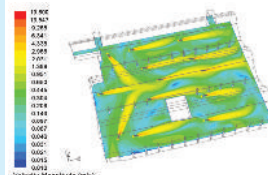
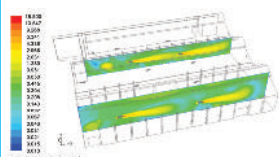
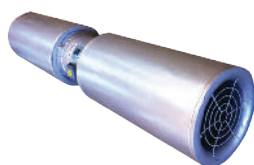


Underground Carpark Ventilation

High efficiency & flexible systems



About Us



At Lti Ventilatoren, Singapore, we produce complete range of ventilation products over a decade. Our products are required for ventilation of areas where we have to improve the Indoor Air Quality (IAQ), an important ingredient of life. With more than 30 years of experience of our colleagues in producing ventilation fans, we have been successful in setting up few manufacturing/assembly plants across the world.

Our long history of production & continuous investment in our R&D, have given us success in developing new innovative products with better efficiencies, low noise levels & compact sizes for easy installations.

Our name LTi, L-Long term T-Technical i-Innovative, supports our concept of continuous growth with our technical innovations on our existing product range & to develop new products for growing markets.

Our wide range of products includes Axial fans, Bifurcated axial fans, belt driven axial fans, Jet fans, centrifugal fans, In-line fans, mixed flow fans, special application fans for chemical resistance & battery room applications. Our customers are in domestic

sector, commercial sector, Industrial sector, power sector & infrastructure sector.

LTi Ventilatoren (Asia) Pte Ltd, established to support local markets by producing complete range of fans with national/international technologies to serve our customers locally & globally.

Our experience in the ventilation systems give our customers confidence to have most efficient/economical solutions for their ventilation requirements. This confidence in LTi & its high quality products is backed by excellent

pre/after sales services by our experienced sales & technical staff.

We provide complete designing solutions for ventilation problems. With this catalogue, we provide the complete overview of the fan type, Lti can offer to the market. For further detailed discussions & information kindly feel free to contact our local sales company/distributor/dealer worldwide.

Quality standards

Our focus is customer satisfaction. The bases for the same are best quality & accurate delivery time. We believe in quality of our products, to support this our products carries 3 years standard warranty against any manufacturing defect. The products have been tested in Singapore with PSB & AMCA for their performances. The air & sound performances are tested as per AMCA standards. The products required for high temperature applications are tested in accordance with BS/EN latest standards for different temperature & time classifications.

*No liability for errors! - Subject to technical modification

Our Projects



Project Title: ITE College & HQ @ AMK
Consultant: Kajima
Fan supplied : Axial, Cabinet & MIL



Project Title: The Estuary
Contractor: Great Resources M&E Contractor Pte Ltd
Fan supplied: Axial, Cabinet & CIL



Project Title: Suki Sushi
Contractor: Natural Cool Airconditioning & Engineering Pte Ltd
Fan supplied: Axial, Cabinet, CIL & Propeller



Project Title: Central Fire Station
Contractor: BNF Engineering (S) Pte Ltd
Fan supplied: CIL & Propeller

Air Movement and Control Association International, Inc.

Certifies that

LTI Ventilatoren (Asia) Pte Ltd

*Having satisfied the membership requirements, has been granted membership in the
Air Movement and Control Association International, Inc.*

*Member Since
February 2011*

Minh B. Bay
AMCA International President



M. L. S. S. S.
Acting Executive Director

Ductless jet ventilation – the basics

Need

Jet fans systems has been developed to ventilate underground cark parks for both CO removal during normal conditions & extracting smoke during emergency situations. These both requirements can be handled by single system more effectively & economically i.e. jet fan ductless car park ventilation systems.

The complete system is consists of Jet fan, main axial fans for extract & fresh air. Normally fresh air fans are designed for the basements where there is not enough of natural cutouts e.g. ventilation shafts or ramps. In addition to fans a unique control system i.e. designed to specific project, where the signals from CO / heat/smoke sensors operate the system at different speeds according to the need of situation & save energy.

To design an efficient system we need to involve with the designers quite well in advance for suggesting the openings in the basement for an efficient fresh air intake & proper CO/ smoke removal. Fans are normally designed on the basis of air exchange rates for both normal & emergency applications. The local codes or building regulations plays vital role in designing the air flows, control systems & zones in the basement.

The jet fans work at different operating conditions pending on the signals from the CO sensors giving possibilities to save energy “ working on demand” ventilation principle. Jet fans can be controlled individually or together as a group of fire zones. During fire operations complete system including main fresh air, extract air fans & jet fans run at full speed for cleaning the basement from smoke efficiently and quickly.

Advantages

The jet fan system has its own advantages over conventional ducted systems,

- As system doesn't need ducts it allows the structure to have smaller heights appx 0.5m to 0.75m lesser than normal basements.
- Ductless system is easy to install in shorter time compare to conventional, expensive & complex ducted systems. It means saving on installation time & cost.
- Jet fan systems is easy to maintain & an ideal solution for renovations for the car parks.
- It is possible to operate systems in parts/zones as per signals given from CO/smoke sensors.
- As air is free to move in specified directions given by the jet fans, air mixer is proper in all the layers & provide better air quality in the basements compare to conventional ducted system.
- Jet fan systems allow CO & smoke extraction removal as one system with maximum level of automation & highly efficient. CO sensors ensure that only fans in the polluted zones to run. Smoke sensors decide that system should start in full swing once signal given to the controlling device.
- Elimination of ducts in systems give less resistance to the main fans resulting in lesser static pressure i.e. lower motor KW of the fans.
- Very flexible in positioning of jet fans in the car park.

- Low height of the jet fans allow the cark park to be more neat & clean giving possibility to monitor the basement with help of CCTVs
- In case of smoke extraction, the high efficiency of the system provide the rapid & optimum smoke control e.g. smoke removal, smoke cooling & restricted smoke spread.
- Jet fan systems also prevents expensive structural damages in emergency fire conditions by providing proper mixing of fresh air & quick removal of smoke from the basement. This limits the heat exposure to ceilings/slabs.

System requirements

Jet fans system design needs jet fans based on the area of the basement. Main fresh air fans (where cut outs are not sufficient) & extracts fans for both CO & smoke removal. The capacities of the main extract fans based on the air changes. International codes refer 4-6 ACH for CO removal & 8-10 ACH for smoke extraction.

Control system is the heart of the system & need to be designed carefully. The control system decides the response time for the speed of the jet fans after getting signals from CO sensors. This helps the complete system to optimize the energy at different parking loads of the day. Which means the control system will start/stop the fans individually or zone wise pending on the demand of the cark park.

When connected to the fire detection or in high CO levels, the controlling device need to switch on the fans on full speed after getting the signal from heat/smoke sensor or CO sensor. In addition to switching jet fans on high speed on fire floor, the control system is also responsible to switch off fans on other levels upper or lower than the fire floors. Control system will also regulate the main supply / extract fans on demand or signal from the respective sensors in addition to jet fans, quickly & effectively.



CFD Simulation

Computational fluid dynamics (CFD) can simultaneously predict airflow, heat transfer and contaminant transport in and around buildings. A CFD model is built upon fundamental physical equations of fluid flow and energy transfer. The technique is capable of providing time dependent and as well as steady state solutions to the coupled differential equations that govern fluid flows.

The jet fan ventilation system is adapted for the basement ventilation in normal operating conditions as well emergency operating conditions.

The objective of the CFD is to design of ventilation system for the basement car parking area using jet fans. The specific aim is to find the optimal locations, number & configuration of the jet fans required for the ventilation of the car parking lot, for the given positions of inlets and exhaust, and given configuration of the exhaust fans, such that it meets requirements of CO exposure limit set by health and safety regulations.

The acceptance criteria within the Building Regulations adopt the Health and Safety Executive, EH40/2000 – Occupational Exposure Limits 2000. The main criterion is for car parks the carbon monoxide levels are to remain below a designated peak value.

The input to the project shall be the data and information provided by the client in form of 2-D Layout drawing of Basement and check list duly filled in the format given by the supplier. The mathematical modeling for the analysis involves a few simplifying assumptions and care shall be taken to be sufficiently conservative with the assumptions to meet the safety requirements.

The Positioning of the JET Fans shall be based on CFD analysis to transport fresh air from supply points to the all the place

through jet fan and hence forth to the Extract fan which will extract the air out of the Basement.

Processes involved in CFD

When applying a CFD package to undertake a flow and thermal analysis, there are number of steps that involved for completing the CFD process.

- Defining the geometry and domain
- Selecting physical sub-models
- Specifying boundary conditions at the frontiers of the domains including walls, inlets, openings, supply fans, exhaust fans, jet fans, and fire location and burning material properties.
- Discretizing the mathematical equations, which includes creating a mesh (which sub-divides the space into small volumes), setting time steps (which divides the time into discrete steps) and selecting numerical sub-models
- Monitoring the iterative solution process
- Analyzing the solution obtained
- Uncertainties that may arise at each of these steps are highlighted
- Visualize the obtained solution

Control system

Designing of a control systems is an important aspect of the system which needs to be done at the initial design stage itself. Determining the type/ quantity of sensors and deciding the zones and configuring them right is an integral part of the control system design. We, at Sevcon-Lti, design much complex control system in a way that is easy to control and operate.

Intelligent controls & monitoring

The system can be controlled and monitored in a more intelligent way by using smart controllers and sensors. With the latest innovative technology the Sensors are connected through a digital bus to the controllers that helps saving in wiring and offers a dedicated multifunctional approach to regulating and controlling ventilation equipment. Utilizing reliable electrochemical sensor technology, a number of digital BUS CO Detectors may be zoned to measure CO and control ventilation. In this way, energy costs can be streamlined while operating effective air quality control. Please be in touch with Sevcon-Lti team for details.



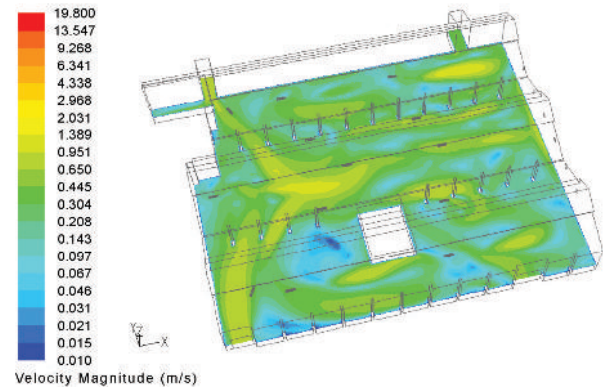
CFD simulations

CFD Simulation

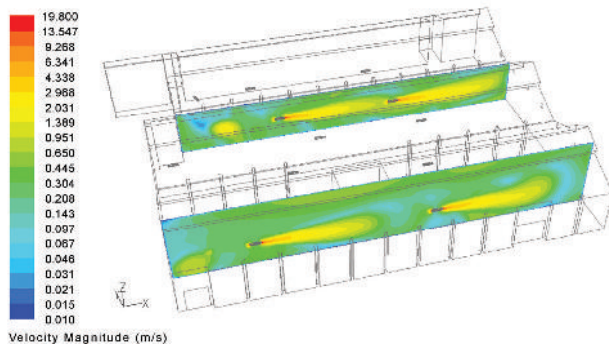
We assist our customers in proper design of basement ventilation system using jet fan systems with the help of CFD (Computational fluid dynamics).

CFD analysis reports are provided on request to find the optimal locations, numbers, size & configuration of the jet fans required for the ventilation of the car parking lot, for the given positions of inlets and exhaust, and given configuration of the exhaust fans, such that it meets requirements of CO exposure limit set by health and safety regulations.

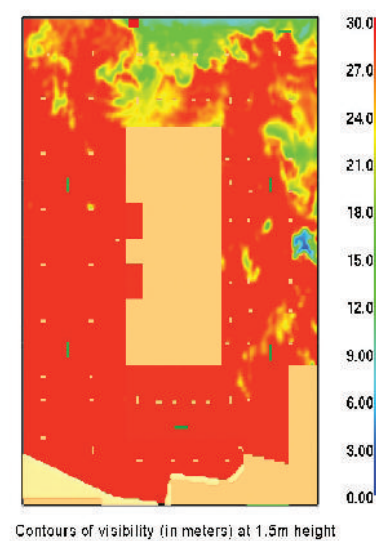
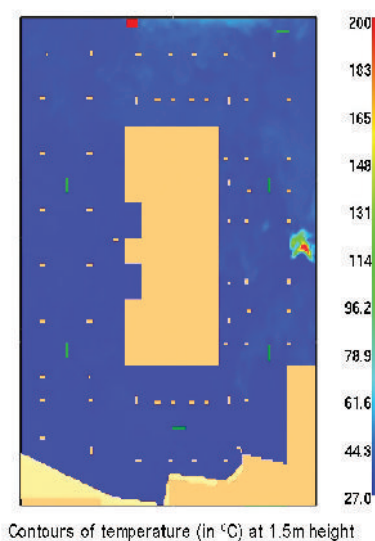
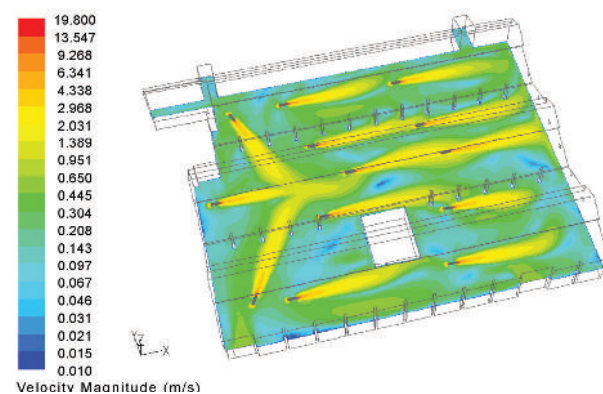
Section velocity vectors



Mean age of air



Influence of drop beams





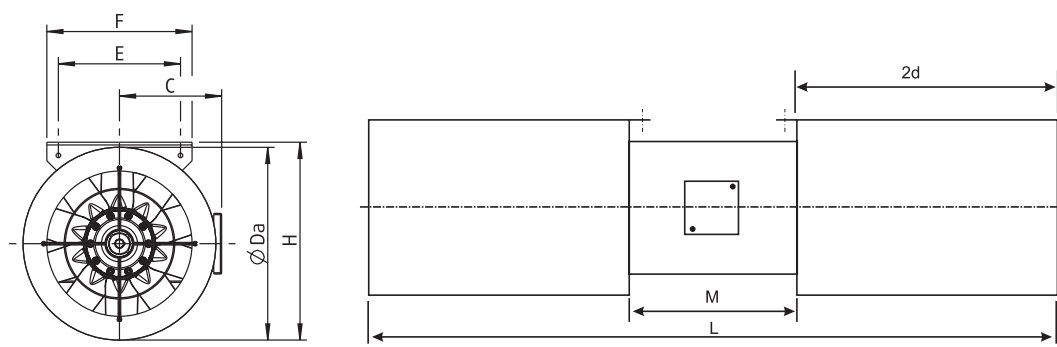
JAF Series -Jet Fan

- Dual use: For daily ventilation and smoke extraction in case of fire F300 (300°C/120 min.).
- Aerodynamical impellers for maximum thrust and with low sound level.
- Motors IP54, insulation class H (smoke extract); motors IP55, insulation class F (CO-exhaust).
- Casing manufactured from galvanized steel.
- Removable fan module also after installation for easy maintenance.
- Certified to BS 7346: Part 2/EN 12101-3

Technical data:

Jet fan JAF	Thrust	Air volume	Motor rated power	Motor rated current	Speed	Sound level 1m, from center of casing	Weight	Temperature
400V/50Hz/3~	N	m ³ /h	kW	A	rpm	LpA dB	kg	
JAF 315-2	31	5400	0.75	1.7	2845	64	60	55°C
JAF 315-2/4	31/9	5400/2700	0.8/0.16	1.9/0.4	2730/1375	64/47	60	55°C
JAF 355-2	51	7200	1.5	3.2	2840	66	70	55°C
JAF 355-2/4	51/11	7200/3600	1.2/0.24	2.6/0.49	2870/1435	66/50	75	55°C
JAF 400-2	81	10400	2.2	4.4	2840	70	85	55°C
JAF 400-2/4	81/17	10400/5200	2.4/0.48	4.9/1.4	2900/1450	70/54	110	55°C
JAF 315-2(T)	31	5400	0.75	1.7	2845	64	60	300°C/2h
JAF 315-2/4(T)	31/9	5400/2700	0.8/0.16	1.9/0.4	2730/1375	64/47	60	300°C/2h
JAF 355-2(T)	51	7200	1.5	3.2	2840	66	70	300°C/2h
JAF 355-2/4(T)	51/11	7200/3600	1.2/0.24	2.6/0.49	2870/1435	66/50	75	300°C/2h
JAF 400-2(T)	81	10400	2.2	4.4	2840	70	85	300°C/2h
JAF 400-2/4(T)	81/17	10400/5200	2.4/0.48	4.9/1.4	2900/1450	70/54	110	300°C/2h

Dimensions:



Size	Da	H	E	C	F	L	M
315	419	430	265	235	315	1660	355
355	459	497	305	255	355	1820	355
400	504	558	350	280	400	2000	400

All dimensions in mm.

CJF Series- Jet Fan

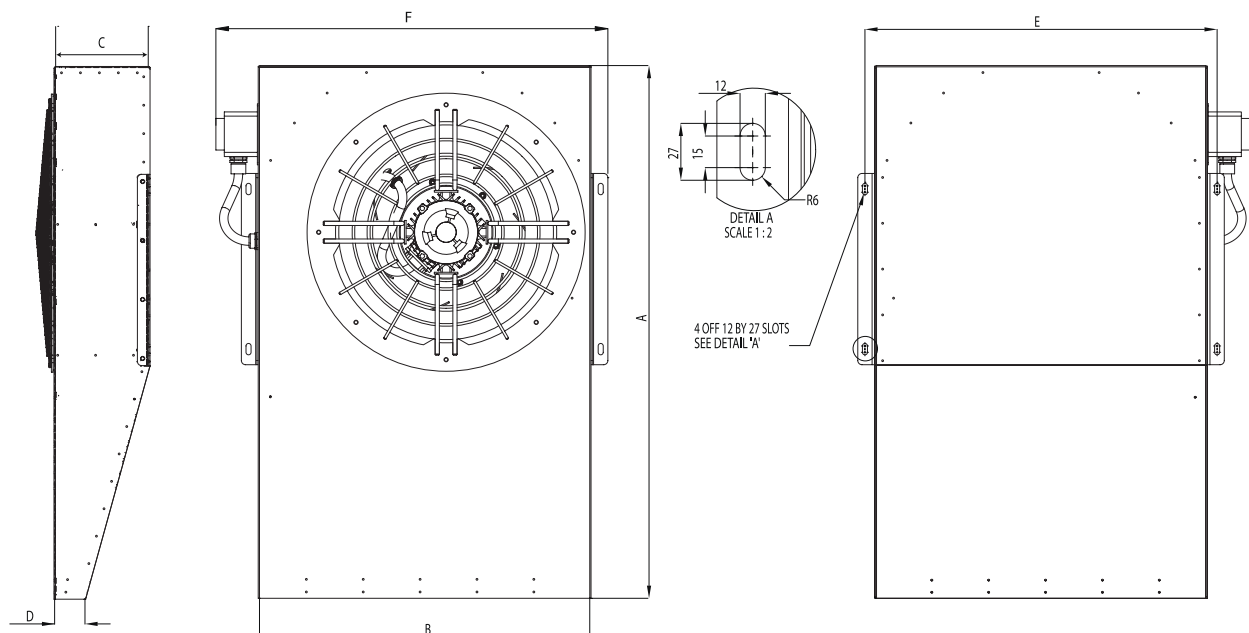


- For normal ventilation and smoke extraction in case of fire F300 (300°C/120 min.).
- Aerodynamical centrifugal impeller for maximum thrust and with low sound level .
- For normal ventilation motors are IP55, insulation class F, For smoke extraction motors are IP54, insulation class H.
- Suitable for low ceiling heights.
- Galvanized steel casing.
- Deflectors for adjusting flow.
- Certified in accordance to BS 7346:Part 2.

Technical data:

Centrifugal Jet Fan CJF	Thrust	Air volume	Motor rated power	Motor rated current	Speed	Sound level 1m, from center of casing	Weight	Temperature
400V/50Hz/3~	N	m³/h	kW	A	rpm	LpA dB	kg	
CJF 50-4/8	54/12	5900/2900	1.39/0.37	3.2/1.36	1450/725	74/58	86	55°C /300°C/2h
CJF 100-4/8	90/21	11500/5750	2.2/0.55	4.4/1.3	1440/720	69/55	145	55°C /300°C/2h

Dimensions:



Model	A	B	C	D	E	F
CJF 50-4/8	1250	775	271	70	836	930
CJF 100-4/8	1700	1150	340	70	1206	1300

JVF Series -Jet fan

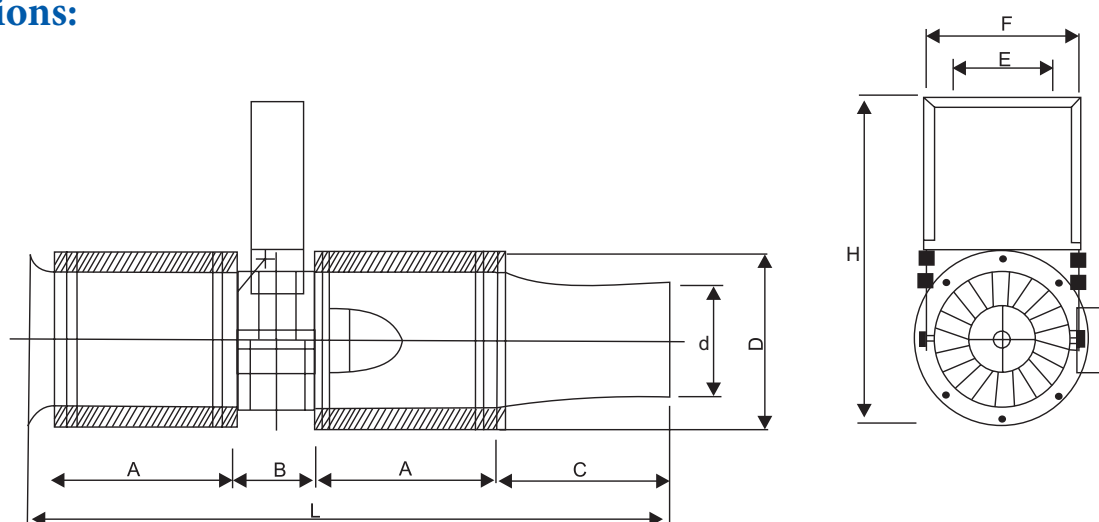


- Nozzle type fan for normal ventilation for car parks.
- 220 V/50 hz Single phase, normal temperature.
- Simple wiring, easy installation, maintenance free.
- Low Power consumption, ultra thin, low noise level.
- Simply suspended from the ceiling with hanger bolts.
- Lubrication free motor bearings require no maintenance.

Technical data :

No	Item	Unit	Models			
			JVF-350AX	JVF-450AX	JVF-550AX	JVF-650AX
1	Nozzle	EA	One nozzle	One nozzle	One nozzle	One nozzle
2	Nozzle Dia	mm	180	250	250	300
3	Air Flow	CMH	1,500	2,300	2,500	3,500/6,800
4	Phase	Ph	1	1	1	1/3
5	Voltage	Volt	220	220	220	220/380
6	Cycle	Hz	50	50	50	50
7	Revolution	RPM	2,850	2,850	2,850	2,850
8	Ampere	Amp	0.8	2.0	2.5	2.8
9	Power consumption	Watt	175	350	500	1,200
10	Sourd Level	dB(A)	55	61	63	60/67
11	Weight	KG	16	25	28	35

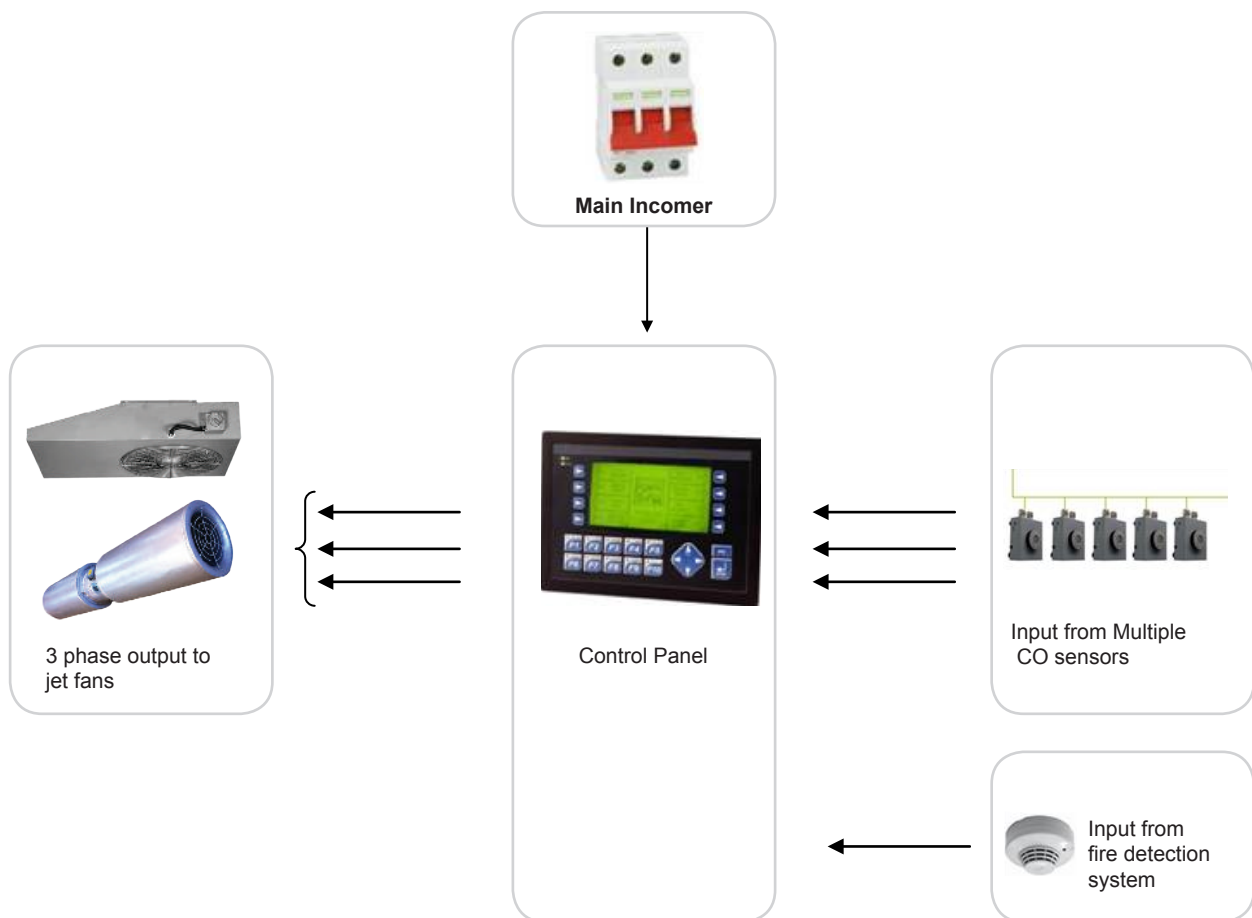
Dimensions:



Model	L	d	D	A	B	C	E	F	H
JVF-350AX	1060	180	280	285	130	320	190	250	600
JVF-450AX	1220	250	360	320	210	330	240	320	750
JVF-550AX	1320	250	360	370	210	330	240	320	750
JVF-650AX	1560	300	440	500	190	310	320	380	800

System Operation:

- The Jet fan system shall consist of jet fans at strategic locations based on CFD analysis, CO sensors and control & power panel.
- The control panel shall provide power to Jet fans & CO sensors and shall switch on & off the jet fans based on demand.
- CO sensors shall be placed at different locations in basement and also the Jet fans will be located at strategic locations.
- Set of jet fans shall run based on Start/stop command from control panel based on signal from CO Sensors.
- The CO level will be sensed by the CO sensors and the signal will be relayed to control panel.
- Control panel shall decide to run set of jet fans based on signal provided by CO sensors.
- In case of fire:
 - ✓ Co sensors operation will be bypassed.
 - ✓ The signal from fire alarm panel shall be sent to jet fan panel.
 - ✓ Jet fan panel shall start jet fans in higher speed.
 - ✓ The main extract fans to achieve required air change shall also receive a signal from fire alarm panel/detection system & run them in case of fire.



Input required for conducting the CFD Analysis

Project Name & Location:				
Customer:				
Basement Level:				
Basement Area (Sq Mt):				
Basement Height (Mt):				
No. of Cars:				
Jet Fans details				
Jet Fan Model:				
Air Volume (CFM):				
Thrust (N):				
Single speed or Dual Speed:				
Unidirectional or bi directional:				
To be used for Smoke extract / CO extract:				
Supply & Exhaust fan details				
Parameter	Supply Air		Exhaust Air	
	Normal Mode	Fire Mode	Normal Mode	Fire Mode
Total Air Qty (CFM)				
Type of fan (axial/Centrifugal)				
Air Qty (CFM) per fan				
Qty of Fans				
Location (s) of fans (s) in Drawing				
Corresponding File name & format				
If Natural, provide Size (Mt.) and Location of the opening in Drawing				
Provide relevant floor plans of the car park:				
Provide relevant sectional drawings plans of the car park:				
We hereby confirm that details provided above are correct and final for proceeding with the CFD.				
Date:				
Name & Signature of the Sender:				
Name of the Organisation:				



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*subject to technical modification