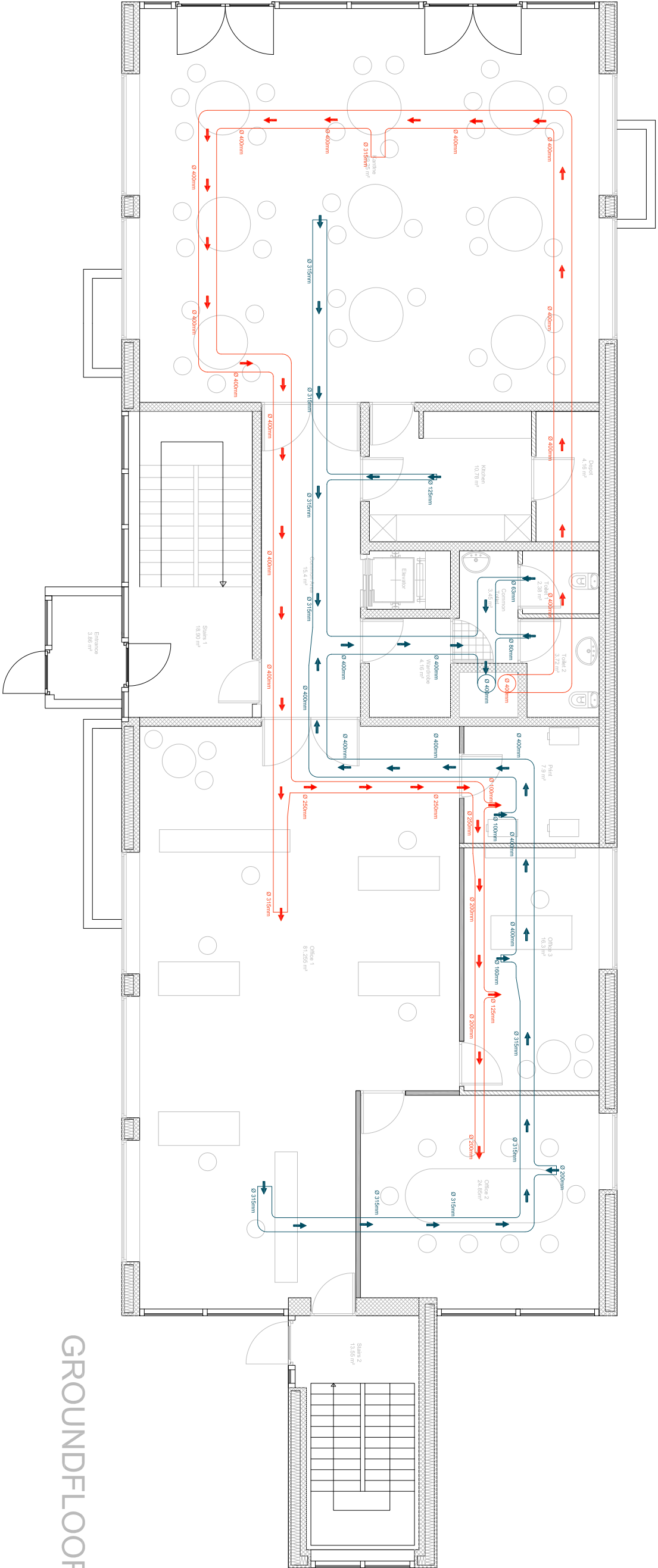INLECT DUCT
EXTRACT DUCT

BASEMENT
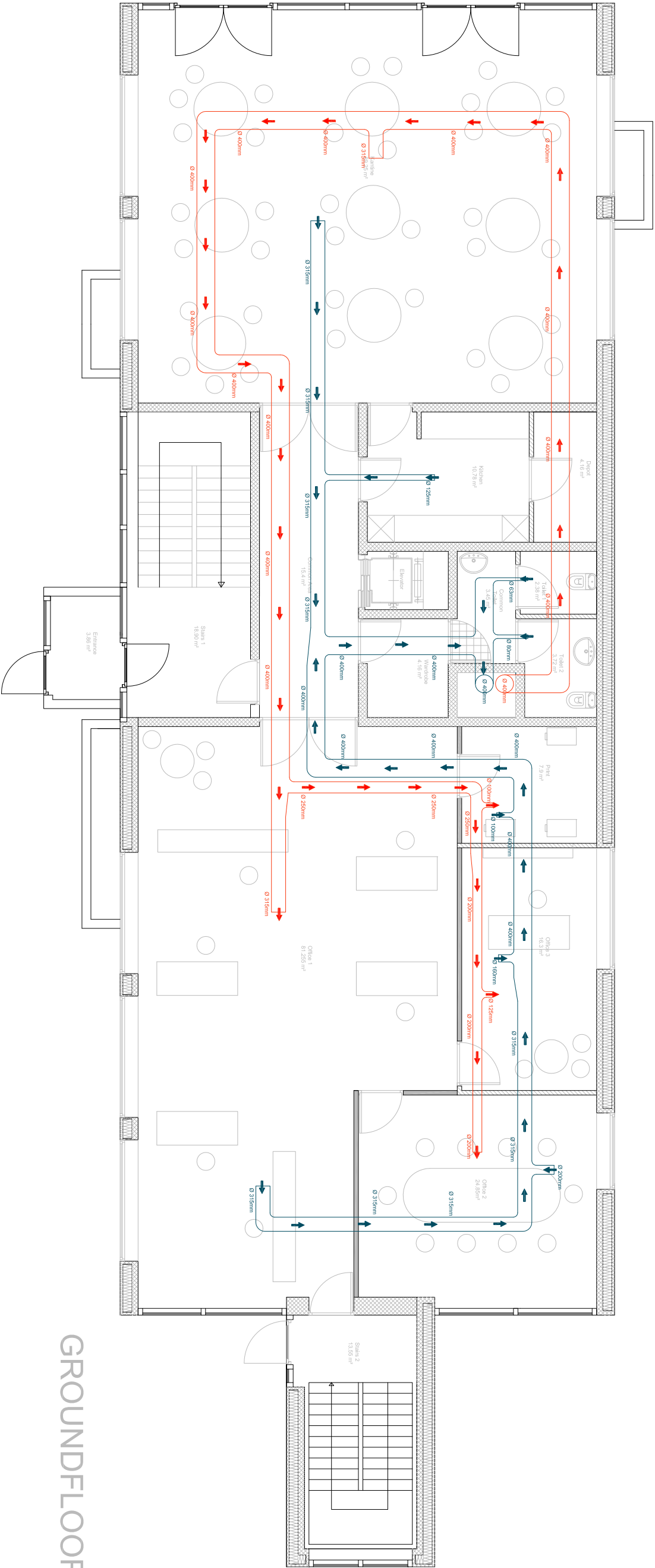
INLECT DUCT

EXTRACT DUCT

GROUNDFLOOR

INLECT DUCT

EXTRACT DUCT
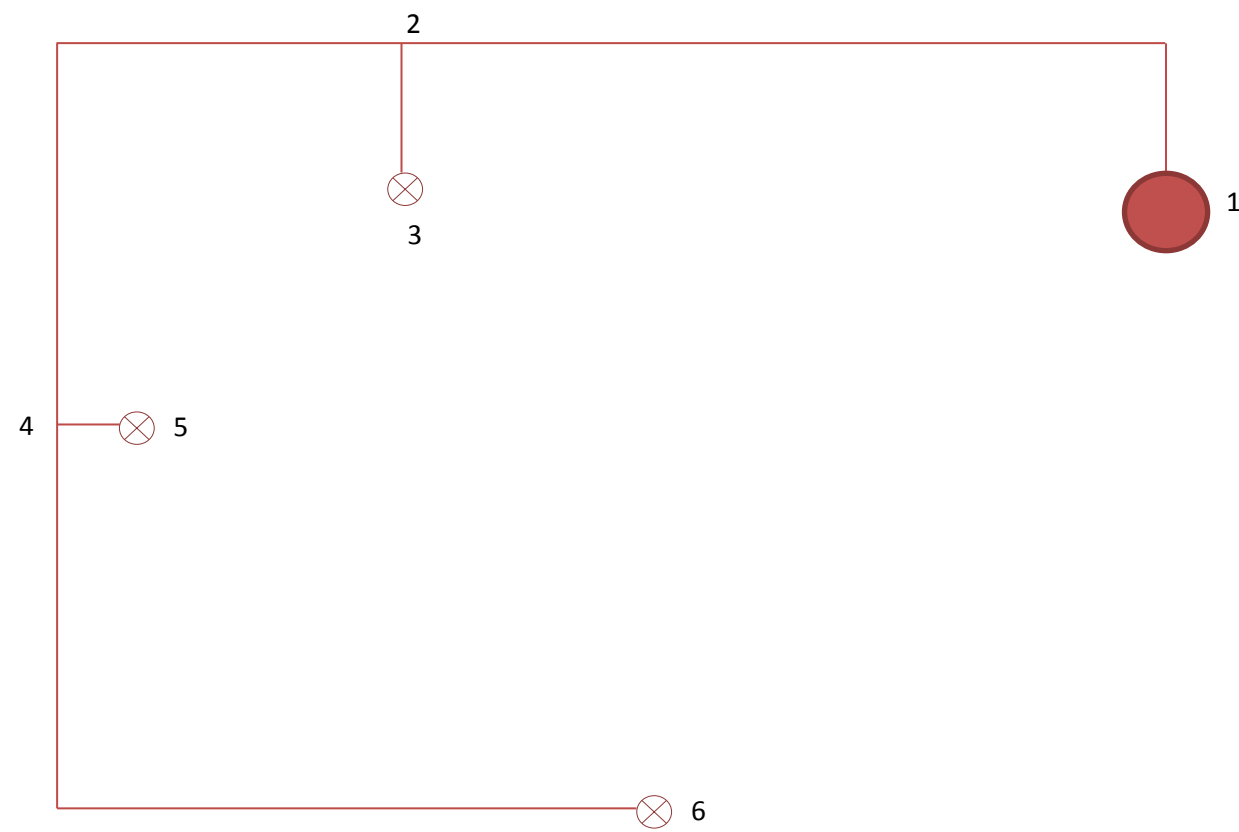
INLET DUCT

ROOM	AREA	VOLUMEN	m³/S	m³/H
Fitness	27.3	84.63	0.084	304.67
Archive	33.91	105.121	0.105	378.44
Pool	24.15	74.865	0.074	269.514
			TOTAL	**952.624**

Distance 1-2, Main Duct:

Air amount: 952.624 m³/h = 0.265 m³/s

$$d = \frac{\sqrt{0.265 \cdot 4}}{5.5 \cdot \pi} = 0.247 \text{ m} \rightarrow \varnothing \text{ 250mm}$$

Distance 2-3, Connection Duct:

Air amount: 304.67 m³/h = 0.084 m³/s

$$d = \frac{\sqrt{0.084 \cdot 4}}{3 \cdot \pi} = 0.16 \text{ m} \rightarrow \varnothing \text{ 160mm}$$

Distance 2-4, Branch Duct:

Air amount: 6470954 m³/h = 0.18 m³/s

$$d = \frac{\sqrt{0.18 \cdot 4}}{4 \cdot \pi} = 0.23\text{m} \rightarrow \varnothing \text{ 250mm}$$

Distance 4-5, Branch Duct:

Air amount: 378.44m³/h = 0.105 m³/s

$$d = \frac{\sqrt{0.105 \cdot 4}}{3 \cdot \pi} = 0.18 \text{ m} \rightarrow \varnothing \text{ 200mm}$$
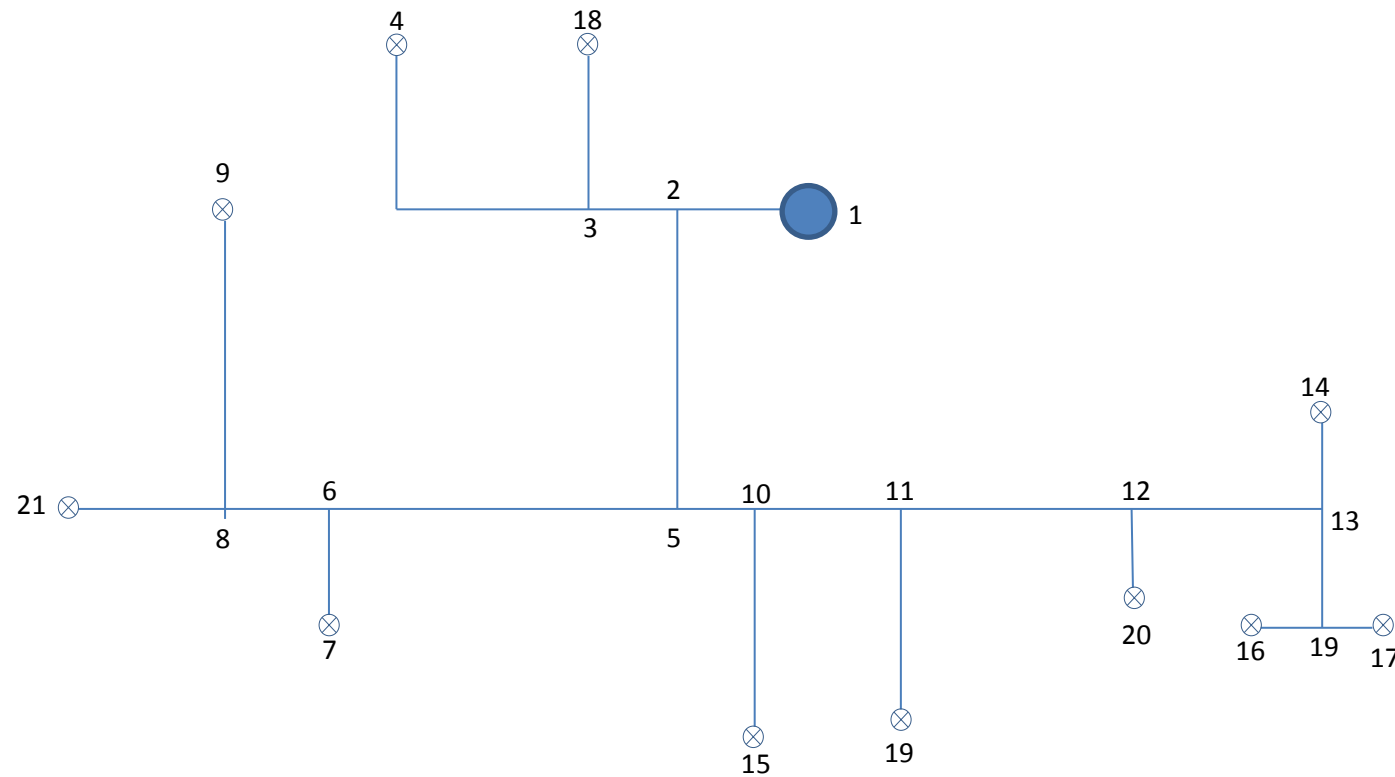
Distance 4-6, Connection Duct:

Air amount: 269.514 m³/h = 0.074 m³/s

$$d = \frac{\sqrt{0.074 \cdot 4}}{3 \cdot \pi} = 0.177 \text{ m} \rightarrow \varnothing \text{ 200mm}$$

EXTRACT DUCTS

ROOM	AREA	VOLUMEN	m³/s	m³/h
Toilet 1	1.6	4.96	1.96×10^{-3}	17.86
Toilet 2	2.875	8.9125	8.9125×10^{-3}	32.08
Fitness	27.3	84.63	0.085	304.67
Archive	33.91	105.121	0.105	37.84
Pool	24.15	74.865	0.075	269.51
Women clothing	20.46	63.426	0.063	228.33
Bathroom	13.52	41.912	0.042	150.38
Men clothing	73.64	228.284	0.228	821.82
Toilet 4	3.46	10.726	0.01	38.61
Toilet 3	3.18	9.858	9.858×10^{-3}	35.49
Toilet 5	1.40	4.34	4.34×10^{-3}	15.624
			TOTAL	1952.714

Distance 1-2, Main Duct:

Air amount:1952.714 m³/h = 0.5424 m³/s

$$d = \frac{\sqrt{0.5424 \cdot 4}}{5.5 \cdot \pi} = 0.354 \text{ m} \rightarrow \emptyset \text{ 400mm}$$

Distance 2-3, Branch duct

Air amount:49.94 m³/h = 0.0138 m³/s

$$d = \frac{\sqrt{0.0138 \cdot 4}}{4 \cdot \pi} = 0.066 \text{ m} \rightarrow \emptyset \text{ 80mm}$$

Distance 3-18, Connection duct

Air amount: 3.21 m³/h = 8.9167×10^{-4} m³/s

$$d = \frac{\sqrt{8.9167 \times 10^{-4} \cdot 4}}{3 \cdot \pi} = 0.019 \text{ m} \rightarrow \emptyset \text{ 25mm}$$

Distance 3-4, Connection duct

Air amount: 32.08 m³/h = 8.911×10^{-3} m³/s

$$d = \frac{\sqrt{8.911 \times 10^{-3} \cdot 4}}{3 \cdot \pi} = 0.061 \text{m} \rightarrow \emptyset \text{ 63mm}$$

Distance 5-6, Brunch duct

Air amount: 612.02 m³/h = 0.17 m³/s

$$d = \frac{\sqrt{0.17 \cdot 4}}{4 \cdot \pi} = 0.17 \text{m} \rightarrow \emptyset \text{ 250mm}$$

Distance 6-7, Connection duct

Air amount: 37.84 m³/h = 0.105 m³/s

$$d = \frac{\sqrt{0.105 \cdot 4}}{3 \cdot \pi} = 0.21 \text{m} \rightarrow \emptyset \text{ 250mm}$$

Distance 6-8, Branch duct

Air amount: 269.51 m³/h = 0.0748 m³/s

$$d = \frac{\sqrt{0.0748 \cdot 4}}{4 \cdot \pi} = 0.154 \text{m} \rightarrow \emptyset \text{ 160mm}$$

Distance 8-9, Connection duct

Air amount: 304.67 m³/h = 0.0846 m³/s

$$d = \frac{\sqrt{0.0846 \cdot 4}}{3 \cdot \pi} = 0.189 \text{m} \rightarrow \emptyset \text{ 200mm}$$

Distance 5-10, Branch duct

Air amount: 1290.754 m³/h = 0.3585 m³/s

$$d = \frac{\sqrt{0.3585 \cdot 4}}{4 \cdot \pi} = 0.337 \text{m} \rightarrow \emptyset \text{ 315mm}$$

Distance 10-15, Connection duct

Air amount: 15.624 m³/h = 4.34·10⁻³ m³/s

$$d = \frac{\sqrt{4.34 \cdot 10^{-3} \cdot 4}}{3 \cdot \pi} = 0.0429m \rightarrow \varnothing \ 63mm$$

Distance 10-11, Branch duct

Air amount: 1275.13 m³/h = 0.354 m³/s

$$d = \frac{\sqrt{0.354 \cdot 4}}{4 \cdot \pi} = 0.335m \rightarrow \varnothing \ 315mm$$

Distance 11-19, Connection duct

Air amount: 228.33 m³/h = 0.063 m³/s

$$d = \frac{\sqrt{0.063 \cdot 4}}{3 \cdot \pi} = 0.163m \rightarrow \varnothing \ 200mm$$

Distance 11-12, Branch duct

Air amount: 1046.8 m³/h = 0.2907 m³/s

$$d = \frac{\sqrt{0.2907 \cdot 4}}{4 \cdot \pi} = 0.304m \rightarrow \varnothing \ 315mm$$

Distance 12-20, Connection duct

Air amount: 150.88 m³/h = 0.0419 m³/s

$$d = \frac{\sqrt{0.0419 \cdot 4}}{3 \cdot \pi} = 0.133m \rightarrow \varnothing \ 160mm$$

Distance 12-13, Branch duct

Air amount: 895.92 m³/h = 0.2488 m³/s

$$d = \frac{\sqrt{0.2488 \cdot 4}}{4 \cdot \pi} = 0.2814m \rightarrow \varnothing \ 315mm$$

Distance 13-14, Connection duct

Air amount: 821.82 m³/h = 0.228 m³/s

$$d = \frac{\sqrt{0.228 \cdot 4}}{3 \cdot \pi} = 0.31m \rightarrow \varnothing \ 315mm$$

Distance 13-19, Branch duct

Air amount: 74.1 m³/h = 0.0205 m³/s

$$d = \frac{\sqrt{0.0205 \cdot 4}}{4 \cdot \pi} = 0.08m \rightarrow \varnothing \ 100mm$$
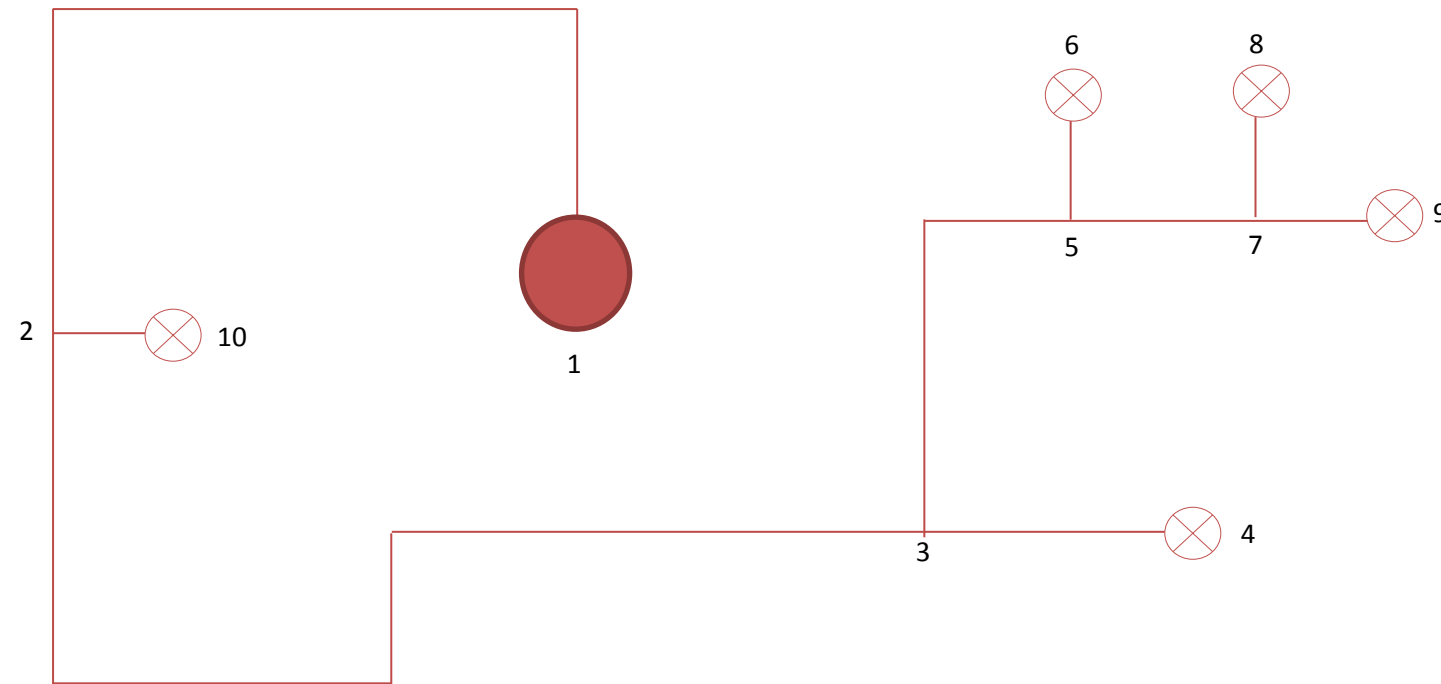

Distance 19-16, Connection duct

Air amount: 38.61 m³/h = 0.0107 m³/s

$$d = \frac{\sqrt{0.0107 \cdot 4}}{3 \cdot \pi} = 0.67m \rightarrow \varnothing \ 80mm$$

Distance 10-15, Connection duct

Air amount: 35.49 m³/h = 9.858·10⁻³ m³/s

$$d = \frac{\sqrt{9.858 \cdot 10^{-3} \cdot 4}}{3 \cdot \pi} = 0.064m \rightarrow \varnothing \ 80mm$$

INLET DUCTS GROUNDFLOOR

ROOM	AREA	VOLUMEN	m³/s	m³/h
Kantine	89.25	240.975	0.2409	867.51
Print	7.9	21.33	0.0213	76.788
Office 1	81.255	219.3885	0.21938	789.8
Office 2	24.85	67.095	0.067	241.542
Office 3	16.3	44.01	0.044	158.436
			TOTAL	**2134.076**

Distance 1-2, Main Duct:

Air amount: 2134.076 m³/h = 0.593 m³/s

$$d = \frac{\sqrt{0.593 \cdot 4}}{5.5 \cdot \pi} = 0.37 \text{ m} \rightarrow \text{Ø 400mm}$$

Distance 2-3, Branch Duct:

Air amount: 1266.566 m³/h = 0.352 m³/s

$$d = \frac{\sqrt{0.352 \cdot 4}}{4 \cdot \pi} = 0.334 \text{ m} \rightarrow \text{Ø 400mm}$$

Distance 3-4, Connection Duct:

Air amount: 789.8 m³/h = 0.2193 m³/s

$$d = \frac{\sqrt{0.2193 \cdot 4}}{3 \cdot \pi} = 0.3049 \text{ m} \rightarrow \text{Ø 315mm}$$

Distance 3-5, Branch Duct:

Air amount: 476.766 m³/h = 0.132 m³/s

$$d = \frac{\sqrt{0.132 \cdot 4}}{4 \cdot \pi} = 0.2049 \text{ m} \rightarrow \text{Ø 250mm}$$

Distance 5-6, Connection Duct:

Air amount: 76.788 m³/h = 0.02133 m³/s

$$d = \frac{\sqrt{0.02133 \cdot 4}}{3 \cdot \pi} = 0.095 \text{ m} \rightarrow \text{Ø 100mm}$$

Distance 5-7, Branch Duct:

Air amount: 399.978 m³/h = 0.111 m³/s

$$d = \frac{\sqrt{0.111 \cdot 4}}{4 \cdot \pi} = 0.1879 \text{ m} \rightarrow \text{Ø 200mm}$$
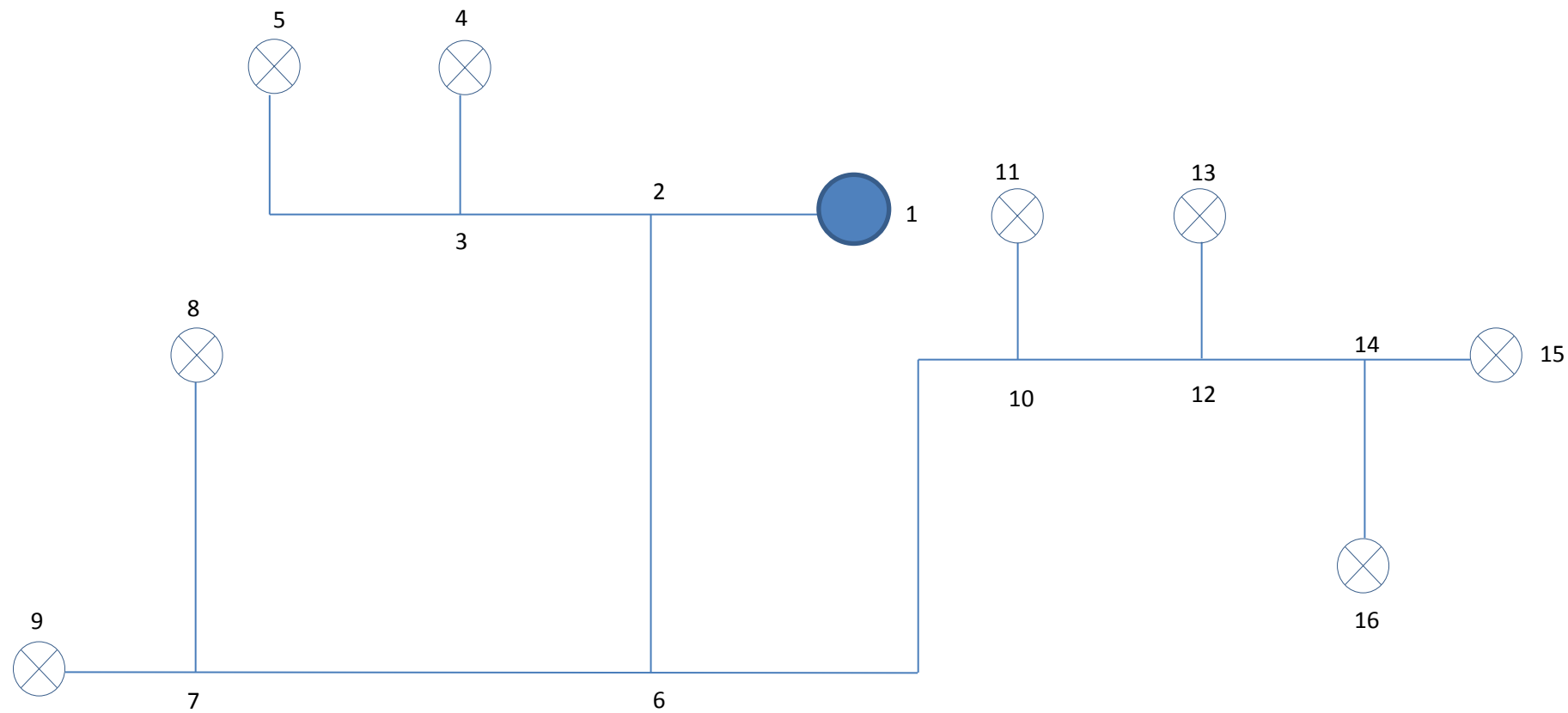
Distance 7-8, Connection Duct:

Air amount: 1580436 m³/h = 0.044 m³/s

$$d = \frac{\sqrt{0.44 \cdot 4}}{3 \cdot \pi} = 0.136 \text{ m} \rightarrow \text{Ø 125mm}$$

Distance 7-9, Connection Duct:

Air amount: 241.542 m³/h = 0.067 m³/s

$$d = \frac{\sqrt{0.067 \cdot 4}}{3 \cdot \pi} = 0.168 \text{ m} \rightarrow \text{Ø 200mm}$$

EXTRACT DUCTS GROUNDFLOOR

ROOM	AREA	VOLUMEN	m³/s	m³/h
Toilet 1	2.38	6.426	$6.426 \cdot 10^{-3}$	23.1336
Toilet 2	3.72	10.044	0.01	36.1584
Kitchen	10.78	29.106	0.029	104.7816
Kantine	89.25	240.975	0.2409	867051
Print	7.9	21.33	0.021	76.788
Office 3	16.3	44.01	0.044	158.436
Office 2	24.85	67.095	0.067	241.542
Office 1	81.255	219.3885	0.2193	789.798
			TOTAL	**2298.1476**

Distance 1-2, Main Duct:

Air amount: 2298.1473m³/h = 0.638 m³/s

$$d = \frac{\sqrt{0.638 \cdot 4}}{5.5 \cdot \pi} = 0.378m \rightarrow \text{Ø } 400mm$$

Distance 3-4, Connection Duct:

Air amount: 36.1584 m³/h = 0.01m³/s

$$d = \frac{\sqrt{0.01 \cdot 4}}{3 \cdot \pi} = 0.065 \text{ m} \rightarrow \text{Ø } 80mm$$

Distance 3-5, Connection Duct:

Air amount: 23.1336 m³/h = $6.426 \cdot 10^{-3}$ m³/s

$$d = \frac{\sqrt{6.426 \cdot 10^{-3} \cdot 4}}{3 \cdot \pi} = 0.052 \text{ m} \rightarrow \text{Ø } 63mm$$

Distance 6-7, Branch Duct:

Air amount: 972.29 m³/h = 0.27 m³/s

$$d = \frac{\sqrt{0.27 \cdot 4}}{4 \cdot \pi} = 0.293 \text{ m} \rightarrow \text{Ø } 315mm$$

Distance 7-8, Connection Duct:

Air amount: 104.7816 m³/h = 0.029 m³/s

$$d = \frac{\sqrt{0.029 \cdot 4}}{3 \cdot \pi} = 0.11 \text{ m} \rightarrow \text{Ø } 125mm$$

Distance 7-9, Connection Duct:

Air amount: 867.51 m³/h = 0.24m³/s

$$d = \frac{\sqrt{0.24 \cdot 4}}{3 \cdot \pi} = 0.31 \text{ m} \rightarrow \text{Ø } 315mm$$

Distance 6-10, Branch Duct:

Air amount: 1266.564 m³/h = 0.351m³/s

$$d = \frac{\sqrt{0.351 \cdot 4}}{4 \cdot \pi} = 0.33 \text{ m} \rightarrow \text{Ø } 400mm$$

Distance 10-11, Connection Duct:

Air amount: 76.788 m³/h = 0.021m³/s

$$d = \frac{\sqrt{0.021 \cdot 4}}{3 \cdot \pi} = 0.094 \text{ m} \rightarrow \text{Ø } 100mm$$

Distance 10-12, Branch Duct:

Air amount: 1189.776 m³/h = 0.33m³/s

$$d = \frac{\sqrt{0.33 \cdot 4}}{4 \cdot \pi} = 0.324 \text{ m} \rightarrow \text{Ø } 400mm$$

Distance 12-13, Connection Duct:

Air amount: 158.436 m³/h = 0.044m³/s

$$d = \frac{\sqrt{0.044 \cdot 4}}{3 \cdot \pi} = 0.1366 \text{ m} \rightarrow \varnothing \text{ 160mm}$$

Distance 3-4, Connection Duct:

Air amount: 36.1584 m³/h = 0.01m³/s

$$d = \frac{\sqrt{0.01 \cdot 4}}{3 \cdot \pi} = 0.065 \text{ m} \rightarrow \varnothing \text{ 80mm}$$

Distance 12-14, Branch Duct:

Air amount: 1031.34 m³/h = 0.286 m³/s

$$d = \frac{\sqrt{0.286 \cdot 4}}{4 \cdot \pi} = 0.3017 \text{ m} \rightarrow \varnothing \text{ 315mm}$$
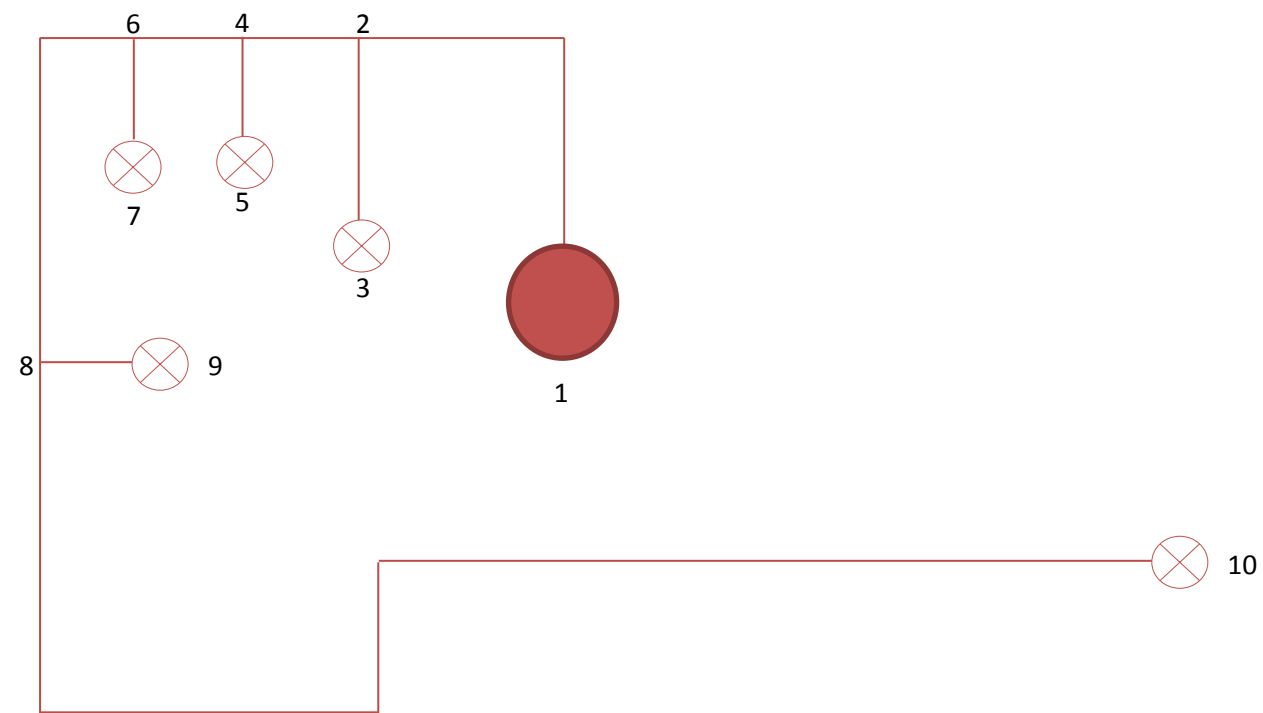
Distance 14-15, Connection Duct:

Air amount: 241.542 m³/h = 0.067m³/s

$$d = \frac{\sqrt{0.067 \cdot 4}}{3 \cdot \pi} = 0.168 \text{ m} \rightarrow \varnothing \text{ 200mm}$$

Distance 14-16, Connection Duct:

Air amount: 789.798 m³/h = 0.219m³/s

$$d = \frac{\sqrt{0.219 \cdot 4}}{3 \cdot \pi} = 0.304 \text{ m} \rightarrow \varnothing \text{ 315mm}$$

INLET DUCTS GROUNDFLOOR

ROOM	AREA	VOLUMEN	m³/s	m³/h
Office 3	12	35.1	0.0351	126.36
Office 2	13.15	35.505	0.0355	127.818
Office 1	62.125	167.7375	0.167	603.855
Office 4	130.615	352.66	0.352	1269.57
Print	10.64	28.728	0.028	103.4208
			TOTAL	2231.0238

Distance 1-2, Main Duct:

Air amount: 2231.0238 m³/h = 0.619 m³/s

$d = \frac{\sqrt{0.619 \cdot 4}}{5.5 \cdot \pi} = 0.378$ m → Ø 400mm

Distance 2-3, Connection Duct:

Air amount: 103.4208 m³/h = 0.028 m³/s

$d = \frac{\sqrt{0.028 \cdot 4}}{3 \cdot \pi} = 0.109$ m → Ø 125mm

Distance 4-5, Connection Duct:

Air amount: 126.36 m³/h = 0.0351 m³/s

$d = \frac{\sqrt{0.0351 \cdot 4}}{3 \cdot \pi} = 0.12$ m → Ø 125mm

Distance 6-7, Connection Duct:

Air amount: 127.818 m³/h = 0.035 m³/s

$d = \frac{\sqrt{0.035 \cdot 4}}{3 \cdot \pi} = 0.12$ m → Ø 125mm

Distance 6-8, Branch Duct:

Air amount: 1873.425 m³/h = 0.52 m³/s

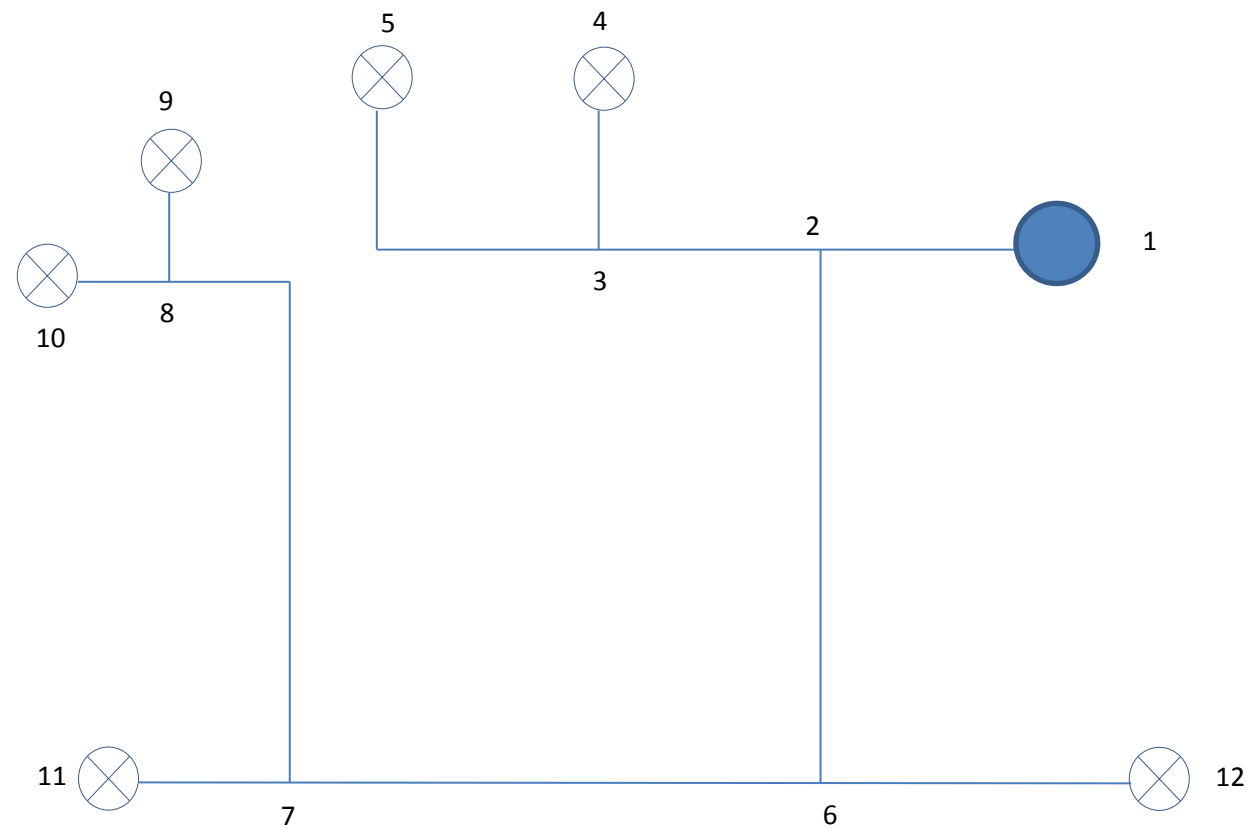$d = \frac{\sqrt{0.52 \cdot 4}}{4 \cdot \pi} = 0.4$ m → Ø 400mm

Distance 8-9, Connection Duct:

Air amount: 603.855 m³/h = 0.167 m³/s

$d = \frac{\sqrt{0.167 \cdot 4}}{3 \cdot \pi} = 0.266$ m → Ø 315mm

Distance 8-10, Connection Duct:

Air amount: 1269.57 m³/h = 0.352 m³/s

$d = \frac{\sqrt{0.352 \cdot 4}}{3 \cdot \pi} = 0.386$ m → Ø 400mm

EXTRACT DUCTS 1st FLOOR

ROOM	AREA	VOLUMEN	m³/s	m³/h
Toilet 1	2.38	6.426	$6.426 \cdot 10^{-3}$	23.1336
Toilet 2	3.72	10.044	0.01	36.1584
Office 3	13	35.1	0.0351	126.36
Office 2	13.15	35.505	0.0355	127.818
Office 1	62.125	167.7375	0.1677	603.855
Office 4	131.615	355.3605	0.355	1279.2978
			TOTAL	**2196.6228**

Distance 1-2, Main Duct:

Air amount: 2196.228m³/h = 0.6107 m³/s

$$d = \frac{\sqrt{0.6107 \cdot 4}}{5.5 \cdot \pi} = 0.375m \rightarrow \text{Ø } 400mm$$

Distance 3-4, Connection Duct:

Air amount: 36.1584 m³/h = 0.01m³/s

$$d = \frac{\sqrt{0.01 \cdot 4}}{3 \cdot \pi} = 0.065 \text{ m} \rightarrow \text{Ø } 80mm$$

Distance 3-5, Connection Duct:

Air amount: 23.1336 m³/h = 6.426·10⁻³ m³/s

$$d = \frac{\sqrt{6.426 \cdot 10^{-3} \cdot 4}}{3 \cdot \pi} = 0.052 \text{ m} \rightarrow \text{Ø } 63mm$$

Distance 6-7, Branch Duct:

Air amount: 858.033 m³/h = 0.238 m³/s

$$d = \frac{\sqrt{0.238 \cdot 4}}{4 \cdot \pi} = 0.275 \text{ m} \rightarrow \text{Ø } 315mm$$

Distance 7-8, Branch Duct:

Air amount: 254.178 m³/h = 0.07 m³/s

$$d = \frac{\sqrt{0.07 \cdot 4}}{4 \cdot \pi} = 0.11 \text{ m} \rightarrow \text{Ø } 125mm$$

Distance 8-9, Connection Duct:

Air amount: 126.36 m³/h = 0.0351m³/s

$$d = \frac{\sqrt{0.0351 \cdot 4}}{3 \cdot \pi} = 0.122 \text{ m} \rightarrow \text{Ø } 125mm$$

Distance 8-10, Connection Duct:

Air amount: 127.818 m³/h = 0.35m³/s

$$d = \frac{\sqrt{0.35 \cdot 4}}{3 \cdot \pi} = 0.12 \text{ m} \rightarrow \text{Ø } 125mm$$

Distance 7-11, Connection Duct:

Air amount: 603.855 m³/h = 0.167m³/s

$$d = \frac{\sqrt{0.167 \cdot 4}}{3 \cdot \pi} = 0.266 \text{ m} \rightarrow \text{Ø } 315mm$$

Distance 6-12, Connection Duct:

Air amount: 1279.2978 m³/h = 0.355m³/s

$$d = \frac{\sqrt{0.355 \cdot 4}}{3 \cdot \pi} = 0.388 \text{ m} \rightarrow \text{Ø } 400mm$$