



## CAR PARK VENTILATIONS SYSTEM

### 01 VOLUME CALCULATIONS

Volume (V) = Area (A) x Height (h)  
Area = Width x Lenght  
= 30 x 100 = 3000 m2  
Height= 3 m  
Volume = 3000 x 3 = 9000 m3

### 02 AIRFLOW CALCULATION

Airflow (Q) = Volume (V) x Air Change (Ach)  
a)Daily Ventilation (CO) Airflow  
Air Change = 6/h  
Airflow = 9000 x 6 = 54000 m3/h  
b)Fire Mode (Ventilation)  
Air Change = 10/h  
Airflow = 9000 x 10 = 90000 m3/h

\* Minimum Air change rates are used based on BS 7346-7 Standards. Air change rate should be higher as per architectural requirements.

### 03 EXHAUST AND FRESHAIR (SUPPLY) FAN SELECTION

A-Airflow  
Exhaust Fan (EXF)  
EXF = 90.000 m3/h x %50 = 45.000 m3/h  
EXF-1 = 45.000 m3/h  
EXF-2 = 45.000 m3/h

\*Exhaust fans must be back up %50 as per BS 7346-7 Standards.

B-Pressure Drop  
Pressure drops on Shaft, Silencer, Dampers and Grills will be calculated based on air speeds.

C-Fire Endurance  
Exhaust and Jetfans will be selected based on TS/EN 12101-3 Fire Endurance standards.

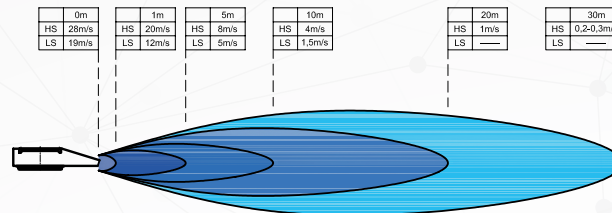
Class	Heat (C)	Minimum Endurance (Min)
F200	200	120
F300	300	60
F400	400	120
F600	600	60
F842	842	30

\*TS/EN 12101-3 Fire Endurance Class

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### CARPARK VENTILATION SYSTEMS AND PLACEMENT

Optimum Thrust power jetfan will be selected consider on size of carpark. Radial Jetfans applications will be advantage on limited ceil height basements and non-reversable options.  
W=15 , L=25m



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### SHAFT SIZING

a)Air Speed Method;  
Shaft Sizes will be calculated with Avarage air speed 8 m/s on section area.  
Airflow = Area x Speed  
Area = 54000 m3/h x 1/3600 h/sec / 8 m/s  
=1,875 m2

b) Fan Size Method;  
Placement of fans inside shaft based on Section air speed, Fan sizes must be considered.

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### SHAFT DAMPER SIZING

Zone arrangement at the interstory , Motorized Smoke Dampers will be selected based on 8 m/sec for Each fan inside exhaust shaft.

Efective Area = 27.000 m3/h x 3600 h/sec / 8 m/sec  
= 0,93 m2  
Selected Damper is 2 pcs 1000x1000 mm.

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### SYSTEM SCREEN PREPARATION

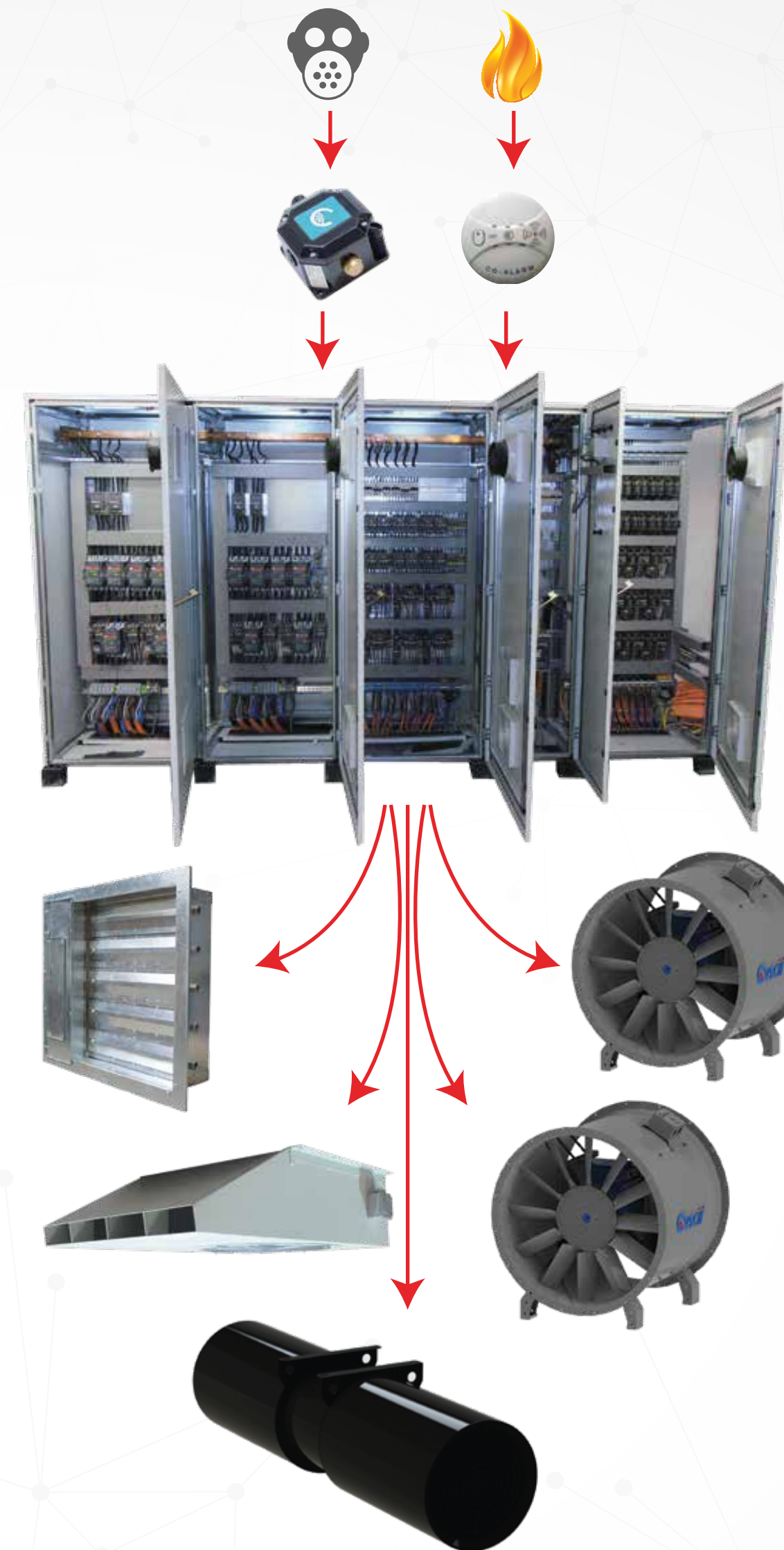
PRODUCT CODE	OPERATION MODE			
	CO Low	CO Mid	CO High	Fire
JF-1	50%	50%	50%	100%
JF-2	50%	50%	50%	100%
JF-3	50%	50%	50%	100%
JF-4	50%	90%	50%	100%
JF-5	50%	50%	50%	100%
JF-6	50%	50%	50%	100%
SEF-1	25%	50%	75%	100%
SEF-2	25%	50%	75%	100%
FAF-1	25%	50%	75%	100%
SD-1	OPEN	OPEN	OPEN	OPEN
SD-2	-	-	-	-

\*Jetfans are operate with 3 min delay,

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### CFD ANALYSIS

Design model will be created with CFD programme and necessary modifications should be completed. System operation will be checked with CFD Simulation.



### JETFAN SYSTEM COST ESTIMATION

System	Price
1-Jetfan	24.000 CVS
2-Smoke Exhaust Fans	13.500 CVS
3-Freshair (Supply) Fans	4.100 CVS
4-Shaft Dampers	3.100 CVS
5-System Control Board	16.000 CVS
6-Electrical Cabling	14.000 CVS
7-Assambling	5.600 CVS
8-CO Detection System	18.000 CVS
9-Fire Detection System	22.000 CVS
<b>Total</b>	<b>120.300 CVS</b>

### DUCT SYSTEM COST ESTIMATION

System	Price
1-Ventilation Duct	55.000 CVS
2-Smoke Exhaust Fans	48.000 CVS
3-Freshair (Supply) Fans	5.000 CVS
4-Grills	3.200 CVS
5-Fire Zone Damper	3.000 CVS
6-System Control Board	12.000 CVS
7-Electrical Cabling	3.000 CVS
8-CO Detection System	18.000 CVS
9-Fire Detection System	22.000 CVS
<b>Total</b>	<b>169.300 CVS</b>

### ENERGY CONSUMPTION (Daily Use)

1-Jetfan	12 kW	1-Smoke Exhaust Fans	180 kW
2-Smoke Exhaust Fans	30 kW	2-Freshair (Supply) Fans	16,5 kW
3-Freshair (Supply) Fans	75 kW		
<b>Total</b>	<b>117 kW</b>	<b>Total</b>	<b>196,5 kW</b>

### %40,4 ENERGY CONSERVATION

Daily Consumption*	351 kW	Daily Consumption*	589,8 kW
Annual Cost**	25623 kW	Annual Cost**	43,055 kW
<b>17432 CVS Advantage per year</b>			

\*3 Hour Operation bases

\*\*kW/h Price based on 0,20 CVS

-Calculation estimated based on; 8.000m² carpark with 3 m height.

-Smoke exhaust fans, F300 fire rated and dual speed

-Price estimation included; one way silencer, connection feet, counter flange and anti-vibration set

-Jetfans are Axial (Impulse) type and 50/13 Newton power.

-The chart only for estimation and currency is accepted as "CVS"



## AXIAL DUCT FAN



- Galvanized steel case (TS EN ISO 1461)
- Aerofoil aluminium impellers (Polyamide alternative)
- Adjustable pitch angle for maximum efficiency
- Frequency inverter
- Double speed
- AMCA LAB. Tested

## ROOF FAN



- Sheet steel casing
- Vertical exhaust
- Motor out of air flow
- Suitable for continuously 120°C
- Impeller ,backward curved blades

## VERTICAL DISCHARGE FLAP ROOF FAN



- Galvanized sheet metal with electrostatic oven drying case
- Aerofoil sectioned aluminium blades
- Adjustable blade angles for maximum efficiency
- Three-phased motors suitable to operate with frequency inverters
- Suitable to operative outdoor
- EN 12101-3 certificated

## AXIAL JET FAN



- 2 speed motors for daily ventilation and in case of fire
- %100 unidirectional option
- Galvanized steel case ( TS EN ISO 1461 )
- Guard grill and adjustable deflector
- Self - sound absorber fan case
- Insulation class H, IP55 high efficiency IE2 motors
- EN 12101- 3 certified - 200°C / 2h, 300°C / 2h, 400°C / 2h
- %100 Reversible

## DETECTION SENSORS



- Carbon Monoxide detection
- Fire detection (Smoke / heat)
- NO<sub>2</sub> detection systems

## CONTROL UNITS



- MCC /DDC Board
- Frequency inverter
- System script
- Operator Board
- Damage info
- Low Maintenance and operating costs
- Energy saver

## RADIAL JET FAN

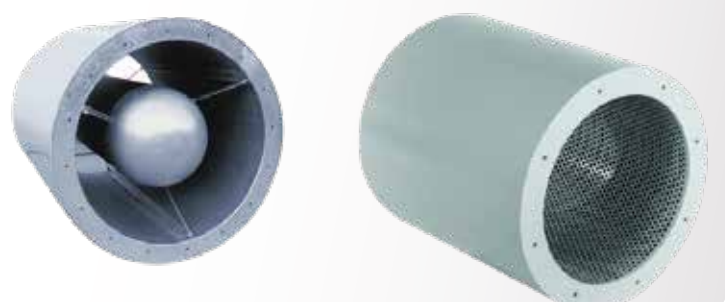


- 2 speed motors for daily ventilation and in case of fire
- Galvanized steel case ( TS EN ISO 1461 )
- Guard grill and adjustable deflector
- Terminal box out of case
- Insulation class H, IP55 high efficiency IE2 motors
- EN 12101- 3 certified - 300°C / 2h, 400°C / 2h

## CERTIFICATES

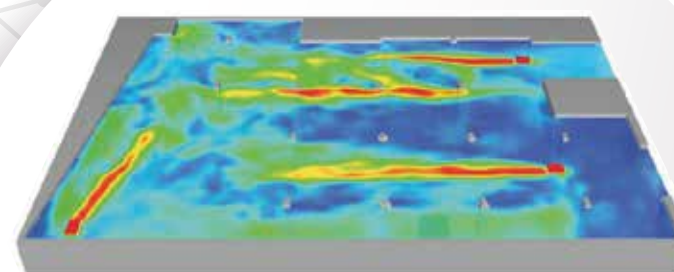


## SILENCER



- With or without Pod
- Mounting to shooting and/or sucking side
- High sound distinctness

## CFD ANALYSIS



- Demonstration of speed, optical density, temperature, smoke distribution analysis from 1.7 m (human eye level).
- Air velocities on ramps and escape routes are not above 5 m/s.
- The visibility is not less than 10m.
- Criteria for not exceeding 60°C in escape routes.

## DAMPER



- Action mechanism competent to fire
- Interstage zoning

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