.051	0.06	0.020	–	–
1 600	275.4	0.10	0.057	0.06	0.022	–	–
1 700	292.6	0.10	0.063	0.07	0.025	–	–
1 800	309.8	0.11	0.069	0.07	0.027	0.04	0.008
1 900	327.0	0.11	0.076	0.08	0.030	0.04	0.009
2 000	344.3	0.12	0.083	0.08	0.033	0.05	0.009
2 500	430.3	0.15	0.122	0.10	0.048	0.06	0.014
3 000	516.4	0.18	0.167	0.12	0.066	0.07	0.019
3 500	602.4	0.21	0.218	0.14	0.086	0.08	0.024
4 000	688.5	0.24	0.275	0.16	0.108	0.09	0.030
4 500	774.6	0.27	0.338	0.18	0.132	0.11	0.037
5 000	860.6	0.30	0.406	0.20	0.159	0.12	0.045
5 500	946.7	0.33	0.479	0.22	0.187	0.13	0.053
6 000	1 032.8	0.36	0.558	0.24	0.218	0.14	0.061
6 500	1 118.8	0.39	0.642	0.26	0.251	0.15	0.070
7 000	1 204.9	0.42	0.731	0.28	0.285	0.16	0.080
7 500	1 290.9	0.45	0.825	0.30	0.322	0.18	0.090
8 000	1 377.0	0.48	0.924	0.32	0.360	0.19	0.101
8 500	1 463.1	0.51	1.028	0.34	0.401	0.20	0.112
9 000	1 549.1	0.54	1.136	0.36	0.443	0.21	0.124
9 500	1 635.2	0.57	1.250	0.38	0.487	0.22	0.136
10 000	1 721.3	0.60	1.368	0.40	0.533	0.24	0.149
10 500	1 807.3	0.63	1.491	0.42	0.581	0.25	0.162
11 000	1 893.4	0.66	1.619	0.44	0.630	0.26	0.176
11 500	1 979.4	0.69	1.751	0.46	0.682	0.27	0.190
12 000	2 065.5	0.72	1.888	0.48	0.735	0.28	0.205
12 500	2 151.6	0.75	2.030	0.50	0.790	0.29	0.220
13 000	2 237.6	0.78	2.175	0.52	0.846	0.31	0.236
13 500	2 323.7	0.81	2.326	0.54	0.905	0.32	0.252
14 000	2 409.8	0.84	2.481	0.56	0.965	0.33	0.269
14 500	2 495.8	0.87	2.640	0.58	1.026	0.34	0.286
15 000	2 581.9	0.90	2.804	0.60	1.090	0.35	0.303
15 500	2 667.9	0.93	2.972	0.62	1.155	0.36	0.321
16 000	2 754.0	0.96	3.144	0.64	1.222	0.38	0.340
16 500	2 840.1	0.99	3.321	0.66	1.290	0.39	0.359
17 000	2 926.1	1.02	3.502	0.68	1.360	0.40	0.378
17 500	3 012.2	1.05	3.688	0.70	1.432	0.41	0.398
18 000	3 098.3	1.08	3.877	0.72	1.505	0.42	0.418
18 500	3 184.3	1.11	4.071	0.74	1.580	0.44	0.439
19 000	3 270.4	1.14	4.269	0.76	1.657	0.45	0.460
19 500	3 356.4	1.17	4.472	0.78	1.735	0.46	0.482
20 000	3 442.5	1.20	4.678	0.80	1.815	0.47	0.504
20 500	3 528.6	1.23	4.889	0.82	1.896	0.48	0.526
21 000	3 614.6	1.25	5.103	0.84	1.979	0.49	0.549

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
21 500	3 700.7	1.28	5.322	0.86	2.064	0.51	0.573
22 000	3 786.8	1.31	5.545	0.89	2.150	0.52	0.596
22 500	3 872.8	1.34	5.772	0.91	2.238	0.53	0.621
23 000	3 958.9	1.37	6.003	0.93	2.327	0.54	0.645
23 500	4 044.9	1.40	6.239	0.95	2.418	0.55	0.670
24 000	4 131.0	1.43	6.478	0.97	2.510	0.56	0.696
24 500	4 217.1	1.46	6.721	0.99	2.604	0.58	0.722
25 000	4 303.1	1.49	6.969	1.01	2.700	0.59	0.748
25 500	4 389.2	1.52	7.220	1.03	2.797	0.60	0.775
26 000	4 475.3	1.55	7.475	1.05	2.895	0.61	0.802
26 500	4 561.3	1.58	7.735	1.07	2.995	0.62	0.830
27 000	4 647.4	1.61	7.998	1.09	3.097	0.64	0.858
27 500	4 733.4	1.64	8.265	1.11	3.200	0.65	0.886
28 000	4 819.5	1.67	8.537	1.13	3.305	0.66	0.915
28 500	4 905.6	1.70	8.812	1.15	3.411	0.67	0.944
29 000	4 991.6	1.73	9.091	1.17	3.518	0.68	0.974
29 500	5 077.7	1.76	9.374	1.19	3.627	0.69	1.004
30 000	5 163.8	1.79	9.661	1.21	3.738	0.71	1.034
32 500	5 594.1	1.94	11.154	1.31	4.313	0.76	1.193
35 000	6 024.4	2.09	12.743	1.41	4.925	0.82	1.361
37 500	6 454.7	2.24	14.427	1.51	5.574	0.88	1.539
40 000	6 885.0	2.39	16.205	1.61	6.258	0.94	1.727
42 500	7 315.3	2.54	18.077	1.71	6.978	1.00	1.925
45 000	7 745.6	2.69	20.041	1.81	7.733	1.06	2.132
47 500	8 176.0	2.84	22.097	1.91	8.522	1.12	2.349
50 000	8 606.3	2.99	24.243	2.01	9.347	1.18	2.575
52 500	9 036.6	–	–	2.11	10.205	1.24	2.811
55 000	9 466.9	–	–	2.21	11.098	1.29	3.055
57 500	9 897.2	–	–	2.31	12.025	1.35	3.309
60 000	10 327.5	–	–	2.41	12.985	1.41	3.572
62 500	10 757.8	–	–	2.51	13.979	1.47	3.844
65 000	11 188.1	–	–	2.62	15.006	1.53	4.124
67 500	11 618.5	–	–	2.72	16.066	1.59	4.414
70 000	12 048.8	–	–	2.82	17.158	1.65	4.713
72 500	12 479.1	–	–	2.92	18.284	1.71	5.020
75 000	12 909.4	–	–	3.02	19.442	1.76	5.337
77 500	13 339.7	–	–	–	–	1.82	5.662
80 000	13 770.0	–	–	–	–	1.88	5.995
82 500	14 200.3	–	–	–	–	1.94	6.337
85 000	14 630.6	–	–	–	–	2.00	6.688
87 500	15 061.0	–	–	–	–	2.06	7.048
90 000	15 491.3	–	–	–	–	2.12	7.416
92 500	15 921.6	–	–	–	–	2.18	7.792
95 000	16 351.9	–	–	–	–	2.23	8.177
97 500	16 782.2	–	–	–	–	2.29	8.570
100 000	17 212.5	–	–	–	–	2.35	8.972
105 000	18 073.2	–	–	–	–	2.47	9.800
110 000	18 933.8	–	–	–	–	2.59	10.662
115 000	19 794.4	–	–	–	–	2.71	11.556

d [mm]		35		42		54	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
120 000	20 655.0	–	–	–	–	2.82	12.484
125 000	21 515.7	–	–	–	–	2.94	13.444
130 000	22 376.3	–	–	–	–	3.06	14.436

4 / 4

Table 19: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 35 °C/return flow 30 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3 500	602.4	0.04	0.004	–	–	–	–
4 000	688.5	0.05	0.006	–	–	–	–
4 500	774.6	0.05	0.007	–	–	–	–
5 000	860.6	0.06	0.008	0.04	0.004	–	–
5 500	946.7	0.06	0.010	0.05	0.004	–	–
6 000	1 032.8	0.07	0.011	0.05	0.005	–	–
6 500	1 118.8	0.07	0.013	0.05	0.006	–	–
7 000	1 204.9	0.08	0.015	0.06	0.007	–	–
7 500	1 290.9	0.09	0.016	0.06	0.008	0.04	0.003
8 000	1 377.0	0.09	0.018	0.07	0.009	0.05	0.003
8 500	1 463.1	0.10	0.020	0.07	0.009	0.05	0.004
9 000	1 549.1	0.10	0.022	0.07	0.010	0.05	0.004
9 500	1 635.2	0.11	0.025	0.08	0.011	0.05	0.005
10 000	1 721.3	0.11	0.027	0.08	0.013	0.06	0.005
10 500	1 807.3	0.12	0.029	0.09	0.014	0.06	0.006
11 000	1 893.4	0.13	0.032	0.09	0.015	0.06	0.006
11 500	1 979.4	0.13	0.034	0.10	0.016	0.07	0.006
12 000	2 065.5	0.14	0.037	0.10	0.017	0.07	0.007
12 500	2 151.6	0.14	0.040	0.10	0.018	0.07	0.007
13 000	2 237.6	0.15	0.043	0.11	0.020	0.07	0.008
13 500	2 323.7	0.15	0.045	0.11	0.021	0.08	0.009
14 000	2 409.8	0.16	0.048	0.12	0.023	0.08	0.009
14 500	2 495.8	0.17	0.052	0.12	0.024	0.08	0.010
15 000	2 581.9	0.17	0.055	0.12	0.025	0.08	0.010
15 500	2 667.9	0.18	0.058	0.13	0.027	0.09	0.011
16 000	2 754.0	0.18	0.061	0.13	0.028	0.09	0.011
16 500	2 840.1	0.19	0.065	0.14	0.030	0.09	0.012
17 000	2 926.1	0.19	0.068	0.14	0.032	0.10	0.013
17 500	3 012.2	0.20	0.072	0.15	0.033	0.10	0.013
18 000	3 098.3	0.21	0.075	0.15	0.035	0.10	0.014
18 500	3 184.3	0.21	0.079	0.15	0.037	0.10	0.015
19 000	3 270.4	0.22	0.083	0.16	0.038	0.11	0.015
19 500	3 356.4	0.22	0.087	0.16	0.040	0.11	0.016
20 000	3 442.5	0.23	0.091	0.17	0.042	0.11	0.017
20 500	3 528.6	0.23	0.095	0.17	0.044	0.12	0.018
21 000	3 614.6	0.24	0.099	0.17	0.046	0.12	0.018
21 500	3 700.7	0.25	0.103	0.18	0.048	0.12	0.019
22 000	3 786.8	0.25	0.107	0.18	0.050	0.12	0.020
22 500	3 872.8	0.26	0.111	0.19	0.052	0.13	0.021
23 000	3 958.9	0.26	0.116	0.19	0.054	0.13	0.022

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
23 500	4 044.9	0.27	0.120	0.19	0.056	0.13	0.022
24 000	4 131.0	0.27	0.125	0.20	0.058	0.14	0.023
24 500	4 217.1	0.28	0.130	0.20	0.060	0.14	0.024
25 000	4 303.1	0.29	0.134	0.21	0.062	0.14	0.025
25 500	4 389.2	0.29	0.139	0.21	0.064	0.14	0.026
26 000	4 475.3	0.30	0.144	0.22	0.067	0.15	0.027
26 500	4 561.3	0.30	0.149	0.22	0.069	0.15	0.028
27 000	4 647.4	0.31	0.154	0.22	0.071	0.15	0.029
27 500	4 733.4	0.31	0.159	0.23	0.074	0.16	0.030
28 000	4 819.5	0.32	0.164	0.23	0.076	0.16	0.031
28 500	4 905.6	0.33	0.169	0.24	0.078	0.16	0.032
29 000	4 991.6	0.33	0.174	0.24	0.081	0.16	0.033
29 500	5 077.7	0.34	0.180	0.24	0.083	0.17	0.033
30 000	5 163.8	0.34	0.185	0.25	0.086	0.17	0.035
32 500	5 594.1	0.37	0.213	0.27	0.099	0.18	0.040
35 000	6 024.4	0.40	0.243	0.29	0.113	0.20	0.045
37 500	6 454.7	0.43	0.275	0.31	0.127	0.21	0.051
40 000	6 885.0	0.46	0.308	0.33	0.143	0.23	0.057
42 500	7 315.3	0.49	0.344	0.35	0.159	0.24	0.064
45 000	7 745.6	0.52	0.380	0.37	0.176	0.25	0.071
47 500	8 176.0	0.54	0.419	0.39	0.194	0.27	0.078
50 000	8 606.3	0.57	0.459	0.41	0.212	0.28	0.085
52 500	9 036.6	0.60	0.500	0.44	0.231	0.30	0.093
55 000	9 466.9	0.63	0.544	0.46	0.251	0.31	0.101
57 500	9 897.2	0.66	0.589	0.48	0.272	0.33	0.109
60 000	10 327.5	0.69	0.635	0.50	0.293	0.34	0.118
62 500	10 757.8	0.72	0.683	0.52	0.315	0.35	0.126
65 000	11 188.1	0.74	0.733	0.54	0.338	0.37	0.136
67 500	11 618.5	0.77	0.784	0.56	0.362	0.38	0.145
70 000	12 048.8	0.80	0.837	0.58	0.386	0.40	0.155
72 500	12 479.1	0.83	0.891	0.60	0.411	0.41	0.165
75 000	12 909.4	0.86	0.947	0.62	0.437	0.42	0.175
77 500	13 339.7	0.89	1.004	0.64	0.463	0.44	0.185
80 000	13 770.0	0.92	1.063	0.66	0.490	0.45	0.196
82 500	14 200.3	0.94	1.123	0.68	0.518	0.47	0.207
85 000	14 630.6	0.97	1.185	0.70	0.546	0.48	0.219
87 500	15 061.0	1.00	1.248	0.73	0.575	0.50	0.230
90 000	15 491.3	1.03	1.313	0.75	0.605	0.51	0.242
92 500	15 921.6	1.06	1.379	0.77	0.636	0.52	0.254
95 000	16 351.9	1.09	1.447	0.79	0.667	0.54	0.267
97 500	16 782.2	1.12	1.516	0.81	0.699	0.55	0.279
100 000	17 212.5	1.15	1.586	0.83	0.731	0.57	0.292
105 000	18 073.2	1.20	1.732	0.87	0.798	0.59	0.319
110 000	18 933.8	1.26	1.883	0.91	0.867	0.62	0.347
115 000	19 794.4	1.32	2.040	0.95	0.940	0.65	0.375
120 000	20 655.0	1.37	2.203	1.00	1.014	0.68	0.405
125 000	21 515.7	1.43	2.371	1.04	1.092	0.71	0.436
130 000	22 376.3	1.49	2.545	1.08	1.171	0.74	0.468
135 000	23 236.9	1.55	2.724	1.12	1.254	0.76	0.500

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
140 000	24 097.5	1.60	2.909	1.16	1.339	0.79	0.534
145 000	24 958.2	1.66	3.100	1.20	1.426	0.82	0.569
150 000	25 818.8	1.72	3.295	1.24	1.516	0.85	0.605
155 000	26 679.4	1.77	3.497	1.29	1.608	0.88	0.641
160 000	27 540.0	1.83	3.703	1.33	1.703	0.91	0.679
165 000	28 400.7	1.89	3.916	1.37	1.800	0.93	0.718
170 000	29 261.3	1.95	4.133	1.41	1.900	0.96	0.757
175 000	30 121.9	2.00	4.356	1.45	2.002	0.99	0.798
180 000	30 982.5	2.06	4.584	1.49	2.107	1.02	0.840
185 000	31 843.2	2.12	4.817	1.53	2.213	1.05	0.882
190 000	32 703.8	2.18	5.056	1.58	2.323	1.07	0.926
195 000	33 564.4	2.23	5.300	1.62	2.435	1.10	0.970
200 000	34 425.1	2.29	5.549	1.66	2.549	1.13	1.015
205 000	35 285.7	2.35	5.803	1.70	2.665	1.16	1.061
210 000	36 146.3	2.40	6.063	1.74	2.784	1.19	1.109
215 000	37 006.9	2.46	6.327	1.78	2.905	1.22	1.157
220 000	37 867.6	2.52	6.597	1.82	3.029	1.24	1.206
225 000	38 728.2	2.58	6.872	1.87	3.155	1.27	1.256
230 000	39 588.8	2.63	7.152	1.91	3.283	1.30	1.307
235 000	40 449.4	2.69	7.438	1.95	3.413	1.33	1.358
240 000	41 310.1	2.75	7.728	1.99	3.546	1.36	1.411
245 000	42 170.7	2.81	8.023	2.03	3.681	1.39	1.465
250 000	43 031.3	2.86	8.324	2.07	3.819	1.41	1.519
255 000	43 891.9	2.92	8.629	2.11	3.959	1.44	1.575
260 000	44 752.6	2.98	8.940	2.16	4.101	1.47	1.631
265 000	45 613.2	3.03	9.255	2.20	4.245	1.50	1.688
270 000	46 473.8	3.09	9.576	2.24	4.392	1.53	1.746
275 000	47 334.4	–	–	2.28	4.540	1.56	1.805
280 000	48 195.1	–	–	2.32	4.692	1.58	1.865
285 000	49 055.7	–	–	2.36	4.845	1.61	1.926
290 000	49 916.3	–	–	2.40	5.001	1.64	1.988
295 000	50 777.0	–	–	2.45	5.158	1.67	2.050
300 000	51 637.6	–	–	2.49	5.319	1.70	2.114
310 000	53 358.8	–	–	2.57	5.645	1.75	2.243
320 000	55 080.1	–	–	2.65	5.981	1.81	2.376
330 000	56 801.3	–	–	2.74	6.326	1.87	2.513
340 000	58 522.6	–	–	2.82	6.680	1.92	2.653
350 000	60 243.8	–	–	2.90	7.042	1.98	2.796
360 000	61 965.1	–	–	2.99	7.413	2.04	2.943
370 000	63 686.3	–	–	3.07	7.793	2.09	3.093
380 000	65 407.6	–	–	–	–	2.15	3.247
390 000	67 128.9	–	–	–	–	2.21	3.404
400 000	68 850.1	–	–	–	–	2.26	3.564
410 000	70 571.4	–	–	–	–	2.32	3.728
420 000	72 292.6	–	–	–	–	2.38	3.896
430 000	74 013.9	–	–	–	–	2.43	4.066
440 000	75 735.1	–	–	–	–	2.49	4.240
450 000	77 456.4	–	–	–	–	2.55	4.417
460 000	79 177.6	–	–	–	–	2.60	4.598

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
470 000	80 898.9	–	–	–	–	2.66	4.782
480 000	82 620.1	–	–	–	–	2.72	4.969
490 000	84 341.4	–	–	–	–	2.77	5.159
500 000	86 062.6	–	–	–	–	2.83	5.353

3.5 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:	4,182 J/(kg•K)
Range:	10 K	Surface roughness:	0.0015 mm
Average temperature:	40 °C		

Table 20: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 45 °C / return flow 35 °C, d15–28 mm

d [mm]		15		18		22		28	
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]
300	25.8	0.05	0.067	–	–	–	–	–	–
400	34.4	0.07	0.090	0.05	0.039	–	–	–	–
500	43.0	0.09	0.112	0.06	0.049	–	–	–	–
600	51.6	0.11	0.135	0.07	0.059	0.05	0.026	–	–
700	60.3	0.13	0.285	0.08	0.069	0.06	0.030	–	–
800	68.9	0.15	0.357	0.10	0.135	0.06	0.035	–	–
900	77.5	0.16	0.435	0.11	0.164	0.07	0.039	0.04	0.013
1 000	86.1	0.18	0.521	0.12	0.196	0.08	0.076	0.05	0.015
1 100	94.7	0.20	0.613	0.13	0.231	0.09	0.089	0.05	0.016
1 200	103.3	0.22	0.711	0.14	0.267	0.10	0.103	0.06	0.018
1 300	111.9	0.24	0.815	0.16	0.307	0.10	0.118	0.06	0.034
1 400	120.5	0.25	0.926	0.17	0.348	0.11	0.134	0.07	0.038
1 500	129.1	0.27	1.042	0.18	0.391	0.12	0.151	0.07	0.043
1 600	137.7	0.29	1.164	0.19	0.437	0.13	0.168	0.07	0.048
1 700	146.3	0.31	1.292	0.20	0.485	0.14	0.186	0.08	0.053
1 800	154.9	0.33	1.426	0.22	0.535	0.14	0.205	0.08	0.058
1 900	163.6	0.34	1.565	0.23	0.587	0.15	0.225	0.09	0.064
2 000	172.2	0.36	1.710	0.24	0.641	0.16	0.246	0.09	0.070
2 500	215.2	0.45	2.517	0.30	0.941	0.20	0.361	0.12	0.102
3 000	258.2	0.54	3.456	0.36	1.291	0.24	0.494	0.14	0.140
3 500	301.3	0.64	4.522	0.42	1.687	0.28	0.645	0.16	0.182
4 000	344.3	0.73	5.711	0.48	2.128	0.32	0.813	0.19	0.230
4 500	387.4	0.82	7.021	0.54	2.614	0.36	0.997	0.21	0.281
5 000	430.4	0.91	8.449	0.60	3.143	0.40	1.198	0.23	0.338

d [mm]		15		18		22		28	
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]
5 500	473.5	1.00	9.992	0.66	3.714	0.44	1.415	0.26	0.398
6 000	516.5	1.09	11.648	0.72	4.327	0.48	1.647	0.28	0.464
6 500	559.5	1.18	13.416	0.78	4.981	0.52	1.895	0.30	0.533
7 000	602.6	1.27	15.294	0.84	5.675	0.56	2.158	0.33	0.606
7 500	645.6	1.36	17.281	0.90	6.409	0.60	2.436	0.35	0.684
8 000	688.7	1.45	19.375	0.96	7.182	0.64	2.728	0.37	0.766
8 500	731.7	1.54	21.576	1.02	7.993	0.68	3.035	0.40	0.851
9 000	774.7	1.63	23.882	1.08	8.843	0.72	3.357	0.42	0.941
9 500	817.8	1.72	26.292	1.14	9.731	0.76	3.692	0.44	1.035
10 000	860.8	1.82	28.805	1.20	10.657	0.80	4.042	0.47	1.132
10 500	903.9	1.91	31.420	1.26	11.620	0.84	4.406	0.49	1.233
11 000	946.9	2.00	34.138	1.32	12.620	0.88	4.783	0.52	1.338
11 500	990.0	2.09	36.956	1.38	13.656	0.92	5.174	0.54	1.447
12 000	1 033.0	2.18	39.874	1.44	14.729	0.96	5.579	0.56	1.560
12 500	1 076.0	2.27	42.892	1.50	15.838	1.00	5.997	0.59	1.676
13 000	1 119.1	2.36	46.009	1.56	16.983	1.04	6.429	0.61	1.796
13 500	1 162.1	2.45	49.224	1.62	18.164	1.08	6.874	0.63	1.920
14 000	1 205.2	2.54	52.537	1.68	19.380	1.12	7.332	0.66	2.047
14 500	1 248.2	2.63	55.948	1.74	20.632	1.16	7.803	0.68	2.178
15 000	1 291.2	2.72	59.455	1.80	21.918	1.20	8.287	0.70	2.312
15 500	1 334.3	2.81	63.058	1.86	23.239	1.24	8.785	0.73	2.450
16 000	1 377.3	2.91	66.757	1.92	24.595	1.28	9.295	0.75	2.592
16 500	1 420.4	3.00	70.552	1.98	25.986	1.32	9.818	0.77	2.737
17 000	1 463.4	3.09	74.442	2.04	27.411	1.36	10.354	0.80	2.885
17 500	1 506.5	–	–	2.10	28.870	1.40	10.902	0.82	3.037
18 000	1 549.5	–	–	2.16	30.363	1.44	11.463	0.84	3.193
18 500	1 592.5	–	–	2.22	31.890	1.48	12.037	0.87	3.352
19 000	1 635.6	–	–	2.28	33.451	1.52	12.624	0.89	3.514
19 500	1 678.6	–	–	2.34	35.045	1.56	13.222	0.91	3.680
20 000	1 721.7	–	–	2.40	36.673	1.60	13.834	0.94	3.849
20 500	1 764.7	–	–	2.46	38.334	1.64	14.457	0.96	4.022
21 000	1 807.7	–	–	2.52	40.029	1.68	15.093	0.98	4.198
21 500	1 850.8	–	–	2.58	41.756	1.72	15.741	1.01	4.377
22 000	1 893.8	–	–	2.64	43.517	1.76	16.402	1.03	4.559
22 500	1 936.9	–	–	2.70	45.310	1.80	17.075	1.05	4.745
23 000	1 979.9	–	–	2.76	47.137	1.84	17.759	1.08	4.935
23 500	2 023.0	–	–	2.82	48.996	1.88	18.456	1.10	5.127
24 000	2 066.0	–	–	2.88	50.887	1.92	19.165	1.12	5.323
24 500	2 109.0	–	–	2.94	52.811	1.96	19.886	1.15	5.522
25 000	2 152.1	–	–	3.00	54.768	2.00	20.619	1.17	5.724
25 500	2 195.1	–	–	3.06	56.757	2.04	21.364	1.19	5.930
26 000	2 238.2	–	–	–	–	2.08	22.121	1.22	6.139
26 500	2 281.2	–	–	–	–	2.12	22.890	1.24	6.351
27 000	2 324.2	–	–	–	–	2.16	23.670	1.26	6.566
27 500	2 367.3	–	–	–	–	2.20	24.463	1.29	6.785
28 000	2 410.3	–	–	–	–	2.24	25.267	1.31	7.007
28 500	2 453.4	–	–	–	–	2.28	26.083	1.33	7.232
29 000	2 496.4	–	–	–	–	2.32	26.911	1.36	7.460
29 500	2 539.5	–	–	–	–	2.36	27.750	1.38	7.691

d [mm]		15		18		22		28	
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]
30 000	2 582.5	–	–	–	–	2.40	28.601	1.40	7.926
32 500	2 797.7	–	–	–	–	2.60	33.031	1.52	9.145
35 000	3 012.9	–	–	–	–	2.80	37.747	1.64	10.443
37 500	3 228.1	–	–	–	–	3.00	42.749	1.76	11.817
40 000	3 443.3	–	–	–	–	–	–	1.87	13.268
42 500	3 658.5	–	–	–	–	–	–	1.99	14.794
45 000	3 873.7	–	–	–	–	–	–	2.11	16.395
47 500	4 089.0	–	–	–	–	–	–	2.22	18.071
50 000	4 304.2	–	–	–	–	–	–	2.34	19.819
52 500	4 519.4	–	–	–	–	–	–	2.46	21.641
55 000	4 734.6	–	–	–	–	–	–	2.58	23.536
57 500	4 949.8	–	–	–	–	–	–	2.69	25.502
60 000	5 165.0	–	–	–	–	–	–	2.81	27.540
62 500	5 380.2	–	–	–	–	–	–	2.93	29.649
65 000	5 595.4	–	–	–	–	–	–	3.04	31.829

Table 21: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 45 °C / return flow 35 °C, d35–54 mm

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1 400	120.5	0.04	0.009	–	–	–	–
1 500	129.1	0.04	0.009	–	–	–	–
1 600	137.7	0.05	0.017	–	–	–	–
1 700	146.3	0.05	0.019	–	–	–	–
1 800	154.9	0.05	0.021	–	–	–	–
1 900	163.6	0.06	0.022	–	–	–	–
2 000	172.2	0.06	0.025	0.04	0.010	–	–
2 500	215.2	0.07	0.036	0.05	0.014	–	–
3 000	258.2	0.09	0.049	0.06	0.019	–	–
3 500	301.3	0.10	0.064	0.07	0.025	0.04	0.007
4 000	344.3	0.12	0.080	0.08	0.031	0.05	0.009
4 500	387.4	0.13	0.098	0.09	0.038	0.05	0.011
5 000	430.4	0.15	0.117	0.10	0.046	0.06	0.013
5 500	473.5	0.16	0.138	0.11	0.054	0.06	0.015
6 000	516.5	0.18	0.161	0.12	0.063	0.07	0.018
6 500	559.5	0.19	0.185	0.13	0.073	0.08	0.020
7 000	602.6	0.21	0.210	0.14	0.082	0.08	0.023
7 500	645.6	0.22	0.237	0.15	0.093	0.09	0.026
8 000	688.7	0.24	0.265	0.16	0.104	0.09	0.029
8 500	731.7	0.25	0.295	0.17	0.115	0.10	0.032
9 000	774.7	0.27	0.326	0.18	0.127	0.11	0.036
9 500	817.8	0.28	0.358	0.19	0.140	0.11	0.039
10 000	860.8	0.30	0.392	0.20	0.153	0.12	0.043
10 500	903.9	0.31	0.427	0.21	0.167	0.12	0.047
11 000	946.9	0.33	0.463	0.22	0.181	0.13	0.051
11 500	990.0	0.34	0.500	0.23	0.195	0.14	0.055
12 000	1 033.0	0.36	0.539	0.24	0.210	0.14	0.059
12 500	1 076.0	0.37	0.579	0.25	0.226	0.15	0.063

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
13 000	1 119.1	0.39	0.620	0.26	0.242	0.15	0.068
13 500	1 162.1	0.40	0.663	0.27	0.259	0.16	0.072
14 000	1 205.2	0.42	0.707	0.28	0.276	0.17	0.077
14 500	1 248.2	0.43	0.752	0.29	0.293	0.17	0.082
15 000	1 291.2	0.45	0.798	0.30	0.311	0.18	0.087
15 500	1 334.3	0.46	0.845	0.31	0.329	0.18	0.092
16 000	1 377.3	0.48	0.894	0.32	0.348	0.19	0.097
16 500	1 420.4	0.49	0.944	0.33	0.368	0.19	0.103
17 000	1 463.4	0.51	0.995	0.34	0.388	0.20	0.108
17 500	1 506.5	0.52	1.047	0.35	0.408	0.21	0.114
18 000	1 549.5	0.54	1.100	0.36	0.429	0.21	0.120
18 500	1 592.5	0.55	1.155	0.37	0.450	0.22	0.125
19 000	1 635.6	0.57	1.210	0.38	0.471	0.22	0.131
19 500	1 678.6	0.58	1.267	0.39	0.493	0.23	0.138
20 000	1 721.7	0.60	1.325	0.40	0.516	0.24	0.144
20 500	1 764.7	0.61	1.384	0.41	0.539	0.24	0.150
21 000	1 807.7	0.63	1.445	0.42	0.562	0.25	0.157
21 500	1 850.8	0.64	1.506	0.43	0.586	0.25	0.163
22 000	1 893.8	0.66	1.569	0.44	0.610	0.26	0.170
22 500	1 936.9	0.67	1.632	0.45	0.635	0.27	0.177
23 000	1 979.9	0.69	1.697	0.46	0.660	0.27	0.184
23 500	2 023.0	0.70	1.763	0.47	0.686	0.28	0.191
24 000	2 066.0	0.72	1.830	0.48	0.712	0.28	0.198
24 500	2 109.0	0.73	1.898	0.49	0.738	0.29	0.205
25 000	2 152.1	0.75	1.968	0.50	0.765	0.29	0.213
25 500	2 195.1	0.76	2.038	0.51	0.792	0.30	0.220
26 000	2 238.2	0.78	2.110	0.52	0.820	0.31	0.228
26 500	2 281.2	0.79	2.182	0.53	0.848	0.31	0.236
27 000	2 324.2	0.81	2.256	0.54	0.876	0.32	0.244
27 500	2 367.3	0.82	2.331	0.55	0.905	0.32	0.252
28 000	2 410.3	0.84	2.406	0.56	0.935	0.33	0.260
28 500	2 453.4	0.85	2.483	0.57	0.964	0.34	0.268
29 000	2 496.4	0.87	2.561	0.59	0.995	0.34	0.277
29 500	2 539.5	0.88	2.640	0.60	1.025	0.35	0.285
30 000	2 582.5	0.90	2.721	0.61	1.056	0.35	0.294
32 500	2 797.7	0.97	3.137	0.66	1.217	0.38	0.338
35 000	3 012.9	1.05	3.580	0.71	1.389	0.41	0.385
37 500	3 228.1	1.12	4.049	0.76	1.570	0.44	0.436
40 000	3 443.3	1.20	4.544	0.81	1.761	0.47	0.488
42 500	3 658.5	1.27	5.064	0.86	1.962	0.50	0.544
45 000	3 873.7	1.35	5.610	0.91	2.173	0.53	0.602
47 500	4 089.0	1.42	6.180	0.96	2.393	0.56	0.662
50 000	4 304.2	1.50	6.775	1.01	2.622	0.59	0.726
52 500	4 519.4	1.57	7.395	1.06	2.861	0.62	0.792
55 000	4 734.6	1.65	8.039	1.11	3.109	0.65	0.860
57 500	4 949.8	1.72	8.708	1.16	3.367	0.68	0.931
60 000	5 165.0	1.80	9.400	1.21	3.633	0.71	1.004
62 500	5 380.2	1.87	10.116	1.26	3.909	0.74	1.080
65 000	5 595.4	1.95	10.856	1.31	4.194	0.77	1.158

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
67 500	5 810.6	2.02	11.620	1.36	4.488	0.80	1.239
70 000	6 025.8	2.10	12.406	1.41	4.790	0.83	1.322
72 500	6 241.0	2.17	13.217	1.46	5.102	0.86	1.408
75 000	6 456.2	2.25	14.050	1.51	5.422	0.88	1.496
77 500	6 671.4	2.32	14.907	1.56	5.752	0.91	1.586
80 000	6 886.7	2.40	15.786	1.61	6.090	0.94	1.679
82 500	7 101.9	2.47	16.689	1.66	6.436	0.97	1.774
85 000	7 317.1	2.55	17.614	1.71	6.792	1.00	1.871
87 500	7 532.3	2.62	18.562	1.77	7.156	1.03	1.971
90 000	7 747.5	2.70	19.533	1.82	7.528	1.06	2.073
92 500	7 962.7	2.77	20.526	1.87	7.909	1.09	2.178
95 000	8 177.9	2.85	21.541	1.92	8.299	1.12	2.284
97 500	8 393.1	2.92	22.579	1.97	8.697	1.15	2.393
100 000	8 608.3	3.00	23.640	2.02	9.103	1.18	2.505
105 000	9 038.7	–	–	2.12	9.942	1.24	2.734
110 000	9 469.2	–	–	2.22	10.813	1.30	2.973
115 000	9 899.6	–	–	2.32	11.718	1.36	3.220
120 000	10 330.0	–	–	2.42	12.656	1.42	3.477
125 000	10 760.4	–	–	2.52	13.627	1.47	3.742
130 000	11 190.8	–	–	2.62	14.631	1.53	4.016
135 000	11 621.2	–	–	2.72	15.666	1.59	4.298
140 000	12 051.6	–	–	2.82	16.735	1.65	4.590
145 000	12 482.1	–	–	2.93	17.835	1.71	4.890
150 000	12 912.5	–	–	3.03	18.967	1.77	5.199
155 000	13 342.9	–	–	–	–	1.83	5.516
160 000	13 773.3	–	–	–	–	1.89	5.842
165 000	14 203.7	–	–	–	–	1.95	6.176
170 000	14 634.1	–	–	–	–	2.01	6.518
175 000	15 064.6	–	–	–	–	2.06	6.870
180 000	15 495.0	–	–	–	–	2.12	7.229
185 000	15 925.4	–	–	–	–	2.18	7.597
190 000	16 355.8	–	–	–	–	2.24	7.973
195 000	16 786.2	–	–	–	–	2.30	8.357
200 000	17 216.6	–	–	–	–	2.36	8.750
205 000	17 647.1	–	–	–	–	2.42	9.150
210 000	18 077.5	–	–	–	–	2.48	9.559
215 000	18 507.9	–	–	–	–	2.54	9.976
220 000	18 938.3	–	–	–	–	2.60	10.402
225 000	19 368.7	–	–	–	–	2.65	10.835
230 000	19 799.1	–	–	–	–	2.71	11.277
235 000	20 229.6	–	–	–	–	2.77	11.726
240 000	20 660.0	–	–	–	–	2.83	12.183
245 000	21 090.4	–	–	–	–	2.89	12.649
250 000	21 520.8	–	–	–	–	2.95	13.122
255 000	21 951.2	–	–	–	–	3.01	13.604
260 000	22 381.6	–	–	–	–	3.07	14.093

Table 22: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 45 °C/return flow 35 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
$\dot{Q}$ [W]	$\dot{m}$ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
7 000	602.6	0.04	0.004	–	–	–	–
7 500	645.6	0.04	0.005	–	–	–	–
8 000	688.7	0.05	0.005	–	–	–	–
8 500	731.7	0.05	0.006	–	–	–	–
9 000	774.7	0.05	0.007	–	–	–	–
9 500	817.8	0.05	0.007	–	–	–	–
10 000	860.8	0.06	0.008	0.04	0.004	–	–
10 500	903.9	0.06	0.009	0.04	0.004	–	–
11 000	946.9	0.06	0.009	0.05	0.004	–	–
11 500	990.0	0.07	0.010	0.05	0.005	–	–
12 000	1 033.0	0.07	0.011	0.05	0.005	–	–
12 500	1 076.0	0.07	0.012	0.05	0.005	–	–
13 000	1 119.1	0.07	0.012	0.05	0.006	–	–
13 500	1 162.1	0.08	0.013	0.06	0.006	–	–
14 000	1 205.2	0.08	0.014	0.06	0.007	–	–
14 500	1 248.2	0.08	0.015	0.06	0.007	0.04	0.003
15 000	1 291.2	0.09	0.016	0.06	0.007	0.04	0.003
15 500	1 334.3	0.09	0.017	0.06	0.008	0.04	0.003
16 000	1 377.3	0.09	0.018	0.07	0.008	0.05	0.003
16 500	1 420.4	0.09	0.019	0.07	0.009	0.05	0.004
17 000	1 463.4	0.10	0.020	0.07	0.009	0.05	0.004
17 500	1 506.5	0.10	0.021	0.07	0.010	0.05	0.004
18 000	1 549.5	0.10	0.022	0.07	0.010	0.05	0.004
18 500	1 592.5	0.11	0.023	0.08	0.011	0.05	0.004
19 000	1 635.6	0.11	0.024	0.08	0.011	0.05	0.004
19 500	1 678.6	0.11	0.025	0.08	0.012	0.06	0.005
20 000	1 721.7	0.11	0.026	0.08	0.012	0.06	0.005
20 500	1 764.7	0.12	0.027	0.09	0.013	0.06	0.005
21 000	1 807.7	0.12	0.028	0.09	0.013	0.06	0.005
21 500	1 850.8	0.12	0.030	0.09	0.014	0.06	0.006
22 000	1 893.8	0.13	0.031	0.09	0.014	0.06	0.006
22 500	1 936.9	0.13	0.032	0.09	0.015	0.06	0.006
23 000	1 979.9	0.13	0.033	0.10	0.015	0.07	0.006
23 500	2 023.0	0.13	0.034	0.10	0.016	0.07	0.006
24 000	2 066.0	0.14	0.036	0.10	0.017	0.07	0.007
24 500	2 109.0	0.14	0.037	0.10	0.017	0.07	0.007
25 000	2 152.1	0.14	0.038	0.10	0.018	0.07	0.007
25 500	2 195.1	0.15	0.040	0.11	0.018	0.07	0.007
26 000	2 238.2	0.15	0.041	0.11	0.019	0.07	0.008
26 500	2 281.2	0.15	0.043	0.11	0.020	0.08	0.008
27 000	2 324.2	0.16	0.044	0.11	0.020	0.08	0.008
27 500	2 367.3	0.16	0.045	0.11	0.021	0.08	0.009
28 000	2 410.3	0.16	0.047	0.12	0.022	0.08	0.009
28 500	2 453.4	0.16	0.048	0.12	0.022	0.08	0.009
29 000	2 496.4	0.17	0.050	0.12	0.023	0.08	0.009
29 500	2 539.5	0.17	0.051	0.12	0.024	0.08	0.010
30 000	2 582.5	0.17	0.053	0.12	0.025	0.09	0.010
32 500	2 797.7	0.19	0.061	0.14	0.028	0.09	0.011

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
35 000	3 012.9	0.20	0.069	0.15	0.032	0.10	0.013
37 500	3 228.1	0.22	0.078	0.16	0.036	0.11	0.015
40 000	3 443.3	0.23	0.088	0.17	0.041	0.11	0.016
42 500	3 658.5	0.24	0.098	0.18	0.045	0.12	0.018
45 000	3 873.7	0.26	0.108	0.19	0.050	0.13	0.020
47 500	4 089.0	0.27	0.119	0.20	0.055	0.13	0.022
50 000	4 304.2	0.29	0.130	0.21	0.060	0.14	0.024
52 500	4 519.4	0.30	0.142	0.22	0.066	0.15	0.026
55 000	4 734.6	0.32	0.154	0.23	0.071	0.16	0.029
57 500	4 949.8	0.33	0.166	0.24	0.077	0.16	0.031
60 000	5 165.0	0.34	0.180	0.25	0.083	0.17	0.033
62 500	5 380.2	0.36	0.193	0.26	0.089	0.18	0.036
65 000	5 595.4	0.37	0.207	0.27	0.096	0.18	0.038
67 500	5 810.6	0.39	0.221	0.28	0.102	0.19	0.041
70 000	6 025.8	0.40	0.236	0.29	0.109	0.20	0.044
72 500	6 241.0	0.42	0.251	0.30	0.116	0.21	0.047
75 000	6 456.2	0.43	0.267	0.31	0.123	0.21	0.050
77 500	6 671.4	0.45	0.283	0.32	0.131	0.22	0.052
80 000	6 886.7	0.46	0.299	0.33	0.138	0.23	0.056
82 500	7 101.9	0.47	0.316	0.34	0.146	0.23	0.059
85 000	7 317.1	0.49	0.333	0.35	0.154	0.24	0.062
87 500	7 532.3	0.50	0.351	0.36	0.162	0.25	0.065
90 000	7 747.5	0.52	0.369	0.37	0.171	0.26	0.068
92 500	7 962.7	0.53	0.388	0.38	0.179	0.26	0.072
95 000	8 177.9	0.55	0.407	0.40	0.188	0.27	0.075
97 500	8 393.1	0.56	0.426	0.41	0.197	0.28	0.079
100 000	8 608.3	0.57	0.446	0.42	0.206	0.28	0.082
105 000	9 038.7	0.60	0.486	0.44	0.224	0.30	0.090
110 000	9 469.2	0.63	0.528	0.46	0.244	0.31	0.098
115 000	9 899.6	0.66	0.572	0.48	0.264	0.33	0.106
120 000	10 330.0	0.69	0.617	0.50	0.285	0.34	0.114
125 000	10 760.4	0.72	0.664	0.52	0.306	0.35	0.123
130 000	11 190.8	0.75	0.712	0.54	0.329	0.37	0.132
135 000	11 621.2	0.78	0.762	0.56	0.352	0.38	0.141
140 000	12 051.6	0.80	0.813	0.58	0.375	0.40	0.150
145 000	12 482.1	0.83	0.866	0.60	0.400	0.41	0.160
150 000	12 912.5	0.86	0.921	0.62	0.425	0.43	0.170
155 000	13 342.9	0.89	0.977	0.64	0.450	0.44	0.180
160 000	13 773.3	0.92	1.034	0.67	0.477	0.45	0.191
165 000	14 203.7	0.95	1.093	0.69	0.504	0.47	0.201
170 000	14 634.1	0.98	1.153	0.71	0.531	0.48	0.212
175 000	15 064.6	1.00	1.214	0.73	0.560	0.50	0.224
180 000	15 495.0	1.03	1.278	0.75	0.589	0.51	0.235
185 000	15 925.4	1.06	1.342	0.77	0.618	0.52	0.247
190 000	16 355.8	1.09	1.408	0.79	0.649	0.54	0.259
195 000	16 786.2	1.12	1.476	0.81	0.680	0.55	0.272
200 000	17 216.6	1.15	1.544	0.83	0.711	0.57	0.284
205 000	17 647.1	1.18	1.615	0.85	0.744	0.58	0.297
210 000	18 077.5	1.21	1.686	0.87	0.776	0.60	0.310

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
215 000	18 507.9	1.23	1.760	0.89	0.810	0.61	0.323
220 000	18 938.3	1.26	1.834	0.91	0.844	0.62	0.337
225 000	19 368.7	1.29	1.910	0.94	0.879	0.64	0.351
230 000	19 799.1	1.32	1.987	0.96	0.915	0.65	0.365
235 000	20 229.6	1.35	2.066	0.98	0.951	0.67	0.379
240 000	20 660.0	1.38	2.146	1.00	0.987	0.68	0.394
245 000	21 090.4	1.41	2.227	1.02	1.025	0.70	0.409
250 000	21 520.8	1.44	2.310	1.04	1.063	0.71	0.424
255 000	21 951.2	1.46	2.394	1.06	1.101	0.72	0.439
260 000	22 381.6	1.49	2.480	1.08	1.141	0.74	0.455
265 000	22 812.1	1.52	2.567	1.10	1.180	0.75	0.471
270 000	23 242.5	1.55	2.655	1.12	1.221	0.77	0.487
275 000	23 672.9	1.58	2.745	1.14	1.262	0.78	0.503
280 000	24 103.3	1.61	2.836	1.16	1.304	0.79	0.520
285 000	24 533.7	1.64	2.928	1.19	1.346	0.81	0.537
290 000	24 964.1	1.67	3.022	1.21	1.389	0.82	0.554
295 000	25 394.5	1.69	3.117	1.23	1.433	0.84	0.571
300 000	25 825.0	1.72	3.213	1.25	1.477	0.85	0.589
310 000	26 685.8	1.78	3.410	1.29	1.567	0.88	0.624
320 000	27 546.6	1.84	3.611	1.33	1.659	0.91	0.661
330 000	28 407.5	1.89	3.819	1.37	1.754	0.94	0.699
340 000	29 268.3	1.95	4.031	1.41	1.852	0.96	0.738
350 000	30 129.1	2.01	4.249	1.46	1.951	0.99	0.777
360 000	30 990.0	2.07	4.472	1.50	2.054	1.02	0.818
370 000	31 850.8	2.12	4.700	1.54	2.158	1.05	0.859
380 000	32 711.6	2.18	4.933	1.58	2.265	1.08	0.902
390 000	33 572.5	2.24	5.172	1.62	2.374	1.11	0.945
400 000	34 433.3	2.30	5.415	1.66	2.485	1.13	0.989
410 000	35 294.1	2.35	5.664	1.70	2.599	1.16	1.034
420 000	36 154.9	2.41	5.918	1.75	2.715	1.19	1.080
430 000	37 015.8	2.47	6.177	1.79	2.834	1.22	1.127
440 000	37 876.6	2.53	6.441	1.83	2.955	1.25	1.175
450 000	38 737.4	2.58	6.710	1.87	3.078	1.28	1.224
460 000	39 598.3	2.64	6.984	1.91	3.203	1.31	1.274
470 000	40 459.1	2.70	7.263	1.95	3.331	1.33	1.324
480 000	41 319.9	2.76	7.547	2.00	3.460	1.36	1.376
490 000	42 180.8	2.81	7.836	2.04	3.593	1.39	1.428
500 000	43 041.6	2.87	8.130	2.08	3.727	1.42	1.482
550 000	47 345.8	–	–	2.29	4.433	1.56	1.761
600 000	51 649.9	–	–	2.50	5.194	1.70	2.062
650 000	55 954.1	–	–	2.70	6.010	1.84	2.385
700 000	60 258.2	–	–	2.91	6.881	1.99	2.730
750 000	64 562.4	–	–	–	–	2.13	3.095
800 000	68 866.6	–	–	–	–	2.27	3.481
850 000	73 170.7	–	–	–	–	2.41	3.888
900 000	77 474.9	–	–	–	–	2.55	4.316
950 000	81 779.1	–	–	–	–	2.70	4.764
1,000,000	86 083.2	–	–	–	–	2.84	5.232
1,050,000	90 387.4	–	–	–	–	2.98	5.721

3.6 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:	4,181 J/(kg•K)
Range:	10 K	Surface roughness:	0.0015 mm
Average temperature:	40 °C		

Table 23: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 55 °C / return flow 45 °C, d15–28 mm

d [mm]		**15**		**18**		**22**		**28**	
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]**
300	25.8	0.05	0.057	–	–	–	–	–	–
400	34.4	0.07	0.076	0.05	0.033	–	–	–	–
500	43.1	0.09	0.095	0.06	0.041	0.04	0.018	–	–
600	51.7	0.11	0.209	0.07	0.049	0.05	0.022	–	–
700	60.3	0.13	0.271	0.08	0.102	0.06	0.026	–	–
800	68.9	0.15	0.340	0.10	0.128	0.06	0.029	–	–
900	77.5	0.16	0.415	0.11	0.156	0.07	0.060	0.04	0.011
1 000	86.1	0.18	0.497	0.12	0.187	0.08	0.072	0.05	0.013
1 100	94.7	0.20	0.585	0.13	0.220	0.09	0.085	0.05	0.024
1 200	103.3	0.22	0.679	0.14	0.255	0.10	0.098	0.06	0.028
1 300	111.9	0.24	0.779	0.16	0.292	0.10	0.112	0.06	0.032
1 400	120.5	0.26	0.885	0.17	0.332	0.11	0.128	0.07	0.036
1 500	129.2	0.27	0.996	0.18	0.374	0.12	0.144	0.07	0.041
1 600	137.8	0.29	1.114	0.19	0.417	0.13	0.160	0.08	0.046
1 700	146.4	0.31	1.237	0.20	0.463	0.14	0.178	0.08	0.051
1 800	155.0	0.33	1.365	0.22	0.511	0.14	0.196	0.08	0.056
1 900	163.6	0.35	1.499	0.23	0.561	0.15	0.215	0.09	0.061
2 000	172.2	0.36	1.638	0.24	0.613	0.16	0.235	0.09	0.067
2 500	215.3	0.46	2.415	0.30	0.902	0.20	0.345	0.12	0.098
3 000	258.3	0.55	3.319	0.36	1.238	0.24	0.473	0.14	0.134
3 500	301.4	0.64	4.347	0.42	1.619	0.28	0.618	0.16	0.174
4 000	344.4	0.73	5.494	0.48	2.045	0.32	0.780	0.19	0.220
4 500	387.5	0.82	6.759	0.54	2.513	0.36	0.958	0.21	0.270
5 000	430.5	0.91	8.138	0.60	3.023	0.40	1.151	0.24	0.324
5 500	473.6	1.00	9.629	0.66	3.575	0.44	1.360	0.26	0.382
6 000	516.6	1.09	11.231	0.72	4.167	0.48	1.584	0.28	0.445
6 500	559.7	1.19	12.942	0.78	4.798	0.52	1.823	0.31	0.512
7 000	602.7	1.28	14.760	0.84	5.469	0.56	2.077	0.33	0.583
7 500	645.8	1.37	16.684	0.90	6.178	0.60	2.345	0.35	0.657
8 000	688.8	1.46	18.713	0.96	6.926	0.64	2.628	0.38	0.736
8 500	731.9	1.55	20.845	1.02	7.711	0.68	2.924	0.40	0.819
9 000	774.9	1.64	23.080	1.08	8.534	0.72	3.235	0.42	0.905
9 500	818.0	1.73	25.417	1.14	9.394	0.76	3.560	0.45	0.996
10 000	861.0	1.82	27.855	1.20	10.290	0.80	3.898	0.47	1.090
10 500	904.1	1.91	30.393	1.26	11.223	0.84	4.249	0.49	1.188
11 000	947.1	2.01	33.031	1.32	12.192	0.88	4.615	0.52	1.289

d [mm]		15		18		22		28	
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]
11 500	990.2	2.10	35.767	1.38	13.196	0.92	4.993	0.54	1.394
12 000	1 033.2	2.19	38.601	1.44	14.236	0.96	5.385	0.56	1.503
12 500	1 076.3	2.28	41.532	1.50	15.312	1.00	5.790	0.59	1.615
13 000	1 119.3	2.37	44.561	1.57	16.422	1.04	6.208	0.61	1.731
13 500	1 162.4	2.46	47.685	1.63	17.567	1.08	6.639	0.63	1.851
14 000	1 205.5	2.55	50.905	1.69	18.747	1.12	7.082	0.66	1.974
14 500	1 248.5	2.64	54.221	1.75	19.962	1.16	7.539	0.68	2.101
15 000	1 291.6	2.74	57.632	1.81	21.210	1.20	8.008	0.71	2.231
15 500	1 334.6	2.83	61.137	1.87	22.493	1.24	8.490	0.73	2.364
16 000	1 377.7	2.92	64.736	1.93	23.810	1.28	8.985	0.75	2.501
16 500	1 420.7	3.01	68.428	1.99	25.160	1.32	9.492	0.78	2.641
17 000	1 463.8	–	–	2.05	26.544	1.36	10.012	0.80	2.785
17 500	1 506.8	–	–	2.11	27.962	1.40	10.544	0.82	2.932
18 000	1 549.9	–	–	2.17	29.412	1.44	11.088	0.85	3.083
18 500	1 592.9	–	–	2.23	30.896	1.48	11.645	0.87	3.237
19 000	1 636.0	–	–	2.29	32.413	1.52	12.214	0.89	3.394
19 500	1 679.0	–	–	2.35	33.963	1.56	12.795	0.92	3.555
20 000	1 722.1	–	–	2.41	35.546	1.60	13.388	0.94	3.719
20 500	1 765.1	–	–	2.47	37.161	1.64	13.993	0.96	3.886
21 000	1 808.2	–	–	2.53	38.809	1.68	14.611	0.99	4.056
21 500	1 851.2	–	–	2.59	40.490	1.72	15.240	1.01	4.230
22 000	1 894.3	–	–	2.65	42.203	1.77	15.881	1.03	4.407
22 500	1 937.3	–	–	2.71	43.948	1.81	16.535	1.06	4.587
23 000	1 980.4	–	–	2.77	45.725	1.85	17.200	1.08	4.771
23 500	2 023.4	–	–	2.83	47.534	1.89	17.877	1.11	4.957
24 000	2 066.5	–	–	2.89	49.376	1.93	18.566	1.13	5.147
24 500	2 109.5	–	–	2.95	51.249	1.97	19.266	1.15	5.340
25 000	2 152.6	–	–	3.01	53.153	2.01	19.979	1.18	5.537
25 500	2 195.6	–	–	3.07	55.090	2.05	20.703	1.20	5.736
26 000	2 238.7	–	–	–	–	2.09	21.439	1.22	5.939
26 500	2 281.8	–	–	–	–	2.13	22.186	1.25	6.144
27 000	2 324.8	–	–	–	–	2.17	22.945	1.27	6.353
27 500	2 367.9	–	–	–	–	2.21	23.715	1.29	6.565
28 000	2 410.9	–	–	–	–	2.25	24.497	1.32	6.781
28 500	2 454.0	–	–	–	–	2.29	25.291	1.34	6.999
29 000	2 497.0	–	–	–	–	2.33	26.096	1.36	7.220
29 500	2 540.1	–	–	–	–	2.37	26.912	1.39	7.445
30 000	2 583.1	–	–	–	–	2.41	27.740	1.41	7.672
32 500	2 798.4	–	–	–	–	2.61	32.050	1.53	8.857
35 000	3 013.6	–	–	–	–	2.81	36.642	1.65	10.117
37 500	3 228.9	–	–	–	–	3.01	41.514	1.76	11.453
40 000	3 444.2	–	–	–	–	–	–	1.88	12.863
42 500	3 659.4	–	–	–	–	–	–	2.00	14.347
45 000	3 874.7	–	–	–	–	–	–	2.12	15.905
47 500	4 089.9	–	–	–	–	–	–	2.23	17.534
50 000	4 305.2	–	–	–	–	–	–	2.35	19.237
52 500	4 520.4	–	–	–	–	–	–	2.47	21.010
55 000	4 735.7	–	–	–	–	–	–	2.59	22.855
57 500	4 951.0	–	–	–	–	–	–	2.70	24.770

d [mm]		15		18		22		28	
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]
60 000	5 166.2	–	–	–	–	–	–	2.82	26.756
62 500	5 381.5	–	–	–	–	–	–	2.94	28.811
65 000	5 596.7	–	–	–	–	–	–	3.06	30.936

Table 24: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 55 °C / return flow 45 °C, d35–54 mm

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
1 400	120.5	0.04	0.013	–	–	–	–
1 500	129.2	0.05	0.014	–	–	–	–
1 600	137.8	0.05	0.016	–	–	–	–
1 700	146.4	0.05	0.018	–	–	–	–
1 800	155.0	0.05	0.020	–	–	–	–
1 900	163.6	0.06	0.021	–	–	–	–
2 000	172.2	0.06	0.023	0.04	0.009	–	–
2 500	215.3	0.08	0.034	0.05	0.013	–	–
3 000	258.3	0.09	0.047	0.06	0.018	–	–
3 500	301.4	0.11	0.061	0.07	0.024	0.04	0.007
4 000	344.4	0.12	0.077	0.08	0.030	0.05	0.008
4 500	387.5	0.14	0.094	0.09	0.037	0.05	0.010
5 000	430.5	0.15	0.113	0.10	0.044	0.06	0.012
5 500	473.6	0.17	0.133	0.11	0.052	0.07	0.015
6 000	516.6	0.18	0.154	0.12	0.060	0.07	0.017
6 500	559.7	0.20	0.177	0.13	0.069	0.08	0.020
7 000	602.7	0.21	0.202	0.14	0.079	0.08	0.022
7 500	645.8	0.23	0.228	0.15	0.089	0.09	0.025
8 000	688.8	0.24	0.255	0.16	0.100	0.09	0.028
8 500	731.9	0.26	0.283	0.17	0.111	0.10	0.031
9 000	774.9	0.27	0.313	0.18	0.122	0.11	0.034
9 500	818.0	0.29	0.344	0.19	0.134	0.11	0.038
10 000	861.0	0.30	0.377	0.20	0.147	0.12	0.041
10 500	904.1	0.32	0.410	0.21	0.160	0.12	0.045
11 000	947.1	0.33	0.445	0.22	0.174	0.13	0.049
11 500	990.2	0.35	0.481	0.23	0.188	0.14	0.053
12 000	1 033.2	0.36	0.519	0.24	0.202	0.14	0.057
12 500	1 076.3	0.38	0.557	0.25	0.217	0.15	0.061
13 000	1 119.3	0.39	0.597	0.26	0.233	0.15	0.065
13 500	1 162.4	0.41	0.638	0.27	0.249	0.16	0.069
14 000	1 205.5	0.42	0.681	0.28	0.265	0.17	0.074
14 500	1 248.5	0.44	0.724	0.29	0.282	0.17	0.079
15 000	1 291.6	0.45	0.769	0.30	0.299	0.18	0.084
15 500	1 334.6	0.47	0.814	0.31	0.317	0.18	0.088
16 000	1 377.7	0.48	0.861	0.32	0.335	0.19	0.094
16 500	1 420.7	0.50	0.910	0.33	0.354	0.20	0.099
17 000	1 463.8	0.51	0.959	0.34	0.373	0.20	0.104
17 500	1 506.8	0.53	1.009	0.35	0.393	0.21	0.109
18 000	1 549.9	0.54	1.061	0.36	0.413	0.21	0.115
18 500	1 592.9	0.56	1.114	0.37	0.433	0.22	0.121

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
19 000	1 636.0	0.57	1.168	0.39	0.454	0.23	0.126
19 500	1 679.0	0.59	1.223	0.40	0.475	0.23	0.132
20 000	1 722.1	0.60	1.279	0.41	0.497	0.24	0.138
20 500	1 765.1	0.62	1.336	0.42	0.519	0.24	0.145
21 000	1 808.2	0.63	1.394	0.43	0.542	0.25	0.151
21 500	1 851.2	0.65	1.454	0.44	0.565	0.25	0.157
22 000	1 894.3	0.66	1.514	0.45	0.588	0.26	0.164
22 500	1 937.3	0.68	1.576	0.46	0.612	0.27	0.170
23 000	1 980.4	0.69	1.639	0.47	0.637	0.27	0.177
23 500	2 023.4	0.71	1.703	0.48	0.661	0.28	0.184
24 000	2 066.5	0.72	1.767	0.49	0.686	0.28	0.191
24 500	2 109.5	0.74	1.833	0.50	0.712	0.29	0.198
25 000	2 152.6	0.75	1.901	0.51	0.738	0.30	0.205
25 500	2 195.6	0.77	1.969	0.52	0.764	0.30	0.212
26 000	2 238.7	0.78	2.038	0.53	0.791	0.31	0.220
26 500	2 281.8	0.80	2.108	0.54	0.818	0.31	0.227
27 000	2 324.8	0.81	2.180	0.55	0.846	0.32	0.235
27 500	2 367.9	0.83	2.252	0.56	0.874	0.33	0.243
28 000	2 410.9	0.84	2.326	0.57	0.902	0.33	0.251
28 500	2 454.0	0.86	2.400	0.58	0.931	0.34	0.259
29 000	2 497.0	0.87	2.476	0.59	0.960	0.34	0.267
29 500	2 540.1	0.89	2.552	0.60	0.990	0.35	0.275
30 000	2 583.1	0.90	2.630	0.61	1.020	0.36	0.283
32 500	2 798.4	0.98	3.034	0.66	1.176	0.39	0.326
35 000	3 013.6	1.05	3.464	0.71	1.342	0.41	0.372
37 500	3 228.9	1.13	3.919	0.76	1.518	0.44	0.420
40 000	3 444.2	1.20	4.399	0.81	1.703	0.47	0.472
42 500	3 659.4	1.28	4.904	0.86	1.898	0.50	0.525
45 000	3 874.7	1.35	5.434	0.91	2.102	0.53	0.581
47 500	4 089.9	1.43	5.988	0.96	2.315	0.56	0.640
50 000	4 305.2	1.50	6.566	1.01	2.538	0.59	0.701
52 500	4 520.4	1.58	7.168	1.06	2.770	0.62	0.765
55 000	4 735.7	1.66	7.795	1.11	3.011	0.65	0.831
57 500	4 951.0	1.73	8.444	1.17	3.261	0.68	0.900
60 000	5 166.2	1.81	9.118	1.22	3.520	0.71	0.971
62 500	5 381.5	1.88	9.814	1.27	3.788	0.74	1.045
65 000	5 596.7	1.96	10.534	1.32	4.064	0.77	1.121
67 500	5 812.0	2.03	11.277	1.37	4.350	0.80	1.199
70 000	6 027.3	2.11	12.043	1.42	4.644	0.83	1.280
72 500	6 242.5	2.18	12.832	1.47	4.947	0.86	1.363
75 000	6 457.8	2.26	13.643	1.52	5.258	0.89	1.448
77 500	6 673.0	2.33	14.478	1.57	5.579	0.92	1.536
80 000	6 888.3	2.41	15.334	1.62	5.907	0.95	1.626
82 500	7 103.6	2.48	16.214	1.67	6.244	0.98	1.718
85 000	7 318.8	2.56	17.115	1.72	6.590	1.01	1.813
87 500	7 534.1	2.63	18.039	1.77	6.944	1.04	1.910
90 000	7 749.3	2.71	18.985	1.82	7.307	1.07	2.009
92 500	7 964.6	2.78	19.953	1.87	7.678	1.10	2.111
95 000	8 179.9	2.86	20.943	1.93	8.057	1.13	2.214

d [mm]		35		42		54	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
97 500	8 395.1	2.93	21.955	1.98	8.444	1.16	2.320
100 000	8 610.4	3.01	22.989	2.03	8.840	1.19	2.428
105 000	9 040.9	–	–	2.13	9.657	1.24	2.651
110 000	9 471.4	–	–	2.23	10.506	1.30	2.883
115 000	9 901.9	–	–	2.33	11.387	1.36	3.124
120 000	10 332.5	–	–	2.43	12.301	1.42	3.373
125 000	10 763.0	–	–	2.53	13.248	1.48	3.631
130 000	11 193.5	–	–	2.63	14.226	1.54	3.898
135 000	11 624.0	–	–	2.74	15.236	1.60	4.173
140 000	12 054.5	–	–	2.84	16.278	1.66	4.457
145 000	12 485.1	–	–	2.94	17.351	1.72	4.749
150 000	12 915.6	–	–	3.04	18.456	1.78	5.049
155 000	13 346.1	–	–	–	–	1.84	5.358
160 000	13 776.6	–	–	–	–	1.90	5.675
165 000	14 207.1	–	–	–	–	1.96	6.001
170 000	14 637.6	–	–	–	–	2.01	6.335
175 000	15 068.2	–	–	–	–	2.07	6.677
180 000	15 498.7	–	–	–	–	2.13	7.027
185 000	15 929.2	–	–	–	–	2.19	7.385
190 000	16 359.7	–	–	–	–	2.25	7.752
195 000	16 790.2	–	–	–	–	2.31	8.127
200 000	17 220.8	–	–	–	–	2.37	8.510
205 000	17 651.3	–	–	–	–	2.43	8.900
210 000	18 081.8	–	–	–	–	2.49	9.299
215 000	18 512.3	–	–	–	–	2.55	9.706
220 000	18 942.8	–	–	–	–	2.61	10.121
225 000	19 373.4	–	–	–	–	2.67	10.544
230 000	19 803.9	–	–	–	–	2.73	10.974
235 000	20 234.4	–	–	–	–	2.78	11.413
240 000	20 664.9	–	–	–	–	2.84	11.859
245 000	21 095.4	–	–	–	–	2.90	12.314
250 000	21 526.0	–	–	–	–	2.96	12.776
255 000	21 956.5	–	–	–	–	3.02	13.246
260 000	22 387.0	–	–	–	–	3.08	13.724

3 / 3

Table 25: Pressure loss in Geberit Mapress Therm system pipes, heating, inlet flow 55 °C/return flow 45 °C, d76.1–108 mm

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
7 000	602.7	0.04	0.004	–	–	–	–
7 500	645.8	0.04	0.005	–	–	–	–
8 000	688.8	0.05	0.005	–	–	–	–
8 500	731.9	0.05	0.006	–	–	–	–
9 000	774.9	0.05	0.006	–	–	–	–
9 500	818.0	0.05	0.007	–	–	–	–
10 000	861.0	0.06	0.007	0.04	0.003	–	–
10 500	904.1	0.06	0.008	0.04	0.004	–	–
11 000	947.1	0.06	0.009	0.05	0.004	–	–

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
11 500	990.2	0.07	0.010	0.05	0.004	–	–
12 000	1 033.2	0.07	0.010	0.05	0.005	–	–
12 500	1 076.3	0.07	0.011	0.05	0.005	–	–
13 000	1 119.3	0.07	0.012	0.05	0.005	–	–
13 500	1 162.4	0.08	0.013	0.06	0.006	–	–
14 000	1 205.5	0.08	0.013	0.06	0.006	–	–
14 500	1 248.5	0.08	0.014	0.06	0.007	0.04	0.003
15 000	1 291.6	0.09	0.015	0.06	0.007	0.04	0.003
15 500	1 334.6	0.09	0.016	0.06	0.007	0.04	0.003
16 000	1 377.7	0.09	0.017	0.07	0.008	0.05	0.003
16 500	1 420.7	0.10	0.018	0.07	0.008	0.05	0.003
17 000	1 463.8	0.10	0.019	0.07	0.009	0.05	0.004
17 500	1 506.8	0.10	0.020	0.07	0.009	0.05	0.004
18 000	1 549.9	0.10	0.021	0.08	0.010	0.05	0.004
18 500	1 592.9	0.11	0.022	0.08	0.010	0.05	0.004
19 000	1 636.0	0.11	0.023	0.08	0.011	0.05	0.004
19 500	1 679.0	0.11	0.024	0.08	0.011	0.06	0.004
20 000	1 722.1	0.12	0.025	0.08	0.012	0.06	0.005
20 500	1 765.1	0.12	0.026	0.09	0.012	0.06	0.005
21 000	1 808.2	0.12	0.027	0.09	0.013	0.06	0.005
21 500	1 851.2	0.12	0.028	0.09	0.013	0.06	0.005
22 000	1 894.3	0.13	0.030	0.09	0.014	0.06	0.006
22 500	1 937.3	0.13	0.031	0.09	0.014	0.06	0.006
23 000	1 980.4	0.13	0.032	0.10	0.015	0.07	0.006
23 500	2 023.4	0.14	0.033	0.10	0.015	0.07	0.006
24 000	2 066.5	0.14	0.034	0.10	0.016	0.07	0.006
24 500	2 109.5	0.14	0.036	0.10	0.017	0.07	0.007
25 000	2 152.6	0.14	0.037	0.10	0.017	0.07	0.007
25 500	2 195.6	0.15	0.038	0.11	0.018	0.07	0.007
26 000	2 238.7	0.15	0.040	0.11	0.018	0.07	0.007
26 500	2 281.8	0.15	0.041	0.11	0.019	0.08	0.008
27 000	2 324.8	0.16	0.042	0.11	0.020	0.08	0.008
27 500	2 367.9	0.16	0.044	0.11	0.020	0.08	0.008
28 000	2 410.9	0.16	0.045	0.12	0.021	0.08	0.008
28 500	2 454.0	0.16	0.046	0.12	0.022	0.08	0.009
29 000	2 497.0	0.17	0.048	0.12	0.022	0.08	0.009
29 500	2 540.1	0.17	0.049	0.12	0.023	0.08	0.009
30 000	2 583.1	0.17	0.051	0.13	0.024	0.09	0.010
32 500	2 798.4	0.19	0.059	0.14	0.027	0.09	0.011
35 000	3 013.6	0.20	0.067	0.15	0.031	0.10	0.012
37 500	3 228.9	0.22	0.075	0.16	0.035	0.11	0.014
40 000	3 444.2	0.23	0.085	0.17	0.039	0.11	0.016
42 500	3 659.4	0.25	0.094	0.18	0.044	0.12	0.018
45 000	3 874.7	0.26	0.104	0.19	0.048	0.13	0.019
47 500	4 089.9	0.27	0.115	0.20	0.053	0.14	0.021
50 000	4 305.2	0.29	0.125	0.21	0.058	0.14	0.023
52 500	4 520.4	0.30	0.137	0.22	0.063	0.15	0.025
55 000	4 735.7	0.32	0.149	0.23	0.069	0.16	0.028
57 500	4 951.0	0.33	0.161	0.24	0.074	0.16	0.030

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
60 000	5 166.2	0.35	0.173	0.25	0.080	0.17	0.032
62 500	5 381.5	0.36	0.186	0.26	0.086	0.18	0.035
65 000	5 596.7	0.37	0.200	0.27	0.092	0.19	0.037
67 500	5 812.0	0.39	0.214	0.28	0.099	0.19	0.040
70 000	6 027.3	0.40	0.228	0.29	0.105	0.20	0.042
72 500	6 242.5	0.42	0.243	0.30	0.112	0.21	0.045
75 000	6 457.8	0.43	0.258	0.31	0.119	0.21	0.048
77 500	6 673.0	0.45	0.273	0.32	0.126	0.22	0.051
80 000	6 888.3	0.46	0.289	0.33	0.134	0.23	0.054
82 500	7 103.6	0.48	0.306	0.34	0.141	0.24	0.057
85 000	7 318.8	0.49	0.322	0.36	0.149	0.24	0.060
87 500	7 534.1	0.50	0.340	0.37	0.157	0.25	0.063
90 000	7 749.3	0.52	0.357	0.38	0.165	0.26	0.066
92 500	7 964.6	0.53	0.375	0.39	0.173	0.26	0.069
95 000	8 179.9	0.55	0.393	0.40	0.182	0.27	0.073
97 500	8 395.1	0.56	0.412	0.41	0.190	0.28	0.076
100 000	8 610.4	0.58	0.431	0.42	0.199	0.28	0.080
105 000	9 040.9	0.61	0.470	0.44	0.217	0.30	0.087
110 000	9 471.4	0.63	0.511	0.46	0.236	0.31	0.094
115 000	9 901.9	0.66	0.554	0.48	0.255	0.33	0.102
120 000	10 332.5	0.69	0.598	0.50	0.276	0.34	0.110
125 000	10 763.0	0.72	0.643	0.52	0.297	0.36	0.119
130 000	11 193.5	0.75	0.690	0.54	0.318	0.37	0.127
135 000	11 624.0	0.78	0.738	0.56	0.340	0.38	0.136
140 000	12 054.5	0.81	0.788	0.58	0.363	0.40	0.145
145 000	12 485.1	0.84	0.840	0.61	0.387	0.41	0.155
150 000	12 915.6	0.87	0.892	0.63	0.411	0.43	0.164
155 000	13 346.1	0.89	0.947	0.65	0.436	0.44	0.174
160 000	13 776.6	0.92	1.002	0.67	0.462	0.46	0.184
165 000	14 207.1	0.95	1.060	0.69	0.488	0.47	0.195
170 000	14 637.6	0.98	1.118	0.71	0.515	0.48	0.206
175 000	15 068.2	1.01	1.178	0.73	0.542	0.50	0.217
180 000	15 498.7	1.04	1.239	0.75	0.571	0.51	0.228
185 000	15 929.2	1.07	1.302	0.77	0.599	0.53	0.239
190 000	16 359.7	1.10	1.366	0.79	0.629	0.54	0.251
195 000	16 790.2	1.12	1.432	0.81	0.659	0.56	0.263
200 000	17 220.8	1.15	1.499	0.84	0.690	0.57	0.275
205 000	17 651.3	1.18	1.567	0.86	0.721	0.58	0.288
210 000	18 081.8	1.21	1.637	0.88	0.753	0.60	0.300
215 000	18 512.3	1.24	1.708	0.90	0.786	0.61	0.313
220 000	18 942.8	1.27	1.781	0.92	0.819	0.63	0.327
225 000	19 373.4	1.30	1.855	0.94	0.853	0.64	0.340
230 000	19 803.9	1.33	1.930	0.96	0.887	0.66	0.354
235 000	20 234.4	1.36	2.006	0.98	0.922	0.67	0.368
240 000	20 664.9	1.38	2.084	1.00	0.958	0.68	0.382
245 000	21 095.4	1.41	2.164	1.02	0.995	0.70	0.397
250 000	21 526.0	1.44	2.244	1.04	1.031	0.71	0.411
255 000	21 956.5	1.47	2.326	1.07	1.069	0.73	0.426
260 000	22 387.0	1.50	2.409	1.09	1.107	0.74	0.441

d [mm]		76.1		88.9		108	
Q̇ [W]	ṁ [kg/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
265 000	22 817.5	1.53	2.494	1.11	1.146	0.76	0.457
270 000	23 248.0	1.56	2.580	1.13	1.185	0.77	0.472
275 000	23 678.5	1.59	2.667	1.15	1.225	0.78	0.488
280 000	24 109.1	1.62	2.756	1.17	1.266	0.80	0.504
285 000	24 539.6	1.64	2.846	1.19	1.307	0.81	0.521
290 000	24 970.1	1.67	2.937	1.21	1.349	0.83	0.537
295 000	25 400.6	1.70	3.030	1.23	1.391	0.84	0.554
300 000	25 831.1	1.73	3.123	1.25	1.434	0.85	0.571
310 000	26 692.2	1.79	3.315	1.29	1.522	0.88	0.606
320 000	27 553.2	1.85	3.512	1.34	1.612	0.91	0.642
330 000	28 414.3	1.90	3.714	1.38	1.705	0.94	0.679
340 000	29 275.3	1.96	3.921	1.42	1.799	0.97	0.716
350 000	30 136.3	2.02	4.133	1.46	1.897	1.00	0.755
360 000	30 997.4	2.08	4.351	1.50	1.996	1.03	0.794
370 000	31 858.4	2.13	4.573	1.55	2.098	1.05	0.835
380 000	32 719.4	2.19	4.801	1.59	2.202	1.08	0.876
390 000	33 580.5	2.25	5.034	1.63	2.308	1.11	0.918
400 000	34 441.5	2.31	5.271	1.67	2.417	1.14	0.961
410 000	35 302.6	2.36	5.514	1.71	2.528	1.17	1.005
420 000	36 163.6	2.42	5.762	1.75	2.641	1.20	1.050
430 000	37 024.6	2.48	6.014	1.80	2.757	1.23	1.096
440 000	37 885.7	2.54	6.272	1.84	2.874	1.25	1.142
450 000	38 746.7	2.60	6.535	1.88	2.994	1.28	1.190
460 000	39 607.7	2.65	6.802	1.92	3.117	1.31	1.238
470 000	40 468.8	2.71	7.075	1.96	3.241	1.34	1.287
480 000	41 329.8	2.77	7.352	2.00	3.368	1.37	1.338
490 000	42 190.9	2.83	7.635	2.05	3.497	1.40	1.389
500 000	43 051.9	2.88	7.922	2.09	3.628	1.42	1.441
550 000	47 357.1	–	–	2.30	4.316	1.57	1.713
600 000	51 662.3	–	–	2.51	5.060	1.71	2.007
650 000	55 967.5	–	–	2.72	5.857	1.85	2.322
700 000	60 272.7	–	–	2.92	6.708	1.99	2.658
750 000	64 577.9	–	–	–	–	2.14	3.014
800 000	68 883.0	–	–	–	–	2.28	3.392
850 000	73 188.2	–	–	–	–	2.42	3.789
900 000	77 493.4	–	–	–	–	2.56	4.207
950 000	81 798.6	–	–	–	–	2.71	4.644
1,000,000	86 103.8	–	–	–	–	2.85	5.102
1,050,000	90 409.0	–	–	–	–	2.99	5.579

4 COMPRESSED AIR PRESSURE LOSS

4.1 COMPRESSED AIR, 3 BAR

Medium:	Compressed air	Density:	4.771 kg/m^3
Relative operating pressure:	3 bar	Viscosity:	0.0000182635 Pa•s
Absolute operating pressure:	4 bar	Surface roughness:	0.0015 mm
Temperature:	20 °C		

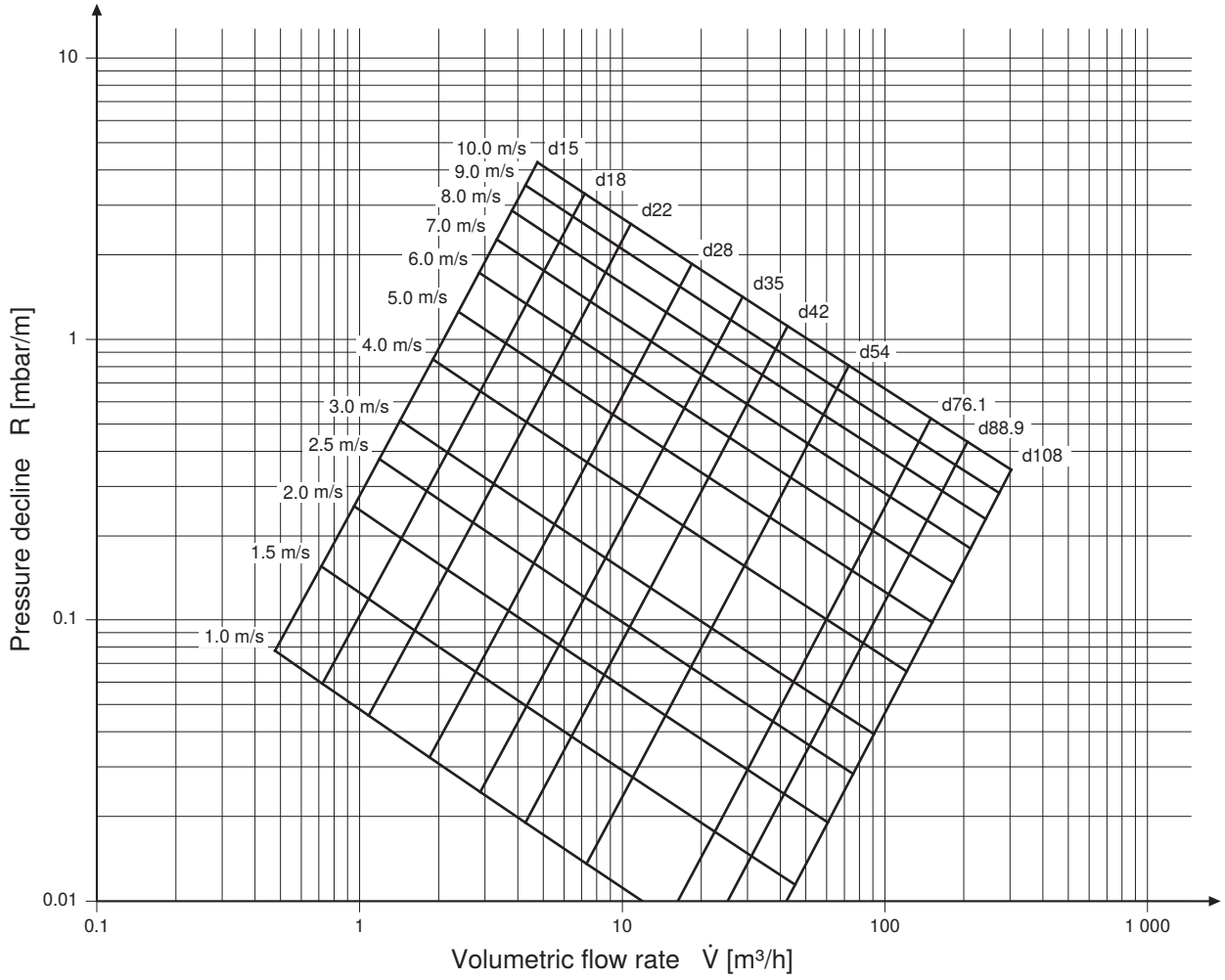


Table 26: Pressure loss in Geberit Mapress Therm system pipes, compressed air 3 bar, d15–35 mm

d [mm]	15		18		22		28		35	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
0.50	1.05	0.0834	–	–	–	–	–	–	–	–
0.75	1.57	0.1668	1.04	0.0626	–	–	–	–	–	–
1.00	2.09	0.2738	1.38	0.1026	0.92	0.0394	–	–	–	–
1.25	2.62	0.4029	1.73	0.1507	1.15	0.0577	–	–	–	–
1.50	3.14	0.5531	2.07	0.2066	1.38	0.0791	–	–	–	–
1.75	3.66	0.7237	2.42	0.2700	1.61	0.1032	0.94	0.0292	–	–
2.00	4.19	0.9141	2.76	0.3407	1.84	0.1301	1.08	0.0367	–	–
2.25	4.71	1.1237	3.11	0.4184	2.07	0.1596	1.21	0.0450	–	–
2.50	5.23	1.3521	3.45	0.5031	2.30	0.1918	1.35	0.0541	0.86	0.0188
2.75	5.76	1.5990	3.80	0.5945	2.53	0.2265	1.48	0.0638	0.95	0.0222
3.00	6.28	1.8640	4.14	0.6925	2.76	0.2637	1.62	0.0742	1.04	0.0258
3.25	6.80	2.1469	4.49	0.7972	2.99	0.3033	1.75	0.0853	1.12	0.0296
3.50	7.32	2.4474	4.84	0.9082	3.22	0.3454	1.89	0.0970	1.21	0.0337
3.75	7.85	2.7653	5.18	1.0256	3.45	0.3898	2.02	0.1095	1.30	0.0380
4.00	8.37	3.1004	5.53	1.1493	3.68	0.4366	2.16	0.1225	1.38	0.0425
4.50	9.42	3.8213	6.22	1.4152	4.14	0.5372	2.43	0.1506	1.55	0.0522
5.00	–	–	6.91	1.7053	4.60	0.6468	2.70	0.1812	1.73	0.0627
5.50	–	–	7.60	2.0194	5.06	0.7654	2.97	0.2142	1.90	0.0741
6.00	–	–	8.29	2.3568	5.52	0.8927	3.24	0.2496	2.07	0.0863
6.50	–	–	8.98	2.7175	5.98	1.0287	3.51	0.2874	2.25	0.0993
7.00	–	–	9.67	3.1009	6.44	1.1732	3.78	0.3276	2.42	0.1131
7.50	–	–	–	–	6.90	1.3261	4.05	0.3700	2.59	0.1277
8.00	–	–	–	–	7.37	1.4873	4.32	0.4147	2.76	0.1430
8.50	–	–	–	–	7.83	1.6567	4.59	0.4617	2.94	0.1592
9.00	–	–	–	–	8.29	1.8342	4.86	0.5109	3.11	0.1761
9.50	–	–	–	–	8.75	2.0198	5.13	0.5623	3.28	0.1937
10.00	–	–	–	–	9.21	2.2134	5.40	0.6159	3.45	0.2121
10.50	–	–	–	–	9.67	2.4149	5.67	0.6717	3.63	0.2312
11.00	–	–	–	–	–	–	5.94	0.7296	3.80	0.2510
11.50	–	–	–	–	–	–	6.21	0.7896	3.97	0.2716
12.00	–	–	–	–	–	–	6.48	0.8517	4.14	0.2929
12.50	–	–	–	–	–	–	6.75	0.9159	4.32	0.3149
13.00	–	–	–	–	–	–	7.02	0.9823	4.49	0.3376
13.50	–	–	–	–	–	–	7.29	1.0506	4.66	0.3610
14.00	–	–	–	–	–	–	7.56	1.1211	4.84	0.3851
14.50	–	–	–	–	–	–	7.83	1.1936	5.01	0.4098
15.00	–	–	–	–	–	–	8.10	1.2681	5.18	0.4353
16.00	–	–	–	–	–	–	8.63	1.4231	5.53	0.4883
17.00	–	–	–	–	–	–	9.17	1.5862	5.87	0.5440
18.00	–	–	–	–	–	–	9.71	1.7572	6.22	0.6024
19.00	–	–	–	–	–	–	–	–	6.56	0.6634
20.00	–	–	–	–	–	–	–	–	6.91	0.7271
21.00	–	–	–	–	–	–	–	–	7.25	0.7933
22.00	–	–	–	–	–	–	–	–	7.60	0.8621
23.00	–	–	–	–	–	–	–	–	7.94	0.9336
24.00	–	–	–	–	–	–	–	–	8.29	1.0075
25.00	–	–	–	–	–	–	–	–	8.63	1.0840

Table 27: Pressure loss in Geberit Mapress Therm system pipes, compressed air 3 bar, d42–108 mm

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
3.75	0.87	0.0149	–	–	–	–	–	–	–	–
4.00	0.93	0.0166	–	–	–	–	–	–	–	–
4.50	1.05	0.0204	–	–	–	–	–	–	–	–
5.00	1.16	0.0245	–	–	–	–	–	–	–	–
5.50	1.28	0.0289	–	–	–	–	–	–	–	–
6.00	1.40	0.0337	–	–	–	–	–	–	–	–
6.50	1.51	0.0387	0.88	0.0108	–	–	–	–	–	–
7.00	1.63	0.0441	0.95	0.0123	–	–	–	–	–	–
7.50	1.74	0.0498	1.02	0.0139	–	–	–	–	–	–
8.00	1.86	0.0558	1.09	0.0156	–	–	–	–	–	–
8.50	1.98	0.0620	1.16	0.0173	–	–	–	–	–	–
9.00	2.09	0.0686	1.22	0.0191	–	–	–	–	–	–
9.50	2.21	0.0754	1.29	0.0210	–	–	–	–	–	–
10.00	2.33	0.0826	1.36	0.0230	–	–	–	–	–	–
10.50	2.44	0.0900	1.43	0.0251	–	–	–	–	–	–
11.00	2.56	0.0977	1.50	0.0272	–	–	–	–	–	–
11.50	2.67	0.1056	1.56	0.0294	–	–	–	–	–	–
12.00	2.79	0.1139	1.63	0.0317	–	–	–	–	–	–
12.50	2.91	0.1224	1.70	0.0341	–	–	–	–	–	–
13.00	3.02	0.1312	1.77	0.0365	0.86	0.0066	–	–	–	–
13.50	3.14	0.1402	1.84	0.0390	0.89	0.0070	–	–	–	–
14.00	3.26	0.1496	1.90	0.0416	0.93	0.0075	–	–	–	–
14.50	3.37	0.1592	1.97	0.0442	0.96	0.0080	–	–	–	–
15.00	3.49	0.1690	2.04	0.0470	0.99	0.0085	–	–	–	–
16.00	3.72	0.1895	2.18	0.0526	1.06	0.0095	–	–	–	–
17.00	3.95	0.2111	2.31	0.0586	1.13	0.0105	–	–	–	–
18.00	4.19	0.2336	2.45	0.0648	1.19	0.0117	0.86	0.0054	–	–
19.00	4.42	0.2572	2.58	0.0714	1.26	0.0128	0.91	0.0059	–	–
20.00	4.65	0.2818	2.72	0.0781	1.32	0.0140	0.96	0.0065	–	–
21.00	4.88	0.3074	2.86	0.0852	1.39	0.0153	1.01	0.0071	–	–
22.00	5.12	0.3340	2.99	0.0925	1.46	0.0166	1.05	0.0077	–	–
23.00	5.35	0.3615	3.13	0.1001	1.52	0.0180	1.10	0.0083	–	–
24.00	5.58	0.3900	3.26	0.1080	1.59	0.0194	1.15	0.0090	–	–
25.00	5.81	0.4195	3.40	0.1161	1.65	0.0208	1.20	0.0096	–	–
30.00	6.98	0.5813	4.08	0.1607	1.99	0.0287	1.44	0.0133	0.98	0.0053
35.00	8.14	0.7664	4.76	0.2115	2.32	0.0378	1.68	0.0175	1.14	0.0070
40.00	9.30	0.9742	5.44	0.2686	2.65	0.0479	1.92	0.0221	1.31	0.0089
45.00	–	–	6.12	0.3317	2.98	0.0591	2.16	0.0273	1.47	0.0109
50.00	–	–	6.80	0.4007	3.31	0.0713	2.40	0.0329	1.63	0.0132
55.00	–	–	7.48	0.4756	3.64	0.0845	2.64	0.0390	1.80	0.0156
60.00	–	–	8.16	0.5562	3.97	0.0987	2.88	0.0456	1.96	0.0183
65.00	–	–	8.84	0.6424	4.30	0.1140	3.12	0.0526	2.13	0.0210
70.00	–	–	9.52	0.7343	4.63	0.1301	3.36	0.0600	2.29	0.0240
75.00	–	–	–	–	4.96	0.1473	3.59	0.0679	2.45	0.0272
80.00	–	–	–	–	5.29	0.1654	3.83	0.0762	2.62	0.0305
85.00	–	–	–	–	5.63	0.1844	4.07	0.0850	2.78	0.0340
90.00	–	–	–	–	5.96	0.2044	4.31	0.0942	2.94	0.0376
95.00	–	–	–	–	6.29	0.2253	4.55	0.1038	3.11	0.0415

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
100.00	–	–	–	–	6.62	0.2471	4.79	0.1138	3.27	0.0455
105.00	–	–	–	–	6.95	0.2698	5.03	0.1242	3.43	0.0496
110.00	–	–	–	–	7.28	0.2934	5.27	0.1351	3.60	0.0539
115.00	–	–	–	–	7.61	0.3179	5.51	0.1463	3.76	0.0584
120.00	–	–	–	–	7.94	0.3433	5.75	0.1580	3.92	0.0630
125.00	–	–	–	–	8.27	0.3696	5.99	0.1700	4.09	0.0678
130.00	–	–	–	–	8.60	0.3967	6.23	0.1825	4.25	0.0728
135.00	–	–	–	–	8.94	0.4247	6.47	0.1953	4.41	0.0779
140.00	–	–	–	–	9.27	0.4536	6.71	0.2086	4.58	0.0832
145.00	–	–	–	–	9.60	0.4833	6.95	0.2222	4.74	0.0886
150.00	–	–	–	–	9.93	0.5139	7.19	0.2362	4.90	0.0942
155.00	–	–	–	–	–	–	7.43	0.2507	5.07	0.0999
160.00	–	–	–	–	–	–	7.67	0.2655	5.23	0.1058
165.00	–	–	–	–	–	–	7.91	0.2806	5.40	0.1118
170.00	–	–	–	–	–	–	8.15	0.2962	5.56	0.1180
175.00	–	–	–	–	–	–	8.39	0.3122	5.72	0.1243
180.00	–	–	–	–	–	–	8.63	0.3285	5.89	0.1308
185.00	–	–	–	–	–	–	8.87	0.3452	6.05	0.1375
190.00	–	–	–	–	–	–	9.11	0.3623	6.21	0.1442
195.00	–	–	–	–	–	–	9.35	0.3797	6.38	0.1512
200.00	–	–	–	–	–	–	9.59	0.3976	6.54	0.1582
205.00	–	–	–	–	–	–	9.83	0.4158	6.70	0.1655
210.00	–	–	–	–	–	–	10.07	0.4344	6.87	0.1728
215.00	–	–	–	–	–	–	–	–	7.03	0.1804
220.00	–	–	–	–	–	–	–	–	7.19	0.1880
225.00	–	–	–	–	–	–	–	–	7.36	0.1958
230.00	–	–	–	–	–	–	–	–	7.52	0.2038
235.00	–	–	–	–	–	–	–	–	7.68	0.2119
240.00	–	–	–	–	–	–	–	–	7.85	0.2201
245.00	–	–	–	–	–	–	–	–	8.01	0.2285
250.00	–	–	–	–	–	–	–	–	8.17	0.2370
255.00	–	–	–	–	–	–	–	–	8.34	0.2456
260.00	–	–	–	–	–	–	–	–	8.50	0.2544
265.00	–	–	–	–	–	–	–	–	8.67	0.2634
270.00	–	–	–	–	–	–	–	–	8.83	0.2725
275.00	–	–	–	–	–	–	–	–	8.99	0.2817
280.00	–	–	–	–	–	–	–	–	9.16	0.2911
285.00	–	–	–	–	–	–	–	–	9.32	0.3006
290.00	–	–	–	–	–	–	–	–	9.48	0.3102
295.00	–	–	–	–	–	–	–	–	9.65	0.3200
300.00	–	–	–	–	–	–	–	–	9.81	0.3299

4.2 COMPRESSED AIR, 6 BAR

Medium:	Compressed air	Density:	8.352 kg/m^3
Relative operating pressure:	6 bar	Viscosity:	0.000018302 Pa•s
Absolute operating pressure:	7 bar	Surface roughness:	0.0015 mm
Temperature:	20 °C		

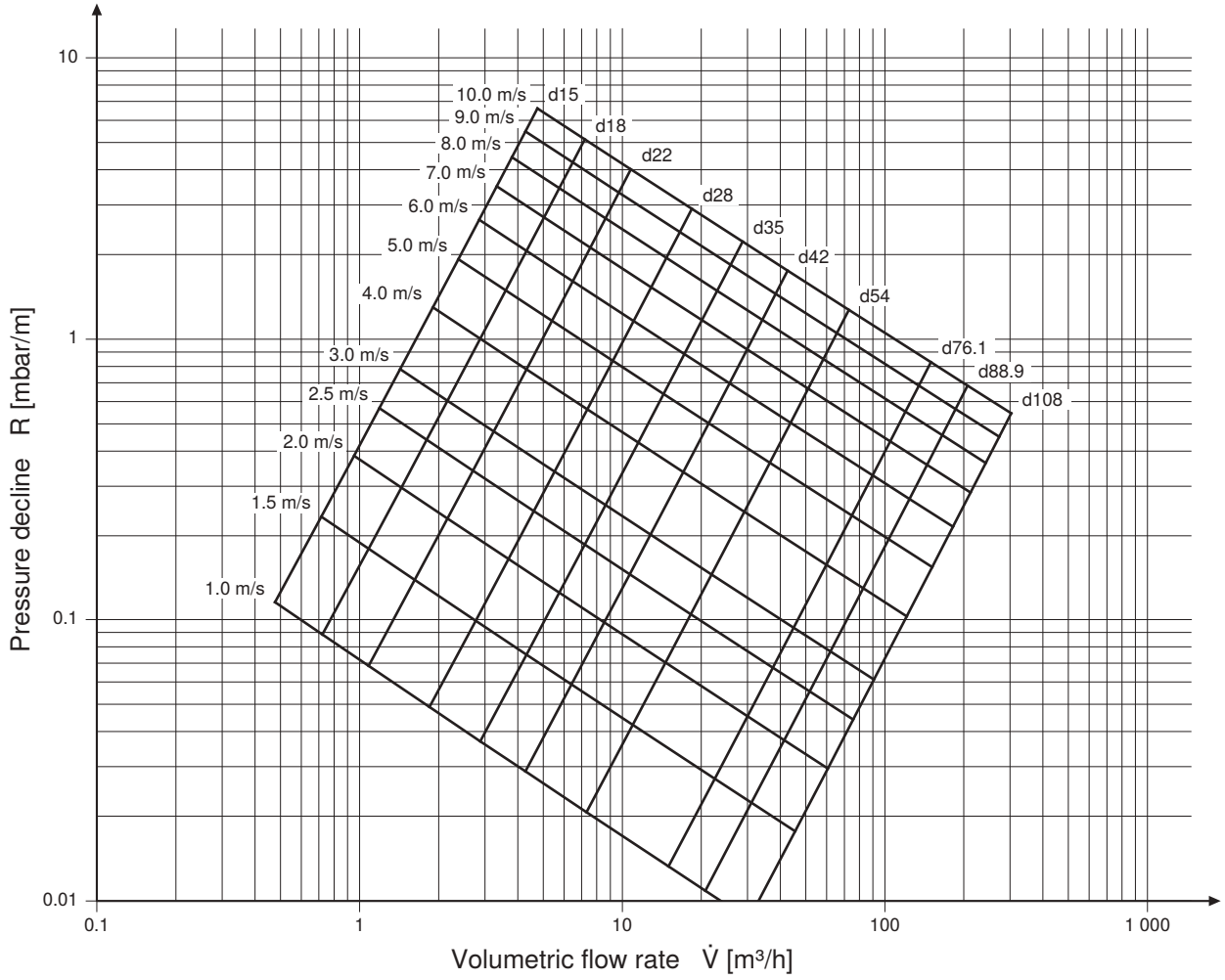


Table 28: Pressure loss in Geberit Mapress Therm system pipes, compressed air 6 bar, d15–35 mm

d [mm]	15		18		22		28		35	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
0.50	1.05	0.1244	–	–	–	–	–	–	–	–
0.75	1.57	0.2508	1.04	0.0938	–	–	–	–	–	–
1.00	2.09	0.4139	1.38	0.1544	0.92	0.0590	–	–	–	–
1.25	2.62	0.6116	1.73	0.2278	1.15	0.0869	–	–	–	–
1.50	3.14	0.8425	2.07	0.3133	1.38	0.1194	–	–	–	–
1.75	3.66	1.1054	2.42	0.4106	1.61	0.1563	0.94	0.0440	–	–
2.00	4.19	1.3995	2.76	0.5194	1.84	0.1975	1.08	0.0555	–	–
2.25	4.71	1.7241	3.11	0.6392	2.07	0.2429	1.21	0.0682	–	–
2.50	5.23	2.0785	3.45	0.7699	2.30	0.2923	1.35	0.0820	0.86	0.0284
2.75	5.76	2.4623	3.80	0.9113	2.53	0.3458	1.48	0.0969	0.95	0.0335
3.00	6.28	2.8748	4.14	1.0633	2.76	0.4032	1.62	0.1129	1.04	0.0390
3.25	6.80	3.3159	4.49	1.2256	2.99	0.4644	1.75	0.1299	1.12	0.0449
3.50	7.32	3.7851	4.84	1.3981	3.22	0.5295	1.89	0.1480	1.21	0.0511
3.75	7.85	4.2820	5.18	1.5806	3.45	0.5983	2.02	0.1672	1.30	0.0577
4.00	8.37	4.8065	5.53	1.7732	3.68	0.6709	2.16	0.1873	1.38	0.0647
4.50	9.42	5.9369	6.22	2.1879	4.14	0.8270	2.43	0.2306	1.55	0.0796
5.00	–	–	6.91	2.6413	4.60	0.9975	2.70	0.2779	1.73	0.0958
5.50	–	–	7.60	3.1328	5.06	1.1822	2.97	0.3291	1.90	0.1134
6.00	–	–	8.29	3.6619	5.52	1.3809	3.24	0.3841	2.07	0.1322
6.50	–	–	8.98	4.2282	5.98	1.5933	3.51	0.4428	2.25	0.1523
7.00	–	–	9.67	4.8311	6.44	1.8193	3.78	0.5053	2.42	0.1737
7.50	–	–	–	–	6.90	2.0588	4.05	0.5714	2.59	0.1963
8.00	–	–	–	–	7.37	2.3115	4.32	0.6411	2.76	0.2202
8.50	–	–	–	–	7.83	2.5774	4.59	0.7144	2.94	0.2452
9.00	–	–	–	–	8.29	2.8563	4.86	0.7912	3.11	0.2715
9.50	–	–	–	–	8.75	3.1483	5.13	0.8715	3.28	0.2990
10.00	–	–	–	–	9.21	3.4530	5.40	0.9554	3.45	0.3276
10.50	–	–	–	–	9.67	3.7705	5.67	1.0426	3.63	0.3574
11.00	–	–	–	–	–	–	5.94	1.1334	3.80	0.3883
11.50	–	–	–	–	–	–	6.21	1.2275	3.97	0.4204
12.00	–	–	–	–	–	–	6.48	1.3249	4.14	0.4536
12.50	–	–	–	–	–	–	6.75	1.4258	4.32	0.4880
13.00	–	–	–	–	–	–	7.02	1.5300	4.49	0.5235
13.50	–	–	–	–	–	–	7.29	1.6375	4.66	0.5601
14.00	–	–	–	–	–	–	7.56	1.7482	4.84	0.5978
14.50	–	–	–	–	–	–	7.83	1.8623	5.01	0.6366
15.00	–	–	–	–	–	–	8.10	1.9797	5.18	0.6765
16.00	–	–	–	–	–	–	8.63	2.2241	5.53	0.7596
17.00	–	–	–	–	–	–	9.17	2.4813	5.87	0.8471
18.00	–	–	–	–	–	–	9.71	2.7514	6.22	0.9388
19.00	–	–	–	–	–	–	–	–	6.56	1.0347
20.00	–	–	–	–	–	–	–	–	6.91	1.1349
21.00	–	–	–	–	–	–	–	–	7.25	1.2393
22.00	–	–	–	–	–	–	–	–	7.60	1.3478
23.00	–	–	–	–	–	–	–	–	7.94	1.4604
24.00	–	–	–	–	–	–	–	–	8.29	1.5771
25.00	–	–	–	–	–	–	–	–	8.63	1.6979

Table 29: Pressure loss in Geberit Mapress Therm system pipes, compressed air 6 bar, d42-108 mm

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
3.75	0.87	0.0225	–	–	–	–	–	–	–	–
4.00	0.93	0.0252	–	–	–	–	–	–	–	–
4.50	1.05	0.0310	–	–	–	–	–	–	–	–
5.00	1.16	0.0373	–	–	–	–	–	–	–	–
5.50	1.28	0.0441	–	–	–	–	–	–	–	–
6.00	1.40	0.0514	–	–	–	–	–	–	–	–
6.50	1.51	0.0593	0.88	0.0165	–	–	–	–	–	–
7.00	1.63	0.0675	0.95	0.0188	–	–	–	–	–	–
7.50	1.74	0.0763	1.02	0.0212	–	–	–	–	–	–
8.00	1.86	0.0855	1.09	0.0238	–	–	–	–	–	–
8.50	1.98	0.0952	1.16	0.0265	–	–	–	–	–	–
9.00	2.09	0.1054	1.22	0.0293	–	–	–	–	–	–
9.50	2.21	0.1160	1.29	0.0322	–	–	–	–	–	–
10.00	2.33	0.1271	1.36	0.0353	–	–	–	–	–	–
10.50	2.44	0.1386	1.43	0.0385	–	–	–	–	–	–
11.00	2.56	0.1505	1.50	0.0418	–	–	–	–	–	–
11.50	2.67	0.1629	1.56	0.0452	–	–	–	–	–	–
12.00	2.79	0.1758	1.63	0.0487	–	–	–	–	–	–
12.50	2.91	0.1890	1.70	0.0524	–	–	–	–	–	–
13.00	3.02	0.2027	1.77	0.0562	0.86	0.0101	–	–	–	–
13.50	3.14	0.2169	1.84	0.0601	0.89	0.0108	–	–	–	–
14.00	3.26	0.2314	1.90	0.0641	0.93	0.0115	–	–	–	–
14.50	3.37	0.2464	1.97	0.0682	0.96	0.0122	–	–	–	–
15.00	3.49	0.2618	2.04	0.0724	0.99	0.0130	–	–	–	–
16.00	3.72	0.2938	2.18	0.0812	1.06	0.0145	–	–	–	–
17.00	3.95	0.3275	2.31	0.0905	1.13	0.0162	–	–	–	–
18.00	4.19	0.3628	2.45	0.1002	1.19	0.0179	0.86	0.0083	–	–
19.00	4.42	0.3997	2.58	0.1104	1.26	0.0197	0.91	0.0091	–	–
20.00	4.65	0.4382	2.72	0.1210	1.32	0.0216	0.96	0.0100	–	–
21.00	4.88	0.4784	2.86	0.1320	1.39	0.0236	1.01	0.0109	–	–
22.00	5.12	0.5201	2.99	0.1434	1.46	0.0256	1.05	0.0118	–	–
23.00	5.35	0.5633	3.13	0.1553	1.52	0.0277	1.10	0.0128	–	–
24.00	5.58	0.6082	3.26	0.1676	1.59	0.0299	1.15	0.0138	–	–
25.00	5.81	0.6546	3.40	0.1803	1.65	0.0321	1.20	0.0148	–	–
30.00	6.98	0.9094	4.08	0.2501	1.99	0.0445	1.44	0.0205	0.98	0.0082
35.00	8.14	1.2017	4.76	0.3301	2.32	0.0586	1.68	0.0270	1.14	0.0108
40.00	9.30	1.5306	5.44	0.4199	2.65	0.0744	1.92	0.0343	1.31	0.0137
45.00	–	–	6.12	0.5193	2.98	0.0919	2.16	0.0424	1.47	0.0170
50.00	–	–	6.80	0.6284	3.31	0.1111	2.40	0.0512	1.63	0.0205
55.00	–	–	7.48	0.7467	3.64	0.1319	2.64	0.0607	1.80	0.0243
60.00	–	–	8.16	0.8743	3.97	0.1543	2.88	0.0710	1.96	0.0284
65.00	–	–	8.84	1.0111	4.30	0.1782	3.12	0.0820	2.13	0.0327
70.00	–	–	9.52	1.1569	4.63	0.2037	3.36	0.0937	2.29	0.0374
75.00	–	–	–	–	4.96	0.2308	3.59	0.1062	2.45	0.0423
80.00	–	–	–	–	5.29	0.2594	3.83	0.1193	2.62	0.0476
85.00	–	–	–	–	5.63	0.2895	4.07	0.1331	2.78	0.0530
90.00	–	–	–	–	5.96	0.3210	4.31	0.1475	2.94	0.0588
95.00	–	–	–	–	6.29	0.3541	4.55	0.1627	3.11	0.0648

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
100.00	–	–	–	–	6.62	0.3886	4.79	0.1785	3.27	0.0711
105.00	–	–	–	–	6.95	0.4246	5.03	0.1950	3.43	0.0776
110.00	–	–	–	–	7.28	0.4621	5.27	0.2121	3.60	0.0844
115.00	–	–	–	–	7.61	0.5009	5.51	0.2299	3.76	0.0915
120.00	–	–	–	–	7.94	0.5413	5.75	0.2484	3.92	0.0988
125.00	–	–	–	–	8.27	0.5830	5.99	0.2675	4.09	0.1064
130.00	–	–	–	–	8.60	0.6261	6.23	0.2872	4.25	0.1142
135.00	–	–	–	–	8.94	0.6707	6.47	0.3076	4.41	0.1223
140.00	–	–	–	–	9.27	0.7167	6.71	0.3286	4.58	0.1306
145.00	–	–	–	–	9.60	0.7640	6.95	0.3502	4.74	0.1392
150.00	–	–	–	–	9.93	0.8128	7.19	0.3725	4.90	0.1480
155.00	–	–	–	–	–	–	7.43	0.3954	5.07	0.1571
160.00	–	–	–	–	–	–	7.67	0.4189	5.23	0.1664
165.00	–	–	–	–	–	–	7.91	0.4431	5.40	0.1760
170.00	–	–	–	–	–	–	8.15	0.4678	5.56	0.1858
175.00	–	–	–	–	–	–	8.39	0.4932	5.72	0.1958
180.00	–	–	–	–	–	–	8.63	0.5192	5.89	0.2061
185.00	–	–	–	–	–	–	8.87	0.5458	6.05	0.2166
190.00	–	–	–	–	–	–	9.11	0.5730	6.21	0.2274
195.00	–	–	–	–	–	–	9.35	0.6009	6.38	0.2384
200.00	–	–	–	–	–	–	9.59	0.6293	6.54	0.2497
205.00	–	–	–	–	–	–	9.83	0.6583	6.70	0.2611
210.00	–	–	–	–	–	–	10.07	0.6880	6.87	0.2728
215.00	–	–	–	–	–	–	–	–	7.03	0.2848
220.00	–	–	–	–	–	–	–	–	7.19	0.2970
225.00	–	–	–	–	–	–	–	–	7.36	0.3094
230.00	–	–	–	–	–	–	–	–	7.52	0.3220
235.00	–	–	–	–	–	–	–	–	7.68	0.3349
240.00	–	–	–	–	–	–	–	–	7.85	0.3480
245.00	–	–	–	–	–	–	–	–	8.01	0.3614
250.00	–	–	–	–	–	–	–	–	8.17	0.3749
255.00	–	–	–	–	–	–	–	–	8.34	0.3887
260.00	–	–	–	–	–	–	–	–	8.50	0.4028
265.00	–	–	–	–	–	–	–	–	8.67	0.4170
270.00	–	–	–	–	–	–	–	–	8.83	0.4315
275.00	–	–	–	–	–	–	–	–	8.99	0.4462
280.00	–	–	–	–	–	–	–	–	9.16	0.4611
285.00	–	–	–	–	–	–	–	–	9.32	0.4763
290.00	–	–	–	–	–	–	–	–	9.48	0.4917
295.00	–	–	–	–	–	–	–	–	9.65	0.5073
300.00	–	–	–	–	–	–	–	–	9.81	0.5231

4.3 COMPRESSED AIR, 8 BAR

Medium:	Compressed air	Density:	10.739 kg/m^3
Relative operating pressure:	8 bar	Viscosity:	0.00001833 Pa•s
Absolute operating pressure:	9 bar	Surface roughness:	0.0015 mm
Temperature:	20 °C		

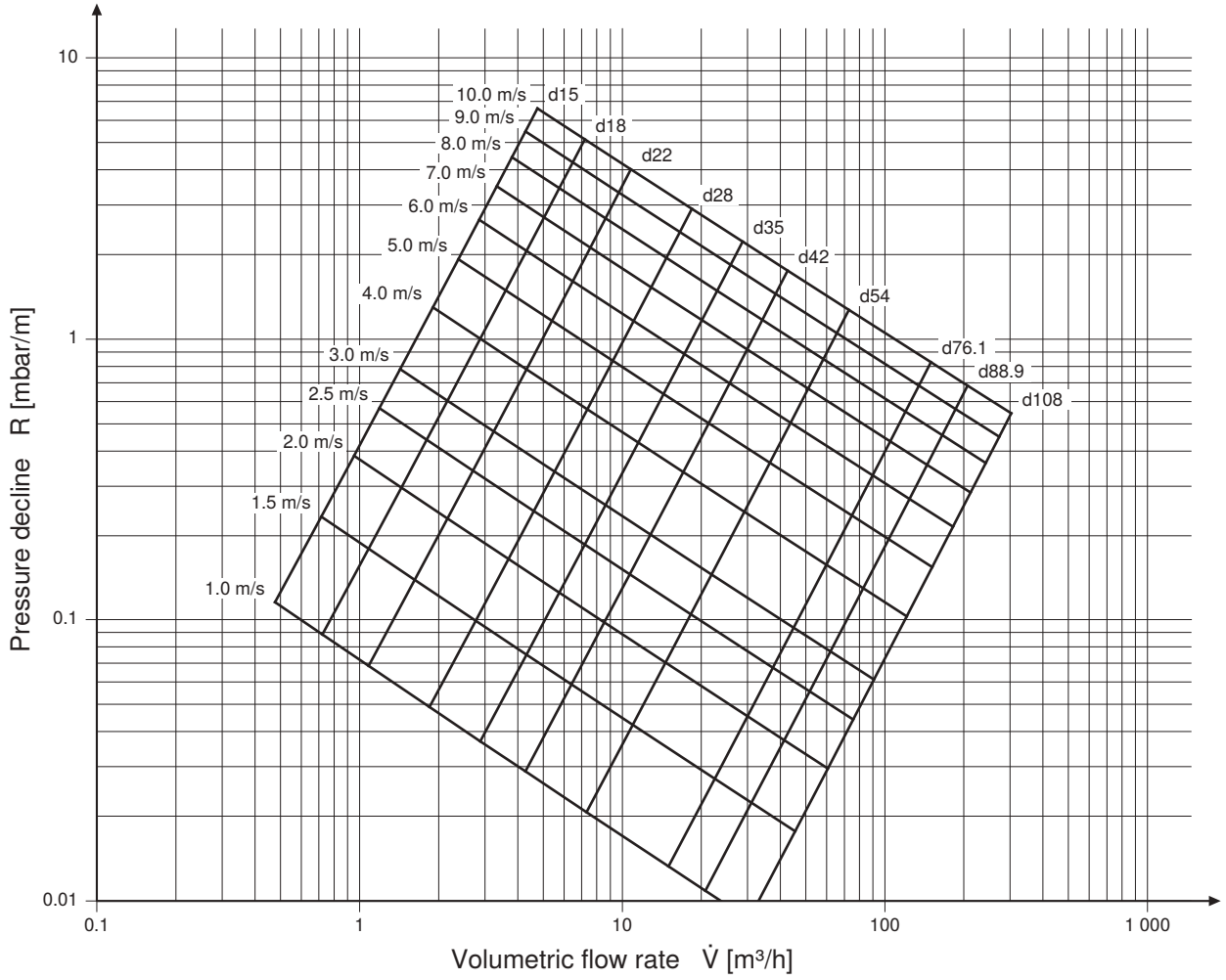


Table 30: Pressure loss in Geberit Mapress Therm system pipes, compressed air 8 bar, d15–35 mm

d [mm]	15		18		22		28		35	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
0.50	1.05	0.1494	–	–	–	–	–	–	–	–
0.75	1.57	0.3022	1.04	0.1128	–	–	–	–	–	–
1.00	2.09	0.5000	1.38	0.1862	0.92	0.0710	–	–	–	–
1.25	2.62	0.7402	1.73	0.2752	1.15	0.1048	–	–	–	–
1.50	3.14	1.0212	2.07	0.3791	1.38	0.1442	–	–	–	–
1.75	3.66	1.3415	2.42	0.4974	1.61	0.1890	0.94	0.0530	–	–
2.00	4.19	1.7003	2.76	0.6297	1.84	0.2390	1.08	0.0670	–	–
2.25	4.71	2.0965	3.11	0.7757	2.07	0.2942	1.21	0.0824	–	–
2.50	5.23	2.5296	3.45	0.9351	2.30	0.3544	1.35	0.0991	0.86	0.0343
2.75	5.76	2.9990	3.80	1.1076	2.53	0.4195	1.48	0.1173	0.95	0.0405
3.00	6.28	3.5040	4.14	1.2931	2.76	0.4894	1.62	0.1367	1.04	0.0472
3.25	6.80	4.0442	4.49	1.4914	2.99	0.5641	1.75	0.1574	1.12	0.0543
3.50	7.32	4.6193	4.84	1.7023	3.22	0.6435	1.89	0.1795	1.21	0.0619
3.75	7.85	5.2288	5.18	1.9257	3.45	0.7275	2.02	0.2028	1.30	0.0699
4.00	8.37	5.8724	5.53	2.1614	3.68	0.8161	2.16	0.2273	1.38	0.0783
4.50	9.42	7.2607	6.22	2.6692	4.14	1.0069	2.43	0.2802	1.55	0.0965
5.00	–	–	6.91	3.2251	4.60	1.2155	2.70	0.3378	1.73	0.1162
5.50	–	–	7.60	3.8283	5.06	1.4416	2.97	0.4003	1.90	0.1376
6.00	–	–	8.29	4.4780	5.52	1.6849	3.24	0.4675	2.07	0.1606
6.50	–	–	8.98	5.1738	5.98	1.9453	3.51	0.5393	2.25	0.1852
7.00	–	–	9.67	5.9152	6.44	2.2224	3.78	0.6156	2.42	0.2113
7.50	–	–	–	–	6.90	2.5162	4.05	0.6965	2.59	0.2389
8.00	–	–	–	–	7.37	2.8265	4.32	0.7818	2.76	0.2680
8.50	–	–	–	–	7.83	3.1532	4.59	0.8716	2.94	0.2986
9.00	–	–	–	–	8.29	3.4960	4.86	0.9657	3.11	0.3307
9.50	–	–	–	–	8.75	3.8549	5.13	1.0642	3.28	0.3643
10.00	–	–	–	–	9.21	4.2298	5.40	1.1670	3.45	0.3993
10.50	–	–	–	–	9.67	4.6205	5.67	1.2740	3.63	0.4358
11.00	–	–	–	–	–	–	5.94	1.3853	3.80	0.4737
11.50	–	–	–	–	–	–	6.21	1.5009	3.97	0.5130
12.00	–	–	–	–	–	–	6.48	1.6206	4.14	0.5537
12.50	–	–	–	–	–	–	6.75	1.7444	4.32	0.5958
13.00	–	–	–	–	–	–	7.02	1.8724	4.49	0.6393
13.50	–	–	–	–	–	–	7.29	2.0045	4.66	0.6842
14.00	–	–	–	–	–	–	7.56	2.1407	4.84	0.7304
14.50	–	–	–	–	–	–	7.83	2.2810	5.01	0.7781
15.00	–	–	–	–	–	–	8.10	2.4253	5.18	0.8270
16.00	–	–	–	–	–	–	8.63	2.7261	5.53	0.9290
17.00	–	–	–	–	–	–	9.17	3.0428	5.87	1.0364
18.00	–	–	–	–	–	–	9.71	3.3755	6.22	1.1490
19.00	–	–	–	–	–	–	–	–	6.56	1.2670
20.00	–	–	–	–	–	–	–	–	6.91	1.3901
21.00	–	–	–	–	–	–	–	–	7.25	1.5185
22.00	–	–	–	–	–	–	–	–	7.60	1.6520
23.00	–	–	–	–	–	–	–	–	7.94	1.7906
24.00	–	–	–	–	–	–	–	–	8.29	1.9343
25.00	–	–	–	–	–	–	–	–	8.63	2.0831

Table 31: Pressure loss in Geberit Mapress Therm system pipes, compressed air 8 bar, d42–108 mm

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
3.75	0.87	0.0272	–	–	–	–	–	–	–	–
4.00	0.93	0.0305	–	–	–	–	–	–	–	–
4.50	1.05	0.0375	–	–	–	–	–	–	–	–
5.00	1.16	0.0452	–	–	–	–	–	–	–	–
5.50	1.28	0.0535	–	–	–	–	–	–	–	–
6.00	1.40	0.0624	–	–	–	–	–	–	–	–
6.50	1.51	0.0719	0.88	0.0200	–	–	–	–	–	–
7.00	1.63	0.0820	0.95	0.0228	–	–	–	–	–	–
7.50	1.74	0.0927	1.02	0.0257	–	–	–	–	–	–
8.00	1.86	0.1040	1.09	0.0288	–	–	–	–	–	–
8.50	1.98	0.1158	1.16	0.0321	–	–	–	–	–	–
9.00	2.09	0.1282	1.22	0.0355	–	–	–	–	–	–
9.50	2.21	0.1411	1.29	0.0391	–	–	–	–	–	–
10.00	2.33	0.1547	1.36	0.0428	–	–	–	–	–	–
10.50	2.44	0.1687	1.43	0.0467	–	–	–	–	–	–
11.00	2.56	0.1833	1.50	0.0508	–	–	–	–	–	–
11.50	2.67	0.1985	1.56	0.0549	–	–	–	–	–	–
12.00	2.79	0.2142	1.63	0.0593	–	–	–	–	–	–
12.50	2.91	0.2304	1.70	0.0637	–	–	–	–	–	–
13.00	3.02	0.2472	1.77	0.0683	0.86	0.0122	–	–	–	–
13.50	3.14	0.2645	1.84	0.0731	0.89	0.0131	–	–	–	–
14.00	3.26	0.2823	1.90	0.0780	0.93	0.0139	–	–	–	–
14.50	3.37	0.3006	1.97	0.0830	0.96	0.0148	–	–	–	–
15.00	3.49	0.3194	2.04	0.0882	0.99	0.0158	–	–	–	–
16.00	3.72	0.3587	2.18	0.0990	1.06	0.0177	–	–	–	–
17.00	3.95	0.3999	2.31	0.1103	1.13	0.0197	–	–	–	–
18.00	4.19	0.4432	2.45	0.1222	1.19	0.0218	0.86	0.0101	–	–
19.00	4.42	0.4885	2.58	0.1346	1.26	0.0240	0.91	0.0111	–	–
20.00	4.65	0.5358	2.72	0.1476	1.32	0.0263	0.96	0.0121	–	–
21.00	4.88	0.5851	2.86	0.1611	1.39	0.0287	1.01	0.0132	–	–
22.00	5.12	0.6363	2.99	0.1751	1.46	0.0312	1.05	0.0144	–	–
23.00	5.35	0.6894	3.13	0.1897	1.52	0.0337	1.10	0.0156	–	–
24.00	5.58	0.7445	3.26	0.2047	1.59	0.0364	1.15	0.0168	–	–
25.00	5.81	0.8015	3.40	0.2203	1.65	0.0391	1.20	0.0181	–	–
30.00	6.98	1.1149	4.08	0.3059	1.99	0.0543	1.44	0.0250	0.98	0.0100
35.00	8.14	1.4748	4.76	0.4041	2.32	0.0715	1.68	0.0330	1.14	0.0132
40.00	9.30	1.8803	5.44	0.5145	2.65	0.0909	1.92	0.0419	1.31	0.0167
45.00	–	–	6.12	0.6368	2.98	0.1124	2.16	0.0518	1.47	0.0207
50.00	–	–	6.80	0.7710	3.31	0.1359	2.40	0.0626	1.63	0.0250
55.00	–	–	7.48	0.9169	3.64	0.1615	2.64	0.0743	1.80	0.0296
60.00	–	–	8.16	1.0742	3.97	0.1890	2.88	0.0869	1.96	0.0347
65.00	–	–	8.84	1.2429	4.30	0.2184	3.12	0.1004	2.13	0.0400
70.00	–	–	9.52	1.4228	4.63	0.2498	3.36	0.1148	2.29	0.0457
75.00	–	–	–	–	4.96	0.2831	3.59	0.1300	2.45	0.0518
80.00	–	–	–	–	5.29	0.3182	3.83	0.1461	2.62	0.0582
85.00	–	–	–	–	5.63	0.3553	4.07	0.1631	2.78	0.0649
90.00	–	–	–	–	5.96	0.3942	4.31	0.1809	2.94	0.0720
95.00	–	–	–	–	6.29	0.4349	4.55	0.1995	3.11	0.0794

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
100.00	–	–	–	–	6.62	0.4775	4.79	0.2190	3.27	0.0871
105.00	–	–	–	–	6.95	0.5218	5.03	0.2393	3.43	0.0952
110.00	–	–	–	–	7.28	0.5680	5.27	0.2604	3.60	0.1035
115.00	–	–	–	–	7.61	0.6160	5.51	0.2823	3.76	0.1122
120.00	–	–	–	–	7.94	0.6657	5.75	0.3051	3.92	0.1212
125.00	–	–	–	–	8.27	0.7173	5.99	0.3286	4.09	0.1305
130.00	–	–	–	–	8.60	0.7705	6.23	0.3529	4.25	0.1402
135.00	–	–	–	–	8.94	0.8256	6.47	0.3781	4.41	0.1501
140.00	–	–	–	–	9.27	0.8824	6.71	0.4040	4.58	0.1604
145.00	–	–	–	–	9.60	0.9409	6.95	0.4307	4.74	0.1709
150.00	–	–	–	–	9.93	1.0012	7.19	0.4582	4.90	0.1818
155.00	–	–	–	–	–	–	7.43	0.4864	5.07	0.1930
160.00	–	–	–	–	–	–	7.67	0.5155	5.23	0.2045
165.00	–	–	–	–	–	–	7.91	0.5453	5.40	0.2162
170.00	–	–	–	–	–	–	8.15	0.5759	5.56	0.2283
175.00	–	–	–	–	–	–	8.39	0.6072	5.72	0.2407
180.00	–	–	–	–	–	–	8.63	0.6393	5.89	0.2534
185.00	–	–	–	–	–	–	8.87	0.6722	6.05	0.2664
190.00	–	–	–	–	–	–	9.11	0.7059	6.21	0.2797
195.00	–	–	–	–	–	–	9.35	0.7402	6.38	0.2932
200.00	–	–	–	–	–	–	9.59	0.7754	6.54	0.3071
205.00	–	–	–	–	–	–	9.83	0.8113	6.70	0.3213
210.00	–	–	–	–	–	–	10.07	0.8479	6.87	0.3357
215.00	–	–	–	–	–	–	–	–	7.03	0.3505
220.00	–	–	–	–	–	–	–	–	7.19	0.3655
225.00	–	–	–	–	–	–	–	–	7.36	0.3808
230.00	–	–	–	–	–	–	–	–	7.52	0.3965
235.00	–	–	–	–	–	–	–	–	7.68	0.4124
240.00	–	–	–	–	–	–	–	–	7.85	0.4286
245.00	–	–	–	–	–	–	–	–	8.01	0.4450
250.00	–	–	–	–	–	–	–	–	8.17	0.4618
255.00	–	–	–	–	–	–	–	–	8.34	0.4789
260.00	–	–	–	–	–	–	–	–	8.50	0.4962
265.00	–	–	–	–	–	–	–	–	8.67	0.5138
270.00	–	–	–	–	–	–	–	–	8.83	0.5317
275.00	–	–	–	–	–	–	–	–	8.99	0.5499
280.00	–	–	–	–	–	–	–	–	9.16	0.5684
285.00	–	–	–	–	–	–	–	–	9.32	0.5871
290.00	–	–	–	–	–	–	–	–	9.48	0.6062
295.00	–	–	–	–	–	–	–	–	9.65	0.6255
300.00	–	–	–	–	–	–	–	–	9.81	0.6451

4.4 COMPRESSED AIR, 10 BAR

Medium:	Compressed air	Density:	13.133 kg/m^3
Relative operating pressure:	10 bar	Viscosity:	0.0000183576 Pa•s
Absolute operating pressure:	11 bar	Surface roughness:	0.0015 mm
Temperature:	20 °C		

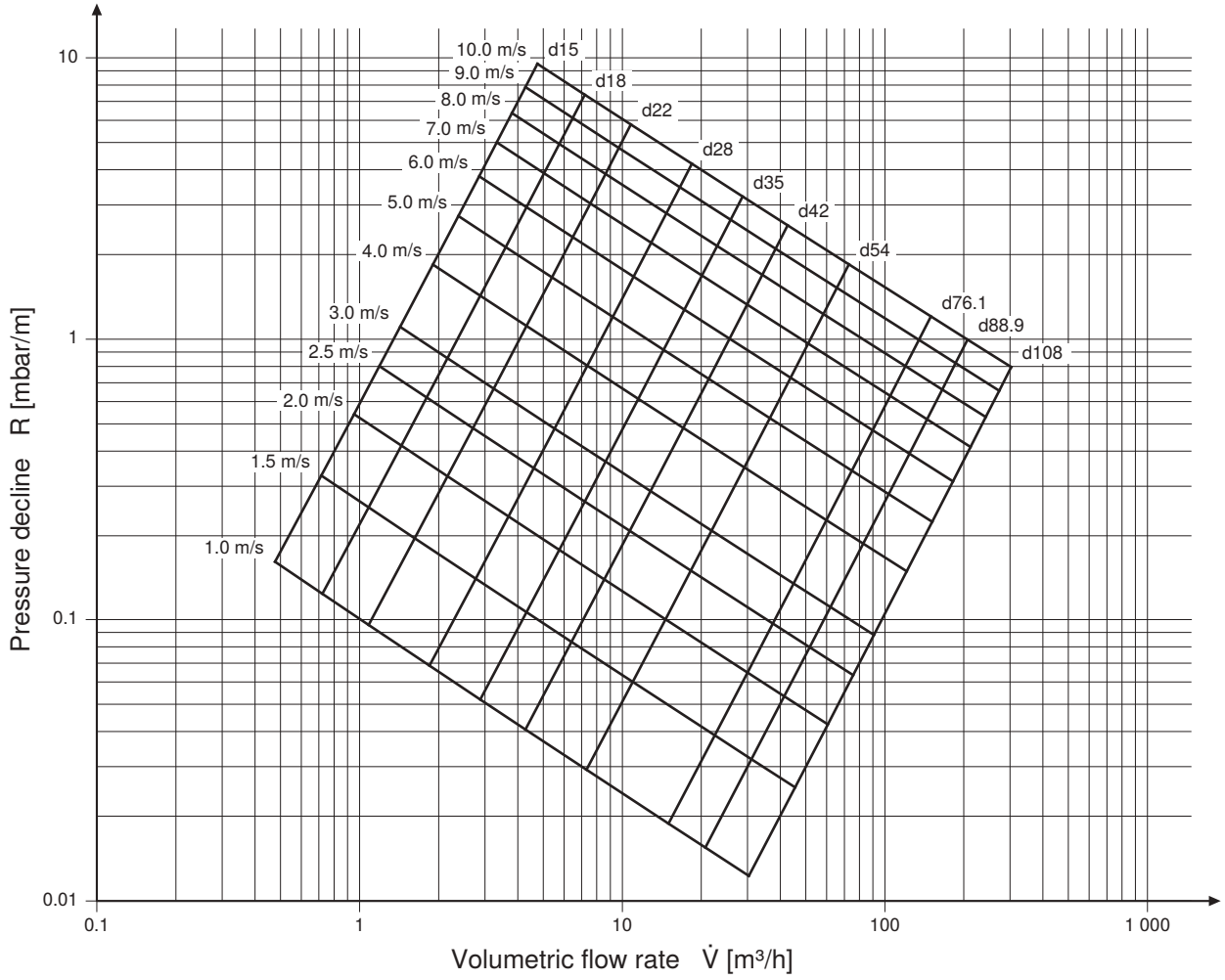


Table 32: Pressure loss in Geberit Mapress Therm system pipes, compressed air 10 bar, d15–35 mm

d [mm]	15		18		22		28		35	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
0.50	1.05	0.1732	–	–	–	–	–	–	–	–
0.75	1.57	0.3515	1.04	0.1310	–	–	–	–	–	–
1.00	2.09	0.5826	1.38	0.2166	0.92	0.0825	–	–	–	–
1.25	2.62	0.8637	1.73	0.3206	1.15	0.1219	–	–	–	–
1.50	3.14	1.1929	2.07	0.4421	1.38	0.1679	–	–	–	–
1.75	3.66	1.5688	2.42	0.5806	1.61	0.2203	0.94	0.0617	–	–
2.00	4.19	1.9900	2.76	0.7357	1.84	0.2789	1.08	0.0780	–	–
2.25	4.71	2.4556	3.11	0.9070	2.07	0.3435	1.21	0.0960	–	–
2.50	5.23	2.9650	3.45	1.0940	2.30	0.4140	1.35	0.1156	0.86	0.0399
2.75	5.76	3.5173	3.80	1.2967	2.53	0.4903	1.48	0.1368	0.95	0.0472
3.00	6.28	4.1120	4.14	1.5147	2.76	0.5723	1.62	0.1596	1.04	0.0550
3.25	6.80	4.7485	4.49	1.7478	2.99	0.6600	1.75	0.1839	1.12	0.0634
3.50	7.32	5.4264	4.84	1.9959	3.22	0.7532	1.89	0.2097	1.21	0.0722
3.75	7.85	6.1453	5.18	2.2588	3.45	0.8519	2.02	0.2370	1.30	0.0816
4.00	8.37	6.9048	5.53	2.5363	3.68	0.9560	2.16	0.2658	1.38	0.0915
4.50	9.42	8.5443	6.22	3.1346	4.14	1.1804	2.43	0.3278	1.55	0.1127
5.00	–	–	6.91	3.7900	4.60	1.4258	2.70	0.3955	1.73	0.1359
5.50	–	–	7.60	4.5016	5.06	1.6920	2.97	0.4689	1.90	0.1610
6.00	–	–	8.29	5.2686	5.52	1.9786	3.24	0.5478	2.07	0.1879
6.50	–	–	8.98	6.0906	5.98	2.2855	3.51	0.6322	2.25	0.2167
7.00	–	–	9.67	6.9670	6.44	2.6124	3.78	0.7221	2.42	0.2474
7.50	–	–	–	–	6.90	2.9591	4.05	0.8172	2.59	0.2799
8.00	–	–	–	–	7.37	3.3253	4.32	0.9177	2.76	0.3141
8.50	–	–	–	–	7.83	3.7110	4.59	1.0234	2.94	0.3501
9.00	–	–	–	–	8.29	4.1161	4.86	1.1343	3.11	0.3879
9.50	–	–	–	–	8.75	4.5402	5.13	1.2504	3.28	0.4273
10.00	–	–	–	–	9.21	4.9834	5.40	1.3716	3.45	0.4686
10.50	–	–	–	–	9.67	5.4455	5.67	1.4978	3.63	0.5115
11.00	–	–	–	–	–	–	5.94	1.6291	3.80	0.5561
11.50	–	–	–	–	–	–	6.21	1.7654	3.97	0.6024
12.00	–	–	–	–	–	–	6.48	1.9067	4.14	0.6503
12.50	–	–	–	–	–	–	6.75	2.0530	4.32	0.6999
13.00	–	–	–	–	–	–	7.02	2.2041	4.49	0.7512
13.50	–	–	–	–	–	–	7.29	2.3602	4.66	0.8041
14.00	–	–	–	–	–	–	7.56	2.5211	4.84	0.8586
14.50	–	–	–	–	–	–	7.83	2.6869	5.01	0.9148
15.00	–	–	–	–	–	–	8.10	2.8575	5.18	0.9726
16.00	–	–	–	–	–	–	8.63	3.2132	5.53	1.0929
17.00	–	–	–	–	–	–	9.17	3.5879	5.87	1.2196
18.00	–	–	–	–	–	–	9.71	3.9816	6.22	1.3526
19.00	–	–	–	–	–	–	–	–	6.56	1.4919
20.00	–	–	–	–	–	–	–	–	6.91	1.6374
21.00	–	–	–	–	–	–	–	–	7.25	1.7891
22.00	–	–	–	–	–	–	–	–	7.60	1.9469
23.00	–	–	–	–	–	–	–	–	7.94	2.1109
24.00	–	–	–	–	–	–	–	–	8.29	2.2809
25.00	–	–	–	–	–	–	–	–	8.63	2.4569

Table 33: Pressure loss in Geberit Mapress Therm system pipes, compressed air 10 bar, d42–108 mm

d [mm]	42		54		76.1		88.9		108	
V̇ [m³/h]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]
3.75	0.87	0.0318	–	–	–	–	–	–	–	–
4.00	0.93	0.0356	–	–	–	–	–	–	–	–
4.50	1.05	0.0438	–	–	–	–	–	–	–	–
5.00	1.16	0.0528	–	–	–	–	–	–	–	–
5.50	1.28	0.0625	–	–	–	–	–	–	–	–
6.00	1.40	0.0729	–	–	–	–	–	–	–	–
6.50	1.51	0.0841	0.88	0.0233	–	–	–	–	–	–
7.00	1.63	0.0959	0.95	0.0266	–	–	–	–	–	–
7.50	1.74	0.1084	1.02	0.0301	–	–	–	–	–	–
8.00	1.86	0.1217	1.09	0.0337	–	–	–	–	–	–
8.50	1.98	0.1356	1.16	0.0375	–	–	–	–	–	–
9.00	2.09	0.1501	1.22	0.0416	–	–	–	–	–	–
9.50	2.21	0.1654	1.29	0.0458	–	–	–	–	–	–
10.00	2.33	0.1812	1.36	0.0501	–	–	–	–	–	–
10.50	2.44	0.1978	1.43	0.0547	–	–	–	–	–	–
11.00	2.56	0.2149	1.50	0.0594	–	–	–	–	–	–
11.50	2.67	0.2328	1.56	0.0643	–	–	–	–	–	–
12.00	2.79	0.2512	1.63	0.0694	–	–	–	–	–	–
12.50	2.91	0.2703	1.70	0.0746	–	–	–	–	–	–
13.00	3.02	0.2900	1.77	0.0800	0.86	0.0143	–	–	–	–
13.50	3.14	0.3104	1.84	0.0856	0.89	0.0153	–	–	–	–
14.00	3.26	0.3313	1.90	0.0914	0.93	0.0163	–	–	–	–
14.50	3.37	0.3529	1.97	0.0973	0.96	0.0174	–	–	–	–
15.00	3.49	0.3751	2.04	0.1034	0.99	0.0184	–	–	–	–
16.00	3.72	0.4213	2.18	0.1161	1.06	0.0207	–	–	–	–
17.00	3.95	0.4700	2.31	0.1294	1.13	0.0230	–	–	–	–
18.00	4.19	0.5210	2.45	0.1434	1.19	0.0255	0.86	0.0118	–	–
19.00	4.42	0.5744	2.58	0.1580	1.26	0.0281	0.91	0.0130	–	–
20.00	4.65	0.6302	2.72	0.1733	1.32	0.0308	0.96	0.0142	–	–
21.00	4.88	0.6883	2.86	0.1891	1.39	0.0336	1.01	0.0155	–	–
22.00	5.12	0.7487	2.99	0.2057	1.46	0.0365	1.05	0.0169	–	–
23.00	5.35	0.8114	3.13	0.2228	1.52	0.0395	1.10	0.0182	–	–
24.00	5.58	0.8765	3.26	0.2406	1.59	0.0427	1.15	0.0197	–	–
25.00	5.81	0.9438	3.40	0.2589	1.65	0.0459	1.20	0.0212	–	–
30.00	6.98	1.3141	4.08	0.3599	1.99	0.0637	1.44	0.0294	0.98	0.0117
35.00	8.14	1.7399	4.76	0.4757	2.32	0.0840	1.68	0.0387	1.14	0.0155
40.00	9.30	2.2200	5.44	0.6061	2.65	0.1069	1.92	0.0492	1.31	0.0196
45.00	–	–	6.12	0.7507	2.98	0.1322	2.16	0.0608	1.47	0.0243
50.00	–	–	6.80	0.9094	3.31	0.1599	2.40	0.0735	1.63	0.0293
55.00	–	–	7.48	1.0820	3.64	0.1901	2.64	0.0874	1.80	0.0348
60.00	–	–	8.16	1.2683	3.97	0.2225	2.88	0.1022	1.96	0.0407
65.00	–	–	8.84	1.4681	4.30	0.2573	3.12	0.1182	2.13	0.0471
70.00	–	–	9.52	1.6813	4.63	0.2944	3.36	0.1351	2.29	0.0538
75.00	–	–	–	–	4.96	0.3337	3.59	0.1531	2.45	0.0609
80.00	–	–	–	–	5.29	0.3753	3.83	0.1722	2.62	0.0685
85.00	–	–	–	–	5.63	0.4191	4.07	0.1922	2.78	0.0764
90.00	–	–	–	–	5.96	0.4651	4.31	0.2132	2.94	0.0848
95.00	–	–	–	–	6.29	0.5133	4.55	0.2353	3.11	0.0935

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
100.00	–	–	–	–	6.62	0.5637	4.79	0.2583	3.27	0.1026
105.00	–	–	–	–	6.95	0.6162	5.03	0.2823	3.43	0.1121
110.00	–	–	–	–	7.28	0.6709	5.27	0.3072	3.60	0.1220
115.00	–	–	–	–	7.61	0.7277	5.51	0.3332	3.76	0.1323
120.00	–	–	–	–	7.94	0.7867	5.75	0.3601	3.92	0.1429
125.00	–	–	–	–	8.27	0.8478	5.99	0.3879	4.09	0.1539
130.00	–	–	–	–	8.60	0.9109	6.23	0.4167	4.25	0.1653
135.00	–	–	–	–	8.94	0.9762	6.47	0.4465	4.41	0.1771
140.00	–	–	–	–	9.27	1.0435	6.71	0.4772	4.58	0.1892
145.00	–	–	–	–	9.60	1.1130	6.95	0.5088	4.74	0.2017
150.00	–	–	–	–	9.93	1.1845	7.19	0.5414	4.90	0.2145
155.00	–	–	–	–	–	–	7.43	0.5749	5.07	0.2278
160.00	–	–	–	–	–	–	7.67	0.6093	5.23	0.2413
165.00	–	–	–	–	–	–	7.91	0.6446	5.40	0.2553
170.00	–	–	–	–	–	–	8.15	0.6809	5.56	0.2696
175.00	–	–	–	–	–	–	8.39	0.7180	5.72	0.2843
180.00	–	–	–	–	–	–	8.63	0.7561	5.89	0.2993
185.00	–	–	–	–	–	–	8.87	0.7951	6.05	0.3146
190.00	–	–	–	–	–	–	9.11	0.8350	6.21	0.3304
195.00	–	–	–	–	–	–	9.35	0.8758	6.38	0.3464
200.00	–	–	–	–	–	–	9.59	0.9176	6.54	0.3629
205.00	–	–	–	–	–	–	9.83	0.9602	6.70	0.3797
210.00	–	–	–	–	–	–	10.07	1.0037	6.87	0.3968
215.00	–	–	–	–	–	–	–	–	7.03	0.4143
220.00	–	–	–	–	–	–	–	–	7.19	0.4321
225.00	–	–	–	–	–	–	–	–	7.36	0.4503
230.00	–	–	–	–	–	–	–	–	7.52	0.4688
235.00	–	–	–	–	–	–	–	–	7.68	0.4876
240.00	–	–	–	–	–	–	–	–	7.85	0.5069
245.00	–	–	–	–	–	–	–	–	8.01	0.5264
250.00	–	–	–	–	–	–	–	–	8.17	0.5463
255.00	–	–	–	–	–	–	–	–	8.34	0.5665
260.00	–	–	–	–	–	–	–	–	8.50	0.5871
265.00	–	–	–	–	–	–	–	–	8.67	0.6080
270.00	–	–	–	–	–	–	–	–	8.83	0.6292
275.00	–	–	–	–	–	–	–	–	8.99	0.6508
280.00	–	–	–	–	–	–	–	–	9.16	0.6728
285.00	–	–	–	–	–	–	–	–	9.32	0.6950
290.00	–	–	–	–	–	–	–	–	9.48	0.7176
295.00	–	–	–	–	–	–	–	–	9.65	0.7405
300.00	–	–	–	–	–	–	–	–	9.81	0.7638

4.5 COMPRESSED AIR, 16 BAR

Medium:	Compressed air	Density:	20.336 kg/m^3
Relative operating pressure:	16 bar	Viscosity:	0.0000184392 Pa•s
Absolute operating pressure:	17 bar	Surface roughness:	0.0015 mm
Temperature:	20 °C		

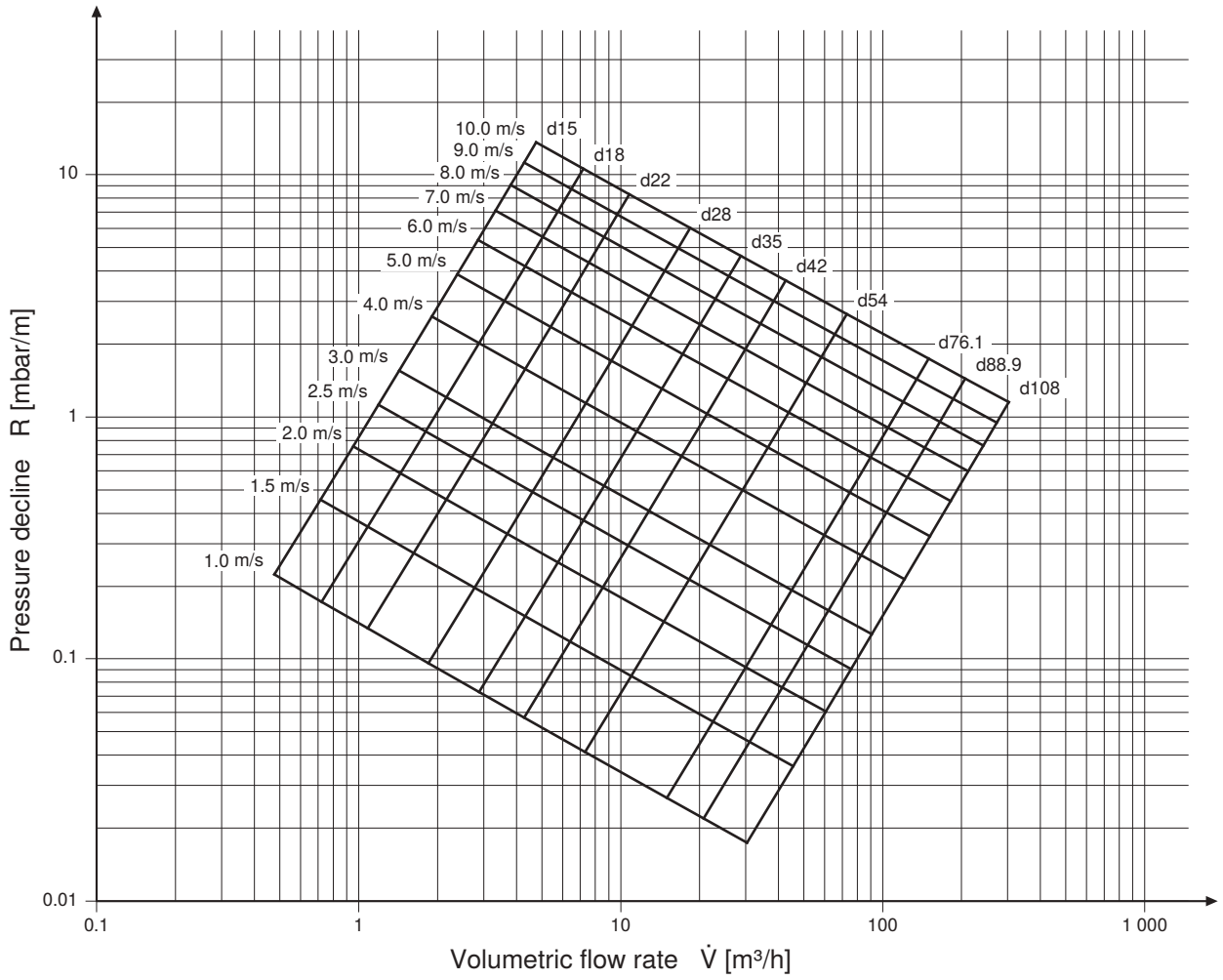


Table 34: Pressure loss in Geberit Mapress Therm system pipes, compressed air 16 bar, d15-35 mm

d [mm]	15		18		22		28		35	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
0.50	1.05	0.2403	–	–	–	–	–	–	–	–
0.75	1.57	0.4903	1.04	0.1821	–	–	–	–	–	–
1.00	2.09	0.8160	1.38	0.3023	0.92	0.1148	–	–	–	–
1.25	2.62	1.2135	1.73	0.4488	1.15	0.1702	–	–	–	–
1.50	3.14	1.6803	2.07	0.6204	1.38	0.2349	–	–	–	–
1.75	3.66	2.2144	2.42	0.8165	1.61	0.3088	0.94	0.0862	–	–
2.00	4.19	2.8143	2.76	1.0364	1.84	0.3915	1.08	0.1091	–	–
2.25	4.71	3.4788	3.11	1.2797	2.07	0.4830	1.21	0.1345	–	–
2.50	5.23	4.2069	3.45	1.5458	2.30	0.5829	1.35	0.1621	0.86	0.0558
2.75	5.76	4.9976	3.80	1.8346	2.53	0.6912	1.48	0.1921	0.95	0.0661
3.00	6.28	5.8502	4.14	2.1456	2.76	0.8077	1.62	0.2242	1.04	0.0771
3.25	6.80	6.7641	4.49	2.4786	2.99	0.9324	1.75	0.2586	1.12	0.0888
3.50	7.32	7.7387	4.84	2.8333	3.22	1.0651	1.89	0.2952	1.21	0.1014
3.75	7.85	8.7734	5.18	3.2096	3.45	1.2058	2.02	0.3340	1.30	0.1146
4.00	8.37	9.8679	5.53	3.6073	3.68	1.3544	2.16	0.3749	1.38	0.1286
4.50	9.42	12.2343	6.22	4.4659	4.14	1.6747	2.43	0.4629	1.55	0.1586
5.00	–	–	6.91	5.4081	4.60	2.0258	2.70	0.5593	1.73	0.1915
5.50	–	–	7.60	6.4326	5.06	2.4071	2.97	0.6639	1.90	0.2271
6.00	–	–	8.29	7.5389	5.52	2.8184	3.24	0.7765	2.07	0.2654
6.50	–	–	8.98	8.7259	5.98	3.2592	3.51	0.8970	2.25	0.3064
7.00	–	–	9.67	9.9931	6.44	3.7292	3.78	1.0254	2.42	0.3501
7.50	–	–	–	–	6.90	4.2283	4.05	1.1616	2.59	0.3963
8.00	–	–	–	–	7.37	4.7561	4.32	1.3055	2.76	0.4451
8.50	–	–	–	–	7.83	5.3125	4.59	1.4570	2.94	0.4965
9.00	–	–	–	–	8.29	5.8974	4.86	1.6161	3.11	0.5504
9.50	–	–	–	–	8.75	6.5104	5.13	1.7827	3.28	0.6069
10.00	–	–	–	–	9.21	7.1514	5.40	1.9568	3.45	0.6658
10.50	–	–	–	–	9.67	7.8204	5.67	2.1383	3.63	0.7272
11.00	–	–	–	–	–	–	5.94	2.3272	3.80	0.7911
11.50	–	–	–	–	–	–	6.21	2.5235	3.97	0.8574
12.00	–	–	–	–	–	–	6.48	2.7270	4.14	0.9262
12.50	–	–	–	–	–	–	6.75	2.9378	4.32	0.9973
13.00	–	–	–	–	–	–	7.02	3.1558	4.49	1.0709
13.50	–	–	–	–	–	–	7.29	3.3810	4.66	1.1468
14.00	–	–	–	–	–	–	7.56	3.6134	4.84	1.2252
14.50	–	–	–	–	–	–	7.83	3.8529	5.01	1.3059
15.00	–	–	–	–	–	–	8.10	4.0996	5.18	1.3889
16.00	–	–	–	–	–	–	8.63	4.6141	5.53	1.5621
17.00	–	–	–	–	–	–	9.17	5.1567	5.87	1.7446
18.00	–	–	–	–	–	–	9.71	5.7274	6.22	1.9363
19.00	–	–	–	–	–	–	–	–	6.56	2.1372
20.00	–	–	–	–	–	–	–	–	6.91	2.3472
21.00	–	–	–	–	–	–	–	–	7.25	2.5664
22.00	–	–	–	–	–	–	–	–	7.60	2.7945
23.00	–	–	–	–	–	–	–	–	7.94	3.0316
24.00	–	–	–	–	–	–	–	–	8.29	3.2777
25.00	–	–	–	–	–	–	–	–	8.63	3.5327

Table 35: Pressure loss in Geberit Mapress Therm system pipes, compressed air 16 bar, d42–108 mm

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
3.75	0.87	0.0445	–	–	–	–	–	–	–	–
4.00	0.93	0.0499	–	–	–	–	–	–	–	–
4.50	1.05	0.0615	–	–	–	–	–	–	–	–
5.00	1.16	0.0742	–	–	–	–	–	–	–	–
5.50	1.28	0.0879	–	–	–	–	–	–	–	–
6.00	1.40	0.1027	–	–	–	–	–	–	–	–
6.50	1.51	0.1185	0.88	0.0328	–	–	–	–	–	–
7.00	1.63	0.1353	0.95	0.0374	–	–	–	–	–	–
7.50	1.74	0.1531	1.02	0.0423	–	–	–	–	–	–
8.00	1.86	0.1719	1.09	0.0475	–	–	–	–	–	–
8.50	1.98	0.1917	1.16	0.0529	–	–	–	–	–	–
9.00	2.09	0.2124	1.22	0.0586	–	–	–	–	–	–
9.50	2.21	0.2341	1.29	0.0645	–	–	–	–	–	–
10.00	2.33	0.2567	1.36	0.0708	–	–	–	–	–	–
10.50	2.44	0.2803	1.43	0.0772	–	–	–	–	–	–
11.00	2.56	0.3048	1.50	0.0839	–	–	–	–	–	–
11.50	2.67	0.3303	1.56	0.0909	–	–	–	–	–	–
12.00	2.79	0.3566	1.63	0.0981	–	–	–	–	–	–
12.50	2.91	0.3839	1.70	0.1056	–	–	–	–	–	–
13.00	3.02	0.4121	1.77	0.1133	0.86	0.0201	–	–	–	–
13.50	3.14	0.4412	1.84	0.1213	0.89	0.0215	–	–	–	–
14.00	3.26	0.4712	1.90	0.1295	0.93	0.0230	–	–	–	–
14.50	3.37	0.5021	1.97	0.1379	0.96	0.0245	–	–	–	–
15.00	3.49	0.5339	2.04	0.1466	0.99	0.0260	–	–	–	–
16.00	3.72	0.6001	2.18	0.1647	1.06	0.0292	–	–	–	–
17.00	3.95	0.6699	2.31	0.1837	1.13	0.0326	–	–	–	–
18.00	4.19	0.7431	2.45	0.2037	1.19	0.0361	0.86	0.0166	–	–
19.00	4.42	0.8198	2.58	0.2246	1.26	0.0397	0.91	0.0183	–	–
20.00	4.65	0.8999	2.72	0.2464	1.32	0.0436	0.96	0.0201	–	–
21.00	4.88	0.9835	2.86	0.2691	1.39	0.0476	1.01	0.0219	–	–
22.00	5.12	1.0705	2.99	0.2928	1.46	0.0517	1.05	0.0238	–	–
23.00	5.35	1.1608	3.13	0.3173	1.52	0.0560	1.10	0.0258	–	–
24.00	5.58	1.2545	3.26	0.3428	1.59	0.0605	1.15	0.0279	–	–
25.00	5.81	1.3515	3.40	0.3691	1.65	0.0651	1.20	0.0300	–	–
30.00	6.98	1.8863	4.08	0.5141	1.99	0.0905	1.44	0.0416	0.98	0.0166
35.00	8.14	2.5026	4.76	0.6808	2.32	0.1196	1.68	0.0550	1.14	0.0219
40.00	9.30	3.1990	5.44	0.8687	2.65	0.1524	1.92	0.0700	1.31	0.0279
45.00	–	–	6.12	1.0776	2.98	0.1887	2.16	0.0866	1.47	0.0345
50.00	–	–	6.80	1.3071	3.31	0.2285	2.40	0.1049	1.63	0.0417
55.00	–	–	7.48	1.5570	3.64	0.2718	2.64	0.1247	1.80	0.0496
60.00	–	–	8.16	1.8271	3.97	0.3185	2.88	0.1460	1.96	0.0580
65.00	–	–	8.84	2.1171	4.30	0.3687	3.12	0.1689	2.13	0.0671
70.00	–	–	9.52	2.4271	4.63	0.4221	3.36	0.1933	2.29	0.0768
75.00	–	–	–	–	4.96	0.4789	3.59	0.2192	2.45	0.0870
80.00	–	–	–	–	5.29	0.5389	3.83	0.2466	2.62	0.0979
85.00	–	–	–	–	5.63	0.6022	4.07	0.2755	2.78	0.1093
90.00	–	–	–	–	5.96	0.6688	4.31	0.3058	2.94	0.1213
95.00	–	–	–	–	6.29	0.7386	4.55	0.3376	3.11	0.1338

d [mm]	42		54		76.1		88.9		108	
$\dot{V}$ [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]	v [m/s]	R [mbar/m]
100.00	–	–	–	–	6.62	0.8116	4.79	0.3709	3.27	0.1469
105.00	–	–	–	–	6.95	0.8877	5.03	0.4055	3.43	0.1606
110.00	–	–	–	–	7.28	0.9670	5.27	0.4416	3.60	0.1749
115.00	–	–	–	–	7.61	1.0495	5.51	0.4791	3.76	0.1897
120.00	–	–	–	–	7.94	1.1351	5.75	0.5181	3.92	0.2050
125.00	–	–	–	–	8.27	1.2239	5.99	0.5584	4.09	0.2209
130.00	–	–	–	–	8.60	1.3157	6.23	0.6001	4.25	0.2373
135.00	–	–	–	–	8.94	1.4106	6.47	0.6432	4.41	0.2543
140.00	–	–	–	–	9.27	1.5086	6.71	0.6877	4.58	0.2718
145.00	–	–	–	–	9.60	1.6097	6.95	0.7336	4.74	0.2899
150.00	–	–	–	–	9.93	1.7139	7.19	0.7809	4.90	0.3085
155.00	–	–	–	–	–	–	7.43	0.8295	5.07	0.3276
160.00	–	–	–	–	–	–	7.67	0.8795	5.23	0.3473
165.00	–	–	–	–	–	–	7.91	0.9308	5.40	0.3674
170.00	–	–	–	–	–	–	8.15	0.9836	5.56	0.3882
175.00	–	–	–	–	–	–	8.39	1.0376	5.72	0.4094
180.00	–	–	–	–	–	–	8.63	1.0930	5.89	0.4312
185.00	–	–	–	–	–	–	8.87	1.1498	6.05	0.4534
190.00	–	–	–	–	–	–	9.11	1.2079	6.21	0.4762
195.00	–	–	–	–	–	–	9.35	1.2673	6.38	0.4996
200.00	–	–	–	–	–	–	9.59	1.3281	6.54	0.5234
205.00	–	–	–	–	–	–	9.83	1.3902	6.70	0.5478
210.00	–	–	–	–	–	–	10.07	1.4537	6.87	0.5726
215.00	–	–	–	–	–	–	–	–	7.03	0.5980
220.00	–	–	–	–	–	–	–	–	7.19	0.6239
225.00	–	–	–	–	–	–	–	–	7.36	0.6503
230.00	–	–	–	–	–	–	–	–	7.52	0.6772
235.00	–	–	–	–	–	–	–	–	7.68	0.7046
240.00	–	–	–	–	–	–	–	–	7.85	0.7326
245.00	–	–	–	–	–	–	–	–	8.01	0.7610
250.00	–	–	–	–	–	–	–	–	8.17	0.7900
255.00	–	–	–	–	–	–	–	–	8.34	0.8194
260.00	–	–	–	–	–	–	–	–	8.50	0.8493
265.00	–	–	–	–	–	–	–	–	8.67	0.8798
270.00	–	–	–	–	–	–	–	–	8.83	0.9107
275.00	–	–	–	–	–	–	–	–	8.99	0.9422
280.00	–	–	–	–	–	–	–	–	9.16	0.9741
285.00	–	–	–	–	–	–	–	–	9.32	1.0066
290.00	–	–	–	–	–	–	–	–	9.48	1.0395
295.00	–	–	–	–	–	–	–	–	9.65	1.0730
300.00	–	–	–	–	–	–	–	–	9.81	1.1069

5 GENERAL INFORMATION

5.1 DISCLAIMER

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