

Duct Pressure Loss Report

Project Name	Thesis
Project Issue Date	25 April 2015
Project Status	Active Cooling
Client Name	Artambo
Project Address	JL. Raya Medan Tenggara Medan, 20228 North Sumatera, Indonesia
Project Number	1
Organization Name	FAI-UTB
Organization Description	Education
Building Name	Residential Family In Indonesia
Author	Artambo Pangaribuan
Phone	
Fax	
Email	
Address	
Test Data	
Specification	
Sales Information	
Product Data	
Installation_Fabrication	
Construction Details	
Green Building-LEED	
Product Properties	
LEED_Green Building	
Copyright	Artambo
Warranty Duration (Years)	
Maintenance Schedule (months)	
Installation Phase	
Expected Lifespan (Years)	
Run Time	7/1/2015 5:01:57 PM

Mechanical Return Air 1

System Information	
System Classification	Return Air
System Type	Return Air
System Name	Mechanical Return Air 1
Abbreviation	

Total Pressure Loss Calculations by Sections

Section	Element	Flow	Velocity	Velocity Pressure	Length	Loss Coefficient	Friction	Equivalent Diameter	Reynolds number	Total Pressure Loss	Section Pressure Loss
1	Duct	502.1 L/s	4.9 m/s	-	6.46	-	0.75 Pa/m	361 mm	117481.49	4.51 Pa	6.2 Pa
	Fittings	502.1 L/s	4.9 m/s	14.5 Pa	-	0.092625	-	-	-	1.3 Pa	
	Equipment	502.1 L/s	-	-	-	-	-	-	-	0.0 Pa	
2	Duct	31.5 L/s	2.1 m/s	-	0.78	-	0.56 Pa/m	137 mm	19478.087	0.39 Pa	14.8 Pa

	Fittings	31.5 L/s	2.1 m/s	2.8 Pa	-	0.139953	-	-	0.4 Pa	
	Air Terminal	31.5 L/s	-	-	-	-	-	-	14.0 Pa	
3	Duct	31.5 L/s	2.7 m/s	-	12.39	-	0.97 Pa/m	122 mm	21809.0715010 Pa	9.2 Pa
	Fittings	31.5 L/s	2.7 m/s	4.4 Pa	-	-0.638182	-	-	-2.8 Pa	
4	Duct	158.8 L/s	5.4 m/s	-	0.87	-	1.96 Pa/m	193 mm	69499.174076 Pa	16.1 Pa
	Fittings	158.8 L/s	5.4 m/s	17.7 Pa	-	0.810587	-	-	14.4 Pa	
5	Fittings	250.3 L/s	8.6 m/s	44.0 Pa	-	0.045391	-	-	2.0 Pa	2.0 Pa
6	Duct	250.3 L/s	8.0 m/s	-	1.56	-	3.82 Pa/m	200 mm	105710.306738 Pa	11.8 Pa
	Fittings	250.3 L/s	8.0 m/s	38.2 Pa	-	0.151823	-	-	5.8 Pa	
7	Duct	271.0 L/s	8.6 m/s	-	1.35	-	4.43 Pa/m	200 mm	114452.628899 Pa	19.6 Pa
	Fittings	271.0 L/s	8.6 m/s	44.7 Pa	-	0.305775	-	-	13.7 Pa	
8	Fittings	271.0 L/s	4.6 m/s	12.9 Pa	-	-0.018276	-	-	-0.2 Pa	-0.2 Pa
9	Duct	293.2 L/s	5.0 m/s	-	2.02	-	1.10 Pa/m	273 mm	90716.810671 Pa	2.1 Pa
	Fittings	293.2 L/s	5.0 m/s	15.1 Pa	-	-0.005656	-	-	-0.1 Pa	
10	Duct	320.4 L/s	5.5 m/s	-	1.28	-	1.30 Pa/m	273 mm	99132.558455 Pa	8.1 Pa
	Fittings	320.4 L/s	5.5 m/s	18.0 Pa	-	0.360326	-	-	6.5 Pa	
11	Duct	410.6 L/s	7.0 m/s	-	0.69	-	2.06 Pa/m	273 mm	127040.663288 Pa	36.2 Pa
	Fittings	410.6 L/s	7.0 m/s	29.6 Pa	-	1.177151	-	-	34.8 Pa	
12	Fittings	22.2 L/s	1.5 m/s	1.4 Pa	-	0.123624	-	-	0.2 Pa	14.2 Pa
	Air Terminal	22.2 L/s	-	-	-	-	-	-	14.0 Pa	
13	Duct	22.2 L/s	2.4 m/s	-	9.81	-	0.88 Pa/m	109 mm	17156.12787 Pa	-156.8 Pa
	Fittings	22.2 L/s	2.4 m/s	3.4 Pa	-	-49.137154	-	-	-165.4 Pa	
14	Fittings	27.2 L/s	1.9 m/s	2.1 Pa	-	0.055806	-	-	0.1 Pa	14.1 Pa
	Air Terminal	27.2 L/s	-	-	-	-	-	-	14.0 Pa	
15	Duct	27.2 L/s	2.3 m/s	-	5.13	-	0.74 Pa/m	122 mm	18831.960205 Pa	-139.1 Pa
	Fittings	27.2 L/s	2.3 m/s	3.3 Pa	-	-43.897548	-	-	-142.9 Pa	
16	Duct	35.8 L/s	2.4 m/s	-	0.78	-	0.70 Pa/m	137 mm	22137.000843 Pa	14.9 Pa
	Fittings	35.8 L/s	2.4 m/s	3.6 Pa	-	0.087995	-	-	0.3 Pa	
	Air Terminal	35.8 L/s	-	-	-	-	-	-	14.0 Pa	
17	Duct	35.8 L/s	2.4 m/s	-	2.75	-	0.69 Pa/m	137 mm	22072.367169 Pa	2.7 Pa
	Fittings	35.8 L/s	2.4 m/s	3.5 Pa	-	0.230028	-	-	0.8 Pa	
18	Duct	127.3 L/s	4.4 m/s	-	1.05	-	1.30 Pa/m	193 mm	55713.128844 Pa	7.0 Pa
	Fittings	127.3 L/s	4.4 m/s	11.4 Pa	-	0.49501	-	-	5.6 Pa	
19	Fittings	20.7 L/s	1.4 m/s	1.2 Pa	-	0.123624	-	-	0.1 Pa	14.1 Pa

	Air Terminal	20.7 L/s	-	-	-	-	-	-	14.0 Pa	
20	Duct	20.7 L/s	2.2 m/s	-	0.78	-	0.77 Pa/m	109 mm	15996.929061 Pa	0.6 Pa
	Fittings	20.7 L/s	2.2 m/s	2.9 Pa	-	0.001213	-	-	-	0.0 Pa
21	Duct	20.7 L/s	2.2 m/s	-	10.26	-	0.78 Pa/m	109 mm	16040.958008 Pa	-709.2 Pa
	Fittings	20.7 L/s	2.2 m/s	3.0 Pa	-	-242.401636	-	-	-	-717.3 Pa
22	Fittings	91.5 L/s	6.2 m/s	23.4 Pa	-	0.328349	-	-	-	7.7 Pa
	Air Terminal	91.5 L/s	-	-	-	-	-	-	-	14.0 Pa
23	Duct	91.5 L/s	3.1 m/s	-	0.66	-	0.72 Pa/m	193 mm	40107.522015 Pa	0.9 Pa
	Fittings	91.5 L/s	3.1 m/s	5.9 Pa	-	0.071473	-	-	-	0.4 Pa
24	Duct	91.5 L/s	3.1 m/s	-	4.71	-	0.71 Pa/m	193 mm	40045.179017 Pa	6.6 Pa
	Fittings	91.5 L/s	3.1 m/s	5.9 Pa	-	0.547783	-	-	-	3.2 Pa
25	Fittings	91.5 L/s	6.2 m/s	23.4 Pa	-	0.328349	-	-	-	7.7 Pa
	Air Terminal	91.5 L/s	-	-	-	-	-	-	-	14.0 Pa
26	Duct	91.5 L/s	3.1 m/s	-	0.66	-	0.72 Pa/m	193 mm	40107.522015 Pa	0.9 Pa
	Fittings	91.5 L/s	3.1 m/s	5.9 Pa	-	0.071473	-	-	-	0.4 Pa
27	Duct	91.5 L/s	3.1 m/s	-	5.23	-	0.71 Pa/m	193 mm	40045.179017 Pa	7.8 Pa
	Fittings	91.5 L/s	3.1 m/s	5.9 Pa	-	0.686329	-	-	-	4.0 Pa
28	Fittings	90.2 L/s	6.2 m/s	22.8 Pa	-	0.320288	-	-	-	7.3 Pa
	Air Terminal	90.2 L/s	-	-	-	-	-	-	-	14.0 Pa
29	Duct	90.2 L/s	3.2 m/s	-	0.66	-	0.74 Pa/m	190 mm	40015.297015 Pa	0.9 Pa
	Fittings	90.2 L/s	3.2 m/s	6.0 Pa	-	0.070954	-	-	-	0.4 Pa
30	Duct	90.2 L/s	3.2 m/s	-	7.82	-	0.75 Pa/m	190 mm	40099.540031 Pa	3.7 Pa
	Fittings	90.2 L/s	3.2 m/s	6.1 Pa	-	-0.355654	-	-	-	-2.2 Pa
31	Fittings	91.5 L/s	6.2 m/s	23.4 Pa	-	0.329379	-	-	-	7.7 Pa
	Air Terminal	91.5 L/s	-	-	-	-	-	-	-	14.0 Pa
32	Duct	91.5 L/s	3.1 m/s	-	2.66	-	0.71 Pa/m	193 mm	40045.179017 Pa	5.7 Pa
	Fittings	91.5 L/s	3.1 m/s	5.9 Pa	-	0.639257	-	-	-	3.8 Pa
33	Duct	91.5 L/s	0.9 m/s	-	0.54	-	0.03 Pa/m	361 mm	21409.195030 Pa	9.0 Pa
	Fittings	91.5 L/s	0.9 m/s	0.5 Pa	-	18.680946	-	-	-	9.0 Pa

Critical Path : 25-26-27-18-4-5-6-7-8-9-10-11-1 ; Total Pressure Loss : 139.3 Pa

Detail Information of Straight Segment by Sections

Section	Element ID	Flow	Size	Velocity	Velocity Pressure	Length	Pressure Loss	Total Pressure Loss
1	501252	502.1 L/s	361 mm \varnothing	4.9 m/s	14.5 Pa	0.00	0.0 Pa	4.9 Pa

	501256	502.1 L/s	361 mmØ	4.9 m/s	14.5 Pa	6.45	4.9 Pa	
2	516783	31.5 L/s	137 mmØ	2.1 m/s	2.8 Pa	0.78	0.4 Pa	0.4 Pa
3	516770	31.5 L/s	122 mmØ	2.7 m/s	4.4 Pa	3.32	3.2 Pa	12.0 Pa
	516795	31.5 L/s	122 mmØ	2.7 m/s	4.4 Pa	9.07	8.8 Pa	
4	516952	158.8 L/s	193 mmØ	5.4 m/s	17.7 Pa	0.87	1.7 Pa	1.7 Pa
6	514953	250.3 L/s	200 mmØ	8.0 m/s	38.2 Pa	1.56	6.0 Pa	6.0 Pa
7	510633	271.0 L/s	200 mmØ	8.6 m/s	44.7 Pa	1.35	6.0 Pa	6.0 Pa
9	510647	293.2 L/s	273 mmØ	5.0 m/s	15.1 Pa	2.02	2.2 Pa	2.2 Pa
10	522612	320.4 L/s	273 mmØ	5.5 m/s	18.0 Pa	1.28	1.7 Pa	1.7 Pa
11	501266	410.6 L/s	273 mmØ	7.0 m/s	29.6 Pa	0.69	1.4 Pa	1.4 Pa
13	501290	22.2 L/s	109 mmØ	2.4 m/s	3.4 Pa	0.78	0.7 Pa	8.6 Pa
	510635	22.2 L/s	109 mmØ	2.4 m/s	3.4 Pa	9.04	7.9 Pa	
15	501372	27.2 L/s	122 mmØ	2.3 m/s	3.3 Pa	4.35	3.2 Pa	3.8 Pa
	501380	27.2 L/s	122 mmØ	2.3 m/s	3.3 Pa	0.78	0.6 Pa	
16	510435	35.8 L/s	137 mmØ	2.4 m/s	3.6 Pa	0.78	0.5 Pa	0.5 Pa
17	517921	35.8 L/s	137 mmØ	2.4 m/s	3.5 Pa	2.75	1.9 Pa	1.9 Pa
18	518987	127.3 L/s	193 mmØ	4.4 m/s	11.4 Pa	0.50	0.6 Pa	1.4 Pa
	519729	127.3 L/s	193 mmØ	4.4 m/s	11.4 Pa	0.56	0.7 Pa	
20	501364	20.7 L/s	109 mmØ	2.2 m/s	2.9 Pa	0.78	0.6 Pa	0.6 Pa
21	501358	20.7 L/s	109 mmØ	2.2 m/s	3.0 Pa	10.26	8.1 Pa	8.1 Pa
23	501322	91.5 L/s	193 mmØ	3.1 m/s	5.9 Pa	0.66	0.5 Pa	0.5 Pa
24	501316	91.5 L/s	193 mmØ	3.1 m/s	5.9 Pa	4.71	3.4 Pa	3.4 Pa
26	501350	91.5 L/s	193 mmØ	3.1 m/s	5.9 Pa	0.66	0.5 Pa	0.5 Pa
27	501344	91.5 L/s	193 mmØ	3.1 m/s	5.9 Pa	5.23	3.7 Pa	3.7 Pa
29	501276	90.2 L/s	190 mmØ	3.2 m/s	6.0 Pa	0.66	0.5 Pa	0.5 Pa
30	510649	90.2 L/s	190 mmØ	3.2 m/s	6.1 Pa	7.82	5.9 Pa	5.9 Pa
32	501384	91.5 L/s	193 mmØ	3.1 m/s	5.9 Pa	2.01	1.4 Pa	1.9 Pa
	501390	91.5 L/s	193 mmØ	3.1 m/s	5.9 Pa	0.66	0.5 Pa	
33	521763	91.5 L/s	361 mmØ	0.9 m/s	0.5 Pa	0.54	0.0 Pa	0.0 Pa

Fitting and Accessory Loss Coefficient Summary by Sections

Section	Element ID	Loss Method	ASHRAE Table	Loss Coefficient	Pressure Loss	Total Pressure Loss
1	501258	Coefficient from ASHRAE Table	CD3-11	0.046312	0.7 Pa	1.3 Pa
	501262	Coefficient from ASHRAE Table	CD3-11	0.046312	0.7 Pa	
	520341	Coefficient from ASHRAE Table	ED5-3	0	0.0 Pa	
2	516785	Coefficient from ASHRAE Table	CD3-11	0.084147	0.2 Pa	0.4 Pa
	516833	Coefficient from ASHRAE Table	ED4-1	0.055806	0.2 Pa	
3	516833	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	-2.8 Pa
	517034		ED5-3	-0.726161	-3.2 Pa	

		Coefficient from ASHRAE Table				
	517315	Coefficient from ASHRAE Table	CD3-11	0.087979	0.4 Pa	
4	516176	Coefficient from ASHRAE Table	ED5-4	0.810587	14.4 Pa	14.4 Pa
	517034	Coefficient from ASHRAE Table	ED5-3	0	0.0 Pa	
5	516176	Coefficient from ASHRAE Table	ED5-4	0	0.0 Pa	2.0 Pa
	519955	Coefficient from ASHRAE Table	ED4-1	0.045391	2.0 Pa	
6	514443	Coefficient from ASHRAE Table	SD5-10	0.151823	5.8 Pa	5.8 Pa
	519955	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
7	514443	Coefficient from ASHRAE Table	SD5-10	0	0.0 Pa	13.7 Pa
	522187	Coefficient from ASHRAE Table	ED4-1	0.305775	13.7 Pa	
8	510637	Coefficient from ASHRAE Table	SD5-10	-0.018276	-0.2 Pa	-0.2 Pa
	522187	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
9	510637	Coefficient from ASHRAE Table	SD5-10	0	0.0 Pa	-0.1 Pa
	522219	Coefficient from ASHRAE Table	ED5-3	-0.005656	-0.1 Pa	
10	510651	Coefficient from ASHRAE Table	SD5-10	0.360326	6.5 Pa	6.5 Pa
	522219	Coefficient from ASHRAE Table	ED5-3	0	0.0 Pa	
11	510651	Coefficient from ASHRAE Table	SD5-10	0	0.0 Pa	34.8 Pa
	520341	Coefficient from ASHRAE Table	ED5-3	1.177151	34.8 Pa	
12	510336	Coefficient from ASHRAE Table	SD4-1	0.123624	0.2 Pa	0.2 Pa
13	510336	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	
	510637	Coefficient from ASHRAE Table	SD5-10	-49.228466	-165.7 Pa	-165.4 Pa
	514310	Coefficient from ASHRAE Table	CD3-11	0.091312	0.3 Pa	
14	510338	Coefficient from ASHRAE Table	ED4-1	0.055806	0.1 Pa	0.1 Pa
15	510338	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
	522219	Coefficient from ASHRAE Table	ED5-3	-43.985527	-143.2 Pa	-142.9 Pa
	522354	Coefficient from ASHRAE Table	CD3-11	0.087979	0.3 Pa	
16	518600		CD3-11	0.084147	0.3 Pa	0.3 Pa

		Coefficient from ASHRAE Table				
	518602	Coefficient from ASHRAE Table	ED4-1	0.003848	0.0 Pa	
17	517363	Coefficient from ASHRAE Table	ED5-3	0.230028	0.8 Pa	0.8 Pa
	518602	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
18	517034	Coefficient from ASHRAE Table	ED5-3	0.425666	4.8 Pa	5.6 Pa
	517363	Coefficient from ASHRAE Table	ED5-3	0	0.0 Pa	
	519776	Coefficient from ASHRAE Table	CD3-11	0.069344	0.8 Pa	
19	510342	Coefficient from ASHRAE Table	SD4-1	0.123624	0.1 Pa	0.1 Pa
20	510342	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	0.0 Pa
	515965	Coefficient from ASHRAE Table	SD4-1	0.001213	0.0 Pa	
21	514443	Coefficient from ASHRAE Table	SD5-10	-242.493027	-717.5 Pa	-717.3 Pa
	515963	Coefficient from ASHRAE Table	CD3-11	0.091391	0.3 Pa	
	515965	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	
22	520007	Coefficient from ASHRAE Table	ED4-1	0.328349	7.7 Pa	7.7 Pa
23	516544	Coefficient from ASHRAE Table	CD3-11	0.069423	0.4 Pa	0.4 Pa
	516546	Coefficient from ASHRAE Table	SD4-1	0.00205	0.0 Pa	
	520007	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
24	516176	Coefficient from ASHRAE Table	ED5-4	0.547783	3.2 Pa	3.2 Pa
	516546	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	
25	510346	Coefficient from ASHRAE Table	ED4-1	0.328349	7.7 Pa	7.7 Pa
26	510346	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	0.4 Pa
	519559	Coefficient from ASHRAE Table	CD3-11	0.069423	0.4 Pa	
	519561	Coefficient from ASHRAE Table	ED4-1	0.00205	0.0 Pa	
27	517363	Coefficient from ASHRAE Table	ED5-3	0.686329	4.0 Pa	4.0 Pa
	519561	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
28	510348	Coefficient from ASHRAE Table	SD4-1	0.320288	7.3 Pa	7.3 Pa
29	503152		CD3-11	0.070026	0.4 Pa	0.4 Pa

		Coefficient from ASHRAE Table				
	510348	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	
	516595	Coefficient from ASHRAE Table	ED4-1	0.000927	0.0 Pa	
30	510651	Coefficient from ASHRAE Table	SD5-10	-0.355654	-2.2 Pa	-2.2 Pa
	516595	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	
31	521810	Coefficient from ASHRAE Table	SD4-1	0.329379	7.7 Pa	7.7 Pa
32	521768	Coefficient from ASHRAE Table	CD3-11	0.069344	0.4 Pa	3.8 Pa
	521772	Coefficient from ASHRAE Table	SD4-1	0.569914	3.4 Pa	
	521810	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	
33	520341	Coefficient from ASHRAE Table	ED5-3	18.680946	9.0 Pa	9.0 Pa
	521772	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	

Mechanical Supply Air 1

System Information	
System Classification	Supply Air
System Type	Supply Air
System Name	Mechanical Supply Air 1
Abbreviation	

Total Pressure Loss Calculations by Sections											
Section	Element	Flow	Velocity	Velocity Pressure	Length	Loss Coefficient	Friction	Equivalent Diameter	Reynolds number	Total Pressure Loss	Section Pressure Loss
1	Fittings	90.2 L/s	1.4 m/s	1.3 Pa	-	1.1	-	-	-	1.4 Pa	15.4 Pa
	Air Terminal	90.2 L/s	-	-	-	-	-	-	-	14.0 Pa	
2	Duct	90.2 L/s	2.6 m/s	-	0.13	-	0.55 Pa/m	202 mm	30686.563937	0.7 Pa	0.7 Pa
	Fittings	90.2 L/s	2.6 m/s	4.0 Pa	-	0.168	-	-	-	0.7 Pa	
3	Duct	90.2 L/s	2.9 m/s	-	7.55	-	0.74 Pa/m	190 mm	31914.026495	5.5 Pa	17.3 Pa
	Fittings	90.2 L/s	2.9 m/s	5.0 Pa	-	2.336667	-	-	-	11.7 Pa	
4	Fittings	90.2 L/s	1.4 m/s	1.3 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
5	Fittings	383.4 L/s	6.1 m/s	22.6 Pa	-	0.036667	-	-	-	0.8 Pa	0.8 Pa
6	Duct	383.4 L/s	4.3 m/s	-	0.28	-	0.73 Pa/m	328 mm	84782.689965	6.5 Pa	6.5 Pa
	Fittings	383.4 L/s	4.3 m/s	10.9 Pa	-	0.5808	-	-	-	6.3 Pa	
7	Fittings	383.4 L/s	6.1 m/s	22.6 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
8	Fittings	474.9 L/s	6.3 m/s	24.1 Pa	-	0.034793	-	-	-	0.8 Pa	0.8 Pa
9	Duct	474.9 L/s	4.5 m/s	-	0.27	-	-	355 mm	96938.243007	11.3 Pa	11.3 Pa

							0.73 Pa/m				
	Fittings	474.9 L/s	4.5 m/s	12.2 Pa	-	0.9108	-	-	-	11.1 Pa	
10	Fittings	474.9 L/s	7.6 m/s	34.7 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
11	Fittings	502.1 L/s	8.0 m/s	38.8 Pa	-	0.051818	-	-	-	2.0 Pa	2.0 Pa
12	Duct	502.1 L/s	4.6 m/s	-	2.50	-	0.75 Pa/m	361 mm	98694.461098	10.9 Pa	21.8 Pa
	Fittings	502.1 L/s	4.6 m/s	12.5 Pa	-	1.592708	-	-	-	20.0 Pa	
13	Fittings	502.1 L/s	5.2 m/s	16.4 Pa	-	0	-	-	-	0.0 Pa	47.0 Pa
	Equipment	502.1 L/s	-	-	-	-	-	-	-	47.0 Pa	
14	Fittings	22.2 L/s	1.4 m/s	1.2 Pa	-	0.7425	-	-	-	0.9 Pa	14.9 Pa
	Air Terminal	22.2 L/s	-	-	-	-	-	-	-	14.0 Pa	
15	Duct	22.2 L/s	2.2 m/s	-	7.70	-	0.88 Pa/m	109 mm	14727.509655	4.5 Pa	10.6 Pa
	Fittings	22.2 L/s	2.2 m/s	3.0 Pa	-	1.291429	-	-	-	3.8 Pa	
16	Fittings	22.2 L/s	0.4 m/s	0.1 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
17	Duct	293.2 L/s	4.7 m/s	-	2.17	-	1.09 Pa/m	273 mm	77803.707007	20.7 Pa	2.4 Pa
	Fittings	293.2 L/s	4.7 m/s	13.2 Pa	-	0	-	-	-	0.0 Pa	
18	Duct	31.5 L/s	2.0 m/s	-	0.23	-	0.56 Pa/m	137 mm	16717.713035	3.5 Pa	15.0 Pa
	Fittings	31.5 L/s	2.0 m/s	2.4 Pa	-	0.35	-	-	-	0.9 Pa	
	Air Terminal	31.5 L/s	-	-	-	-	-	-	-	14.0 Pa	
19	Duct	31.5 L/s	2.5 m/s	-	10.37	-	0.96 Pa/m	122 mm	18575.237110	19.0 Pa	19.3 Pa
	Fittings	31.5 L/s	2.5 m/s	3.8 Pa	-	2.443167	-	-	-	9.3 Pa	
20	Fittings	31.5 L/s	0.5 m/s	0.2 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
21	Fittings	67.3 L/s	1.1 m/s	0.7 Pa	-	4.415555	-	-	-	3.1 Pa	3.1 Pa
22	Duct	67.3 L/s	3.0 m/s	-	0.42	-	0.90 Pa/m	164 mm	29764.606096	19.6 Pa	0.7 Pa
	Fittings	67.3 L/s	3.0 m/s	5.4 Pa	-	0.06	-	-	-	0.3 Pa	
23	Fittings	67.3 L/s	1.1 m/s	0.7 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
24	Fittings	88.0 L/s	1.4 m/s	1.2 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
25	Fittings	179.5 L/s	2.9 m/s	5.0 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
26	Duct	271.0 L/s	4.3 m/s	-	0.36	-	0.94 Pa/m	273 mm	71912.703025	25 Pa	0.3 Pa
	Fittings	271.0 L/s	4.3 m/s	11.3 Pa	-	0	-	-	-	0.0 Pa	
27	Duct	35.8 L/s	2.3 m/s	-	3.83	-	0.70 Pa/m	137 mm	18999.8142.7	Pa	
	Fittings	35.8 L/s	2.3 m/s	3.2 Pa	-	2.44	-	-	-	7.7 Pa	24.4 Pa
	Air Terminal	35.8 L/s	-	-	-	-	-	-	-	14.0 Pa	
28	Fittings	35.8 L/s	0.6 m/s	0.2 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
29	Fittings	20.7 L/s	1.3 m/s	1.1 Pa	-	0.7425	-	-	-	0.8 Pa	14.8 Pa
	Air Terminal	20.7 L/s	-	-	-	-	-	-	-	14.0 Pa	
30	Duct	20.7 L/s	2.1 m/s	-	11.25	-	-	109 mm	13732.407865	8.6 Pa	12.0 Pa

						0.77 Pa/m					
	Fittings	20.7 L/s	2.1 m/s	2.6 Pa	-	1.291429	-	-	-	3.3 Pa	
31	Fittings	20.7 L/s	0.3 m/s	0.1 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
32	Fittings	27.2 L/s	1.7 m/s	1.8 Pa	-	0.35	-	-	-	0.6 Pa	14.6 Pa
	Air Terminal	27.2 L/s	-	-	-	-	-	-	-	14.0 Pa	
33	Duct	27.2 L/s	2.2 m/s	-	4.72	-	0.74 Pa/m	122 mm	16039.569857 Pa		7.1 Pa
	Fittings	27.2 L/s	2.2 m/s	2.8 Pa	-	1.269167	-	-	-	3.6 Pa	
34	Fittings	27.2 L/s	0.4 m/s	0.1 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
35	Duct	91.5 L/s	2.3 m/s	-	0.13	-	0.39 Pa/m	219 mm	30350.610001 Pa		15.2 Pa
	Fittings	91.5 L/s	2.3 m/s	3.1 Pa	-	0.356191	-	-	-	1.1 Pa	
	Air Terminal	91.5 L/s	-	-	-	-	-	-	-	14.0 Pa	
36	Duct	91.5 L/s	2.9 m/s	-	0.72	-	0.72 Pa/m	193 mm	33260.943034 Pa		6.8 Pa
	Fittings	91.5 L/s	2.9 m/s	5.1 Pa	-	1.238925	-	-	-	6.3 Pa	
37	Fittings	91.5 L/s	1.5 m/s	1.3 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
38	Fittings	91.5 L/s	2.3 m/s	3.1 Pa	-	0.356191	-	-	-	1.1 Pa	15.1 Pa
	Air Terminal	91.5 L/s	-	-	-	-	-	-	-	14.0 Pa	
39	Duct	91.5 L/s	2.9 m/s	-	4.49	-	0.72 Pa/m	193 mm	33260.943034 Pa		9.5 Pa
	Fittings	91.5 L/s	2.9 m/s	5.1 Pa	-	1.238925	-	-	-	6.3 Pa	
40	Fittings	91.5 L/s	1.5 m/s	1.3 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
41	Duct	91.5 L/s	2.3 m/s	-	0.13	-	0.39 Pa/m	219 mm	30350.610001 Pa		15.2 Pa
	Fittings	91.5 L/s	2.3 m/s	3.1 Pa	-	0.356191	-	-	-	1.1 Pa	
	Air Terminal	91.5 L/s	-	-	-	-	-	-	-	14.0 Pa	
42	Duct	91.5 L/s	2.9 m/s	-	0.25	-	0.72 Pa/m	193 mm	33260.943034 Pa		6.1 Pa
	Fittings	91.5 L/s	2.9 m/s	5.1 Pa	-	1.159405	-	-	-	5.9 Pa	
43	Fittings	91.5 L/s	0.9 m/s	0.5 Pa	-	0	-	-	-	0.0 Pa	0.0 Pa
Critical Path : 13-12-11-10-9-8-7-6-5-17-26-25-24-23-22-21-20-19-18 ; Total Pressure Loss : 131.1 Pa											

Detail Information of Straight Segment by Sections

Section	Element ID	Flow	Size	Velocity	Velocity Pressure	Length	Pressure Loss	Total Pressure Loss
2	450948	90.2 L/s	250 mmx140 mm	2.6 m/s	4.0 Pa	0.13	0.1 Pa	0.1 Pa
3	448216	90.2 L/s	250 mmx125 mm	2.9 m/s	5.0 Pa	1.31	1.0 Pa	5.6 Pa
	455254	90.2 L/s	250 mmx125 mm	2.9 m/s	5.0 Pa	6.25	4.6 Pa	
6	448228	383.4 L/s	300 mmx300 mm	4.3 m/s	10.9 Pa	0.28	0.2 Pa	0.2 Pa
9	456947	474.9 L/s		4.5 m/s	12.2 Pa	0.27	0.2 Pa	0.2 Pa

			325 mmx325 mm					
12	448225	502.1 L/s	400 mmx275 mm	4.6 m/s	12.5 Pa	0.30	0.2 Pa	1.9 Pa
	448227	502.1 L/s	400 mmx275 mm	4.6 m/s	12.5 Pa	1.34	1.0 Pa	
	454272	502.1 L/s	400 mmx275 mm	4.6 m/s	12.5 Pa	0.26	0.2 Pa	
	1681893	502.1 L/s	400 mmx275 mm	4.6 m/s	12.5 Pa	0.60	0.5 Pa	
15	448277	22.2 L/s	100 mmx100 mm	2.2 m/s	3.0 Pa	0.10	0.1 Pa	6.8 Pa
	451132	22.2 L/s	100 mmx100 mm	2.2 m/s	3.0 Pa	0.28	0.2 Pa	
	1561391	22.2 L/s	100 mmx100 mm	2.2 m/s	3.0 Pa	7.33	6.4 Pa	
17	453972	293.2 L/s	250 mmx250 mm	4.7 m/s	13.2 Pa	2.17	2.4 Pa	2.4 Pa
18	482706	31.5 L/s	125 mmx125 mm	2.0 m/s	2.4 Pa	0.23	0.1 Pa	0.1 Pa
19	448284	31.5 L/s	125 mmx100 mm	2.5 m/s	3.8 Pa	2.97	2.9 Pa	10.0 Pa
	448285	31.5 L/s	125 mmx100 mm	2.5 m/s	3.8 Pa	0.05	0.1 Pa	
	1561567	31.5 L/s	125 mmx100 mm	2.5 m/s	3.8 Pa	7.35	7.1 Pa	
22	448263	67.3 L/s	150 mmx150 mm	3.0 m/s	5.4 Pa	0.42	0.4 Pa	0.4 Pa
26	453975	271.0 L/s	250 mmx250 mm	4.3 m/s	11.3 Pa	0.36	0.3 Pa	0.3 Pa
27	448262	35.8 L/s	125 mmx125 mm	2.3 m/s	3.2 Pa	2.10	1.5 Pa	2.7 Pa
	454205	35.8 L/s	125 mmx125 mm	2.3 m/s	3.2 Pa	0.02	0.0 Pa	
	482507	35.8 L/s	125 mmx125 mm	2.3 m/s	3.2 Pa	0.22	0.2 Pa	
	1561603	35.8 L/s	125 mmx125 mm	2.3 m/s	3.2 Pa	1.49	1.0 Pa	
30	448255	20.7 L/s	100 mmx100 mm	2.1 m/s	2.6 Pa	0.13	0.1 Pa	8.7 Pa
	450820	20.7 L/s	100 mmx100 mm	2.1 m/s	2.6 Pa	0.28	0.2 Pa	
	1561522	20.7 L/s	100 mmx100 mm	2.1 m/s	2.6 Pa	10.84	8.4 Pa	
33	448241	27.2 L/s	125 mmx100 mm	2.2 m/s	2.8 Pa	0.14	0.1 Pa	3.5 Pa
	450633	27.2 L/s	125 mmx100 mm	2.2 m/s	2.8 Pa	0.28	0.2 Pa	
	1561021	27.2 L/s	125 mmx100 mm	2.2 m/s	2.8 Pa	4.31	3.2 Pa	
35	483096	91.5 L/s	200 mmx200 mm	2.3 m/s	3.1 Pa	0.13	0.0 Pa	0.0 Pa
36	448270	91.5 L/s		2.9 m/s	5.1 Pa	0.65	0.5 Pa	0.5 Pa

			225 mmx140 mm					
	1561468	91.5 L/s	225 mmx140 mm	2.9 m/s	5.1 Pa	0.07	0.0 Pa	
39	448248	91.5 L/s	225 mmx140 mm	2.9 m/s	5.1 Pa	0.18	0.1 Pa	
	450760	91.5 L/s	225 mmx140 mm	2.9 m/s	5.1 Pa	0.20	0.1 Pa	3.2 Pa
	1561503	91.5 L/s	225 mmx140 mm	2.9 m/s	5.1 Pa	4.12	2.9 Pa	
41	483196	91.5 L/s	200 mmx200 mm	2.3 m/s	3.1 Pa	0.13	0.0 Pa	0.0 Pa
42	456928	91.5 L/s	225 mmx140 mm	2.9 m/s	5.1 Pa	0.25	0.2 Pa	0.2 Pa

Fitting and Accessory Loss Coefficient Summary by Sections						
Section	Element ID	Loss Method	ASHRAE Table	Loss Coefficient	Pressure Loss	Total Pressure Loss
1	482332	Coefficient from ASHRAE Table	SR4-1	1.1	1.4 Pa	1.4 Pa
2	482332	Coefficient from ASHRAE Table	SR4-1	0	0.0 Pa	0.7 Pa
	482333	Coefficient from ASHRAE Table	SR4-1	0.168	0.7 Pa	
3	451243	Coefficient from ASHRAE Table	SR3-1	1.066667	5.3 Pa	11.7 Pa
	456478	Coefficient from ASHRAE Table	SR3-1	1.21	6.1 Pa	
	479231	Coefficient from ASHRAE Table	SR4-1	0.06	0.3 Pa	
	482333	Coefficient from ASHRAE Table	SR4-1	0	0.0 Pa	
4	453968	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	479231	Coefficient from ASHRAE Table	SR4-1	0	0.0 Pa	
5	453968	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.8 Pa
	479833	Coefficient from ASHRAE Table	SR4-2	0.036667	0.8 Pa	
6	479833	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	6.3 Pa
	479834	Coefficient from ASHRAE Table	SR4-2	0.5808	6.3 Pa	
7	456946	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	479834	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
8	456946	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.8 Pa
	481663	Coefficient from ASHRAE Table	SR4-2	0.034793	0.8 Pa	

9	481663	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	11.1 Pa
	481664	Coefficient from ASHRAE Table	SR4-2	0.9108	11.1 Pa	
10	456974	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	481664	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
11	456974	Coefficient from ASHRAE Table	-	0	0.0 Pa	2.0 Pa
	466691	Coefficient from ASHRAE Table	SR4-2	0.051818	2.0 Pa	
12	454273	Coefficient from ASHRAE Table	CR3-1	0.068318	0.9 Pa	20.0 Pa
	454278	Coefficient from ASHRAE Table	CR3-1	0.068318	0.9 Pa	
	456764	Coefficient from ASHRAE Table	SR3-1	1.1875	14.9 Pa	
	466691	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
	479956	Coefficient from ASHRAE Table	SR4-2	0.188571	2.4 Pa	
	1681890	Coefficient from ASHRAE Table	CR9-1	0.08	1.0 Pa	
13	479956	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	0.0 Pa
14	482941	Coefficient from ASHRAE Table	SR4-2	0.7425	0.9 Pa	0.9 Pa
15	451133	Coefficient from ASHRAE Table	SR3-1	1.15	3.4 Pa	3.8 Pa
	479524	Coefficient from ASHRAE Table	SR4-2	0.061429	0.2 Pa	
	482941	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
	1561388	Coefficient from ASHRAE Table	CR9-1	0.08	0.2 Pa	
16	453971	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	479524	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
17	453968	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	453971	Coefficient from ASHRAE Table	-	0	0.0 Pa	
18	482714	Coefficient from ASHRAE Table	SR4-1	0.35	0.9 Pa	0.9 Pa
19	478588	Coefficient from ASHRAE Table	SR4-2	0.06	0.2 Pa	9.3 Pa
	482712	Coefficient from ASHRAE Table	SR3-1	1.174	4.5 Pa	
	482713	Coefficient from ASHRAE Table	SR3-1	1.129167	4.3 Pa	
	482714	Coefficient from ASHRAE Table	SR4-1	0	0.0 Pa	

	1561565	Coefficient from ASHRAE Table	CR9-1	0.08	0.3 Pa	
20	454204	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	478588	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
21	454204	Coefficient from ASHRAE Table	-	0	0.0 Pa	3.1 Pa
	479788	Coefficient from ASHRAE Table	SR4-2	4.415555	3.1 Pa	
22	479787	Coefficient from ASHRAE Table	SR4-2	0.06	0.3 Pa	0.3 Pa
	479788	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
23	453980	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	479787	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
24	453977	Coefficient from ASHRAE Table	SR5-15	0	0.0 Pa	0.0 Pa
	453980	Coefficient from ASHRAE Table	-	0	0.0 Pa	
25	453974	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	453977	Coefficient from ASHRAE Table	SR5-15	0	0.0 Pa	
26	453971	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	453974	Coefficient from ASHRAE Table	-	0	0.0 Pa	
27	477640	Coefficient from ASHRAE Table	SR4-2	0.06	0.2 Pa	7.7 Pa
	482512	Coefficient from ASHRAE Table	SR3-1	1.15	3.6 Pa	
	482513	Coefficient from ASHRAE Table	SR3-1	1.15	3.6 Pa	
	1561600	Coefficient from ASHRAE Table	CR9-1	0.08	0.3 Pa	
28	454204	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	477640	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
29	482910	Coefficient from ASHRAE Table	SR4-2	0.7425	0.8 Pa	0.8 Pa
30	450821	Coefficient from ASHRAE Table	SR3-1	1.15	3.0 Pa	3.3 Pa
	479628	Coefficient from ASHRAE Table	SR4-2	0.061429	0.2 Pa	
	482910	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
	1561520	Coefficient from ASHRAE Table	CR9-1	0.08	0.2 Pa	
31	453980		-	0	0.0 Pa	0.0 Pa

		Coefficient from ASHRAE Table				
	479628	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
32	482827	Coefficient from ASHRAE Table	SR4-1	0.35	0.6 Pa	0.6 Pa
33	481482	Coefficient from ASHRAE Table	SR3-1	1.129167	3.2 Pa	3.6 Pa
	481484	Coefficient from ASHRAE Table	SR4-2	0.06	0.2 Pa	
	482827	Coefficient from ASHRAE Table	SR4-1	0	0.0 Pa	
	1561018	Coefficient from ASHRAE Table	CR9-1	0.08	0.2 Pa	
34	456974	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	481484	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
35	483107	Coefficient from ASHRAE Table	SR4-2	0.356191	1.1 Pa	1.1 Pa
36	483105	Coefficient from ASHRAE Table	SR4-2	0.05952	0.3 Pa	6.3 Pa
	483106	Coefficient from ASHRAE Table	SR3-1	1.099405	5.6 Pa	
	483107	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
	1561465	Coefficient from ASHRAE Table	CR9-1	0.08	0.4 Pa	
37	453974	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	483105	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
38	483268	Coefficient from ASHRAE Table	SR4-2	0.356191	1.1 Pa	1.1 Pa
39	455020	Coefficient from ASHRAE Table	SR3-1	1.099405	5.6 Pa	6.3 Pa
	482287	Coefficient from ASHRAE Table	SR4-2	0.05952	0.3 Pa	
	483268	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
	1561501	Coefficient from ASHRAE Table	CR9-1	0.08	0.4 Pa	
40	453977	Coefficient from ASHRAE Table	SR5-15	0	0.0 Pa	0.0 Pa
	482287	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	
41	483207	Coefficient from ASHRAE Table	SR4-2	0.356191	1.1 Pa	1.1 Pa
42	483205	Coefficient from ASHRAE Table	SR4-2	0.06	0.3 Pa	5.9 Pa
	483206	Coefficient from ASHRAE Table	SR3-1	1.099405	5.6 Pa	
	483207		SR4-2	0	0.0 Pa	

		Coefficient from ASHRAE Table				
43	456946	Coefficient from ASHRAE Table	-	0	0.0 Pa	0.0 Pa
	483205	Coefficient from ASHRAE Table	SR4-2	0	0.0 Pa	

Mechanical Supply Air 2

System Information

System Classification	Supply Air
System Type	Supply Air
System Name	Mechanical Supply Air 2
Abbreviation	

Total Pressure Loss Calculations by Sections

Section	Element	Flow	Velocity	Velocity Pressure	Length	Loss Coefficient	Friction	Equivalent Diameter	Reynolds number	Total Pressure Loss	Section Pressure Loss
1	Duct	200.8 L/s	2.1 m/s	-	0.46	-	0.16 Pa/m	350 mm	48469.509	0.74 Pa	2.3 Pa
	Fittings	200.8 L/s	2.1 m/s	2.6 Pa	-	0.849625	-	-	-	2.2 Pa	
	Equipment	200.8 L/s	-	-	-	-	-	-	-	0.0 Pa	
2	Duct	200.8 L/s	3.4 m/s	-	0.06	-	0.55 Pa/m	273 mm	62140.396	0.05 Pa	7.0 Pa
	Fittings	200.8 L/s	3.4 m/s	7.1 Pa	-	0.982232	-	-	-	7.0 Pa	
3	Duct	200.8 L/s	4.1 m/s	-	0.65	-	0.85 Pa/m	250 mm	67857.312	0.83 Pa	7.9 Pa
	Fittings	200.8 L/s	4.1 m/s	10.1 Pa	-	0.734383	-	-	-	7.4 Pa	
	Equipment	200.8 L/s	-	-	-	-	-	-	-	0.0 Pa	

Critical Path : 3-2-1 ; Total Pressure Loss : 17.2 Pa

Detail Information of Straight Segment by Sections

Section	Element ID	Flow	Size	Velocity	Velocity Pressure	Length	Pressure Loss	Total Pressure Loss
1	528147	200.8 L/s	350 mm \varnothing	2.1 m/s	2.6 Pa	0.46	0.1 Pa	0.1 Pa
2	533141	200.8 L/s	273 mm \varnothing	3.4 m/s	7.1 Pa	0.04	0.0 Pa	0.0 Pa
	533154	200.8 L/s	273 mm \varnothing	3.4 m/s	7.1 Pa	0.03	0.0 Pa	
3	533153	200.8 L/s	250 mm \varnothing	4.1 m/s	10.1 Pa	0.65	0.5 Pa	0.5 Pa

Fitting and Accessory Loss Coefficient Summary by Sections

Section	Element ID	Loss Method	ASHRAE Table	Loss Coefficient	Pressure Loss	Total Pressure Loss
1	528316	Coefficient from ASHRAE Table	ED4-1	0.849625	2.2 Pa	2.2 Pa
2	528316	Coefficient from ASHRAE Table	ED4-1	0	0.0 Pa	7.0 Pa
	533160	Coefficient from ASHRAE Table	SD4-1	0.253886	1.8 Pa	
	533167	Coefficient from ASHRAE Table	CD3-17	0.728346	5.2 Pa	

3	533157	Coefficient from ASHRAE Table	CD3-17	0.734383	7.4 Pa	7.4 Pa
	533160	Coefficient from ASHRAE Table	SD4-1	0	0.0 Pa	