PRESSURE DROP CALCULATION

PROJECT	
LABEL	**CPEF-R-01 - CARPARK EXHAUST AIR**
DESIGN FLOW RATE	**15,500 l/s** — **REVISION - 1**
CALCULATED ESP	**212 Pa**
DESIGN ESP	**250 Pa**

Duct Section	Duct Element	Duct Parameters (Input)											Output				Fitting loss Co efficient C_o	Duct Fittings Friction Loss (Pa)	Additional Prssure Drop (Pa)	Total Friction Loss (Pa)	Remarks
		Air Flow rate (l/s)		Duct Length (mm)	Width (mm)		Height (mm)		Velocity in Rectangular duct (m/s)		Round Duct		Velocity Pressure (Pa)		Friction Loss in Duct (Pa/m)						
		Q_1	Q_2	L	W_1	W_2	H_1	H_2	V_1	V_2	Duct Dia (mm) D_R	Velocity (m/s) V_R	p_{v1}	p_{v2}	Δp_{f1}	Δp_{f2}					
B3-01	EccCrate Grille	515			1000		250		2.06				3.63		0.140				3.5	**3.500**	
B3 24	Straight Duct - Horizontal	515		1,450	650		300		2.64				5.13		0.214					**0.310**	
B3 23	Straight Duct - Horizontal	515		1,450	650		300		2.64				5.13		0.214					**0.310**	
B3 22	Straight Duct - Horizontal	515		1,450	650		300		2.64				5.13		0.214					**0.310**	
B3 21	Straight Duct - Horizontal	1,030		1,450	650		300		5.28				20.53		0.780					**1.130**	
B3 20	Straight Duct - Horizontal	1,030		1,450	650		300		5.28				20.53		0.780					**1.130**	
B3 19	Straight Duct - Horizontal	1,030		1,450	650		300		5.28				20.53		0.780					**1.130**	
B3 18	Transition	1,030	1,545	900	650	900	300	300	5.28	5.72			20.53	25.87	0.780	0.812				**0.731**	
B3 17	Straight Duct - Horizontal	1,545		1,400	900		300		5.72				25.87		0.812					**1.137**	
B3 16	Straight Duct - Horizontal	1,545		1,400	900		300		5.72				25.87		0.812					**1.137**	
B3 15	Straight Duct - Horizontal	1,545		1,400	900		300		5.72				25.87		0.812					**1.137**	
B3 14	Rectangular Elbow 90 °	1,545			900		300		5.72				25.87		0.812		0.57	14.7		**14.743**	
B3 13	Straight Duct - Horizontal	1,545		1,400	1200		300		4.29				15.75		0.438					**0.613**	
B3 12	Straight Duct - Horizontal	2,060		1,400	1200		300		5.72				28.00		0.753					**1.055**	
B3 11	Straight Duct - Horizontal	2,060		1,400	1200		300		5.72				28.00		0.753					**1.055**	
B3 10	Rectangular Elbow 45 °	2,060			1200		300		5.72				28.00		0.753		0.57	16.0		**15.960**	
B3 9	Rectangular Elbow 45 °	2,060			1200		300		5.72				28.00		0.753		0.57	16.0		**15.960**	
B3.4 FD	Fire Damper	2,060			1200		300		5.72				28.00		0.753		0.19	5.3		**5.320**	
B3 8	Straight Duct - Horizontal	2,060		1,155	1200		300		5.72				28.00		0.753					**0.870**	
B3 7	Straight Duct - Horizontal	2,060		1,400	1200		300		5.72				28.00		0.753					**1.055**	
B3 6	Straight Duct - Horizontal	2,060		1,400	1200		300		5.72				28.00		0.753					**1.055**	
B3 5	Straight Duct - Horizontal	2,060		1,400	1200		300		5.72				28.00		0.753					**1.055**	
B3 4	Straight Duct - Horizontal	2,060		1,400	1200		300		5.72				28.00		0.753					**1.055**	
B3 3	Transition	2,060	2,060	400	1200	1000	300	350	5.72	5.89			28.00	27.04	0.753	0.721				**0.301**	
B3 2	Rectangular Elbow 90 °	2,060			1000		350		5.89				27.04		0.721		1.35	36.5		**36.502**	
B3 1	Mitered Elbow 90 °	2,060			1000		350		5.89				27.04		0.721		0.33	8.9		**8.923**	
B3.1 FD	Fire Damper	2,060			1000		350		5.89				27.04		0.721		0.19	5.1		**5.137**	
Shaft B3-B2	Shaft - Vertical	4,120		2,600	2500		1150		1.43				1.51		0.014					**0.035**	
Shaft B2-B1	Shaft - Vertical	10,040		3,000	2500		1150		3.49				8.98		0.071					**0.212**	
Shaft B1-Roof	Shaft - Vertical	15,500		34,400	2500		1150		5.39				21.40		0.160					**5.511**	
Roof	Rectangular Elbow 90 °	15,500			2200		900		7.83				46.18		0.419		1.1	50.8		**50.797**	
Roof	Flex	15,500									1250	12.64							10.0	**10.000**	
Roof	Silencer	15,500																	2.0	**2.000**	
Roof	Silencer	15,500																	1.0	**1.000**	
Roof	Straight Duct - Horizontal	15,500		700	2200		900		7.83				46.18		0.419					**0.293**	
Pressure drop without considering Safety Factor																				**192.470**	
Considering safety Factor of 10 % additional pressure drop																				**211.718**	