

Air Control Technology Leader

Introduction

2005. 6. 1

MJ AIR TECH CO., LTD.

1440
Mini Jet Fan

MJ AIRTECH ASIA PACIFIC PTE LTD

PROJECT REFERENCE

S/No	Project	Description of System	Status
1	Cluster Housing at Miltonia Close	Car Park Smoke Purging MV System	Completed
2	MUIS Mosque Project at Jurong East	Mechanical Ventilation System for Prayer Hall	Completed
3	Condo at Nathan Road	Car Park Smoke Purging MV Sytem	Completed
4	Market Street Carpark	Car Park MV and Fume Extract System (Above Ground)	Completed
5	Golden Shoe Carpark	Car Park MV and Fume Extract System (Above Ground)	Completed
6	Condo at Lornie Hill	Car Park Smoke Purging MV Sytem	Completed
7	NTUC Commercial Development at Ang Mo Kio	Car Park Mechanical Ventilation (Supply Air) System	Completed
8	1° North Club House at Sentosa Cove	Car Park Smoke Purging MV System (Performance Based)	Completed
9	"One Amber" Condominium development at Amber Road	Car Park Smoke Purging MV System (Performance Based)	In Progress
10	"Capella" Hotel Resort development at Sentosa Island	Car Park Smoke Purging MV System (Performance Based)	In Progress
11	"The Sail" Condo development at Marina Bay	Car Park MV and Fume Extract System (Above Ground)	In Progress
12	J159 Condominium Development at Handy Road	Car Park MV and Fume Extract System (Basement)	In Progress
13	"Tribeca" Condo Development at Kim Seng Road	Car Park Smoke Purging MV System (Performance Based)	In Progress
14	Bishan Junction 8	Car Park MV (Supply Air) System	Completed
15	Bunglow Housing Development @ Sentosa Cove	Mechanical Ventilation Sytem	Completed
16	"The Coast" Condo Development @ Sentosa Cove	Car Park Smoke Purging MV System (Performance Based)	In Progress

Company Outline

연구개발 단계를 거쳐 도약성장 단계에 진입

Company Name	**MJ Air Tech Co., LTD**
Asia Pacific Manager	**MJ Air Tech Asia Pacific Pte Ltd**
Established Date	**May 18, 1992**
Capita Stock	**450,000,000 Won**
Employee	**17**
Address	**Block 1, Ang Mo Kio Industrial Park 2A, #01-03 AMK TECH 1 Singapore 568049 Tel: 6481 1192 Fax: 6481 1102 Email: mjairtech@gmail.com**


Main office & Research Institute

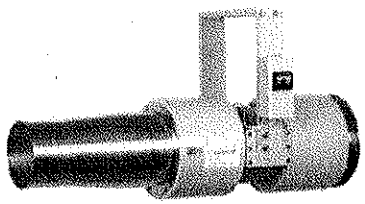

Factory

EI etc.

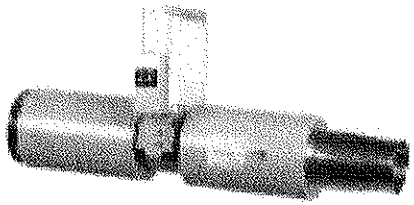
Products

OEM 생산 → 기술제휴 개발 → 독자 개발 단계를 지나 신기술 제품 개발

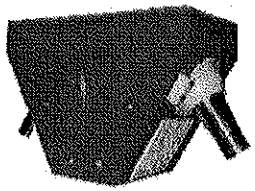
Jet Fan



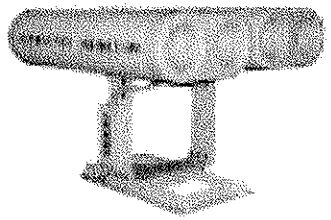
Low Noise Jet Fan



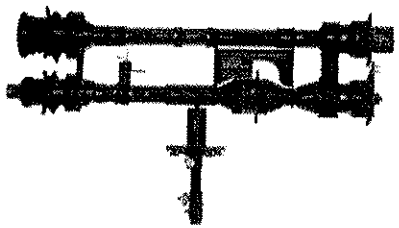
Fan-coil unit for high tall building



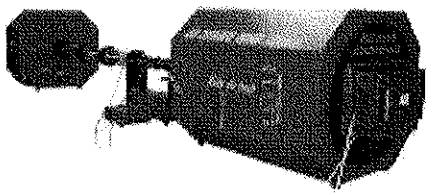
Multi Fan



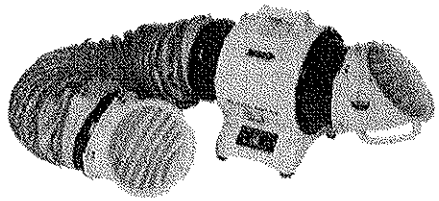
Wind tunnel for refrigerator



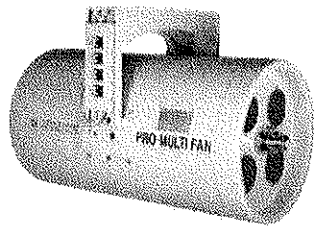
Wind tunnel for air cleaner



Vent Fan



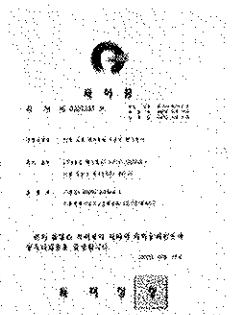
Turbo Fan

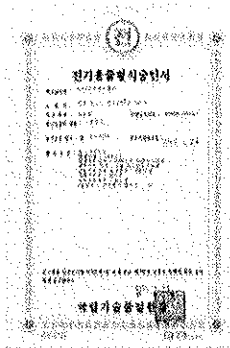


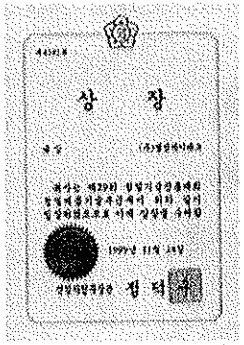
Industrial property, Certification, Standard, Award

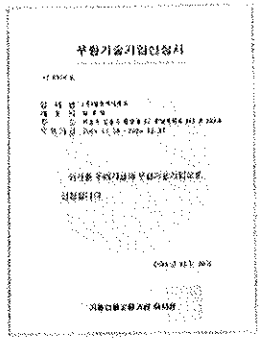
생산 및 개발 제품 전체 국내 최초 개발

Industrial property	Patent(Ventilation system using the multi-integrated fan, '02.5.7, #0337233, Korea)
	Utility(Multi-Integrated jet fan, '99.12.17, #1073292, Korea)
	Utility(Movable direction Pro-jet fan, '02.4.29, #0275053, Korea)
	Registered trade mark(Pro-jet fan, '99.12.13, #0640617, Korea)
Standard certification	Electrical Appliances Safety Certification of Korea (1-8-6222, 6233, 6541, 6542, HAO7152-2001A)
Award	29th Precision technology encouragement award (Gold statue, '99.11, Korea)
	29th Precision technology encouragement award (Distinguished service metal, '99.11, Korea)
Certification	INNO-BIZ (Small and Medium Business Administration, #1010-0098, Korea)
	Excellent Korea Technology based Firm(Korea Technology Credit Guarantee Fund, #1543, Korea)
	Venture company(Small and Medium Business Administration, #2001112471-7817)
	New technology based Firm(Pro-jet fan, '02.6.8, #337)





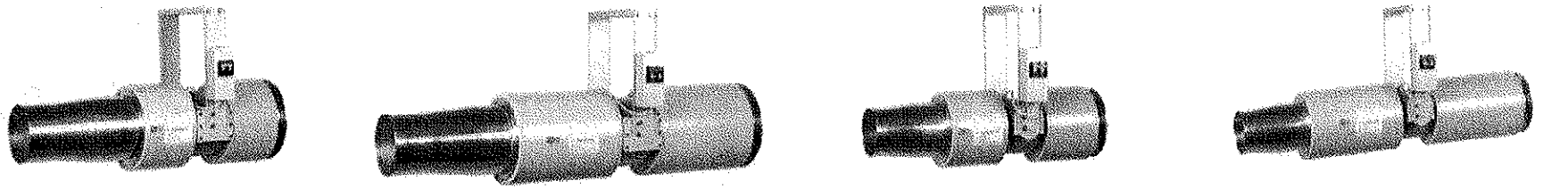




Product 1 (High-efficiency & Low-noise Jet Fan)

국내최초 개발, 기존기술 대체 와해성 제품

Standard type for high-rise building | Low-noise type for high-rise building | Standard type for low-rise building | Low-noise type for low-rise building

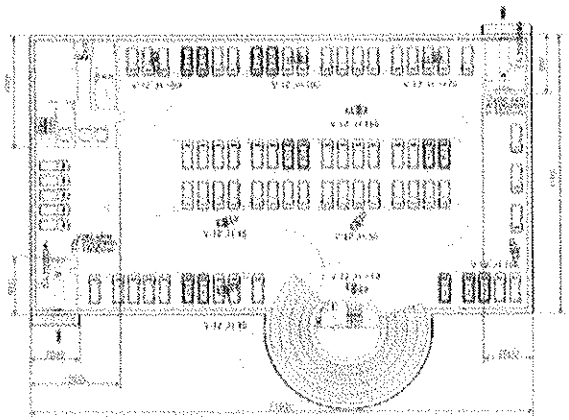


Induced exhaust of the polluted air, Fresh air supply, Temperature stratification removal, Dust removal, Energy save

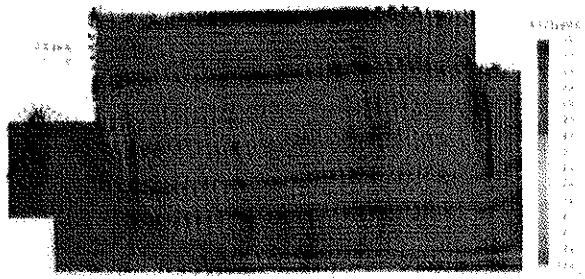
Sports center, Under-parking lot, Museum, Store house, Hotel lobby, Factory etc.



Under-parking lot



Arrangement plan

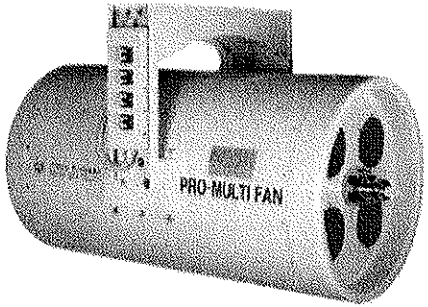


Effect

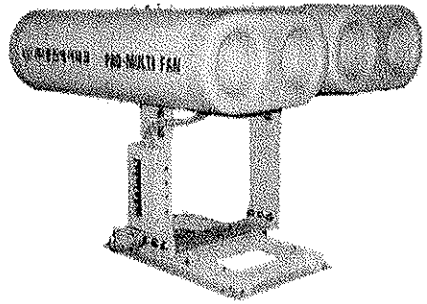
Product 2 (Multi-integrated Fan for long distance air current)

국내 최초 개발, 기존기술 한계 극복 제품

Circle type with 2 row & 2 column

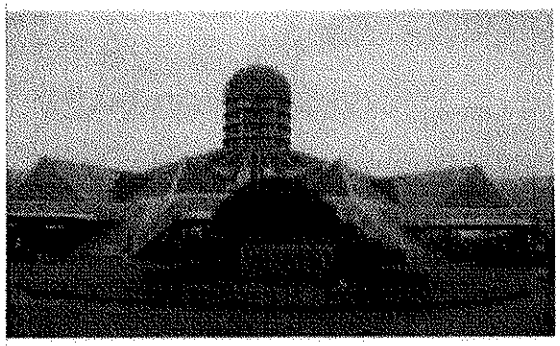


Track type on 4 row & 1 column

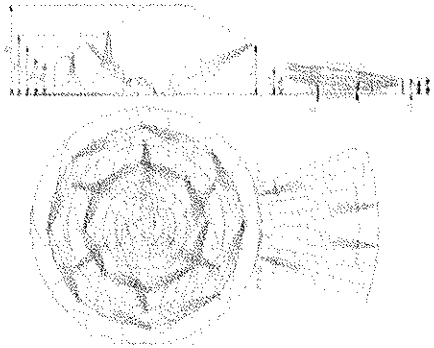


Temperature stratification removal, Temperature & humidity equilibrium, Comport rise, Pollutants removal, Energy save

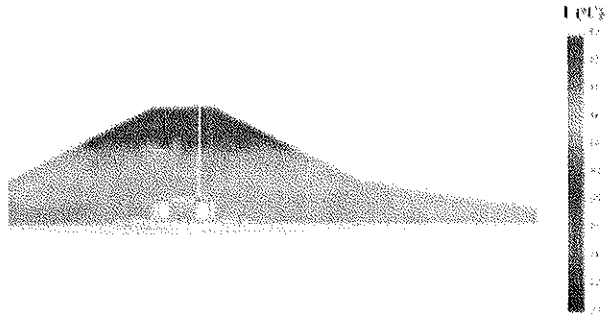
Gymnasium, Exhibition center, Big size factory, Convention center, Swimming pool, Heavy industrial factory, Botanical garden etc.



Botanical garden



Arrangement plan

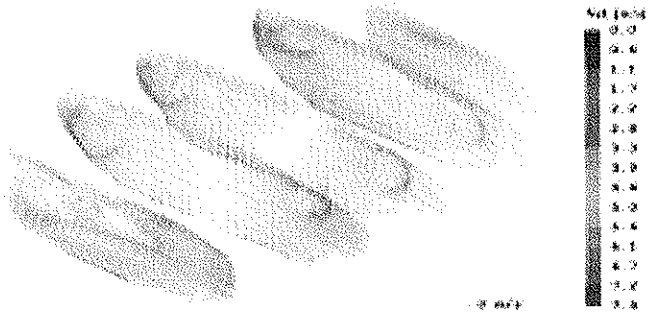


Effect

Technology Possession1 (Velocity, Temperature & Pollutant Prediction Simulation)

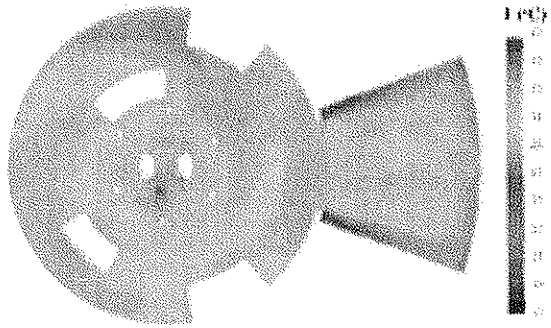
산학 공동연구로 기술 보급 선도

Velocity Simulation



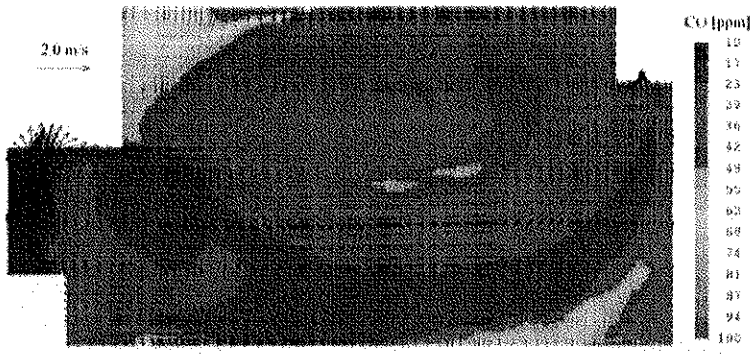
Gymnasium

Temperature Simulation

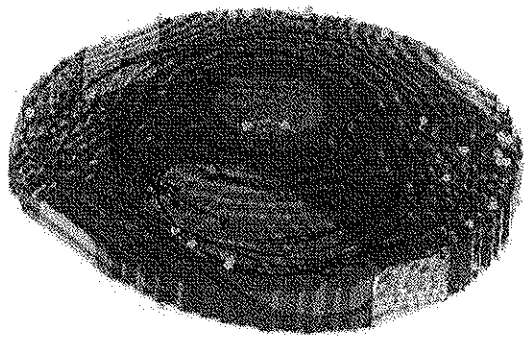


Air conditioning unit optimum design, Energy save & Effect prediction

Changwon cyclodrome, Yeomiji botanical garden, Pyeongyang gymnasium etc.



Pollutant Simulation

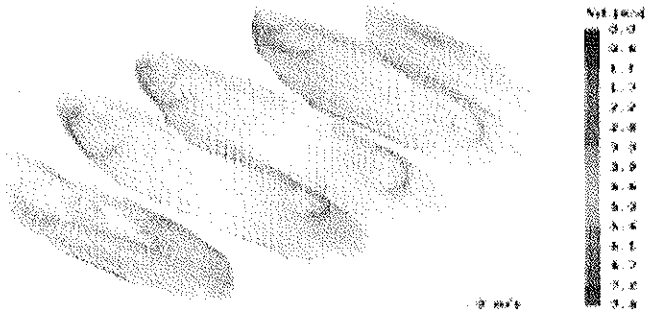


Particle behavior trace

Technology Possession1 (Velocity, Temperature & Pollutant Prediction Simulation)

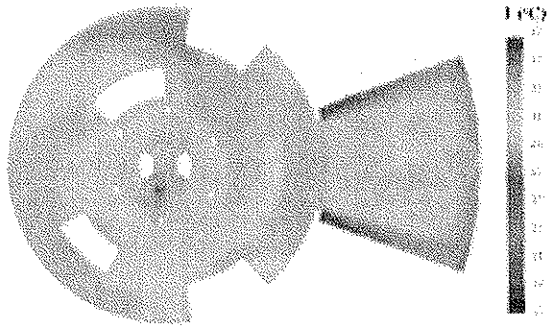
산학 공동연구로 기술 보급 선도

Velocity Simulation



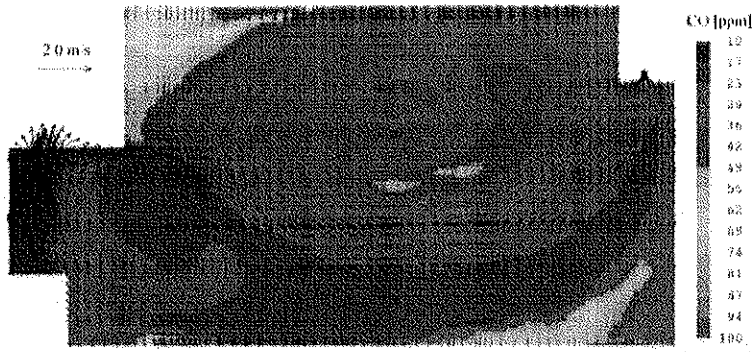
Gymnasium

Temperature Simulation

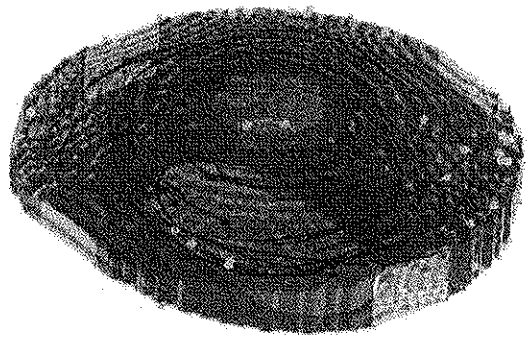


Air conditioning unit optimum design, Energy save & Effect prediction

Changwon cyclodrome, Yeomiji botanical garden, Pyeongyang gymnasium etc.



Pollutant Simulation



Particle behavior trace

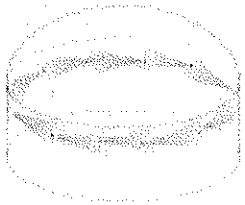
Technology Information

Technology Possession3 (Airflow pattern control technology of large space)

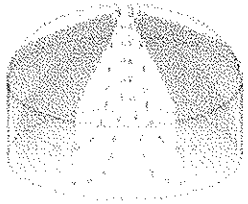
MI AIR TECH CO.,LTD

국내최초 개발, 기존기술 대체 와해성 제품

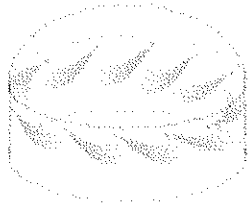
Turning flow



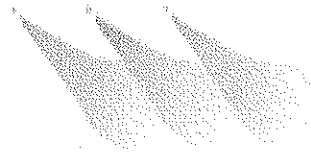
Mixing flow



Induced flow

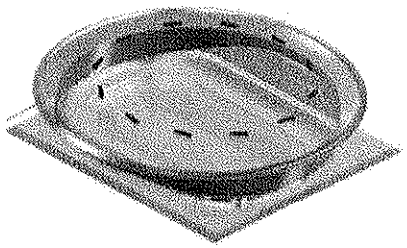


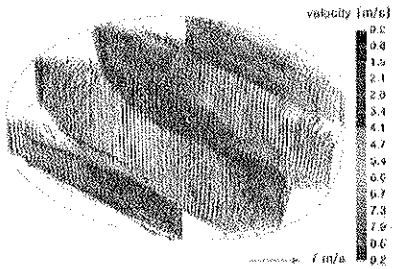
Transfer flow

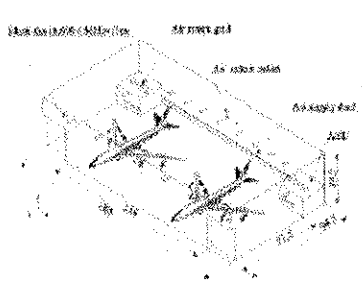


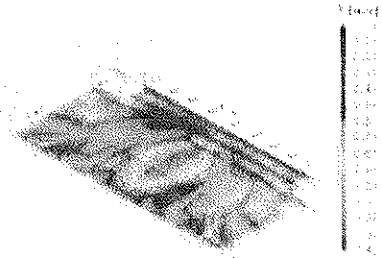
Ventilation efficiency Improvement

Pyeongyang gymnasium, Incheon airport etc.





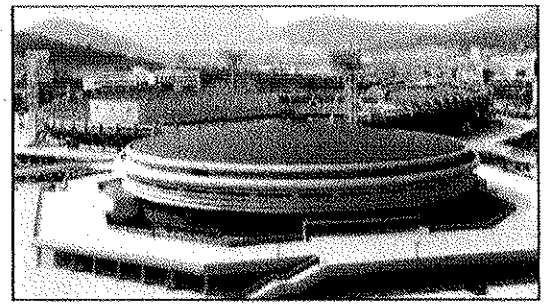




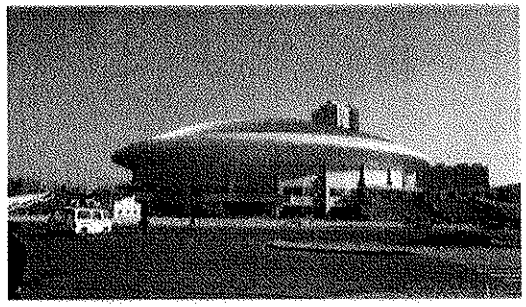
Technology Possession4 (Airflow pattern control system construction and TAB technology) MI AIR TECH CO.,LTD.

신축 설계중인 대공간 기술 적용 가속화

Changwon cyclodrome



Pyeongyang gymnasium

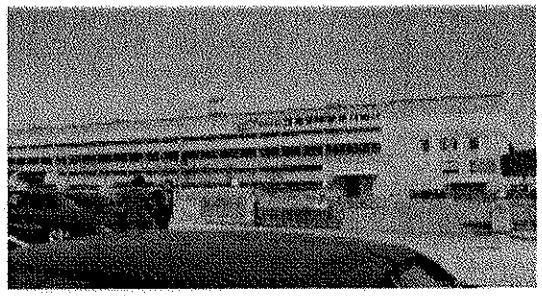


Construction cost reduction, Shortening of a term of works, Cooling, heating & ventilation efficiency improvement

Pyeongyang gymnasium, Growell metal, Suwon AFMC etc.



Incheon Airport



Growell metal Pyeongtack Factory

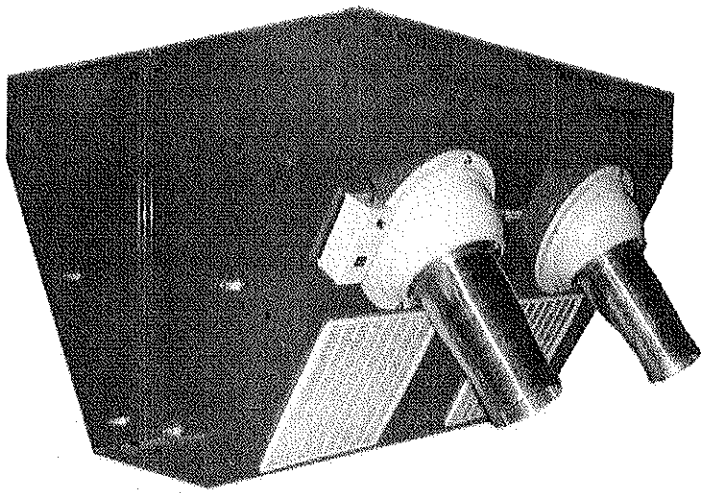
Development technology 1 (Fan coil unit, Heat exchanger)

산업자원부 지원 에너자자원기술개발사업 시제품

Fan coil unit for high-rise building(HFCU-A)

Specification: Flow rate(1,200CMH), Heating capacity (8,000kcal/h

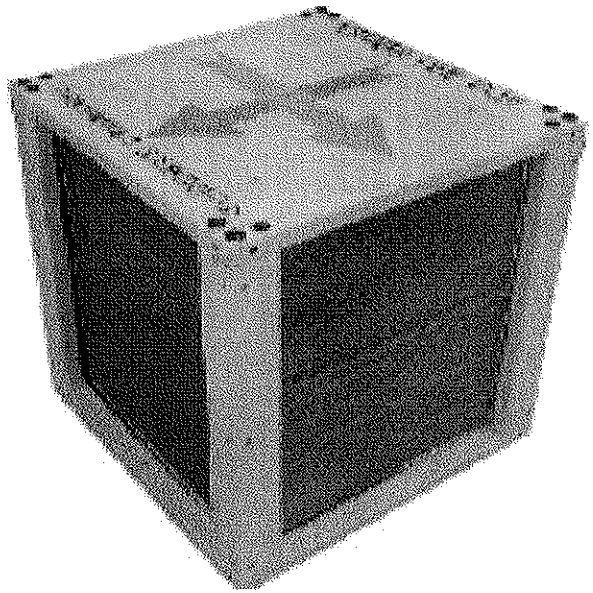
Use: Spot heating for worker of automobile factory



Laminated resin heat exchanger(ME-450)

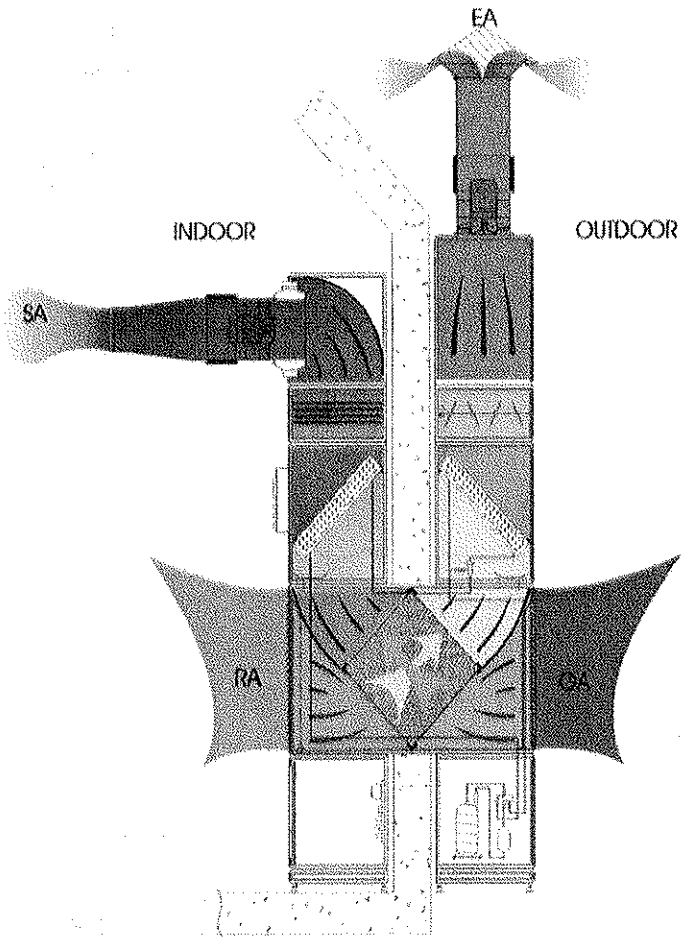
Specification: Sensible heat recovery efficiency(over 55%), Static pressure loss(under 7mmAq)

Use: Energy Saver for Industry, Home and Agriculture

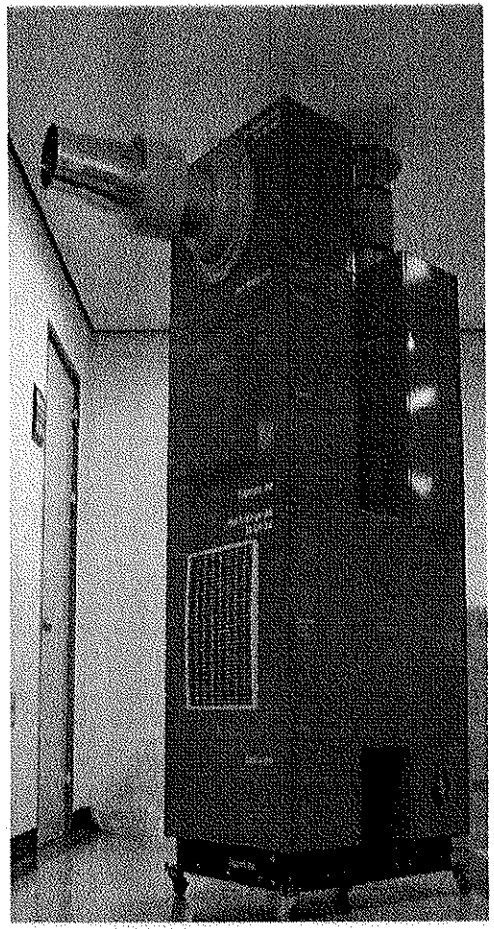


Development technology 2 (Heat pump system for pig house)

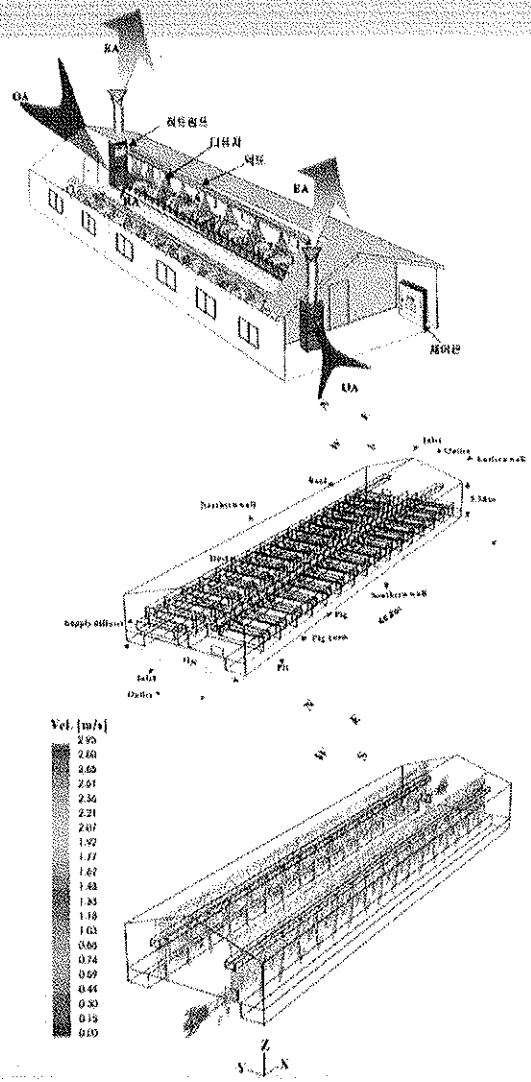
산업자원부 공통핵심기술개발사업 수행중



Concept

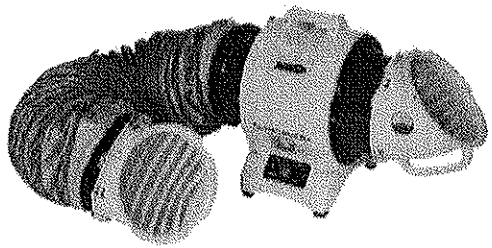


Product



Business process technology 1 (1 stage axial portable fan in high static pressure)

3D 업종 종사 근로자의 건강증진, 작업장 공기환경 개선으로 구인난 경감 및 생산성 향상

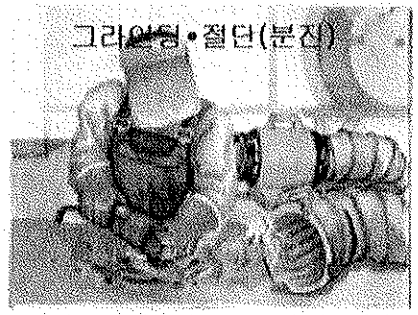


Use for the fume, dust, pollutant and stink removal

- Enlargement of air transfer distance through high static pressure(87mmAq)
- Air current arrival at long distance by jet angle of 23° (40m)
- Operating cost reduction by built-in high efficiency BLDC Motor (470W)

Investment cost	'01. 12~'03. 2(15개월) : 5억
Market size	100억원(40,000대, 총 소요량의 10%) : '03 국내시장
Application	흄,분진,유해가스,악취가 발생되는 중공업 공장, 지하터널, 공동구, 정화조, 맨홀, 저장탱크 등


용접(흄, 유해가스)

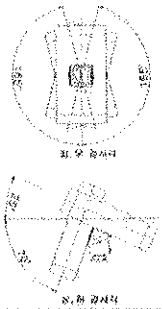

그라인딩•절단(분진)


도장(분진, 유해가스)

Business process technology 2 (Variable direction & air flow rate multi-fan)

패적한 바람이 거주영역에 형성되는 공간 창조 및 온,습도 분포의 균일화 : 바람이 있는 실내 공간 창조

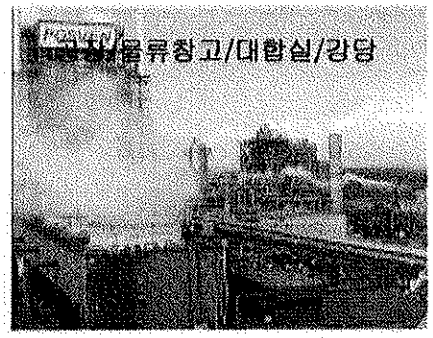




감성기류 발생.기류패턴 제어 및 에너지 절약용

- 상하.좌우 지향각 자동 가변에 의한 최적 기류패턴 제어
- 계절별 취출풍량 자동 가변에 의한 환기효율 극대화
- 저소음{50dB(A)} 정숙 운전에 의한 불쾌감 유발 방지
- 공간 규모.형태.목적별 최적 기류패턴 조성
- 공간 관통력이 우수하여(출구직경의 200배) 상하온도차 최소화

Investment cost	'02. 6 ~'03. 5(12개월) : 4억
Market size	120억원(신축 부문의 시장규모, 개수 및 대체 수요 부문 계상 제외) : '03 국내시장)
Application	실내체육관, 스포츠센터, 수영장, 컨벤션센터, 고층건물 로비, 공항터미널, 박물관, 전시장 등

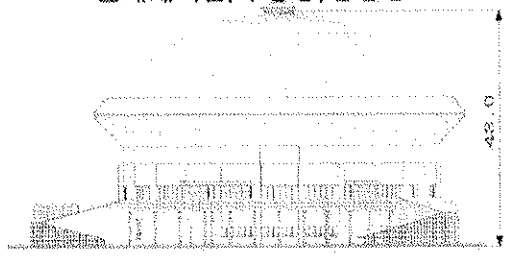


물류창고/대합실/강당



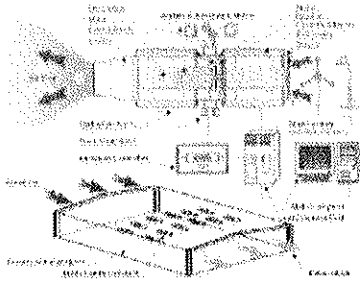
호텔/전시장/공항터미널/박물관

실내체육관/수영장/빙상장



Business process technology 3 (integrated ventilation system with flow pattern control) ㈜ MI AIR TECH CO.,LTD.

국가 주력 산업인 중공업 부문의 생산성 향상 및 수주 증가(작업 환경 평가가 업체 선정의 주요 항목)



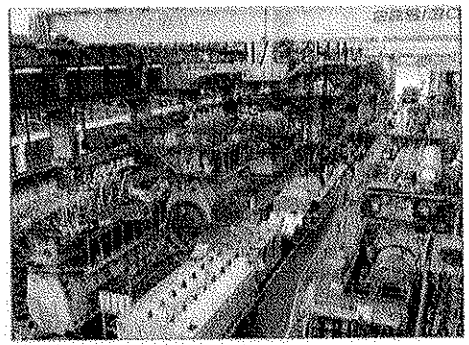
조선.철강.주조.자동차 등 고층고 대형공장용

- *최대도달거리가 출구직경(350mm)의 300배 수준의 터보팬*
- *확산각(23°) 이내로 공간 관통력과 기류 유인 효과(25배)*
- *외기 풍향.풍속 및 오염농도 검출에 따른 터보팬 지향각 가변*
- *건물 구조 및 작업조건 별 기류패턴 통합제어 가능*
- *최적배치 Simulation을 통한 과잉 설치 방지 및 환기효율 향상*

Investment cost	'03. 1~'03. 12(12개월) : 3억
Market size	300억원(조선, 철강, 자동차 등 중공업부분 수요) : '03 국내시장
Application	조선, 철강, 플랜트부문의 대형작업장, 토목, 건설, 중장비 발전설비 제조 공장, 자동차, 발전설비, 중장비 공장

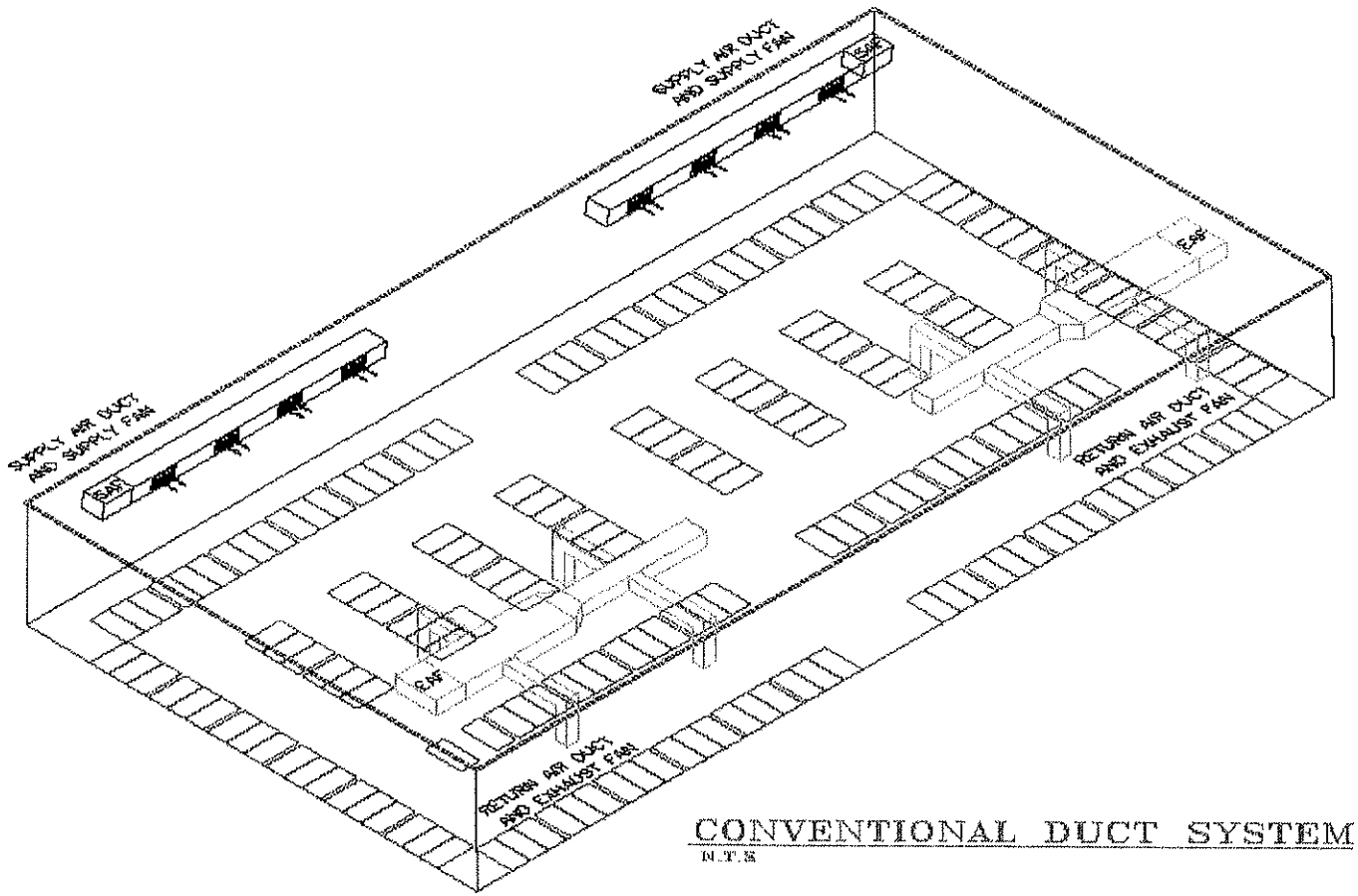






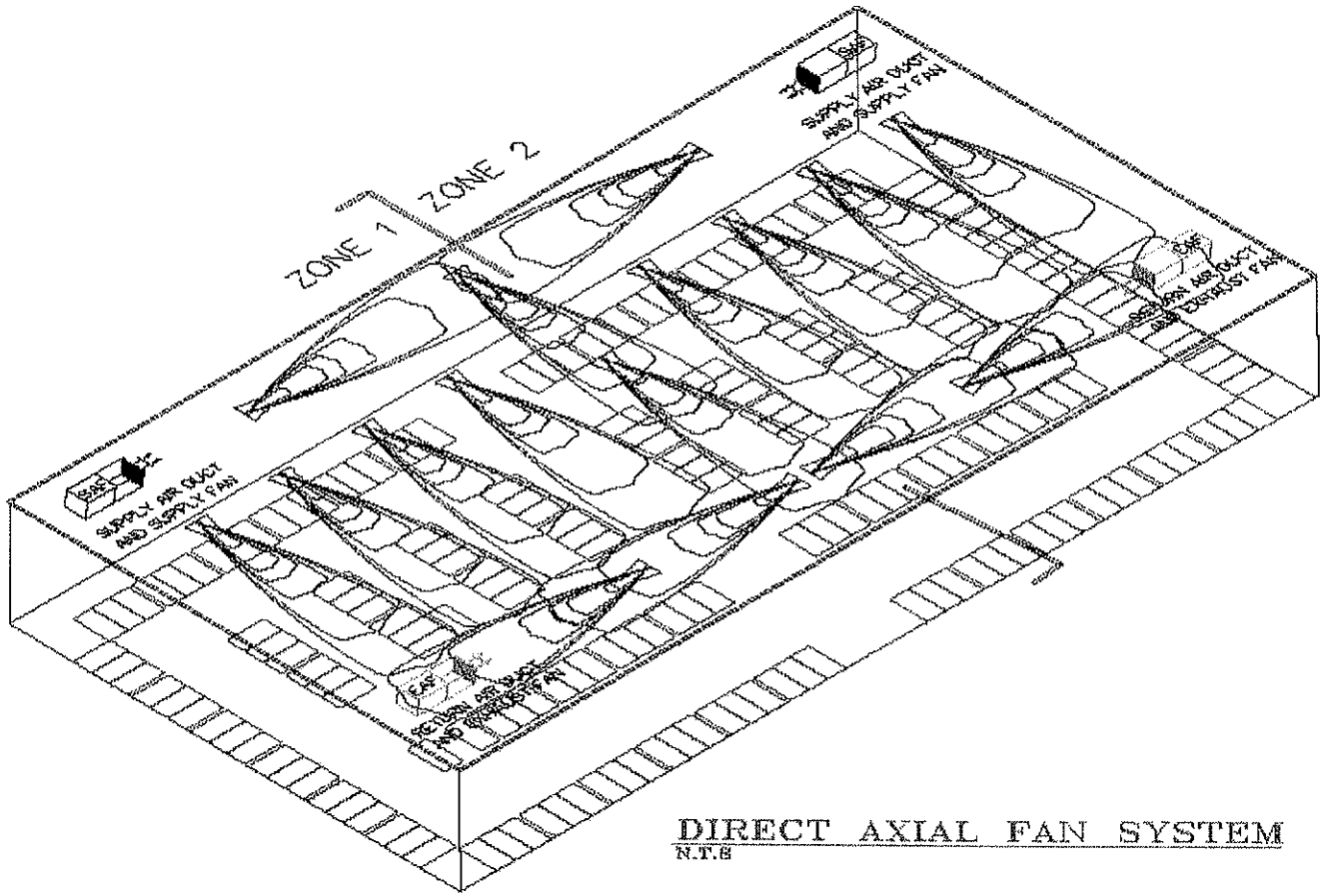
System Comparison for Carpark

	Direct Axial Fan	Conventional System
System Formation	-Supply/Exhaust air fan -DA fans -Control System -CO Monitoring system	-Supply/Exhaust air fan -Duct -Nozzles or diffusers -Control System -CO Monitoring system
Ventilation Method	Air transfer by DA fans -Direct transfer -Indirect transfer	Air transfer by DA fans -Direct transfer
Feature	-Whole ventilation method -Large induced air flow rate -Zone control available -Quantity control available -Easy to retrofit -Simple installation -Low investment cost -Low operation cost -Low noise level -Easy service and maintenance	-Whole ventilation method -Beam penetration is required -High investment cost -High operation cost -Relatively high noise level -Relatively high ceiling height is required



CONVENTIONAL DUCT SYSTEM

N.T.S

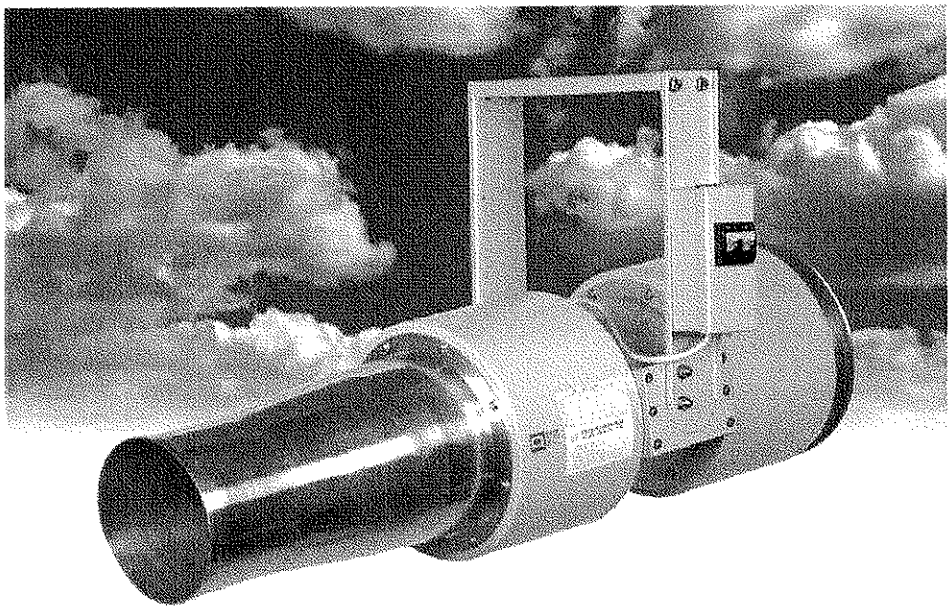


DIRECT AXIAL FAN SYSTEM

N.T.S

Ductless Ventilation System

PRO-JET FAN



3High (Quality, Performance, Efficiency)

3Low (Noise, Power consumption, Initial and operating Cost)

MJ AIR TECH CO., LTD.

We guarantee perfect performance of PRO-JET FAN with the best quality!

PRO-JET FAN is manufactured in aerodynamic design and high-tech, so power consumption is low, product is light and noise is low.
Specially, PRO-JET FAN has the unique characteristics of the long throw and high air-inducing performance.

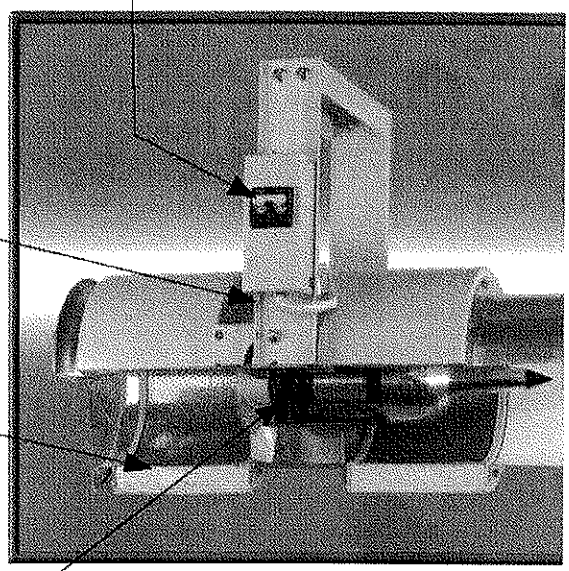
Simple installation & easy control

■ PRO-JET FAN is designed for convenient installation and easy control of nozzle angle. These plans make it possible for changing air-direction, even though PRO-JET FAN is operating without any change of its installation site.

☐ Horizontal tilt angle: 180°
☐ Vertical tilt angle: 100°

Perfectly protected motor

■ Built-in circuit protector of high performance protect a motor from a excess load and accidents by a short-circuit.
■ Attached side red-lamp makes easy monitoring of the operating condition.



Low noise and vibration

■ There is hardly any vibration on PRO-JET FAN due to accurate balancing of a impeller and motor.
■ Even you installed PRO-JET FAN to ventilate your office, our noise reduction technology with the mounted silencers to absorb noise at the front and back side of PRO-JET FAN, is make it possible to work without any noise problems.
☐ PF-40L 1P 220V : 62dB(A)
☐ PF-30L 1P 220V : 59.2dB(A)
※ If you need a class 50dB(A)-PRO-JET FAN, Please send me a special order.

Low power consumption

■ Power consumption and operating cost are low because of using PF-40-3P-380V model which the total pressure efficiency is as high as 80%.
Power consumption
158W(PF-40 3P 380V)
86W(PF-40 3P 380V)
※ If you use the 3 Pole's products, your electric rate will be much lower.
(Power consumption is 20.6kWh/month, in case of using PF-30 3P 39-V for 9 hours a day.)

High performance motor

■ PRO-JET FAN used a specially designed motor, which is capable of continuous operating for more than 25,000hrs and has low vibration and high efficiency so that it has a superior durability.

☐ Degree of insulation B
- Resistant temperature: 130℃
☐ Lifetime: 25,000hrs (Continuous operation)

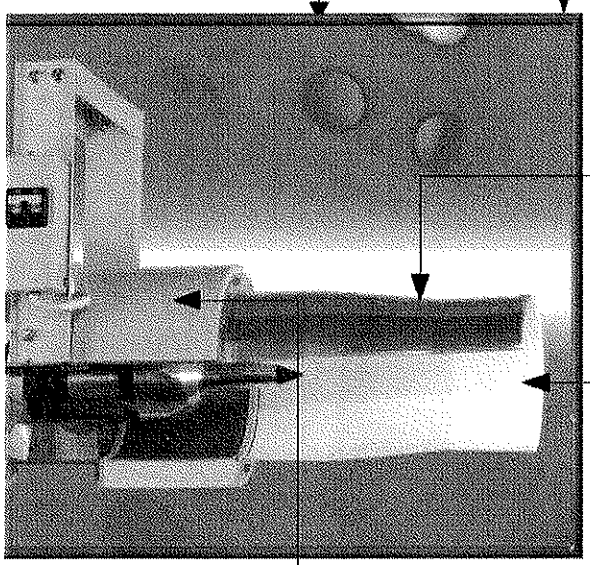
First development of a jet-fan in Korea

In 1997, PRO-JET FAN series were first developed from MU AIR TECH CO.,Ltd. in Korea. PRO-JET FAN's quality, which passed the performance verification field test from a public research institute in Korea, is MU AIR TECH's pride.

Products: 1,500 sets (from 1997.2. to 1998. 12.)

Various kinds of fans (Total 24 kinds)

- Throw : 40m class, 30m class
- Cost : standard type, economic type
- Silencer : standard silencer, long silencer
- Power Supply
  - 1 Pole 220V/1stage
  - 3 Pole 220V/1stage
  - 3 Pole 380V/1stage



High ventilation performance

- Jet air ejects through a fixed guard vane and nozzle which is accurately designed by aerodynamic technology, on this reason, Airflow of low divergence angle is injected.
- PF series can ventilate a wide and long area over 30m, and at that time air velocity is 0.4m/s
  - PF-40 : 34m(air velocity over 0.4m/s)
  - PF-30 : 28m(air velocity over 0.4m/s)

Inductive effect by jet airflow

- The jet airflow ejected from nozzle forms a large-scale whirlpool, and, as a results, a large quantity of the surrounding air is induced and all these mechanism make extreme ventilation effects.
- In case of PF-40 series, ejection airflow rate reaches about 26 times as comparing with mean air-induction ratio

Strong structure

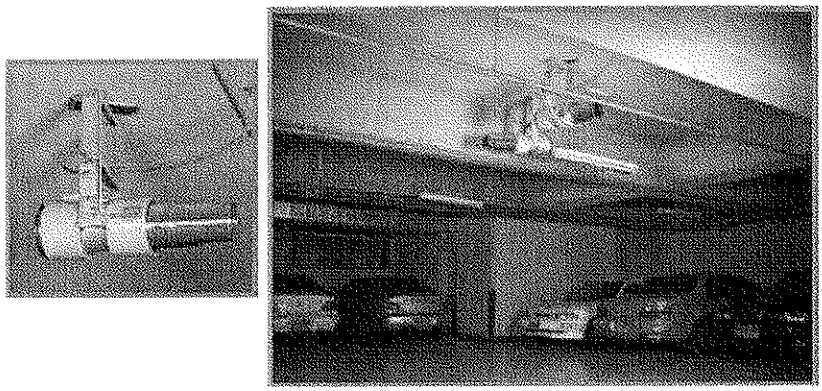
- Pro-jet Fan is prevented corrosion from corrosive gas and humidity by using anti-corrosion material (Al, SUS, Galvanium steel, EGI) and powder coating of the exterior.
- Each unit of fan is firmly welded and each component is assembled by self-lock nut.

Thanks to stylish design of PRO-JET FAN series, usage for various purposes is enabled.

Ductless **PRO-JET FAN** system, a neo-idea technology ventilation system, enhances ventilation and energy efficiency of a large scale working space, moreover it has many advantages to the ventilation of limited area such as underground parking lots through emitting air pollutants produced in underground parking lot with air dilution method.

We have provided our users with engineering solution through CFD and many kinds of experiments for improving ventilation and energy efficiency of a large working space. Our company also have measuring equipments including air pollutants detecting devices and precise heat analysis equipments and so on for providing high-quality engineering services.

Appling dilution-ventilation system to remove pollutants of underground parking



In underground parking lots, there are lots of air pollutants, such as COx, NOx, SOx and micro-macro particles, which are produced by idled and drived cars. When human beings are exposed to these pollutants during short and long term or periodically, those causes not only discomfort feeling but also harm to human beings.

Therefore, the installation of efficient ventilation systems is absolutely needed. The dilution method using duct systems has been mainly utilized as ventilation systems of underground parking lots. However, this duct system has many demerits, which could be classified into two categories.

Bad appearance: heavy duct, enhancement of layer height, and concentration of particles.

Low economics: low energy efficiency, high equipment cost and low ventilation performance

Underground ventilation system to use PRO-JET FAN, which complement the present ventilation system with materializing high ventilation efficiency, is high-tech ductless ventilation system.

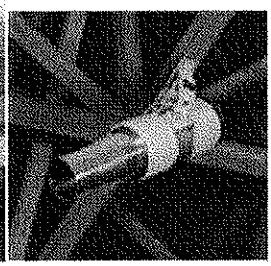
Adaptive to ventilation system in working place, where lots of particles and hazardous gases are produced, such as underground parking lots of apartment, building, department store, complex mall !

CONTENTS

1. 40m air penetration (PF-40 series)
- Specification/fan performance curve
- Air distribution
- Centerline velocity, Entrainment ratio, Operating noise
2. 30m air penetration (PF-30 series)
- Specification/fan performance curve
- Air distribution
- Centerline velocity, Entrainment ratio, Operating noise
3. Air distribution
Air distribution in an enclosure
4. Dimensions Major parts name
5. Application (underground parking lot)
- Overview /Special features/Selection and installation/-Installation guidance
- Operation mode/Estimation equations
- Example of installation diagram and air distribution
- According to system distribution of CO gas concentration
6. System design
- Configuration diagram
- Installation specification
- Nozzle angle adjustment
- Installation and bracket option
- Wiring diagram and control panel
7. Comparison of specifications
8. Selection guide

PORJET FAN Improve heating efficiency of a high-layer building!



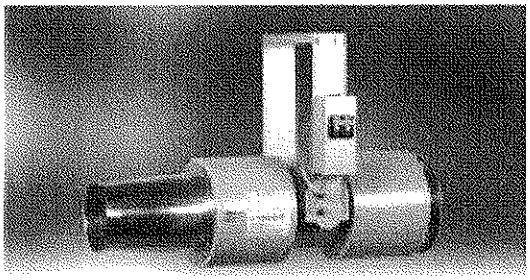


In case of heating high layer buildings such as sports centers, auditoriums, museums et cetera, although you heat those buildings for workers and attendees, you hardly achieve high heating performance in the active zone of those buildings. Although traditional ventilation systems had compulsorily circulated with the diffusers and nozzles, these systems could not succeeded because of short air penetration and poor circulation ability.

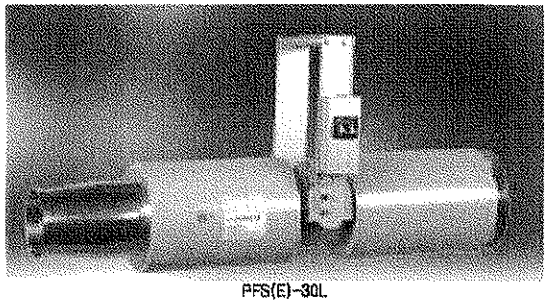
Ventilation system to use **PRO-JET FAN** exert a high circulating-force to compulsorily circulate a stagnant high-temperature air with a regional great-scale whirlpool, and those mechanism help consequently minimize a temperate difference of ups and downs in indoor building.

Useful to low ventilation efficiency buildings and specially, high-layer buildings, which are very difficult to heat because of a rising trend of warm air, such as a grand, hale, sports centers and hotel lobbies!

1. PF-40 series

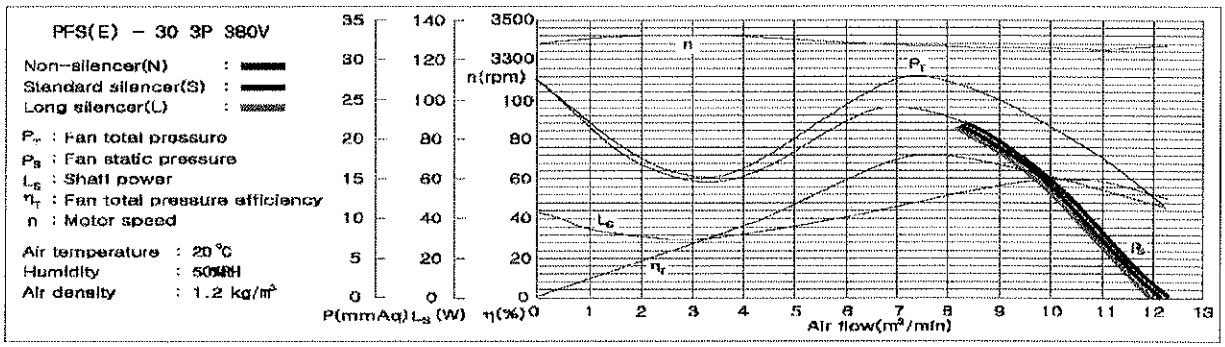


PFS(E)-30S



PFS(E)-30L

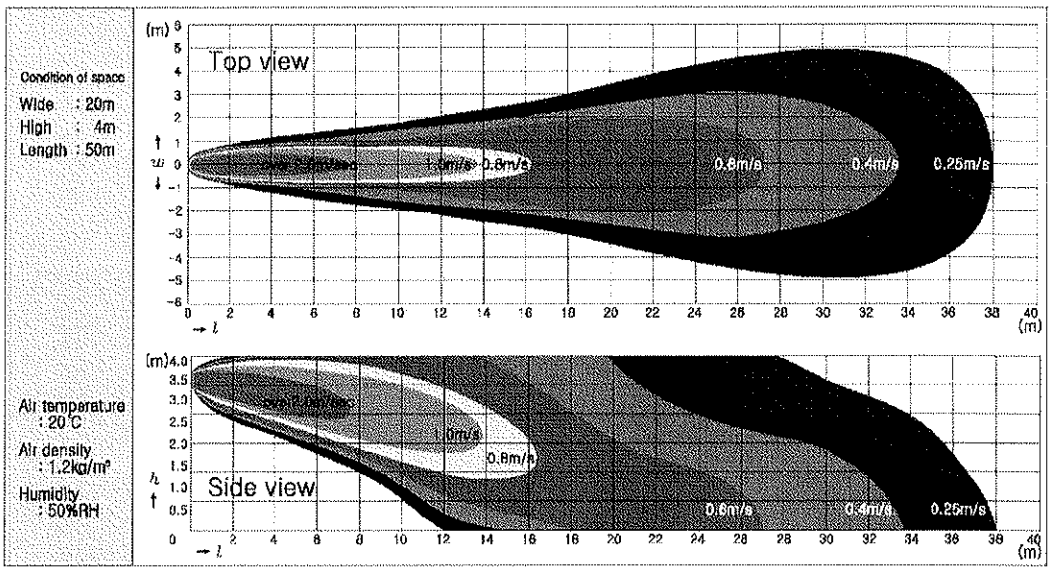
◆ Fan performance curve



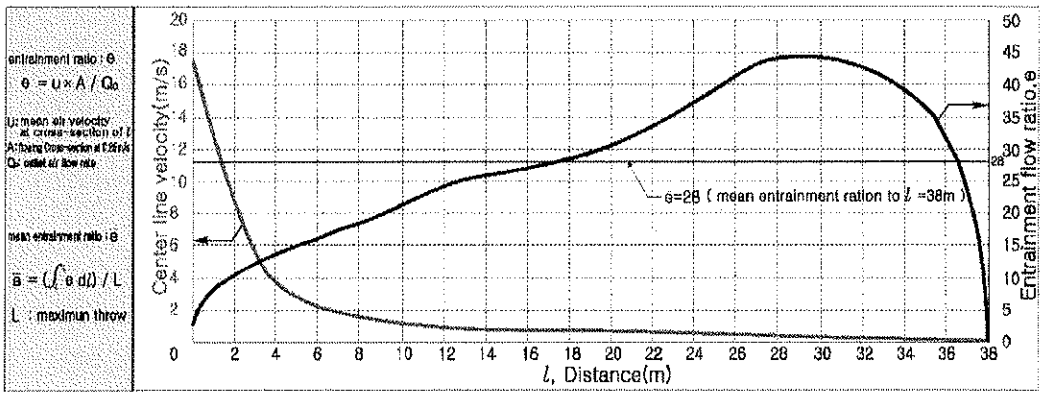
◆ Specification

Local Distributor Country of Origin Country of manufacture Type	MJ Air Tech Asia Pacific Pte Ltd South Korea South Korea Pro-Jet Fan	
Model	PFH 40S / PFS 40S	PFH 30S / PFS 30S
	SMOKE PURGING FAN *VENTILATION FAN*	*SMOKE PURGING FAN* *VENTILATION FAN*
Induced airflow rate (KSB6311) CMH	42,000 (1500 x 28)	21,840 (780 x 28)
Maximum Area Coverage	380 M^2	290 M^2
Maximum Throw Distance	38m ±10% (at 0.25 m/s)	36m ±10% (at 0.25 m/s)
Average entrainment ratio	28 times	28 times
Continuous lifetime operation	25,000 Hours	25,000 Hours
Total Static Pressure (mm Aq)	10 mm Aq	10 mm Aq
Total Pressure Efficiency (%)	71.5 ±5%	67.3 ±5%
Fan Efficiency (%)	62.5 %	53.7 %
Outlet Velocity (m/s)	17.0 m/s	13.5 m/s
Motor RPM	2,910 RPM	2,950 RPM
Type of Bearing	Ball & Lubricant	Ball & Lubricant
Fan Material	Aluminum	Aluminum
Drive Arrangement	Direct Drive	Direct Drive
Type of Fan / motor	Axial / TEAO	Axial / TEAO
Motor Classification	Class F / Class H	Class F / Class H
Vibration Velocity/Displacement	0.04cm/s/0.002cm	0.04cm/s/0.002cm
Motor rated current	2.0 Amp	2.0 Amp
Interruption capacity	1.5 KA	1.5 KA
Motor Rating	230 W	230W
Input Power	80 W (0.08 kw)	60 W ((0.08kw)
Voltage	230/1/50 Hz	230/1/50 Hz
Starting Amp	5.6 Amp (DOL)	4.2 Amp (DOL)
Running Amp	0.8 Amp	0.6 Amp
Motor Starter Type	Capacitor Start/2 pole	Capacitor Start/2 pole
Mounting Swiver Arrangement	Front (90° ARC) Up/Down (45°ARC)	Front (90° ARC) Up/Down (45°ARC)
Mounting type	4 x M12 Bolt, hard bolt to ceiling using top mounting	4 x M12 Bolt, hard bolt to ceiling using top mounting
Mounting Arm standard/	506 mm / 306 mm	486 mm / 306 mm
No. of fixed blade impellers	8	8
Method of fan encasement	Die-cast	Die-cast
No of Silencers	2 nos.	2 nos.
Silencer type	1 D x 2	1 D x 2
Noise dB(A) (KSB 6361)	55 dB(A)@ 2.0m / 60.7 dB(A) @ 1.0m	50 dB(A)@ 2.0m / 55 dB(A) @ 1.0m
Nozzle Dimension	Tapering from ϕ260 to ϕ175mm	Tapering from ϕ228 to ϕ140mm
Nozzle Material	Stainless Steel	Stainless Steel
Dimension of fan	885mm x 290 mm	748mm x 232 mm
Weight	16.3 Kg	13.8 Kg
External Cabling Arrangement	By Looping (max 8 fans per loop)	By Looping (max 8 fans per loop)
External Cabling	2.5 mm	2.5 mm
Operating condition	Ambient : 0°C - 50°C Humidity : >80% RH	Ambient : 0°C - 50°C Humidity : >80% RH

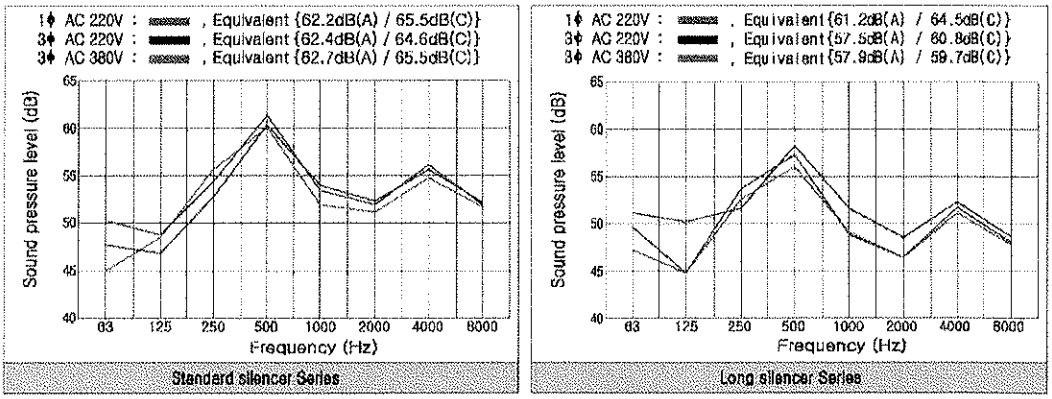
◆ Air distribution of PRO-JET FAN



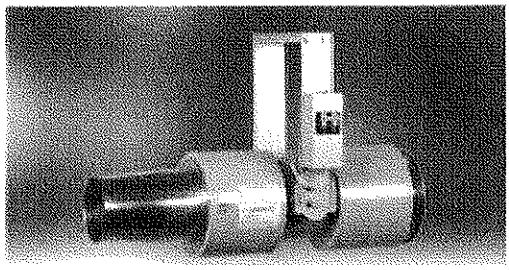
◆ Centerline velocity and Entrainment ratio



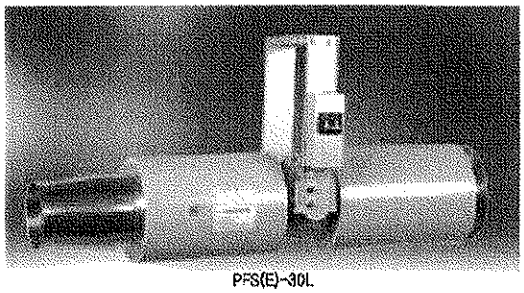
◆ Operating noise



2. PF-30 series



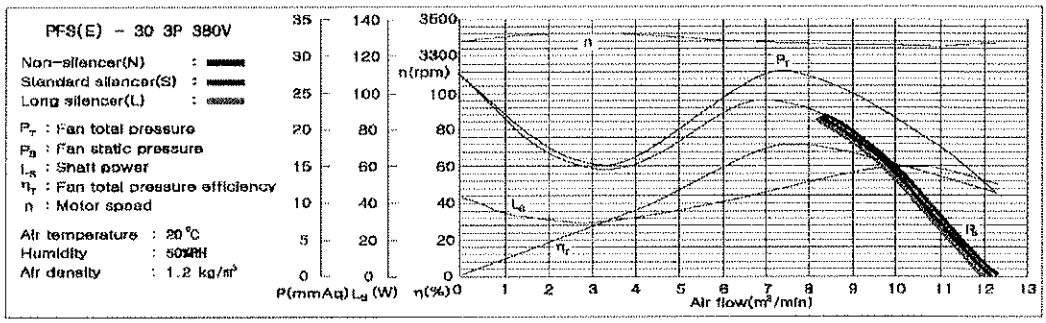
PFS(E)-30S



PFS(E)-30L

*Above described specification may change to improve product qualities without any announcement

◆ Fan performance curve



◆ SPECIFICATION

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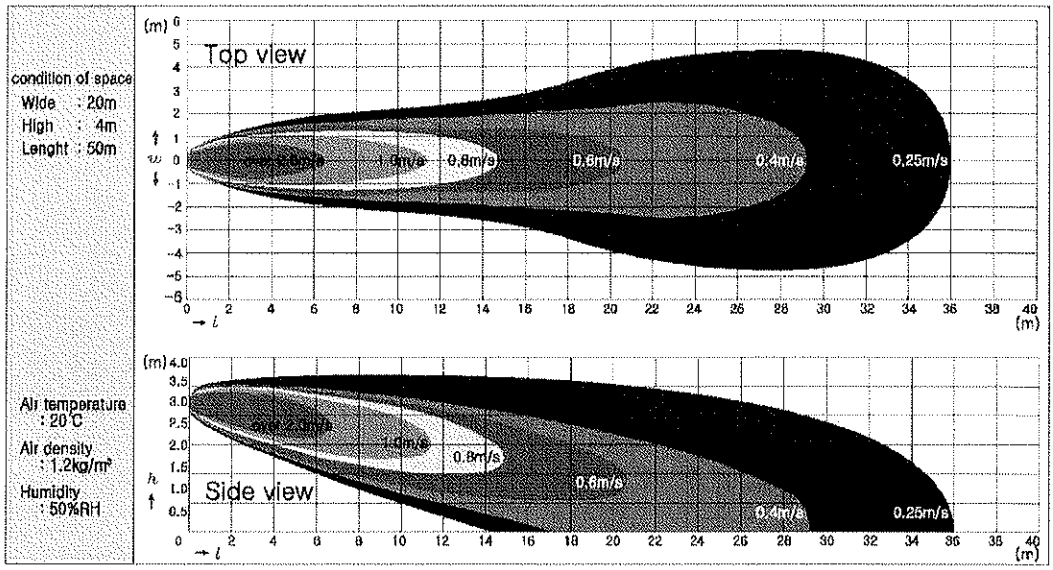
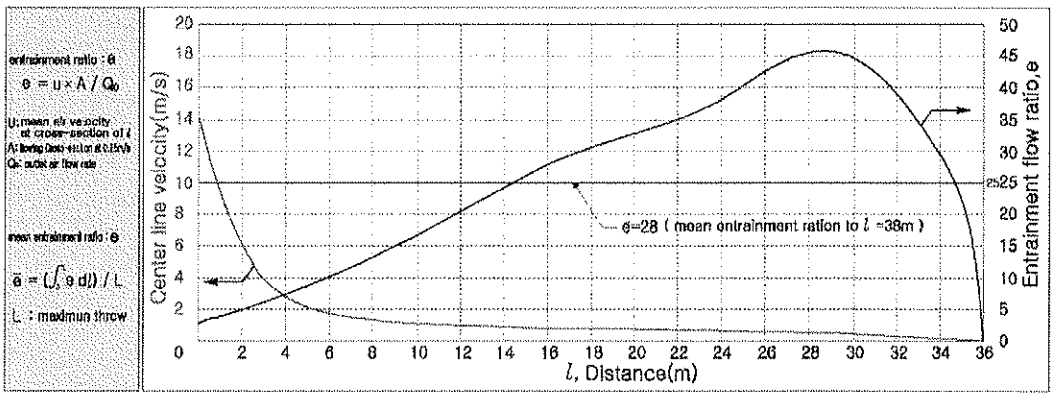
Maximum Area Coverage	380 M²	290 M²
Maximum Throw Distance	38m ±10% (at 0.25 m/s)	36m ±10% (at 0.25 m/s)
Average entrainment ratio	28 times	28 times
Continuous lifetime operation	25,000 Hours	25,000 Hours
Total Static Pressure (mm Aq)	10 mm Aq	10 mm Aq
Total Pressure Efficiency (%)	71.5 ±5%	67.3 ±5%
Fan Efficiency (%)	62.5 %	53.7 %
Outlet Velocity (m/s)	17.0 m/s	13.5 m/s
Motor RPM	2,910 RPM	2,950 RPM
Type of Bearing	Ball & Lubricant	Ball & Lubricant
Fan Material	Aluminum	Aluminum
Drive Arrangement	Direct Drive	Direct Drive
Type of Fan / motor	Axial / TEAO	Axial / TEAO
Motor Classification	Class F / Class H	Class F / Class H
Vibration Velocity/Displacement	0.04cm/s/0.002cm	0.04cm/s/0.002cm
Motor rated current	2.0 Amp	2.0 Amp
Interruption capacity	1.5 KA	1.5 KA
Motor Rating	230 W	230W
Input Power	80 W (0.08 kw)	60 W ((0.08kw)
Voltage	230/1/50 Hz	230/1/50 Hz
Starting Amp	5.6 Amp (DOL)	4.2 Amp (DOL)
Running Amp	0.8 Amp	0.6 Amp
Motor Starter Type	Capacitor Start/2 pole	Capacitor Start/2 pole
Mounting Swiver Arrangement	Front (90° ARC) Up/Down (45°ARC)	Front (90° ARC) Up/Down (45°ARC)
Mounting type	4 x M12 Bolt, hard bolt to ceiling using top mounting	4 x M12 Bolt, hard bolt to ceiling using top mounting
Mounting Arm standard/	506 mm / 306 mm	486 mm / 306 mm
No. of fixed blade impellers	8	8
Method of fan encasement	Die-cast	Die-cast
No of Silencers	2 nos.	2 nos.
Silencer type	1 D x 2	1 D x 2
Noise dB(A) (KSB 6361)	55 dB(A)@ 2.0m / 60.7 dB(A) @ 1.0m	50 dB(A)@ 2.0m / 55 dB(A) @ 1.0m
Nozzle Dimension	Tapering from ϕ260 to ϕ175mm	Tapering from ϕ228 to ϕ140mm
Nozzle Material	Stainless Steel	Stainless Steel
Dimension of fan	885mm x 290 mm	748mm x 232 mm
Weight	16.3 Kg	13.8 Kg
External Cabling Arrangement	By Looping (max 8 fans per loop)	By Looping (max 8 fans per loop)
External Cabling	2.5 mm	2.5 mm
Operating condition	Ambient : 0°C - 50°C Humidity : >80% RH	Ambient : 0°C - 50°C Humidity : >80% RH

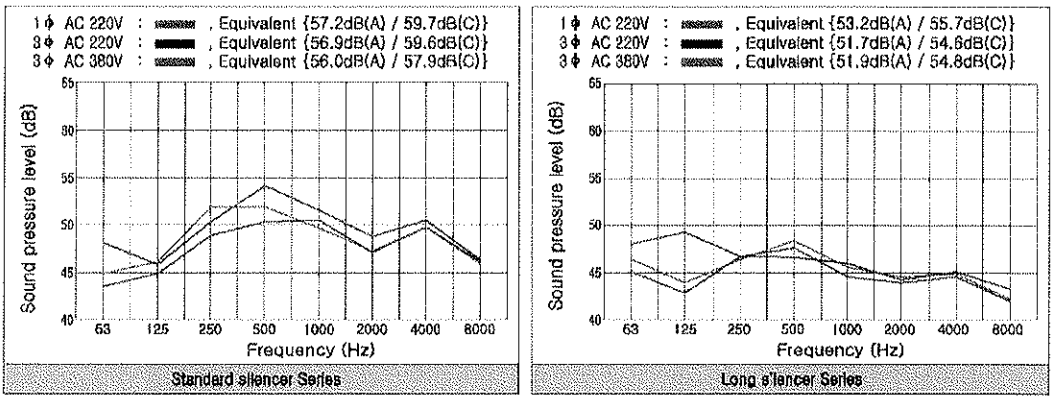
◆ Air distribution of PRO-JET FAN



◆ Centerline velocity and Entrainment ratio

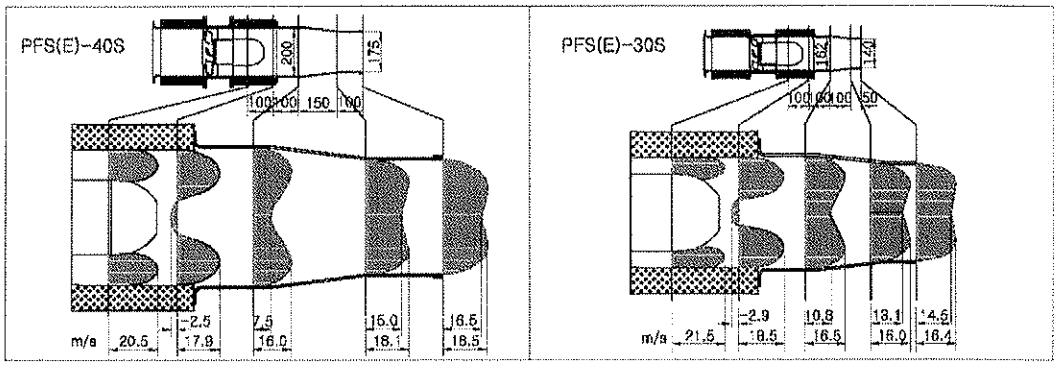


◆ Operating noise

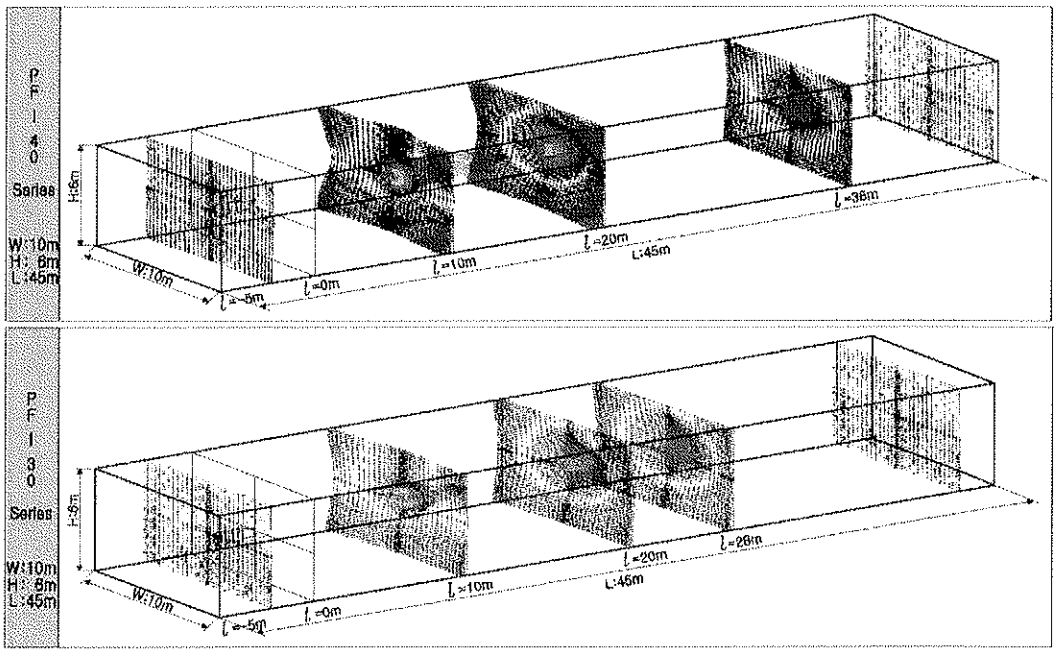


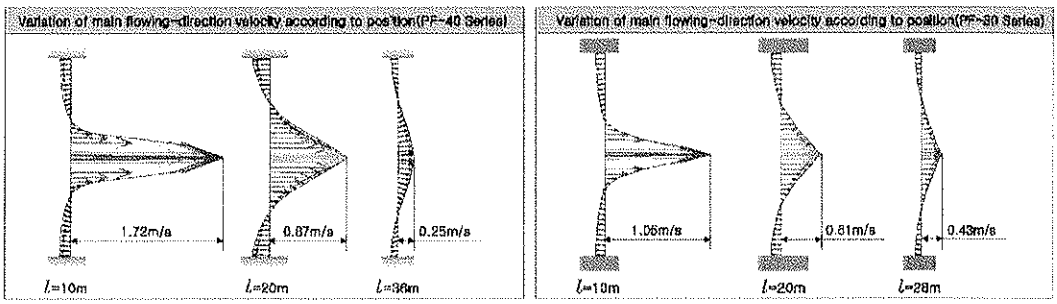
3. Air distribution

◆ Distribution of airflow velocity in the fan nozzle



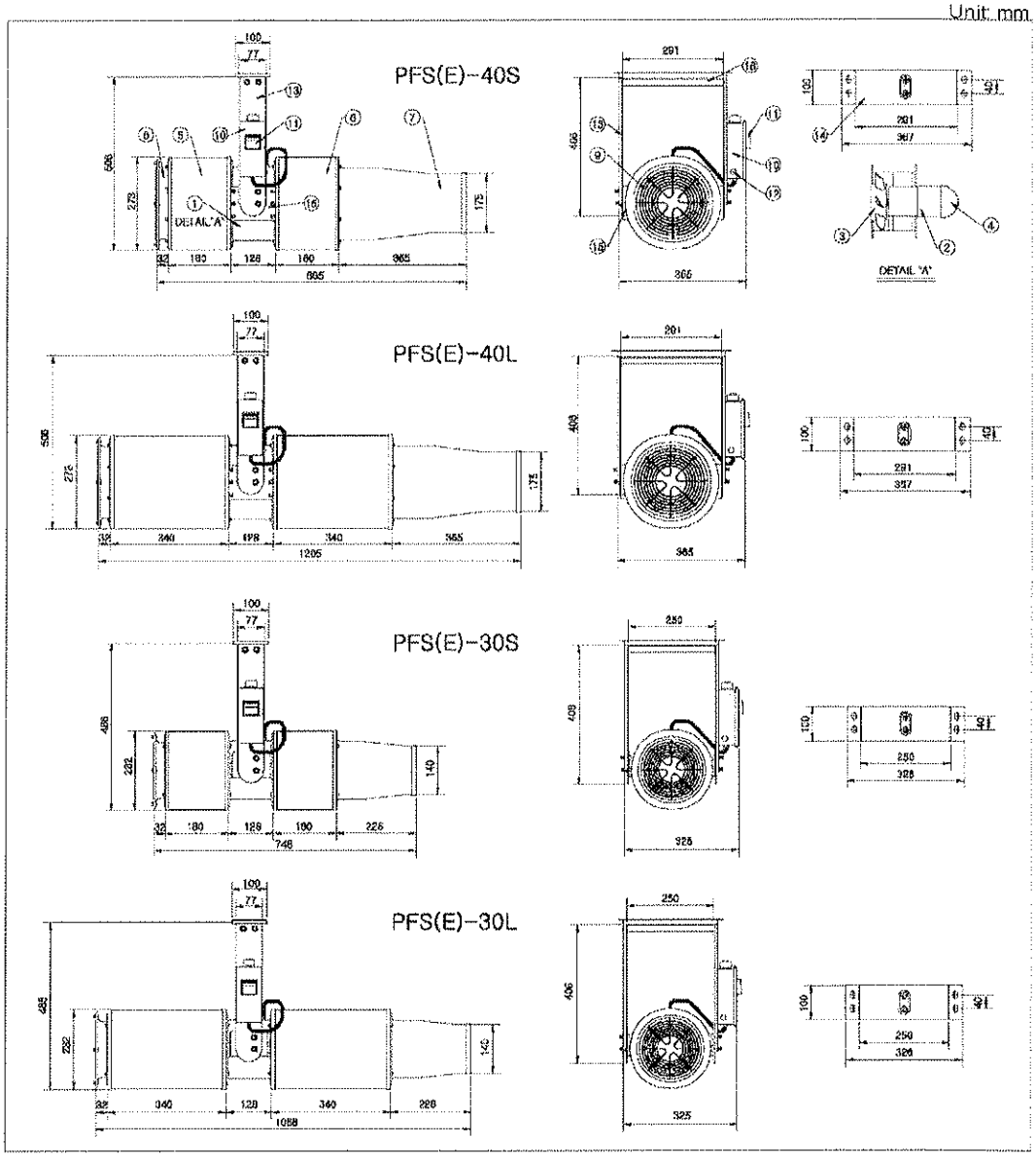
◆ Airflow distribution at enclosed state





4. Outward dimensions

Unit: mm



◆ Main parts name

No.	Parts name	Material PFS	Material PFE	No.	Parts name	Material PFS	Material PFE
①	Fan casing	AL(Casting)		⑨	Inlet screen	SS41	SS41
②	Motor	AL(Casting), S30NA		⑩	Terminal box	SS41(1.2t)	
③	Impeller	AL(Die-Casting)		⑪	Circuit protect	CP(0.3A ~ 2.0A)	
④	Guide cone	ABS(2t)		⑫	Operation indicator	Neon glow lamp(1W)	
⑤	Inlet silencer	STS(in) SPCC(out)	SPCC(in) SPCC(out)	⑬	Suspension arm	SS41(2t)	
⑥	Outlet silencer			⑭	Anchor bracket	SS41(2t)	
⑦	Nozzle	AL(2t)	AL(3t)	⑮	Vertical adjustment	SS41(3.2t)	
⑧	Inlet bell mouth	AL(2t)	AL(3t)	⑯	Horizontal adjustment	SS41(2t)	

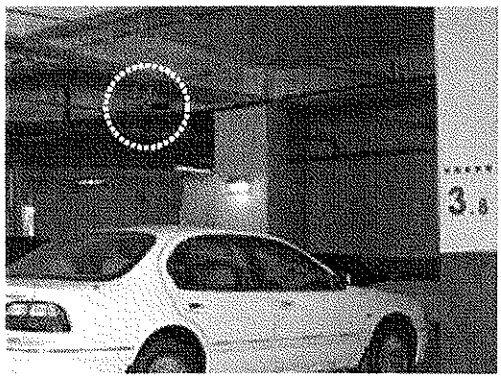
※ Above described specification may change to improve product qualities without any announcement

5. Application-underground parking lots

Overview

Dilution ventilation of exhausted gases from cars in underground parking lots

As a state-of-the-art ductless ventilation system for basement parking lots, **PRO-JET FAN** ventilation system dilutes the congested and contaminated air and induces it to the direction of exhaust port. This system equally disperses fresh air through air-inlet into the entire area and dilutes the congested and contaminated air by stirring it with fresh air and then induces and ventilates air to the direction of exhaust port.
Comparing with the existing ventilation systems, stirring-dilution performance of **PRO-JET FAN** ventilation system is superior. It maximizes ventilation efficiency by large-scale vortex formation and conserves underground parking lot environment.



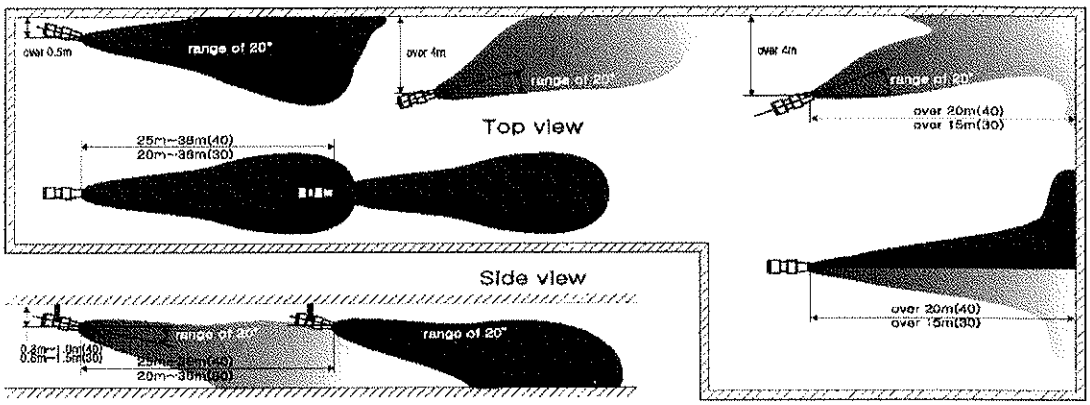
Special features

- **Large-scale air stream formation from air-inlet to air-outlet**
- **Conservation of comfortable circumstances due to low noise level**
- **Efficient dilution of polluted air by much induced airflow (about 28 times)**
- **Low operating cost on account of low power consumption**
- **Dissolution of congested air region by large-scale whirlpool formation**
- **Permission of a low layer design by use of the ductless system**
- **Inhibition of dew condensation by forming circulating airflow along the wall**
- **Unrelated interference with a column, pipe and beam while installing**
- **Reduction of walking people's displeasure due to maintaining under 0.6m/s air velocity (at the height of 1.5m)**
- **Abbreviation of works period owing to easy installation**

Selection and installation of PRO-JET FAN

Model		Application places	Design specifications	
PF-40 series	PFS(E)-40S PFS(E)-40L	**Driving zone** Without any obstacle within 25m **Parking zone** Without any obstacles within 20m **※Recommendation of L-type application** Low noise preferable region such as parking lot for special purpose, region close office and near the entrance of elevator	Max. Vent. area	456m²(W:12m, L:38m, H:6m)
			Opt. Vent. area	340m²(W:10m, L:34m, H:4m)
			Single-line arrangement	25m-34m(Max.38m)
			Distance to wall	back/side: 0.5m(Min. 0.3m)
			Installation height	within 6.0m(Min. 2.5m)
			Distance to obstacle	front:0.5m(beam),.5m(column),back 0.3m
			Installation gradient	within 20° (standard installation gradient at 4m floor-height:12°)
PF-30 series	PFS(E)-30S PFS(E)-30L	**Driving zone** Without any obstacle within 20m **Parking zone** Without any obstacles within 15m **※Recommendation of L-type application** Low noise preferable region such as parking lot for special purpose, region close office and near the entrance of elevator	Max. Vent. area	432m²(W:12m, L:38m, H:6m)
			Opt. Vent. area	290m²(W:10m, L:29m, H:4m)
			Single-line arrangement	20m-29m(Max.36m)
			Distance to wall	back/side: 0.5m(Min. 0.3m)
			Installation height	within 4.0m(Min. 2.0m)
			Distance to obstacle	front:0.5m(beam),.5m(column),back 0.3m
			Installation gradient	within 20° (standard installation gradient at 4m floor-height:10°)

◆ Installation guidance



◆ Operation modes

(Possible to double-selection of operation methods)

Classification	Linkwork of supply and exhaust fans	Operation through Timer-controller(24hrs, 1weekend)	Operation control with CO gas sensor	Operation control using sensing method of incoming and outgoing cars
Control signal	-			
supply and exhaust fans				
PRO-JET FAN				

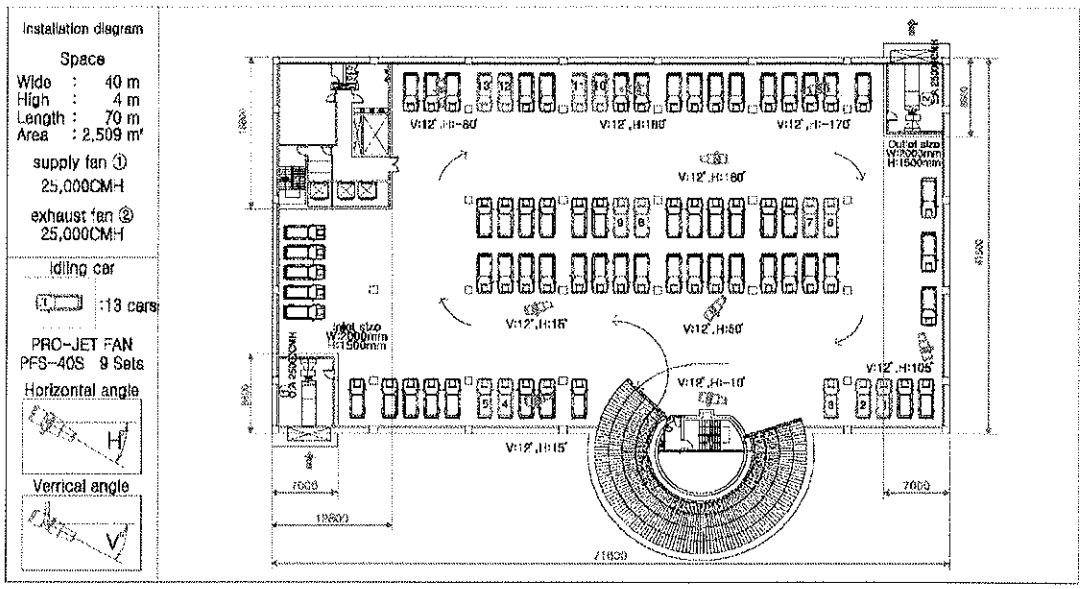
◆ Estimating equations of air changing rate, CO_2 emissions, specification of supply and exhaust fans and PRO-JET FAN's dilution frequency

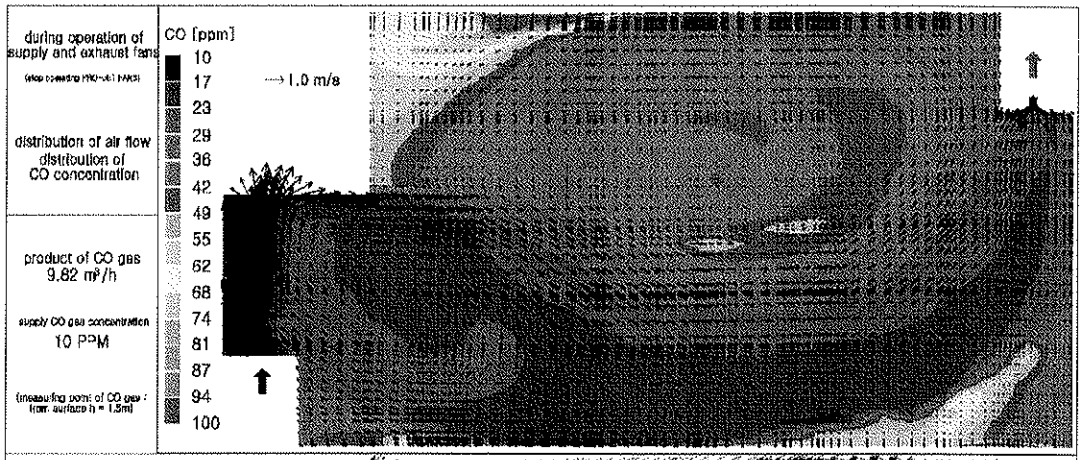
Classifications	Estimating equations	Remarks
CO gas emission	$M = (0.06 \times Nr \times m_r \times d/v) + (N_i \times m_i \times t)$ $Nr = (n/8) \times R$ $Ni = Nr$	M: Co emission rate in parking lot Nr: In and out car numbers per a hour m_r: CO emission per a car during parking d: mean moving distance in parking lot v: mean moving velocity in parking lot N_i: idling car numbers m_i: CO emission per a car during idling condition t: idling time n: available accommodating car numbers 8: parking lot running time for a day R: mean parking rotating rate for a day
Fresh air exchanging frequency	$I_C = Qr/V$	Ic: fresh air exchanging frequency per a hour Qr: legal requirement fresh air to ventilate V: volume of parking lot
Requirement fresh air to ventilate	$Qr = 1.2 \times 10^6 \times M/40 = 30,000 \times M$	Qr: legal requirement fresh air to ventilate 1.2: safety 40: 50(legal permit CO concentration) - 10(fresh air CO concentration)
Dilution frequency, in case of installing PRO-JET FANs	$I_j = 28 \times Q_j \times k/V$	I_j: dilution frequency per a hour 28: mean entrainment ratio of PF-40 series (for instance, PF 30 series is used 25) Qj: airflow rate per a PRO-JET FAN(PF 40 series : 1500m PF 30 series :780) k: PRO-JET FAN installation number

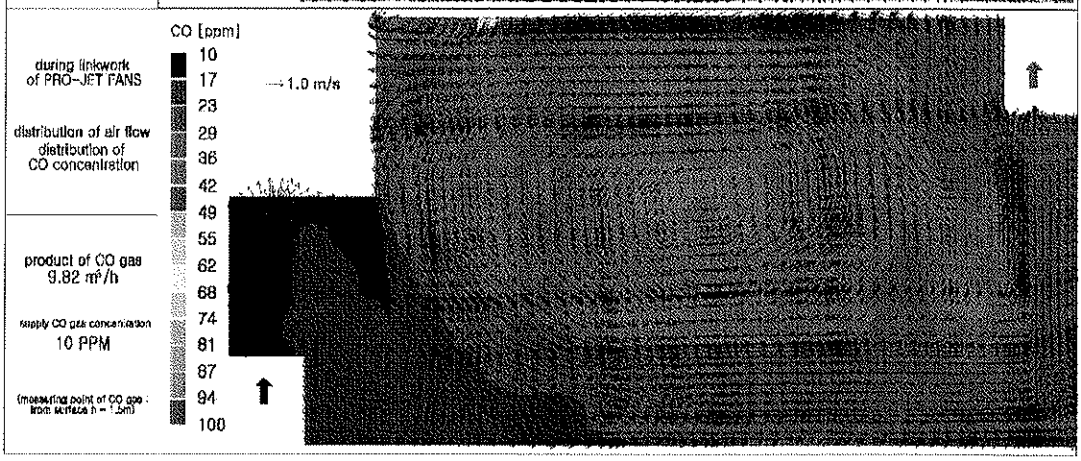
Mean parking circulation ratio per a day according to applying fields (times/day)				At driving condition, mean CO gas emission product (gasoline engine car of class 1,800cc)	
Application	Circulation ratio	Application	Circulation ratio	Area of parking lots [m^2]	Mean emission of CO gas [CMH/car]
Neighborhood living	4.4	performacne	4.2	below 500	0.045
Medicine	6.4	wedding hall	3.1	500-1,000	0.040
Public office	7.1	art center	3.8	1,000-1,500	0.035
General office	3.6	transporting	7.3	1,500-2,000	0.030
Accommodation	5.5	atartment	2.1	over 2,000	0.030
Sales	5.9	outdoor	4.4		

☞ mean CO gas emission at idling condition = 180RPM/car(exhausted gas)/1,000×0.07(7% CO concentration of emission gas from gasoline engine)=0.0126CMM/car

◆ Example of installation diagram and air distribution



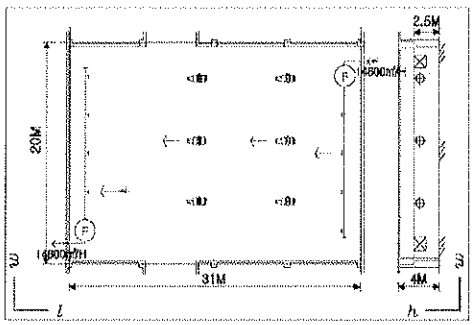


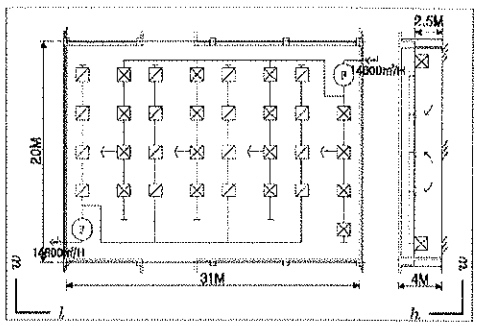


◆ Comparison of CO concentration distribution according to each ventilation system

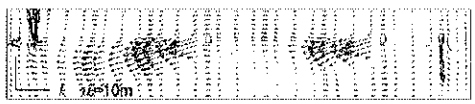
	PRO-JET FAN ventilating system	Duct ventilating system
SYSTEM		
System composition	supply and exhaust fan, PRO-JET FAN	supply and exhaust fan, Diffuser
Installation site	installation between column	installation bellow column
Ventilation type	wide area dilution → carrier → emission	local area dilution → emission
Initial cost	about 10,000won / 3.3m²	about 30,000won / 3.3m²
Construction period	approximately 7days / 10,000m²	approximately 30days / 10,000m²
Air flow characteristics	Formation of a large scale whirlpool	Formation of a large scale whirlpool
Operating cost a month	about 5,688won / 330m² (A PFS-40S is operated for 12hours a day during a month and cost is 100won per 1kWh)	about 28,800won / 330m² (A Duct vent. system is operated for 12hours a day during a month, and operating cost is 100won per 1kWh)

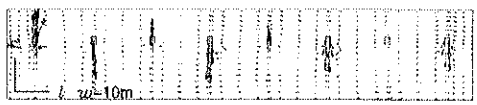
ARRANGEMENT



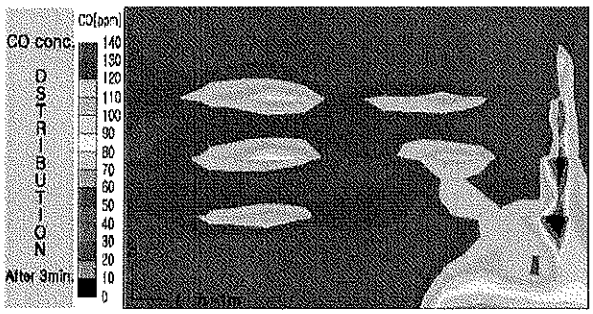


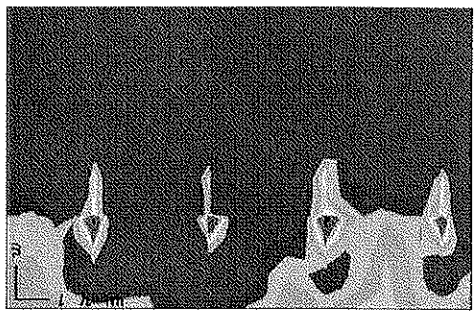
Airflow distribution



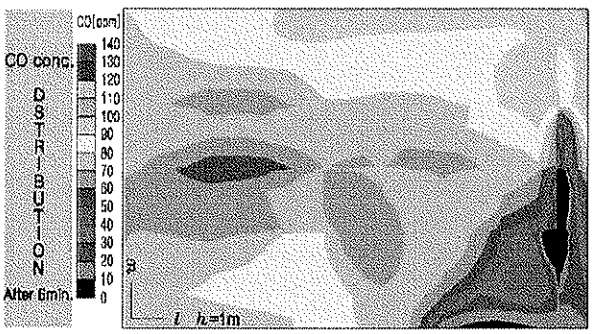


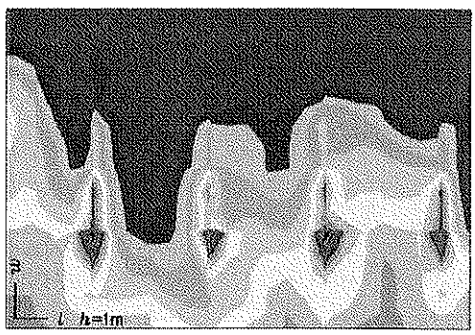
CO conc. DISTRIBUTION After 3min.





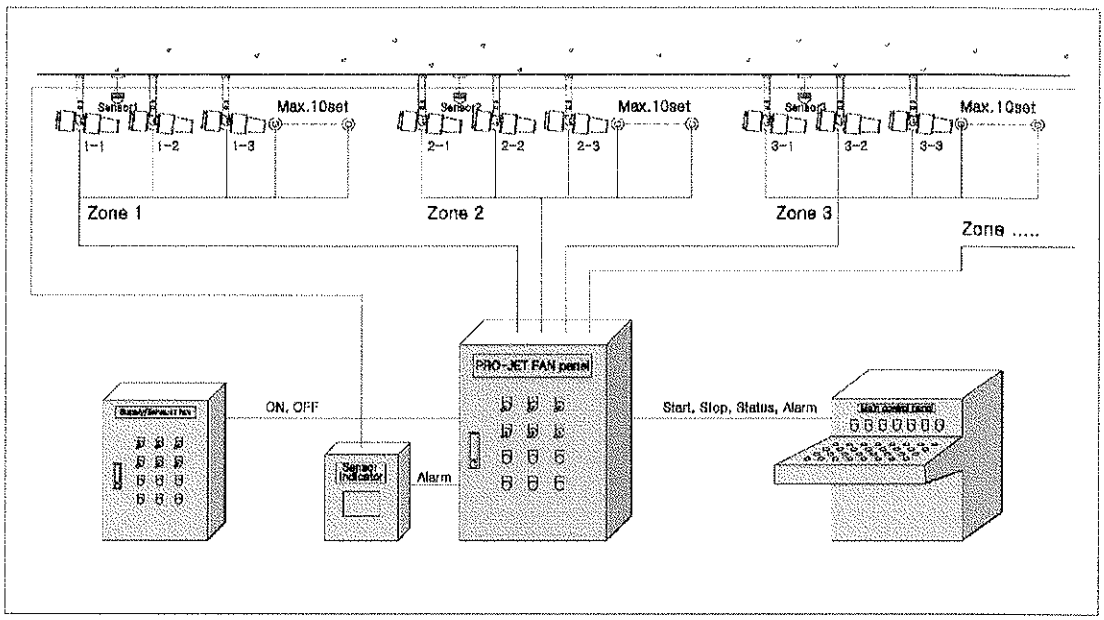
CO conc. DISTRIBUTION After 6min.





6. System design

◆ Configuration diagram

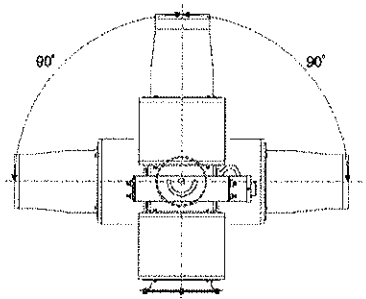


◆ Installation specifications of power supply, piping line and electric wiring

Items	Selection methods	Cautions
Power supply	1P 2W 220V, 3P 4W 380V/220V alternative (different ground wire: 3 models ground wire)	Very low power consumption in case of using 3P power supply
Total load	KW = [(power consumption of fans: Watt)×using fans number]/1,000	-
Zone composition	Composing divide a installation space in control units	-
Piping line	Exposure, non-piping cable wire line	Unit connection: flexible connection (16C)
Electric wiring	IVCU: 2.0mm (1P: 3wires, 3P: 4wires←including ground wire)	Increasing 1 class in using wire over 200m
Local control	Manual timer(24 hours, a week), sensor (CO, temperature, humidity, particle)	Double adoption enable
Remote control	Linkwork with supply and exhaust fans and main monitoring room	Double adoption enable

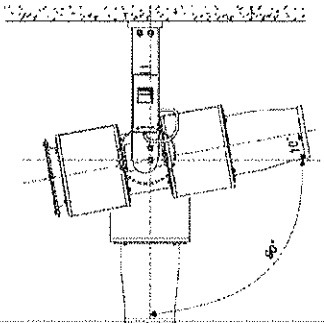
◆ Nozzle angle adjustment

Horizontal angle



To control horizontal angle of PRO-JET FAN, unite a M8×20 bolt on PRO-JET FAN's horizontal adjusting part adhered a column and beam. Next, for forming exact airflow, make a setting of fan injection nozzle angle and finally tie a M8×20 bolt.

Vertical angle

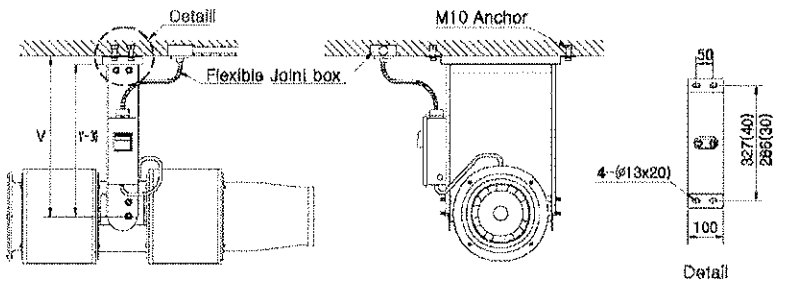


To control vertical injection angle of PRO-JET FAN, unite a M8×20 bolt-nuts on both side-support bar's bottom of PRO-JET FAN's adhered a column and beam. Next, for forming exact airflow, make a setting of fan injection nozzle angle and finally tie a M8×20 bolt-nuts.

◆ Installation and bracket option

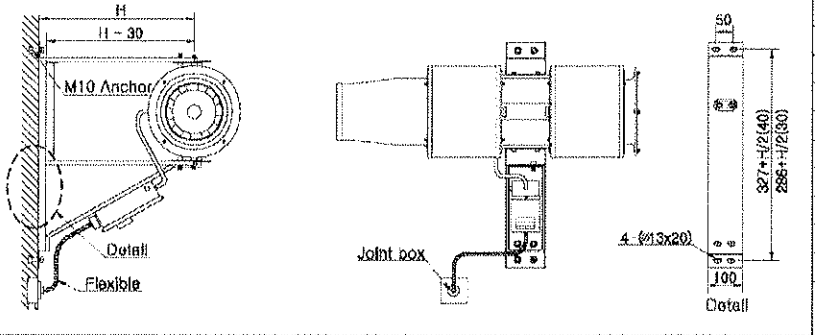
(40) : PF-40 Series, (30) : PF-30 Series, unit: mm

Vertical installation (Beam or ceiling)



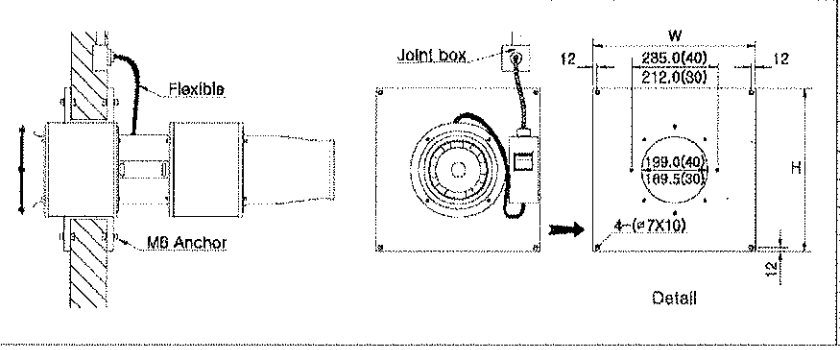
Support bar for vertical installation	
No.	V
V3	300
V4	400 (standard)
V5	500
V6	600
V7	700
V8	800
V9	900
V0	1,000
VX	Option size

Horizontal installation (wall)



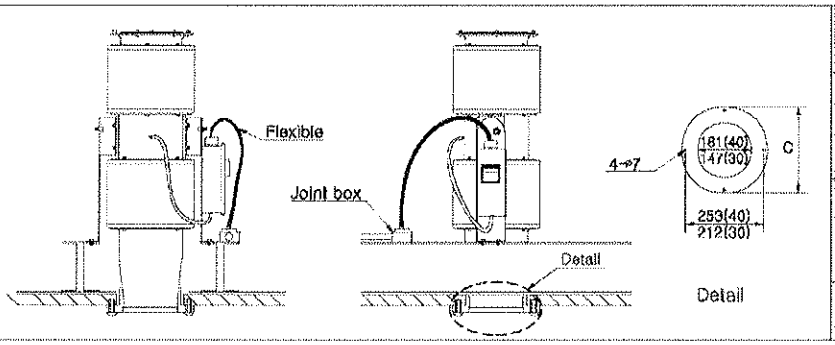
Support bar for horizontal installation	
No.	H
H3	300
H4	400
H5	500 (standard)
H6	600
H7	700
H8	800
H9	900
H0	1,000
HX	Option size

partial embedment (Wall or ceiling)



Support bar for partial embedment installation	
No.	W x H
P3	300 x 300
P4	400 x 400
P5	400 x 500
P6	400 x 600
P7	400 x 700
P8	400 x 800
P9	400 x 900
P0	400 x 1000
PX	Option size

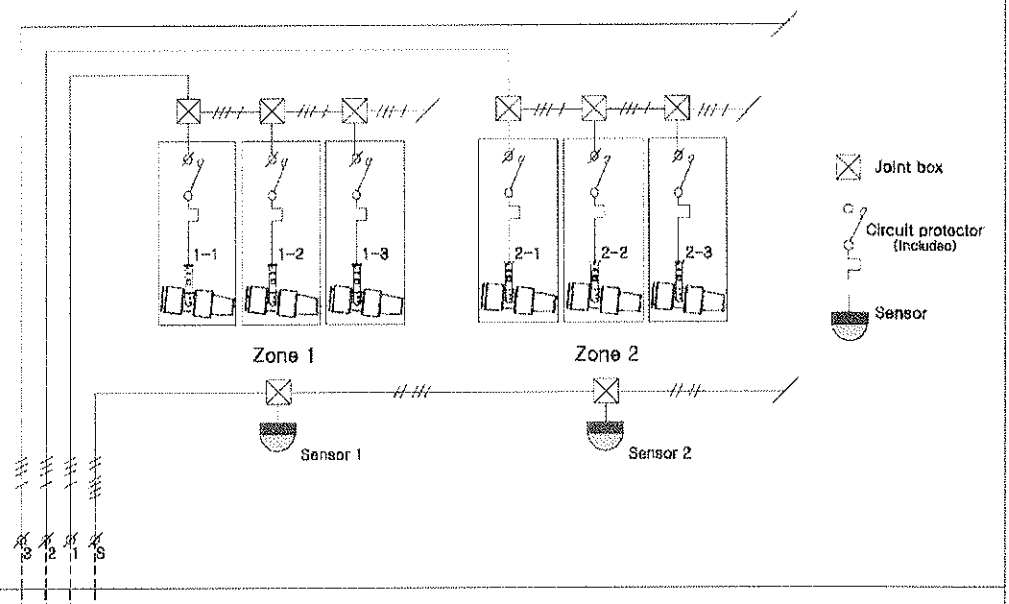
embedment (Wall or ceiling)



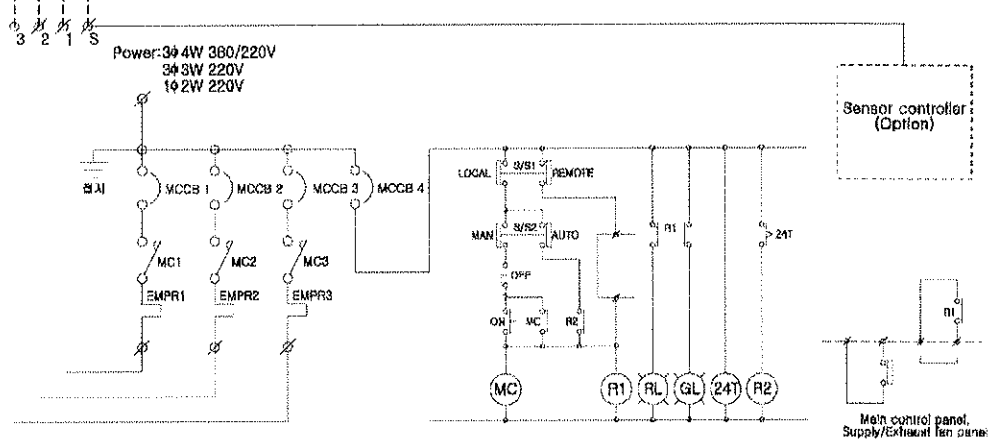
Nozzle cap of embedment type	
No.	C
C1	273 (PF-40 Series)
C2	232 (PF-30 Series)
CX	Option size

◆ Wiring diagram and control panel

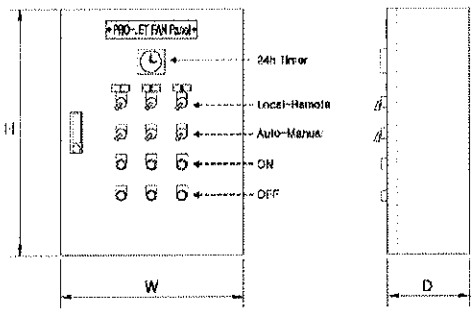
WIRING DIAGRAM



CONTROL PANEL



EXTERNAL DIAGRAM

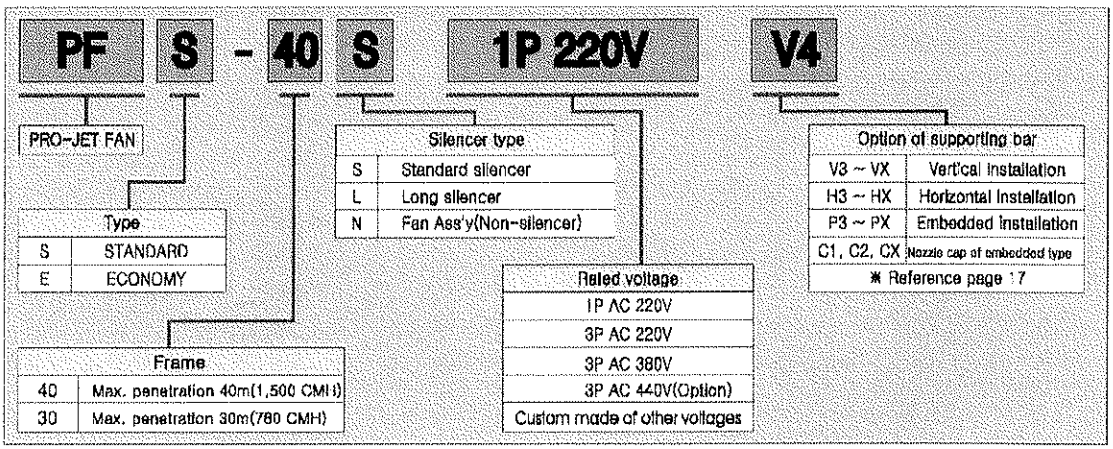


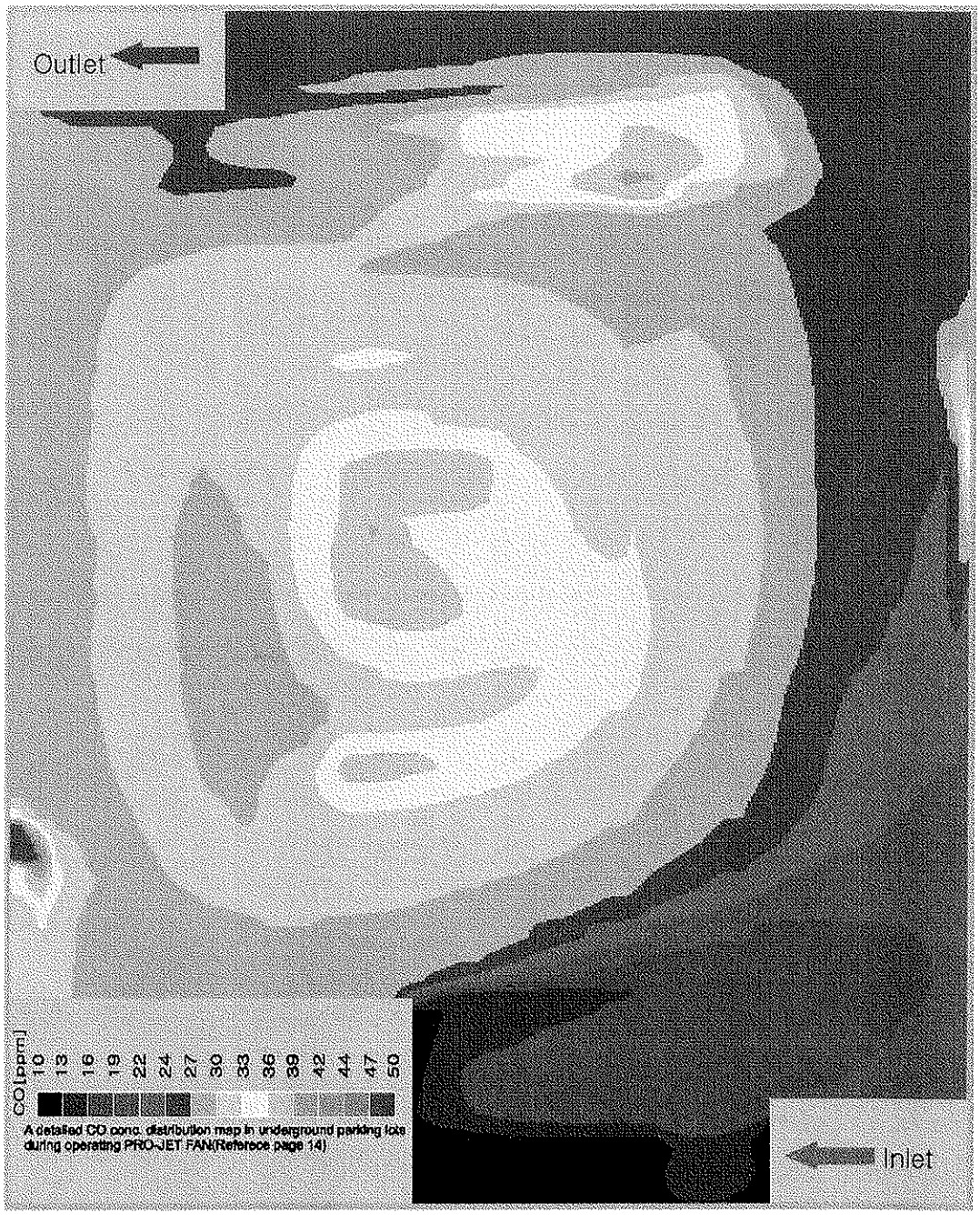
	Zone #	W	H	D
Panel size (unit:mm)	1	300	400	180
	2 ~ 3	400	600	180
	4 ~ 6	600	800	180
	7 ~ 10	700	1,000	180
	11 이상	Custom made		
Coating color (Powder coating)	standard : 5Y 7/1, 7.5BG			
	unstandard : designated color			
Installation type	disclosed, embedded, independent			
Material	Steel(1.6t), SUS(1.5t)			
Service entrance	upper, under, side			

7. Specification of PRO-JET FAN series

Items	Comparison Criteria	Units	PRO-JET FANS					
			PFS(E)-40S			PFS(E)-30S		
			1P 220V	3P 220V	3P 380V	1P 220V	3P 220V	3P 380V
Outlet airflow	Mean airflow velocity of nozzle outlet The more uniform airflow distribution, the more performance	m/s	17.3			14.1		
Airflow Rate	Outlet airflow rate (criteria: KS B 6311) You must choose correctly airflow rate in due consideration of all types and sizes of the used places and located obstacles	CMH	1,500			780		
Power Consumption	Voltage(V)xAmpere(A)x reverse ratio Long operating time of PF series is closely related to operating cost.	W	230	169	158	108	90	86
Total pressure efficiency	[total pressure air power(W)/shaft power(W)] x 100 The more high total pressure efficiency, the less low power consumption, and conclusively performance become very excellent.	%	71.5	70.8	79.9	57.3	53.7	59.9
Mean entrainment ratio	Mean entrainment ratio value to maximum throw of a front direction of outlet Mean entrainment ratio calculate with experimental criteria. (The throw calculated such as follows equation may be many difference in ability: Qx/Qo = 2 x Vo/Vx = 2 x X/K x Do	-	28 ※ℓ= 38m			25 ※ℓ= 36m		
Max. throw	Center airflow velocity 0.25m/sec throw If type of outlet airflow is sorted, airflow is rapidly diffused and consequently airflow-reaching distances are quickly shortened. The throw calculated such as follows equation may be many difference in ability: Vo/Vx = K x Do/K	m	38 ※Datum layer height: 4m			36 ※Datum layer height: 4m		
Optimum vent. area	To reaching distance of airflow, center air velocity over 0.4m/s Optimum ventilation area must be calculated by the standards of the airflow examination	m^2	340(W10xL34) ※Datum layer height: 4m			290(W10xL29) ※Datum layer height: 4m		
Noise	Noise detection at 1m off side equipment (KS B 6361) Noise do not excess a permitting criteria in accordance with the used places	dB(A)	62.2	62.4	62.7	57.2	56.9	56.0
Motor protection	Attachment of motor overload and short protection equipments Motor protection equipment have a necessary function to cut off continuous disorder in case of parallel operation	-	Circuit protector (Rating: 200% rated current of motor)					
Construct	Material / Painting / Assembly type Construct must take the corrosive and solid characteristics.	-	Steel, SUS, AL	Powder painting	Bolt, Nut			

8. Selection guide





A detailed CO conc. distribution map in underground parking lots during operating PRO-JET FAN(Reference page 14)

MJ AIR TECH CO., LTD.

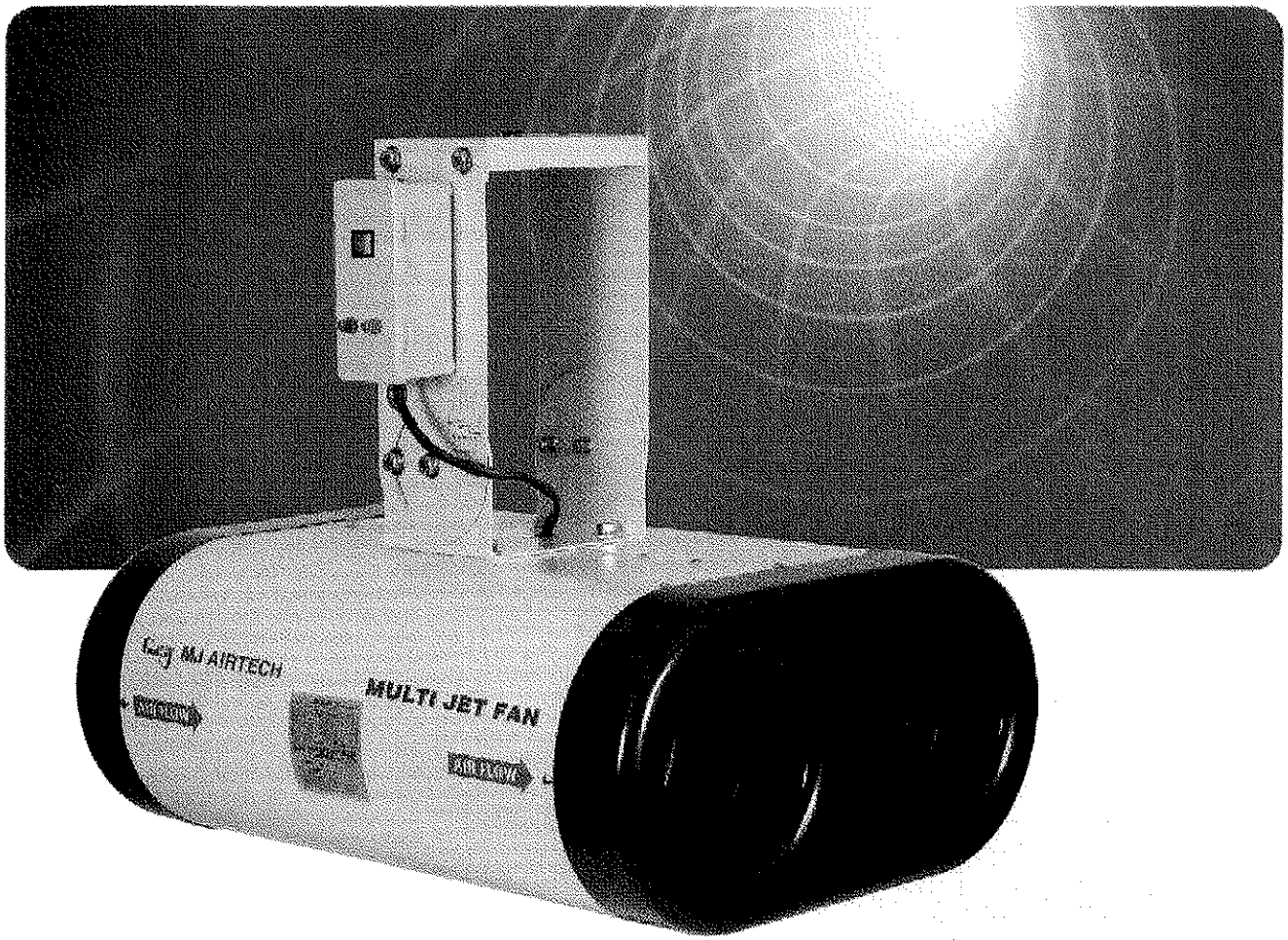
133-791, B102 HIT, Hanyang University,
Haangdang Dong, Seongdong Gu, Seoul Korea
TEL: 82-2-2292-1162 FAX: 82-2-2292-1297
webpage : http://www.mjairtech.co.kr

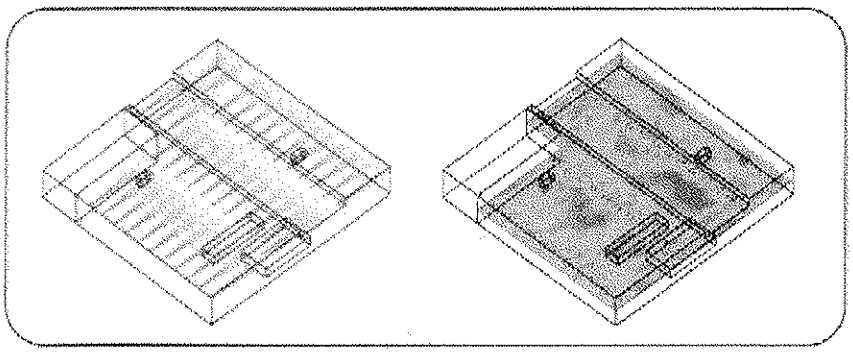
MJ AIRTECH CO., LTD.
www.mjairtech.co.kr

멀티 제트팬

Multi Jet Fan

MJMF-20(2)-50PF / 84PF



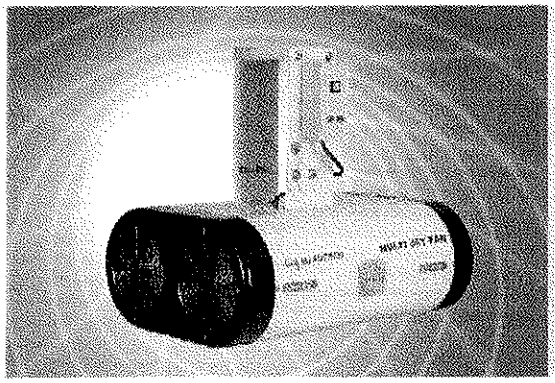


Applications

- 조선소
- 전자제품공장
- 유리공장
- 화학공장
- 자동차공장

Advantages

- 오염물의 유도 배기
- 쾌적도 향상
- 환기효율 향상
- 열성층화 해소
- 선풍기 대체 효과



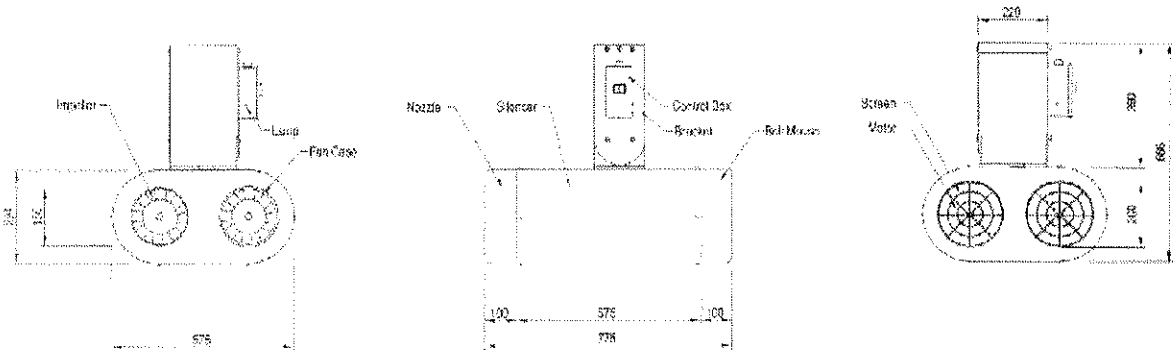
Features

▶장거리 도달 구현(50PF : 50m)
▶Stator 장착으로 고정압 구현(84PF : 87mmAq)
▶Impeller 고정밀 Balancing으로 저진동 구현
▶장시간 운전이 가능한 신뢰성 확보(수명 : 20,000h)
▶토출 풍량 대비 28배의 평균 유도비 구현

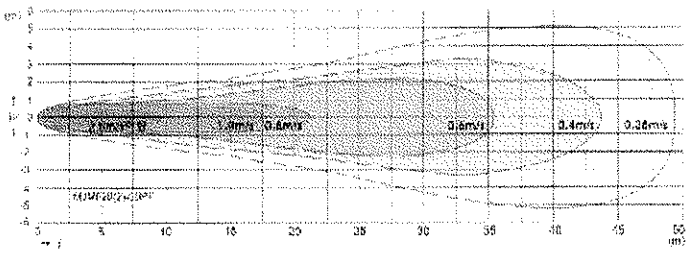
Specifications

모델명(Model)	MJPF20(2)-50PF	MJPF20(2)-84PF
전원(Rated Power)	1ø 220V 60Hz	
출력(Output)	200W	700W
풍량(Flow Rate)	50CMM	25~84CMM
출구속도(Outlet Velocity)	17.3m/s	8.7~26.6m/s
전압(Total Pressure)	38mmAq	87mmAq
도달거리(Throw)	50m	60m
소음(Sound Level)	72dB(A)	
무게(Weight)	45.8kg	

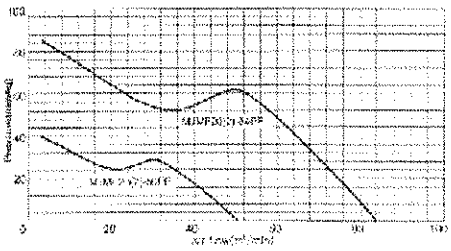
Dimensions



Air Distribution



Performance Curve



(주)명진에어테크
MJ AIRTECH CO., LTD.

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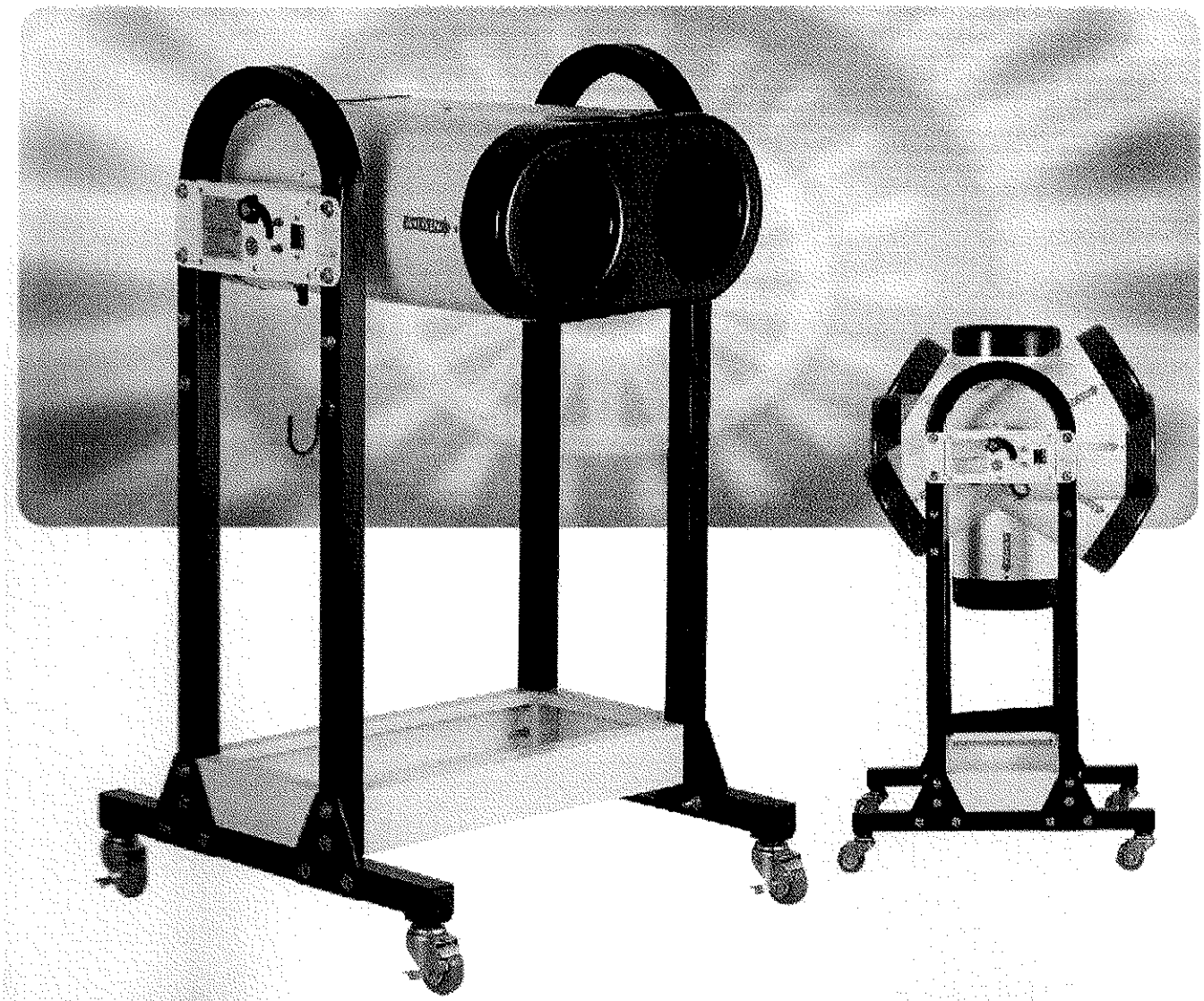
Hanyang university, HIT B-102, 17, Haengdang-dong, Sungdong-ku, Seoul, 133-791, Korea
Tel: 82-2292-1162 Fax: 82-2292-1297
Factory
300-72, Sungsu 2ga 3-dong, Sungdong-ku, Seoul, 133-123, Korea
Tel: 82-499-7647 Fax: 82-3409-5350

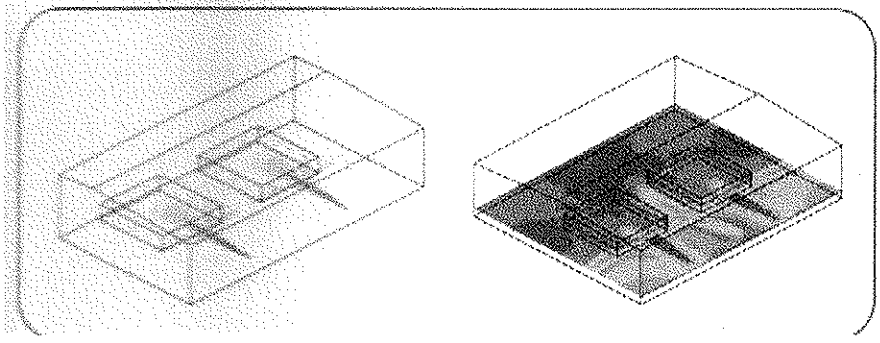
MJ AIRTECH CO., LTD.
www.mjairtech.co.kr

멀티 제트팬

Multi Jet Fan

MJMF-20(2)-50PM / 84PM



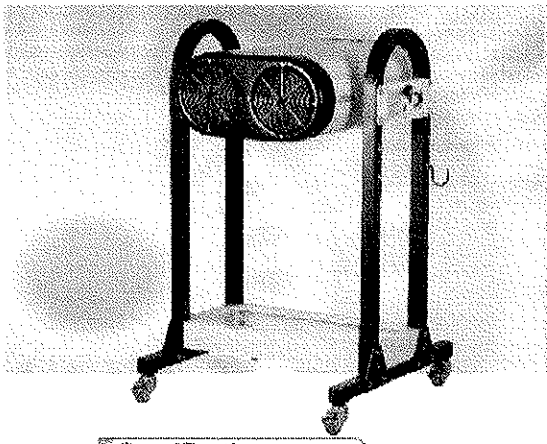


Applications

- 조선소 • 중공업공장 • 타이어공장
- 자동차 정비소 • 목재공장

Advantages

- 블럭 내부로 신선공기 공급
- 블럭 내부에서 용접흄 배출
- 환기효율 향상 • 쾌적도 향상
- 서포기 대용 가능



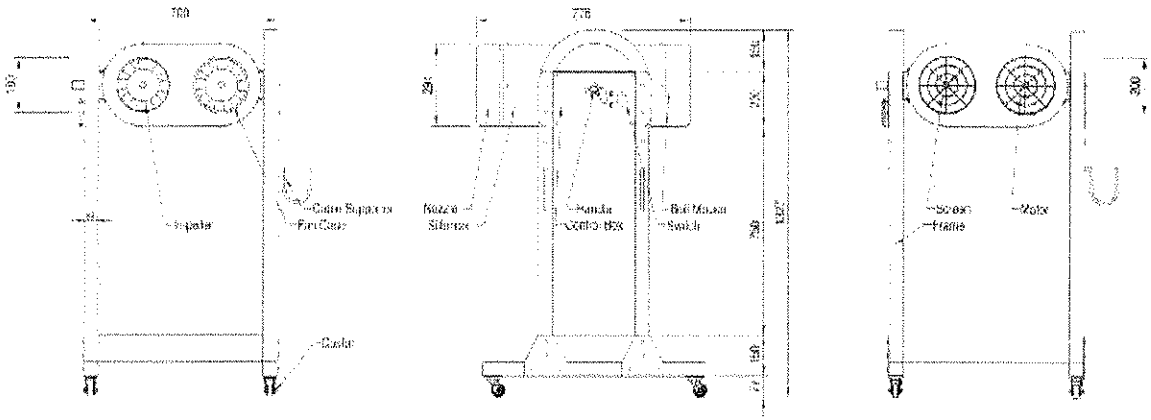
Features

- ▶장거리 도달 구현(60PF : 50m)
- ▶Stator 삽착으로 고정입 구현(84PF : 87mmAq)
- ▶Impeller 고정일 Balancing으로 저진동 구현
- ▶장시간 운전이 가능한 신뢰성 확보(수명 : 20,000h)
- ▶토출 풍량 대비 28배의 평균 유도비 구현

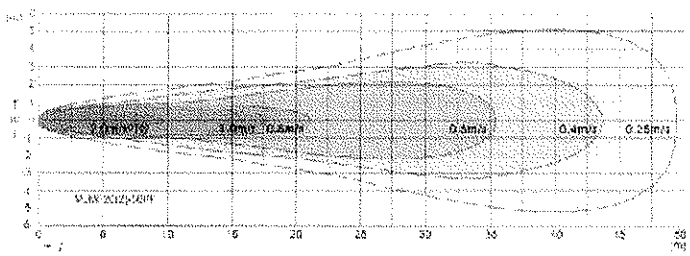
Specifications

모델명(Model)	MJPF20(2)-50PM	MJPF20(2)-84PM
전원(Rated Power)	1ø 220V 60Hz	
출력(Output)	200W	700W
풍량(Flow Rate)	50CMM	25~84CMM
출구속도(Outlet Velocity)	17.3m/s	8.7~26.6m/s
전압(Total Pressure)	38mmAq	87mmAq
도달거리(Throw)	50m	60m
소음(Sound Level)	65dB(A)	
무게(Weight)	80kg	

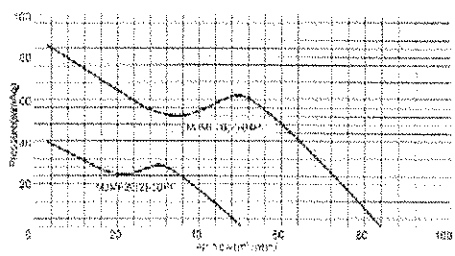
Dimensions



Air Distribution



Performance Curve



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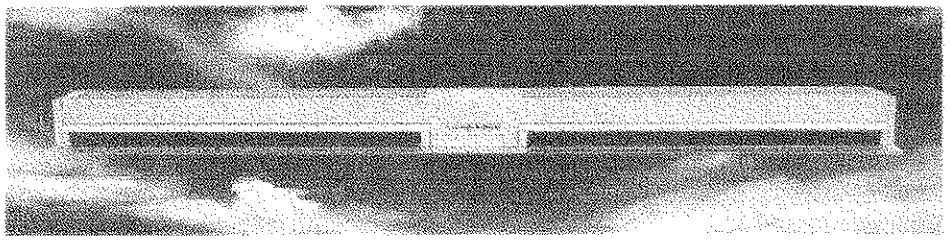
Tel: 82-499-7647 Fax: 82-3409-5350

PRO-LONG LINE FAN



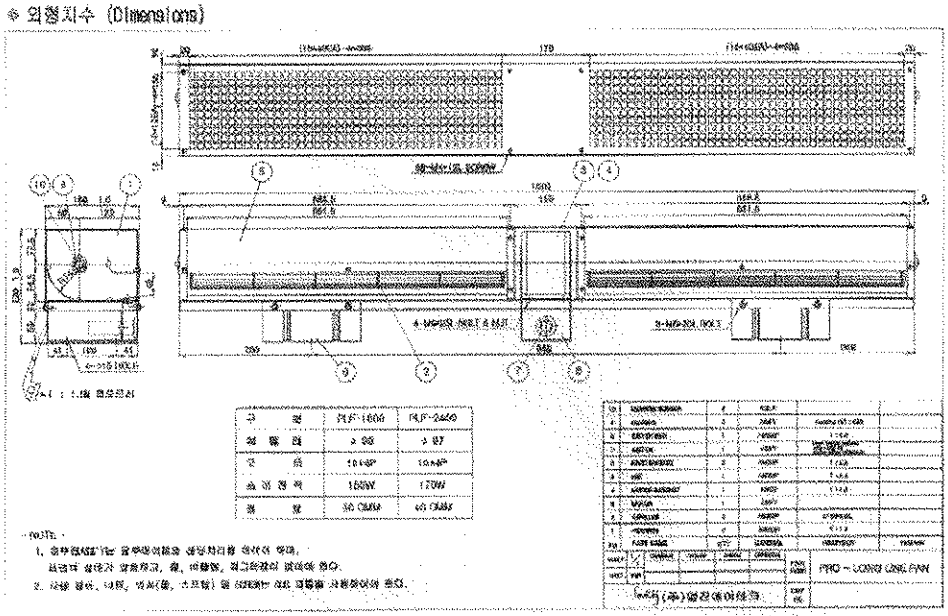
◈ 규 격 표(Specification)

규격 (Specification) / 기종 (Series)		PLF - 1800	PLF - 2400
상 (Phase)	Φ	1Φ x 4P	1Φ x 4P
소비 전력 (Power consumption)	W	150W	170W
풍량 (Air flow rate)	CMH	31	40
소음 (Operating noise)	dB(C) / dB(A)	61	63

◈ 특 징(Special features)

- 저속송풍의 환기 방식으로 쾌적한 분진이 최대의 장점
- 동력비의 절감으로 운전의 지속화
- 설치, 유지보수, 관리가 용이

◈ 외형치수 (Dimensions)



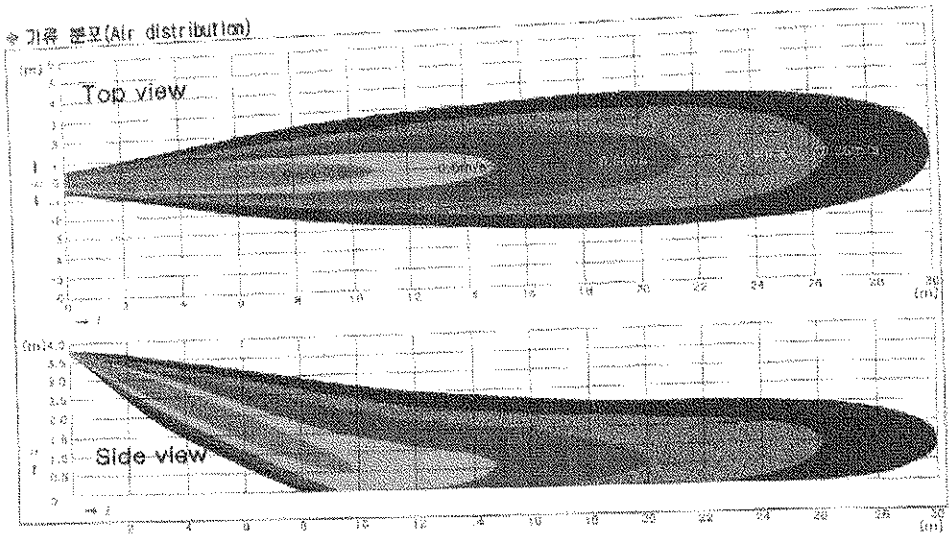
MJ AIR TECH ASIA PACIFIC PTE LTD

Asia-Pacific Manager for MJ Air Tech Co. Ltd (Korea)

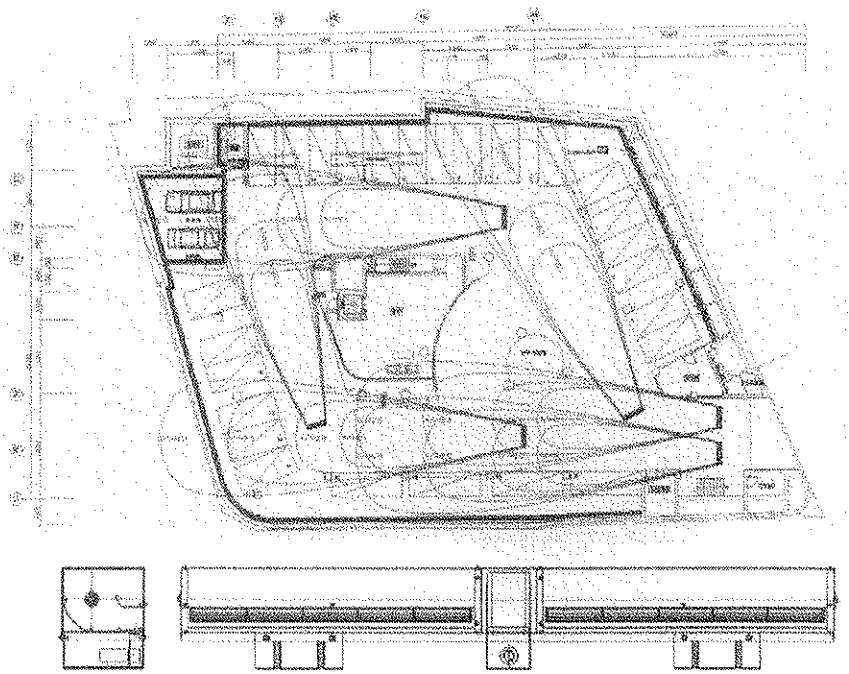
Blk 1, Ang Mo Kio Industrial Park 2A, #01-03, AMK Tech 1, Singapore 568049.

Tel : 6481 1192 Fax : 6481 1102 Email : mjairtech@gmail.com

※ 기류 분포(Air distribution)



※ 배치도

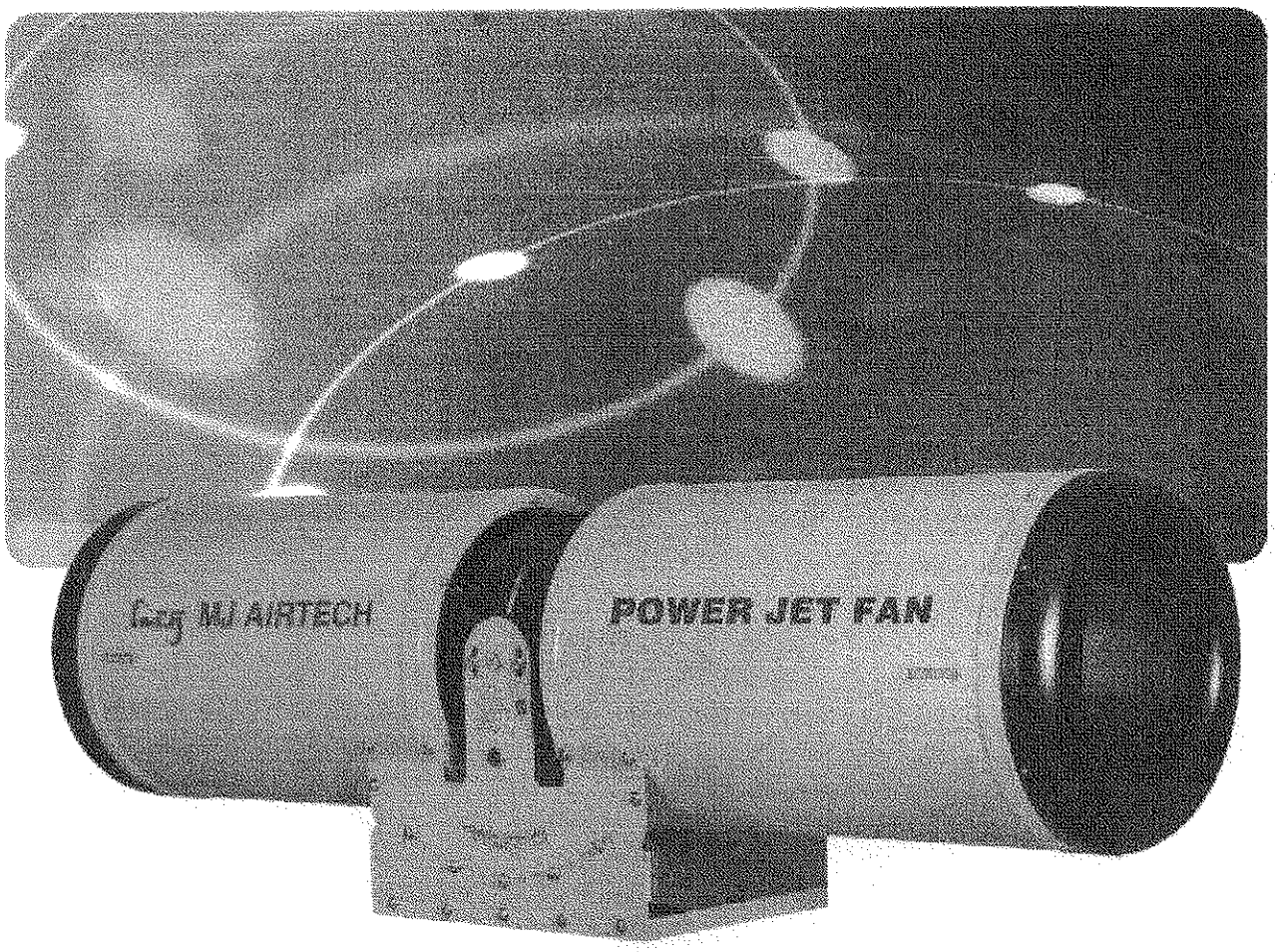


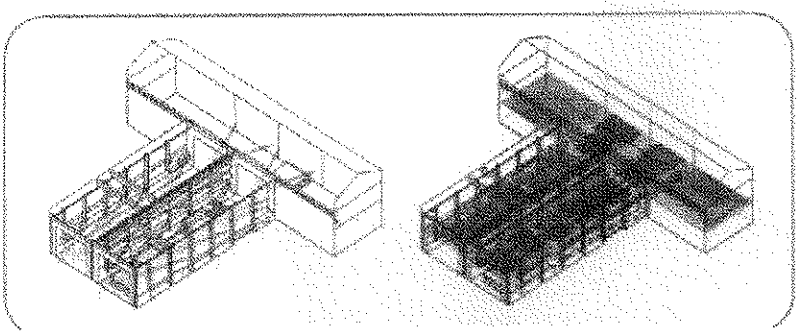
MJ AIRTECH CO., LTD.
www.mjairtech.co.kr

파워 제트팬

Power Jet Fan

MJPF50-200PF / 250PF



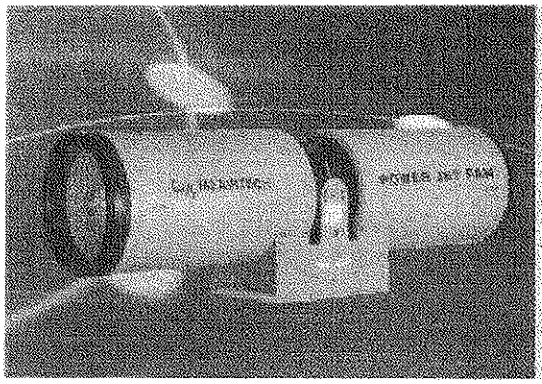


Applications

- 조선소
- 중공업공장
- 자동차공장
- 제철공장
- 제강공장

Advantages

- 용접흄 농도 저감
- 신선공기 공급
- 유해가스 배출
- 쾌적도 향상
- 환기효율 향상



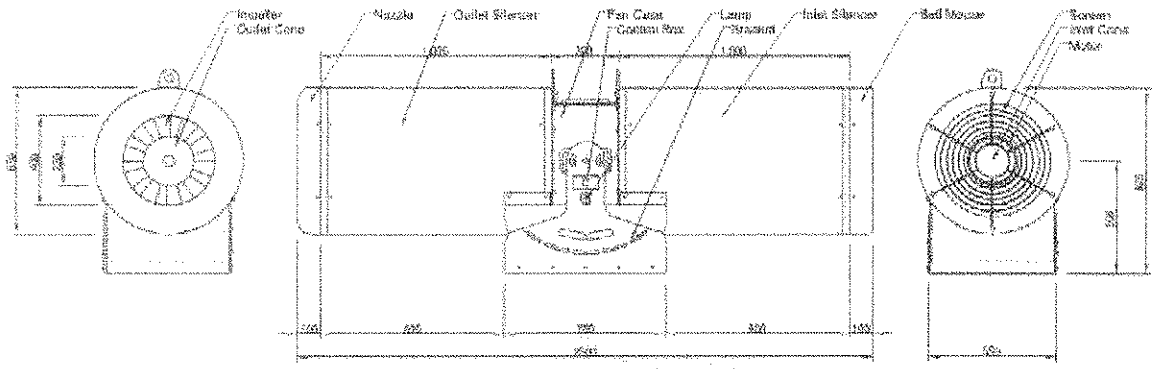
Features

- ▶ 고속의 토출풍속 구현(250PF : 37m/s)
- ▶ 동급 최저소음 구현(250PF : 73dB(A))
- ▶ Impeller 고정밀 Balancing으로 저진동 구현
- ▶ 장거리 도달 구현(250PF : 100m)
- ▶ 상하좌우 지점 각도 수동 조절(상하 20°, 좌우 45°)

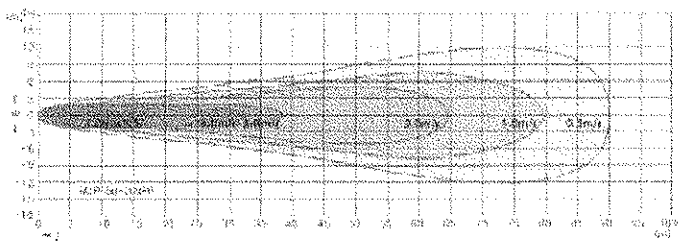
Specifications

모델명(Model)	MJPF50-200PF	MJPF50-250PF
전원(Rated Power)	3Φ 380/440V 60Hz	
출력(Output)	3.7kW	5.5kW
풍량(Flow Rate)	200CMM	250CMM
출구속도(Outlet Velocity)	9~27m/s	11~33m/s
전압(Total Pressure)	54mmAq	80mmAq
투척거리(Throw)	90m	100m
소음(Sound Level)	71dB(A)	73dB(A)
무게(Weight)	180kg	

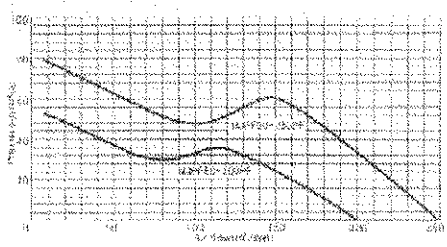
Dimensions



Air Distribution



Performance Curve



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Tel : 6481 1192 Fax : 6481 1102 Email : mjairtech@gmail.com

SINGAPORE CIVIL DEFENCE FORCE
FIRE SAFETY & SHELTER BUREAU

HQ SINGAPORE CIVIL DEFENCE FORCE
91 Ubi Ave 4 Singapore 408827 Fax: 6848 1488
Website: http//:www.scdf.gov.sg

Please quote our ref. no. in all future correspondences

CONSULTATION

Your Ref :
Our Ref :

DID: 68481448
FAX 68481490

MJ AIRTECH ASIA PACIFIC
BLK 1 Ang Mo Kio Industrial Park 2A
#01-03 AMK Tech 1
Singapore 568049

Dear Sir/Madam,

GENERAL ENQUIRY

Thank you for seeking our consultation. Attached are the records of consultation made on 23-DEC-2002.

Yours faithfully,

VIJAYARATNAM
for COMMISSIONER
SINGAPORE CIVIL DEFENCE FORCE

(This is a computer print out. No signature is required)

SINGAPORE CIVIL DEFENCE FORCE
FIRE SAFETY & SHELTER BUREAU

HQ SINGAPORE CIVIL DEFENCE FORCE
91 Ubi Ave 4 Singapore 408827 Fax: 6848 1488
Website: http//:www.scdf.gov.sg

Please quote our ref. no. in all future correspondences

Ref No : CON/C0006846/02

PROPOSAL: GENERAL ENQUIRY

RECORD OF CONSULTATION

Item 1: Intent to employ a seirs of direct axial fans to replace ductwork in the design of smoke purge system to the basement.

Comment: In principle FSSB has No Objection to your proposal. However, the QP intending to employ the concept of air distribution has to seek waiver of the regulation as it does not comply to SSCP 13. A CFD analysis shall be submitted with the plan submission, clearly hightlighting redundancies and mode of emergency operation. Also the physical smoke shall be conducted on site and be verified by the RI before application for FSC.

Building and Construction Authority

5 Maxwell Road #02-00
Tower Block MND Complex
Singapore 069110

Telephone : 325 2211
Facsimile : 325 7150
Email : bca_enquiry@bca.gov.s

Building Plan and Management Divi
Building Plan Department
Tel : 3258636

MJ AIRTECH ASIA PACIFIC
Blk 1, Ang Mo Kio Industrial Park 2A
#01-03 AMK Tech 1
Singapore 568049

Dear Sir

PROJET DIRECT AXIAL FAN

In general, we have no objection to the use of the above-mentioned fans.

However, the QP (engineer) intending to use the above, will be required to subm his proposal for a waiver of the regulation; on a case-by-case basis.

We will evaluate the proposal and if acceptable, grant approval with or withou conditions attached.

Please feel free to call me if you require further clarification.

Yours faithfully

BOK CHEE MENG
CSC SECTION
for COMMISSIONER OF BUILDING CONTROL

TEST REPORT

Ref. Report No.
452-84

Name and address of the applicant

MJ AIRTECH ASIA PACIFIC
Blk 1, Ang Mo Kio Industrial Park 2A
#01-03 AMK Tech 1
Singapore 568049

Standard / Test regulation

- KS A 0701
- KS B 6311

Test result

- Refer to the attachments

Test item(s)

- Direct Axial Fan

Model/type ref.

PFS -30
PFS -40

Manufacturer

MJ AIRTECH ASIA PACIFIC

Additional information

Nothing

Incoming date : August 20, 1999

Test date : August 27, 1999

Issue date : August 30, 1999

This test report only responds to the tested sample and shall not be reproduced except in full without written approval of the Korea Testing Laboratory.

Tested and reported by

C. S. LEE
Senior Engineer

Reviewed by

W. S. LEE
Chief of Testing lab.

KOREA TESTING LABORATORY

TEST RESULT

Ref. Report NO. : 452-84

[1] Test Result

Model	Static pressure (mmAq)	Frequency (Hz)	Flow Rate (㎥/min)	Current (A)	Voltage (V)	Rev./min (RPM)	Sound Level (dB)
PFS-40	0.0	50.5	20.2	1.1	228.0	2923.4	63.3
PFS-30	0.0	50.5	17.7	0.49	234.0	2983.4	64.1

[2] Specification

1. Model : PFS-40

(1) Diameter of outlet(mm) : 175
(2) Power Consumption(W) : 250
(3) Rev./min(RPM) : 2910
(4) Current(A) : 1.09
(5) Voltage(V) : 230
(6) M.F.G No. : MJ-102205
(7) Flow Rate(㎥/min) : 21
(8) Phase : Single
(9) Frequency(Hz) : 50
(10) Date of M.F.G. : 1999.8
(11) Condenser Capacity(μF) : 5.0
(12) No. of Approval : ㉮1-0-6233
(13) M.F.G. : MJ-102205

2. Model : PFS-30

(1) Diameter of outlet(mm) : 175
(2) Power Consumption(W) : 120
(3) Rev./min(RPM) : 2945
(4) Current(A) : 0.52
(5) Voltage(V) : 230
(6) M.F.G No. : MJ-102911
(7) Flow Rate(㎥/min) : 10.8
(8) Phase : Single
(9) Frequency(Hz) : 50
(10) Date of M.F.G. : 1999.8
(11) Condenser Capacity(μF) : 3.5
(12) No. of Approval : ㉮1-0-6233
(13) M.F.G. : MJ-102911

— Under Blank —

MPI TESTING & RESEARCH INSTITUTE

587-10, SINSA-DONG KANGNAM-GU SEOUL. 135-120 KOREA ☐SEOUL(02)543-3710 FAX:(02)516-5398
☐KYUNG IN Branch (02)859-4145 FAX:(02)838-2771 ☐PUSAN Branch (051)513-7418 FAX:(051)513-7419
☐TAEGU Branch (053)741-7533 FAX:(053)741-8630 ☐TAEJON Branch (042)625-6190 FAX:(042)625-6192
☐KWANGJU Branch (062)951-0986 FAX:(062)951-0987

Test Report

Report No. : R2001-038-2 (2 FEB 2001) **Issue Date :** 8 FEB 2001
Applicant address : Blk 1 Ang Mo Kio Industrial Park 2A, #01-03 AMK Tech 1 S(568049)
Company : MJ AIRTECH ASIA PACIFIC
Representative : YUN -CHEOL LIM
Commodity : DIRECT AXIAL FAN
Tested Period : 2 FEB 2001 ~ 7 FEB 2001
Use : QUALITY CONTROL

Test Items / Specimen	Velocity (m/s)	Flow Rate (㎥/min)	Total Pressure (mmAq)	Current (A)	Speed of Rotation (rpm)	Testing Method
HK010202001	11.8	23.4	8.8	0.6	2910	KS B 6311 ('97.3.7.Confirmation)

Remark : Specimen was submitted by applicant and Test Items were required by applicant. End.

Reference :

(1)Fan

Type	Model No.	Serial No.	Product Date	Manufacture	Fan connect
Direct Axial Fan	PFS-40S	HK010202001	2001. 2	MJ AIR TECH CO.,LTD	Direct Connect

This reports only applies to the standards or procedures identified and to the sample specimen submitted for the test unless otherwise specified.
The test results are not indicative or representive of the qualities of the lot from which the sample specimen was taken or of apparently identical or similar products.

President Chang yon Seol

Korea Machinery · Meter and Petrochemical Testing & Research Institute

MPI TESTING & RESEARCH INSTITUTE

537-10, SINSA-DONG KANGNAM-GU SEOUL, 135-120 KOREA ☐SEOUL (02)543-3710 FAX:(02)516-5268
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☐TAEGU Branch (053)741-7533 FAX:(053)741-8630 ☐TAEJON Branch (042)625-6150 FAX:(042)625-6192
☐KWANGJU Branch (062)951-0996 FAX:(062)951-0987

Test Report

(2) Motor

Type	Electrical Power(W)	Volatge (V)	Frequency(Hz)	Current(A)	Speed of Rotation (rpm)
10220V50HZ	132	220	50	0.6	2910

(3) Test Conditions

Test Temperature (℃)	Diameter of Test Duct (mm)
10	205

TESTING PERSON : BONG SOO LEE CONFIRMER : Technical Management YOUNG-MUN KWEON

210×297mm

SINGAPORE CIVIL DEFENCE FORCE

HQ SINGAPORE CIVIL DEFENCE FORCE
91 Ubi Avenue 4 Singapore 408827
Website: http://www.scdf.gov.sg

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SUB2007011953

SUB2007011953

CONSULTATION

Your Ref :
Our Ref : CON/C0001015/07
Date : 2-MAR-2007

DID: **68481452**
FAX **68481490**

MJ AIRTECH ASIA PACIFIC
1,ANG MO KIO IND PARK 2A
#01-03
SINGAPORE 568049

Attn: JAMES L.T. ONG

Dear Sir/Madam,

GENERAL ENQUIRY

Thank you for seeking our consultation. Attached are the records of consultation made on 28-FEB-2007.

Yours faithfully,

EDMUND CHOO BOON CHIN
for **COMMISSIONER**
SINGAPORE CIVIL DEFENCE FORCE

(This is a computer print out. No signature is required)

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91 Ubi Avenue 4 Singapore 408827
Website: http://www.scdf.gov.sg

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Ref No : CON/C0001015/07

PROPOSAL: GENERAL ENQUIRY

RECORD OF CONSULTATION

Item 1: PSB test Report No. 54S07070702/OKB
- To confirm if fan velocity profile and CFD of single fan is acceptable. (Report attached)

Comment: The velocity profile of the horizontal section in the PSB compares favourably with the CFD generated profile done on FLUENT software. However, the legend colour scheme is such that comparison with CFD profile is difficult. FSE to improve on it. The report is tentatively acceptable.

Test Report No. 54S070702/OKB
dated 12 Feb 2007

Note: This report is issued subject to TÜV SÜD PSB Corporation's "Terms and Conditions Governing Technical Services". The terms and conditions governing the issue of this report are set out as attached within this report.

SUBJECT: Ventilation performance (air velocity distribution) of **'PRO-JET FAN'** ductless ventilation system

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VICE PRESIDENT
MECHANICAL
TESTING GROUP

TESTED FOR: MJ Airtech Asia Pacific Pte Ltd
Block 1, Ang Mo Kio Industrial Park 2A
#01-03, AMK Tech 1, Singapore 568049

Attn: Mr James Ong Lay Thiam

INTRODUCTION: The 'air velocity distribution' test is to determine the ventilation fan airflow capacity, operating in an empty enclosed environment.

VENUE AT SITE: Changi Airport Terminal 3 (Basement empty hall)

TEST SAMPLE:

Brand:	'PRO-JET FAN' Ductless Ventilation system
Model:	PFH-40S
Size:	885(Length) X Tapering nozzle outlet from Ø260 to Ø175mm
Airflow rate:	21.3 m³/min
Rated voltage:	1PH/230V/50Hz
Rated current:	0.8 A
Output:	80 Watt
Motor speed:	2910 rpm
Total pressure:	27 mmAq
Installation:	INDOOR
Serial no:	MJ 11456
Production date:	October 2006

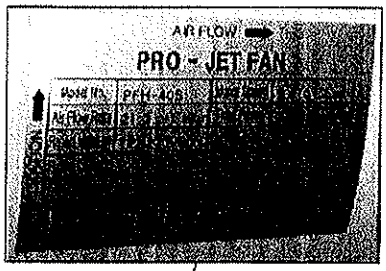

Photo 3: Label on test specimen

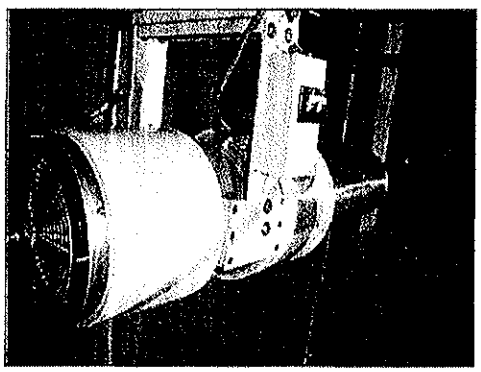

Photo 1: Test specimen (Back view)

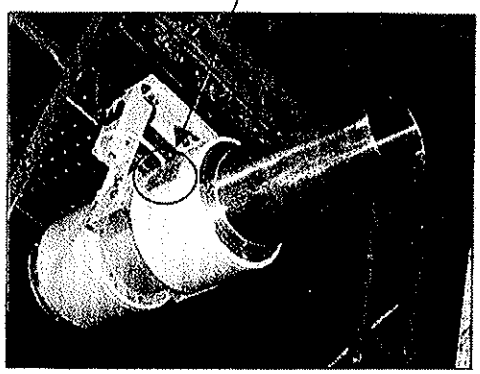

Photo 2: Test specimen (Front view)

David Li Chee Leong
Associate Engineer

Ong Khay Beng
Engineer
Building & Industrial Products
Testing Group

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TÜV SÜD PSB Corporation Pte. Ltd.
Testing Group
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Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
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Regional Head Office:
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3 Science Park Drive
#04-01/05 The Franklin
Singapore 118223

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TEST EQUIPMENT:

Air Velocity Meter for airflow measurements

Manufacturer: TSI
Model: Velocicalc plus 8386-M-GB
Serial number: 54040112
Calibration Report: P0597/06, Dated 20 Apr 2006

Cable ties, aluminium ladder and pole for securing the air velocity meter vertically, rigidly and mobility during test.

TEST SETUP:

An empty hall with an enclosed space of approximately 130m(Length) X 27m(Width) X 8m(Height), is selected for the 'air velocity distribution' test. The 'PRO-JET FAN' is installed at a height of 3m above the floor level located at the center of the hall. Locations for measurements are marked with masking tapes. The air velocity meter is setup rigidly to move around easily during testing.

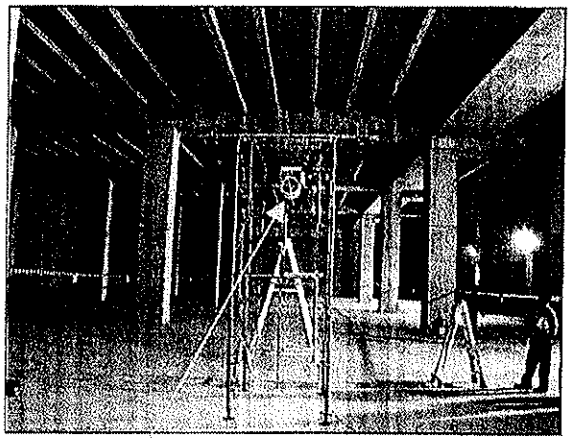

Photo 4: Fan installation setup and hall opening space.

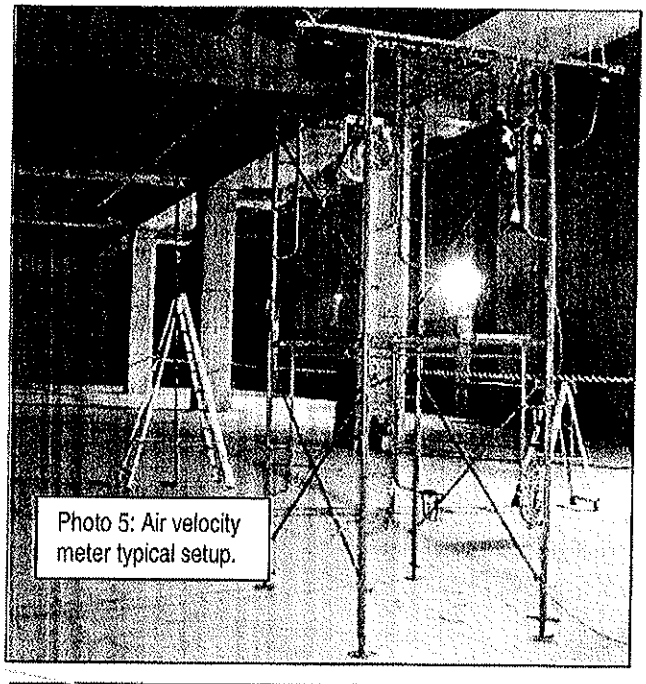

Photo 5: Air velocity meter typical setup.

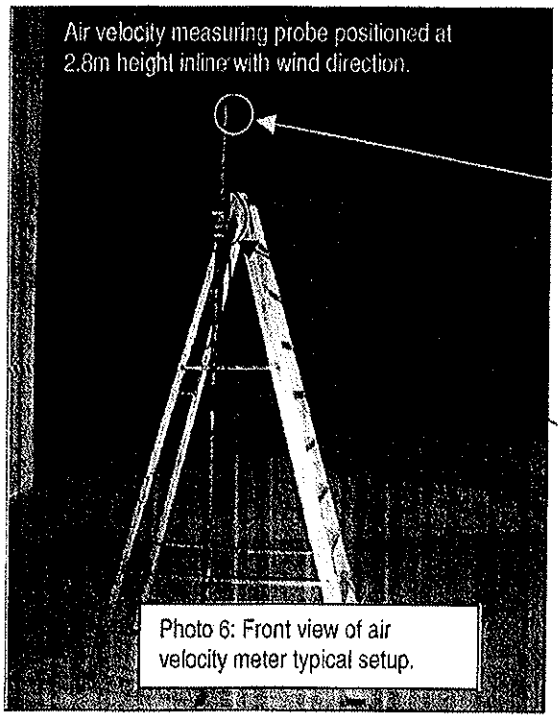

Photo 6: Front view of air velocity meter typical setup.

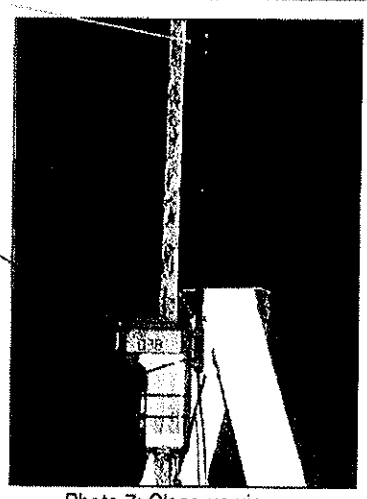

Photo 7: Close-up view of air velocity meter.

Air velocity measuring probe positioned inline with wind direction.

Air velocity meter rigidly secure to ladder with cable ties.

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TEST PROCEDURE:

1) The 'PRO-JET FAN' is switch 'ON' and stabilized for at least a minute. Once stabilized, position the air velocity meter at the fan outlet and record the fan air velocity at various points.

2) Positioned the probe of the air velocity meter inline with the wind direction created by the 'PRO-JET FAN'. Record every pre-marked test locations for a duration of 3~5 minutes, mainly at 0m, 1.4m and 2.8m height above the floor level. At every test height, a set of high/low value is recorded and averaged.

3) Proceed to the next testing point until the entire test pre-marked locations are completed.

TEST RESULTS:

DATE OF TEST: 31 Jan 2007 & 01 Feb 2007

WITNESS BY: Mr James Ong Lay Thiam & Mr Leong Cheng Wee (MJ Air Tech Asia Pacific Pte Ltd)

1) APPENDIX A - Air velocity distribution from **PLAN VIEW** for 'PRO-JET Fan' operating at 14.88 m/s

2) APPENDIX B - Air velocity distribution from **SIDE VIEW** for 'PRO-JET Fan' operating at 14.88 m/s

3) APPENDIX C1 ~ C5 - Air velocity data collected at a height of **2.8m (Page 5 ~ 9)**

4) APPENDIX D1 ~ D5 - Air velocity data collected at a height of **1.4m (Page 10 ~ 14)**

4) APPENDIX E1 ~ E5 - Air velocity data collected at Floor level, **0m (Page 15 ~ 19)**

5) APPENDIX F1 ~ F3 - Air velocity data collected at a height of **4m (Page 20 ~ 22)**

6) APPENDIX G1 - Air velocity data collected at a height of **5.5m (Page 23)**

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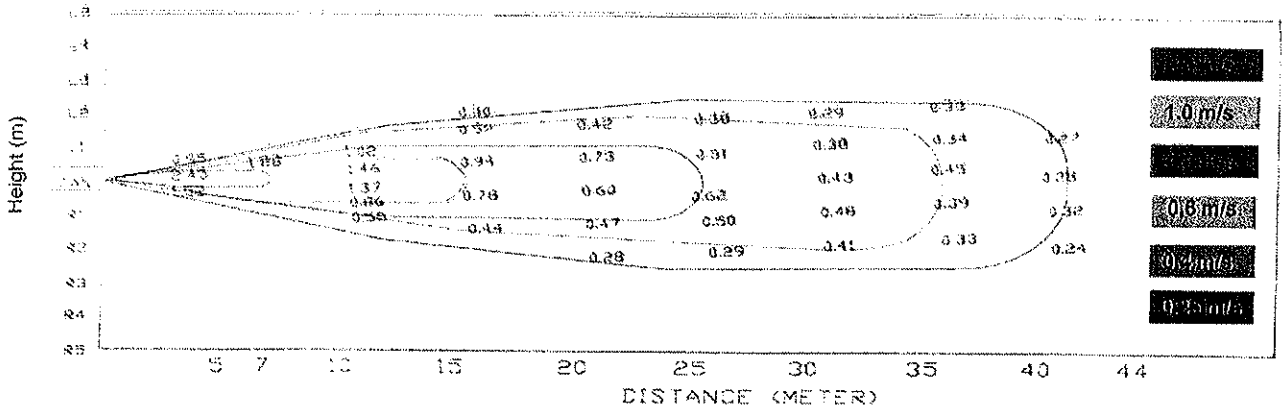
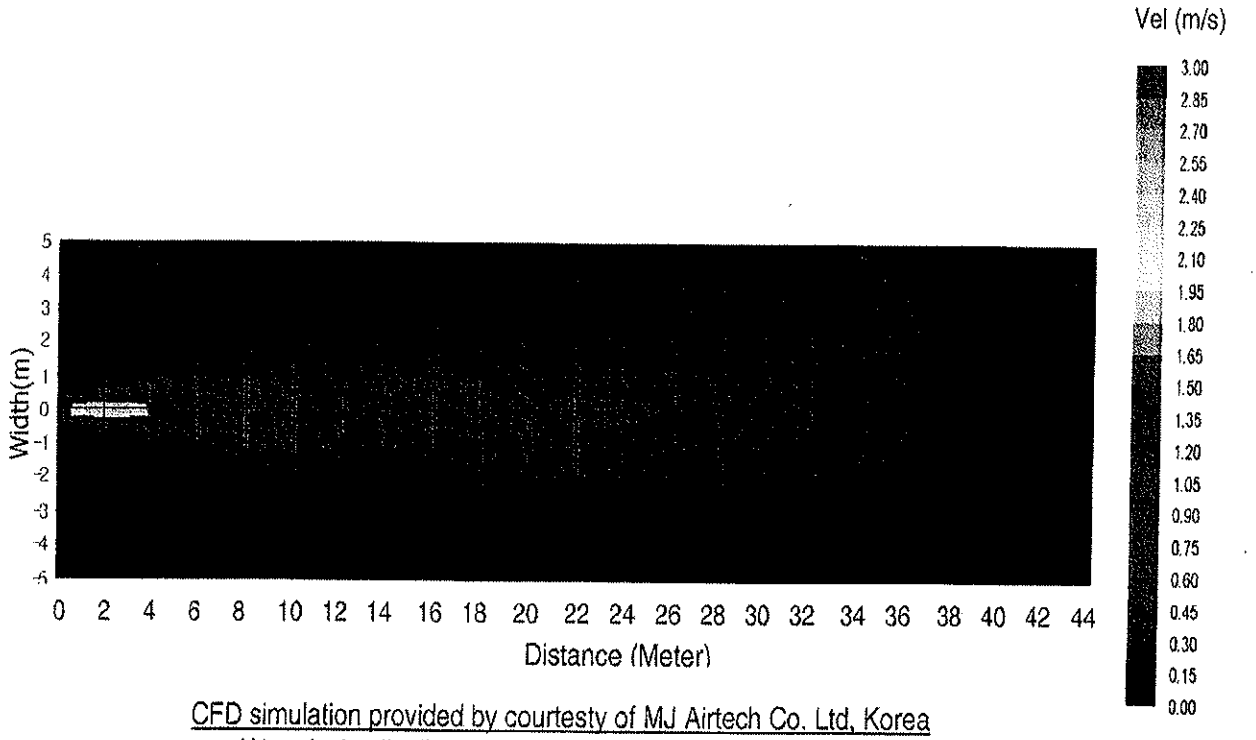
TEST RESULTS SUMMARY:

APPENDIX A

Air velocity distribution from PLAN VIEW for 'PRO-JET Fan' operating at 14.88 m/s



Air velocity distribution from plan view for 'PRO-JET Fan' operating at 14.88 m/s



CFD simulation provided by courtesty of MJ Airtech Co. Ltd, Korea
(Air velocity distribution from plan view for 'PRO-JET Fan')

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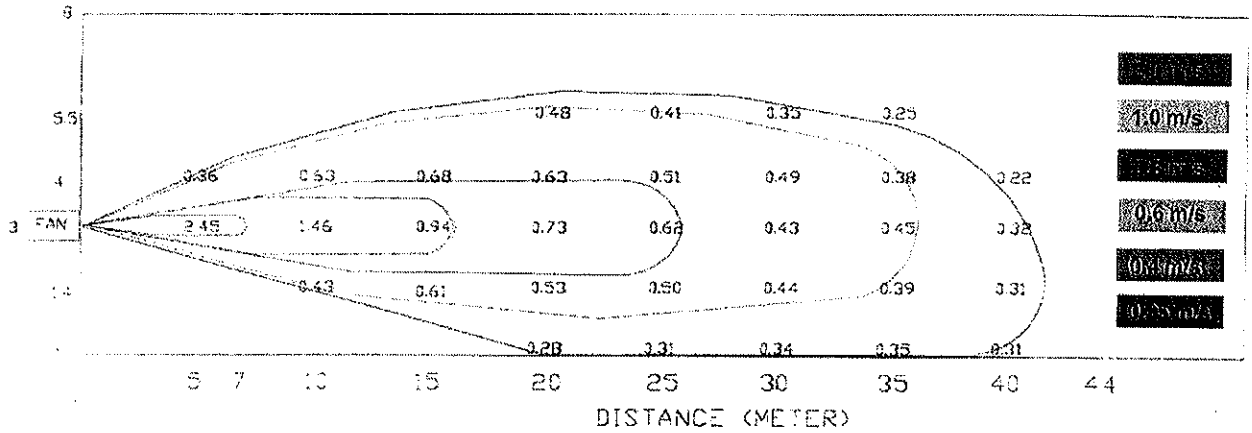
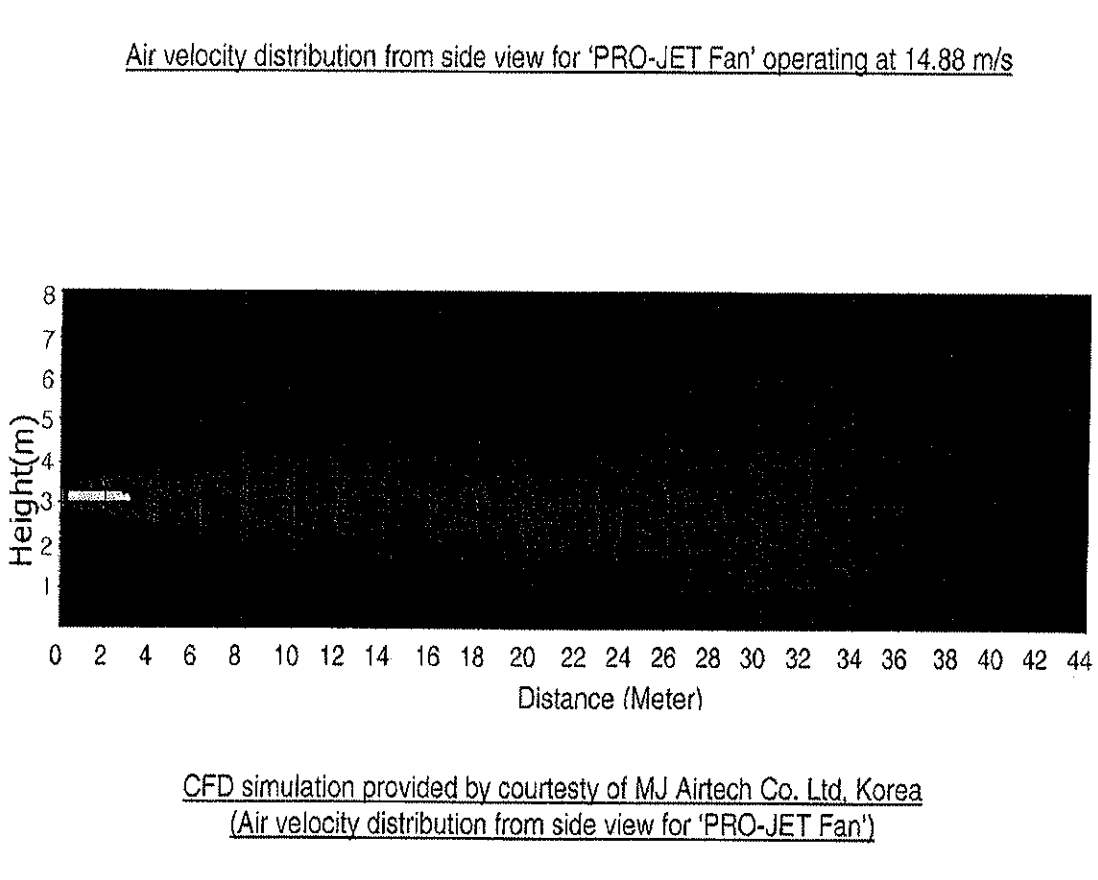
TEST RESULTS SUMMARY CONT'D:

APPENDIX B

Air velocity distribution from SIDE VIEW for 'PRO-JET Fan' operating at 14.88 m/s



Air velocity distribution from side view for 'PRO-JET Fan' operating at 14.88 m/s



CFD simulation provided by courtesty of MJ Airtech Co. Ltd, Korea
(Air velocity distribution from side view for 'PRO-JET Fan')

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2. Unless otherwise requested, a report shall contain only technical results. Analysis and interpretation of the results and professional opinion and recommendations expressed thereupon, if required, shall be clearly indicated and additional fee paid for, by the Client.

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October 2006

Test Report No. 54S066103/LSS
dated 16 Nov 2006

Note: This report is issued subject to TÜV SÜD PSB Corporation's "Terms and Conditions Governing Technical Services". The terms and conditions governing the issue of this report are set out as attached within this report.

SUBJECT:

Testing of elevated temperature Pro-Jet fan

TESTED FOR:

MJ AIRTECH ASIA PACIFIC PTE LTD
Blk 1, Ang Mo Kio Industrial Park 2A,
#01-03, AMK Tech 1,
Singapore 568049

Attn: Mr Leong Cheng Wee

TEST DATE:

7 Nov 2006 to 8 Nov 2006

SAMPLE DESCRIPTION:

One Pro-Jet fan was sampled out of four Pro-Jet fans for elevated temperature test.

PURPOSE OF TEST:

To determine the duration of fan performance at elevated temperature when tested in accordance with BS 7346: Part 2: 1990 "Specification for powered smoke and heat exhaust ventilators."

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JQA-QMA 10040

Laboratory:
TÜV SÜD PSB Corporation Pte. Ltd.
Testing Group
No.1 Science Park Drive
Singapore 118221

Phone [illegible]
Fax [illegible]
E-mail [illegible]
www.psbcorp.com
Co. Reg. [illegible]

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive
#04-01/05 The Franklin
Singapore 118223

SPECIMEN DATA:

The following data was supplied by the manufacturer and taken from the name plate:

Fan Details

Fan Model	:	PFH-40S(L)
Impeller	:	Aluminium
Impeller diameter	:	201 mm
No. of blade	:	8
Length of blade	:	45.6 mm
Casing length	:	128 mm
Casing diameter	:	252 mm(O.D)
S/N	:	MJ11755

Motor Details

Motor model	:	MJ-FE05
Casing	:	Aluminium
Casing length	:	146 mm
Casing diameter	:	110 mm(O.D)
Power consumption	:	Below 140 W
Ampere	:	0.65 A
Voltage	:	230 V
Frequency	:	50 Hz
Speed	:	2910 rpm
Class of insulation	:	250°C, 2 hours
Condenser capacitor	:	3 uF
Bearing	:	6201ZZ

Note: The capacitor was mounted in power distributor panel.

TEST RESULTS:

The fan was subjected to the heating conditions and ran continuously for 150 minutes before the test was terminated as shown in figure 1.

(a) Structural Performance

The fan remained securely intact throughout the test.

(b) Electrical Performance

Current at ambient temperature, I_o	:	0.557 A
Current during test, I	:	0.541 A
I/I_o	:	0.971

(c) Aerodynamic Performance

$$\frac{\Delta P_s}{\Delta P_{s1}} = 1.19$$

ΔP_s indicated static pressure difference across the fan during the second phase of the test, corrected to a gas density of 1.2 kg/m^3.

ΔP_{s1} indicated static pressure difference across the fan at the start of the first phase of the test, corrected to a gas density of 1.2 kg/m^3.

CONCLUSION:

The fan ran continuously for 125 minutes at 250°C. In accordance with BS 7346: Part 2: 1990, the fan achieved Class B.

Lee Ngiap Boon
Associate Engineer

Lee Shen Sun
Product Manager
Building & Industrial Products
Testing Group

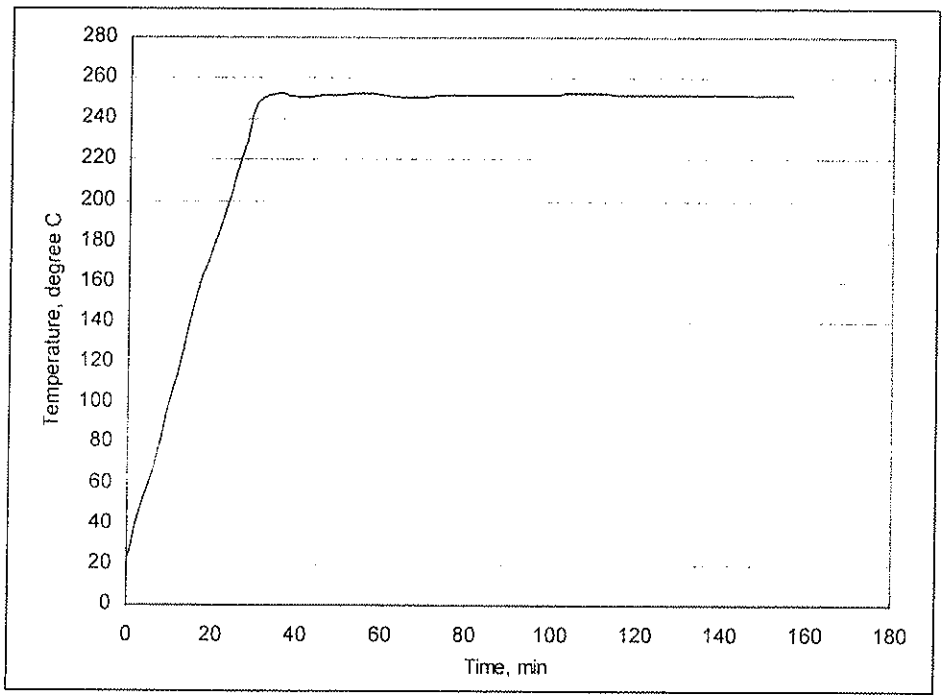

Figure 1 : Heating Conditions

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October 2006

KETI

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KOREA ELECTRIC TESTING INSTITUTE

H. S. Kang

President: **Kang Ho-Sun**

GRAND-DUCHE DE LUXEMBOURG

Société Nationale de Certification et d'Homologation S.à r.l.

Certificate of Conformity

Certificat de Conformité – Konformitätsbescheinigung

according to the
conformément à - gemäß

Low Voltage Directive *Directive Basse Tension* *Niederspannungsrichtlinie*	Electromagnetic Compatibility Directive *Directive relative à la Compatibilité Electromagnétique* *Richtlinie zur Elektromagnetischen Verträglichkeit*
(73/23/EEC)	(89/336/EEC)

Certificate Holder: *Titulaire de l'attestation - Inhaber der Bescheinigung:*	**MJ AIR TECH Co., Ltd.** **Hanyang University HIT B102, 17, Haengdang-Dong** **Seongdong-Gu, Seoul, Korea**
Product Identification: *Identification du produit - Produktidentifizierung:*	**Portable Vent Fan**
Model name: *Nom du modèle - Modellname:*	**MJVF-40H2**
Standards: *Referentiels - Normen*	EN 60335-1:1994+A1+A2+A11+A12+A13+A14+A15+A16 EN 60335-2-80:1997 EN 61000-6-2:2001 EN 61000-6-4:2001
Test report : *Rapport de test - Prüfbericht :*	STC-04-032 / KTI04EC07003
Registered Certificate No: *No du certificat - Zertifikatsnr.:*	0443717-01

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The tested sample fulfils the requirements of the Standards mentioned in the test report. SNCH cannot be held responsible if samples of the tested product differ from the test item.

Luxembourg, 11.10.2004

Claude LIESCH
Conseiller de direction

Société Nationale de Certification et d'Homologation S.à r.l.
11 rue de Luxembourg
NTB P. 23
L-52 r. Sandweiler
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Certificate of Conformity

Certificat de Conformité – Konformitätsbescheinigung

according to the
conformément à - gemäß

Low Voltage Directive	Electromagnetic Compatibility Directive
Directive Basse Tension	*Directive relative à la Compatibilité Electromagnétique*
Niederspannungsrichtlinie	*Richtlinie zur Elektromagnetischen Verträglichkeit*
(73/23/EEC)	(89/336/EEC)

Certificate Holder:
Titulaire de l'attestation - Inhaber der Bescheinigung:
MJ AIR TECH Co., Ltd.
Hanyang University HIT B102, 17, Haengdang-Dong
Seongdong-Gu, Seoul, Korea

Product Identification:
Identification du produit - Produktidentifizierung:
Portable Vent Fan

Model name:
Nom du modèle - Modellname:
MJVF-40H3

Standards:
Référentiels - Normen:
EN 60335-1 : 2001
EN 60335-2-80 : 2002
EN 61000-6-2 : 2001
EN 61000-6-4 : 2001

Test report :
Rapport de test - Prüfbericht :
STC-A06-003 / KTI06EC03001

Registered Certificate No:
No du certificat - Zertifikatsnr.:
0643930-01

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Luxembourg, 2006-03-16

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B.P. 23
L-5201 Sandweiler
☎ (Int+352) 35 72 14-250 Fax (Int+352) 35 72 14-244

Claude LIESCH
Conseiller de direction

Certificate of
Superior Technology Company

Company Name : MJ AIR TECH. CO., LTD.

Representative : Yun-Cheol Lim

Address : Sungdong-ku Seoul KOREA

This is to certify that the company described above has been selected as a Superior Technology Company by Korea Technology Credit Guarantee Fund (KOTEC).

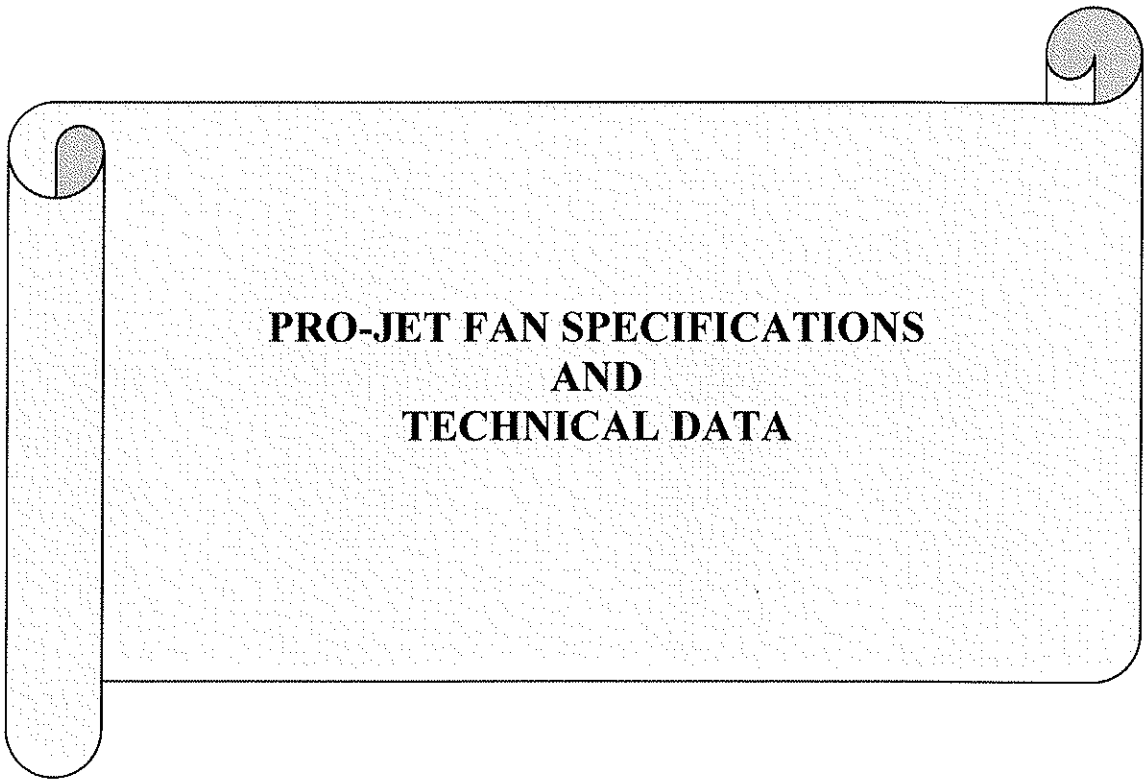
Date : December 28, 2001

Chairman & President

Korea Technology Credit Guarantee Fund

MJ AIR TECH ASIA PACIFIC PTE LTD

Blk 1 Ang Mo Kio Industrial Park 2A #01-03 AMK Tech 1 Singapore 568049
Tel: 65-64811192 Fax: 65-64811102 Email: mjairtech@gmail.com



PRO-JET FAN SPECIFICATIONS AND TECHNICAL DATA

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Ventilation/Smoke Purging Ductless Fan

Local Distributor Country of Origin Country of manufacture Type	MJ Air Tech Asia Pacific Pte Ltd South Korea South Korea Pro-Jet Fan	
Model	PFH 40s / PFS 40S	PFH 30S / PFS 30S
	SMOKE PURGING FAN *VENTILATION FAN*	*SMOKE PURGING FAN* *VENTILATION FAN*
Induced airflow rate (KSB6311) CMH	42,000 (1500 x 28)	21,840 (780 x 28)
Maximum Area Coverage	380 M²	290 M²
Maximum Throw Distance	38m ±10% (at 0.25 m/s)	36m ±10% (at 0.25 m/s)
Average entrainment ratio	28 times	28 times
Continuous lifetime operation	25,000 Hours	25,000 Hours
Total Static Pressure (mm Aq)	10 mm Aq	10 mm Aq
Total Pressure Efficiency (%)	71.5 ±5%	67.3 ±5%
Fan Efficiency (%)	62.5 %	53.7 %
Outlet Velocity (m/s)	17.0 m/s	13.5 m/s
Motor RPM	2,910 RPM	2,950 RPM
Type of Bearing	Ball & Lubricant	Ball & Lubricant
Fan Material	Aluminum	Aluminum
Drive Arrangement	Direct Drive	Direct Drive
Type of Fan / motor	Axial / TEAO	Axial / TEAO
Motor Classification	Class F / Class H	Class F / Class H
Vibration Velocity/Displacement	0.04cm/s/0.002cm	0.04cm/s/0.002cm
Motor rated current	2.0 Amp	2.0 Amp
Interruption capacity	1.5 KA	1.5 KA
Motor Rating	230 W	230W
Input Power	80 W (0.08 kw)	60 W ((0.08kw)
Voltage	230/1/50 Hz	230/1/50 Hz
Starting Amp	5.6 Amp (DOL)	4.2 Amp (DOL)
Running Amp	0.8 Amp	0.6 Amp
Motor Starter Type	Capacitor Start/2 pole	Capacitor Start/2 pole
Mounting Swiver Arrangement	Front (90° ARC) Up/Down (45°ARC)	Front (90° ARC) Up/Down (45°ARC)
Mounting type	4 x M12 Bolt, hard bolt to ceiling using top mounting	4 x M12 Bolt, hard bolt to ceiling using top mounting
Mounting Arm standard/	506 mm / 306 mm	486 mm / 306 mm
No. of fixed blade impellers	8	8
Method of fan encasement	Die-cast	Die-cast
No of Silencers	2 nos.	2 nos.
Silencer type	1 D x 2	1 D x 2

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Local Distributor Country of Origin Country of manufacture Type	MJ Air Tech Asia Pacific Pte Ltd South Korea South Korea Pro-Jet Fan	
Model	PFH 40s / PFS 40S	PFH 30S / PFS 30S
	SMOKE PURGING FAN *VENTILATION FAN*	*SMOKE PURGING FAN* *VENTILATION FAN*
Noise dB(A) (KSB 6361)	55 dB(A)@ 2.0m / 60.7 dB(A) @ 1.0m	50 dB(A)@ 2.0m / 55 dB(A) @ 1.0m
Nozzle Dimension	Tapering from ϕ260 to ϕ175mm	Tapering from ϕ228 to ϕ140mm
Nozzle Material	Stainless Steel	Stainless Steel
Dimension of fan	885mm x 290 mm	748mm x 232 mm
Weight	16.3 Kg	13.8 Kg
External Cabling Arrangement	By Looping (max 8 fans per loop)	By Looping (max 8 fans per loop)
External Cabling	2.5 mm	2.5 mm
Operating condition	Ambient : 0°C - 50°C Humidity : >80% RH	Ambient : 0°C - 50°C Humidity : >80% RH

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Control Scheme

1.0 Carpark Mechanical Ventilation System

a) The mechanical ventilation system of the car parking areas in the basement storey shall comply with the provision of the Building control Act 1989, the Building control regulations 1989 and Singapore CP13: 1999.

b) The car park mechanical ventilation system shall consist of direct axial fans and exhaust fans.

c) The direct axial fans (Pro-Jet fan) and exhaust fans shall be capable of operating effectively at 250°C minimum 2 hours/300°C minimum 1 hour.

d) During normal mode operation, the car park mechanical ventilation system shall be capable of providing 6-air change per hour or maintaining the carbon monoxide concentration to 25ppm averaged over an eight-hour period.

e) During fire mode, the car park mechanical ventilation system shall be capable of performing an air purging operation at a purging rate of not less than 9 air change per hour.

f) The direct axial fans (Pro-Jet fan) and exhaust fans shall be provided with an emergency generator supply system. Secondary power source will be automatically supplied when the primary power supply fails. Automatic switching will be arranged as to ensure that the car park mechanical ventilation system continues to be in the running mode in event of a failure in the principle source of electrical supply.

g) All cables shall be 2.5mm cables.

h) The car park mechanical ventilation system shall meet noise criteria of NC55 during normal mode operation. During fire mode, the general fire alarm shall produce a minimum sound level of either 65 dB(A) or 5 dB(A) above noise from any other source i.e. from the car park mechanical ventilation system by approved test laboratory to KTL-471-61.

i) There shall be separate field control panels for induction axial fans system and the exhaust fan system.

j) The exhaust fan system shall have a remote manual start/stop panel at the guardhouse.

k) The direct axial fans shall have a remote high/low speed indication panel at the guardhouse.

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l) The direct axial fans and exhaust fans shall be triggered by signal from the fire alarm panel. During fire mode, both the exhaust axial fans and direct axial fans shall operate at high speed to provide a purging rate of 9 air change per air hour.

m) The exhaust fan system shall be electrically interlocked direct axial fan system.

n) Interlocking is done in the following manner:

i) Each exhaust axial fan shall be interlocked with its corresponding group of direct axial fans.

ii) If the exhaust fan stops/fail, its corresponding group of direct axial fans shall stop.

iii) The exhaust fan shall continue to run even if any corresponding group of direct axial fans fail or any one of the group fans fails.

iv) The group of direct axial fans shall continue to run even if any one of the group fans fails.

v) If the fire alarm signal is isolated, the exhaust fans and direct axial fans shall continue to run at high speed. If the fireman stop the fans and re-start them, both the exhaust fans and direct axial fans shall continue to run at high speed. This continues to be so until the fans are reset to low speed at the field control panel.

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1) Pro-Jet Fan to be furnished as factory assembled unit as manufactured by MJ Air Tech Co. Ltd (Korea). Country of manufacture is South Korea.

Pro-Jet has characteristic of high performance of ventilation with small air volume. Each Pro-Jet fan has a ventilation distance of at least 38 metres and coverage of 380 m^2 @ 0.25 m/s.

Each unit shall consist of protective inlet screen, inlet bell mouth, silencer (inlet), fan motor, silencer (outlet), discharge nozzle and mounting arm.

1.2) ALL TEST CERTIFICATES BY TÜV SÜD PSB CORPORATION PTE LTD FOR JET FAN PERFORMANCE MUST BE WITHIN 3 YEARS OF THE DATE WHEN THE TEST WAS CONDUCTED. ALL TEST CERIFICATES SUBMITTED WITH DATES EXCEEDING 3 YEARS FROM THE DATE OF THE TEST WILL NOT BE ACCEPTED.

2) PFH/PFS-40S and PFH/PFS 30S

2.1) Pro-Jet fan shall be supported by mounting arm. Mounting arm shall be permit adjustment of the air stream discharge of 180 degree horizontally and 90 degree vertically.

2.2) Protective inlet screen
Protective inlet screen shall be no more than 260mm diameter of circle screen, chrome coated.

2.3) Inlet bell mouth
Inlet bell mouth shall be made of aluminum 3003 and transparent paint coated,

2.4) Silencer (inlet/outlet)
Outside casing shall be finished with a beige, baked-on enamel with 1.2mm cold mill steel sheet. Inside shall contain glass wool to reduce noise level and finished with punched stainless steel sheet. Insulation must be not less than 64 kg/M^2.

2.5) Fan part
Fan part shall be equipped with dynamically balanced axial fan with induced airflow and 80 WATT, 2,910 RPM totally enclosed air over direct drive motor of free maintenance type. Fan motor must be TÜV SÜD CORP tested to BS 7346 Part 2.

- Fan Encasement must be die-cast to ensure continuous operation without degration of performance.
- No. of fixed blade impellers must be at least 8 nos. dynamically balanced and die casted. Jet fans with less impellers will not be accepted.
- Angle of fixed blade impellers must be forward curved aero-dynamically engineered. Method of construction must be die casted. Flat-angled

impellers will not be accepted as they will increase flow resistance and degrade fan performance.

- Fan performance curve must be submitted for approval by consultant.

2.6) Discharge nozzle

Nozzle shall be equipped aerodynamically round shaped aluminum nozzle of 175 mm diameter and finished with transparent paint coated.

2.7) Terminal box

Terminal box shall be equipped with high temperature type indication lamp tested to BS 7346 and endorsed by TÜV SÜD PSB CORPORATION PTE LTD.

The wire to motor shall be enclosed with fiberglass tube for fire protection.

Terminal box shall be sealed with fire rated sealant and all internal wiring and components tested by TÜV SÜD PSB CORP. to BS 7346 Part 2.

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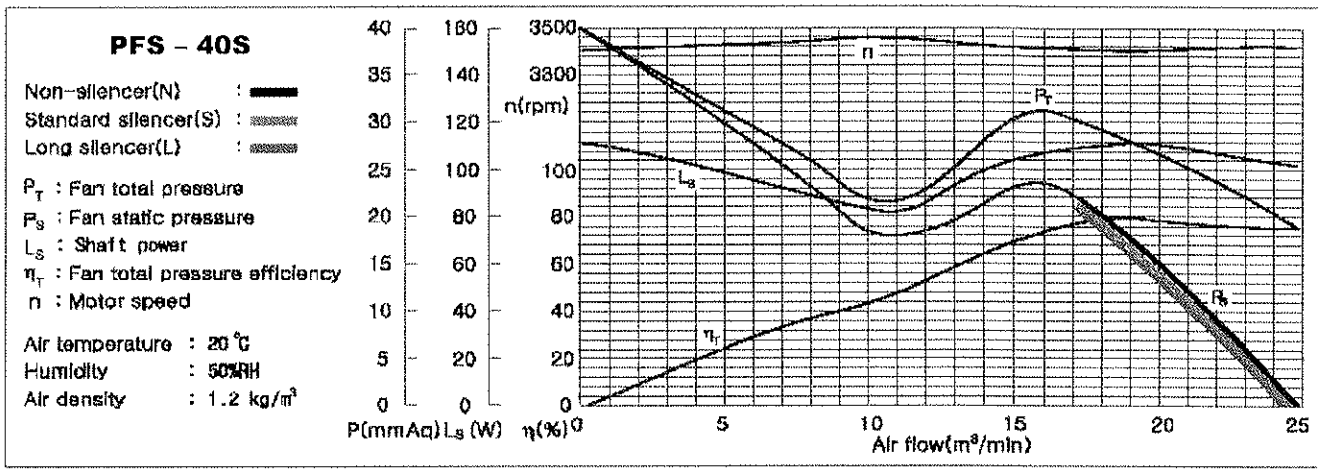
Fan Performance Curve of MJ-Pro-jet Fan



Jet-fan Components

No.	Name	Material		
1	Air intake silencer	Outside plate: SPCC, inner plate: SPG punching, Glass wool filled		
2	Air outlet silencer	Outside plate: SPCC, Inner plate: SPG punching, Glass wool filled		
3	Glass Wool Insulation	Heat resistant to 700° C At least 64 Kg/M²		
4	Air inlet bell mouth	Aluminum alloy		
5	Air outlet nozzle	Aluminum alloy		
6	Suspension arm	SS41, Baked enamel coated		
7	Terminal box	SS41, Baked enamel coated		
9	Operation indicator	Neon glow lamp fire resistant		
10	Vertical adjustment screw	M8 Stainless Steel (Sus 316)		
11	Horizontal adjustment screw	M8 Stainless Steel (Sus 316)		
12	Fan casing	Die-cast Aluminum		
13	Motor	TEAO		
14	Fixed Impeller	8 Nos. Aluminum die-casted		
15	Capacitor	5 MF, 220 V		
16	Inlet screen	SS41, Chrome coated		

Remark:
*1): spare parts for project if required

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Performance Based Specification for ductless Ventilation cum Smoke Purging System for Carpark

3. Description

3.1 The Sub-Contractor shall be responsible for the design, the submission of waiver application to relevant authorities and obtaining the necessary approval from the relevant authorities, supply, installation, testing and commissioning of a complete ductless ventilation cum smoke purging system for indoor carpark complete with carbon monoxide (CO) monitoring system.

3.2 The Sub-Contractor shall not that if the waiver application for ductless ventilation cum smoke purging system is rejected by the relevant authorities, the sub-contractor is not entitled to claim for any coasts whatsoever incurred in the waiver application.

4. General Requirements

4.1 Design & Built Creditability/Track Period of Proprietary Ductless System Supplier

The Sub-Contractor shall submit proven record of projects in Singapore whereby the domesticated proprietary ductless system supplier has successfully obtained waiver of ductless ventilation cum smoke purging system (in lieu of ducted ventilation cum smoke purging system) from BCA/FSSB and has successfully completed such installations to the satisfaction of the BCA/FSSB.

4.2 Authorities Submission

a) Upon award of the contract, the Sub-Contractor's domesticated proprietary ductless system supplier QP (Mechanical) shall immediately seek official waiver from the BCA/FSSB by means of CFD analysis and/or other analytical tools required by the authorities complete with layout plan submission highlighting clearly the redundancies and the mode of emergency operation. CFD analysis shall ensure an effective method of air distribution to sufficiently ventilate the carpark for normal and emergency (smoke purge) system operation.

The Sub-Contractor shall obtain the project's Building plan number from the Architect for waiver application.

b) The Sub-Contractor shall bear all expenses incurred in the preparation of waiver application. No claim for any cost whatsoever incurred in the waiver application shall be entertained.

c) The Sub-Contractor's domesticated proprietary ductless system supplier QP (Mechanical) shall be responsible for formal submission to FSSB Building Plan (M&E) and obtaining the necessary approval and issue the necessary approval and issue the necessary certificate of supervision to FSSB for purpose of Architect's application for TEP/FSC as well as responsible for the issuance of the relevant Certificate of Supervision for the carpark's ventilation system for the purpose of Architect's application to BCA for TOP.

4.3 Physical Validation of the effectiveness of the performance-based ductless system

The Sub-Contractor's domesticated proprietary ductless system supplier shall carry out hot smoke tests on site to verify the design effectiveness and the output of the CFD study submitted to BCA/FSSB. The hot smoke test results shall be certified to be in order in a timely manner by the Sub-Contractor's Qualified Person (QP) and are to be verified by the RI (M&E) prior to the application for the Temporary Fire Permit (TEP)/Fire Safety Certificate (FSC). Prior to the Architect's issuance of Maintenance Certificate, the hot smoke test shall be conducted again to ensure the system is in good working order.

4.4 Maintenance and Warranty for 10 years after TEP

a) The Sub-Contractor's domesticated proprietary ductless system supplier shall provide warranty of the ductless ventilation cum smoke purging system for a period of 10 years after TEP or date of Practical Completion (which ever is later); taking into consideration that the Employer/MCST engages the original installer of the proprietary ductless smoke purging system to execute the comprehensive maintenance after the end of Maintenance Period.

b) The Sub-Contractor shall submit the breakdown costs for comprehensive maintenance of the ductless smoke purging system after the Maintenance Period.

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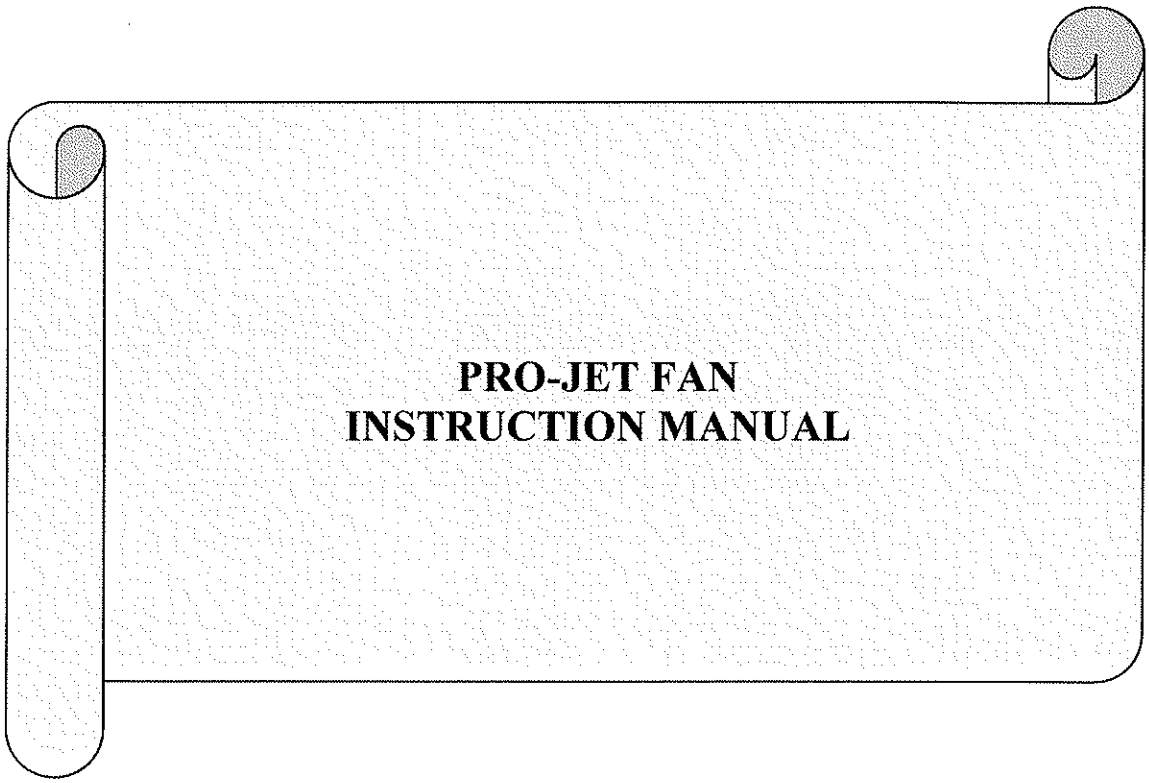

PRO-JET FAN
INSTRUCTION MANUAL

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Inspection (when receiving the Pro-Jet fan)

When receiving the fan, first check whether:

1. The fan is not damaged during transportation because of an accident or any other troubles.
2. The fan model, voltage of the motor, and the length of the suspension arm conform with those you ordered.
3. The number of the fans compiles with those you ordered.

Storage (Including Interim storage)

When you do not install the Pro-Jet fan immediately after receiving it, follow these procedures:

1. Do not stack up more than 5 packages containing the fan.
2. Do not store the fan in a place where the temperature goes high, water may be collected, or the package(s) is exposed to rain.
3. When the fan is stored for more than 3 months, open the package every 3 months to check whether there are no visible abnormalities.

Installation

1. Install the Pro-Jet fan in a place where the ambient temperature does not exceed 50°C, the humidity does not exceed 90%, and there is little dust.
2. Install the Pro-Jet fan in the desired direction. When installing the fan vertically, however, make sure to check that water or any foreign matter does not drop onto it.
3. When suspending the Pro-Jet fan from a ceiling or the like, use fixed metal fittings with enough strength to support the weight of the fan to the ceiling. Then, attach the supplied suspension arm to the fittings. The ceiling surface consists of concrete slabs; pay careful attention to embed the bolts properly into the slab so that the Pro-Jet fan does not drop.
4. The motor circuit breaker is located in the terminal box attached to the side face of the suspension arm. Install the fan in a place, which allows you to access the terminal box to bring the breaker to its ON/OFF position, or to inspect.
5. Loosen the bolts and nuts on the supplied arm to adjust the direction of the airflow. After the direction has been adjusted, tighten the bolts and nuts.
6. When the coating or doing any other work that produces dust is performed over or around the Pro-Jet fan after the fan has been installed, take appropriate measures so that the coating material or dust does not enter the fan.
   The gap between the rotor and casing of the Pro-Jet fan is 0.5mm or less. Therefore, if coating material or dust enters the gap, the motor cannot rotate.

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This may cause the motor to burn. (Usually, the motor circuit breaker opens the motor burns)

Connection

1. Unless otherwise specified when the order is accepted, a 1.5m lead wire and attachment plug (single-phase: 3 pins, three-phase: 4 pins) are attached as standard equipment. Install an outlet which matches with the plug within reach of the lead wire, and perform electrical wiring.

2. When directly connecting Pro-Jet fan to a power supply line without using the plug and outlet, remove the supplied lead wire and connect the power supply line to the circuit breaker terminal in the terminal box.

Start-up

1. Before inserting the attachment plug into the outlet.
   a. Check that the outlet provides the specified potential difference.

   When the outlet does so, insert the plug into the outlet, and:
   b. Bring the motor circuit breaker to its ON position.

   The fan will start to rotate. Then:
   c. Check the fan for the direction of rotation. When the fan rotates counterclockwise, as viewed from the inlet of the fan, the direction is normal.
   d. Check that there were no abnormal sounds and/or vibrations.
   e. Check that the operation indicator is lighting.
   f. Check that there is no abnormality in regard to the direction of the rotation, operating sound, and vibration.

   When there is no abnormality, start the operation.

2. After the Pro-Jet fan starts its normal operation, re-adjust the direction of the airflow.

Routine Inspection (Please perform an inspection bi-yearly)

1. Check that the air flows normally
2. Check that there are no abnormal sounds and/or vibrations
3. Check that the operation indicator is lighting.
4. Check that no foreign matter is stuck in the inlet.

5. Check that the fan unit, silencers, inlet bell mouth, and air outlet nozzle have gathered no rust.

Maintenance and Repair

1. When the air does not flow out normally or there is abnormal sound or vibration, immediately stop the operation of the fan. Pull the plug out of the outlet, or disconnect the fan from the power supply line. Then, detach the fan together with the suspension arm, and remove the air intake silencer. Pull out the fan rotor, and completely clean the fan casing and rotor using a wire brush or the like. At the same time, clean the inlet mouth. Then replace the rotor only, and supply power to operate the fan for a short time.

2. If abnormal sound or vibration still remains, though the casing and rotor are cleaned as described above, reattach the rotor to the motor, and remove the air outlet silencer and the terminal box. Then, send the fan unit and terminal box to our company. After repairing them, we will return them as soon as possible.

3. If the operation indicator does not light and the fan does not operate through power is supplied, check whether the motor circuit breaker trips. If the breaker trips, release it from tripping.

   When the breaker still trips, detach the fan together with the suspension arm, and follow the same procedure as step 1 in checking the rotor and casing for dirt or dust. When the rotor and casing are dirty, clean them and check whether the fan operates normally. When there is no abnormality, reinstall the fan, adjust the direction of the airflow, and then start the operation. If the fan does not operate normally, send the fan unit and terminal box to our company. After repairing them, we will return them as soon as possible.

4. Probably the operation indicator does not go dead because a neon glow lamp is used. However, the lamp may go dim due to age and deterioration, in such case, replace the lamp with a new one.

5. Even when no abnormality occurs, be sure to clean the fan rotor and casing and check the fan for abnormal sound, vibration and current values every 6 months.

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TESTING & COMMISSIONING

Routine Inspection (Pro-Jet Fan, Control panel)

1. Check that the location of Pro-Jet Fan & Control Panel
2. Check that the state of installations of Pro-Jet Fan & Control panel.
3. Check that the Primary electrical power.

Initial start-up

4. Local test for the direction and angle of Pro-Jet Fan.
5. Pre-adjust for the direction and angle of Pro-Jet Fan.
6. Initial start-up for each Pro-Jet Fan.
   - Check that the air flows normally
   - Check that there are no abnormal sounds and/or vibrations
   - Check that the operation indicator is lighting
7. Operating for the whole system

Test and Adjustment

8. Check that the sir stream and induction for the whole area is evenly distributed.
9. Fixing the direction and angle of Pro-Jet Fan.
10. Adjusting the range of thermo-rely in the control panel
11. Check that the interventions for the related equipment or system

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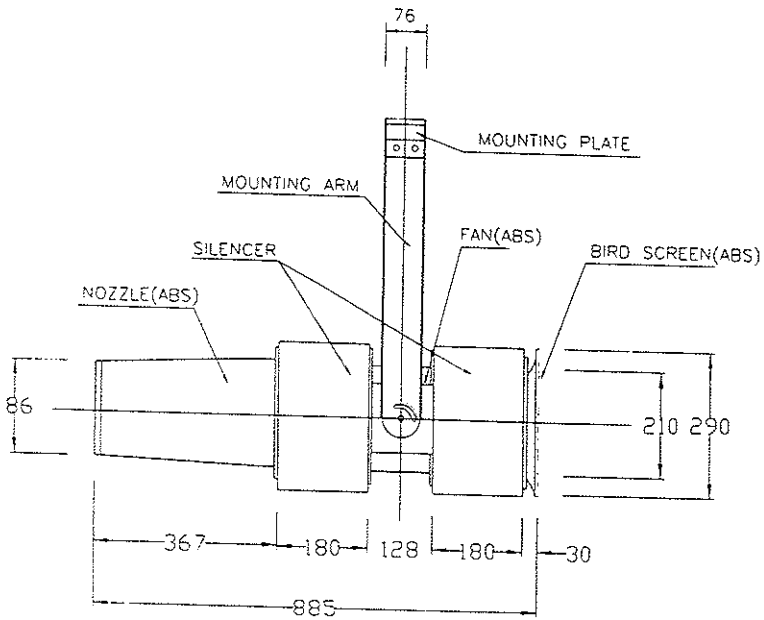
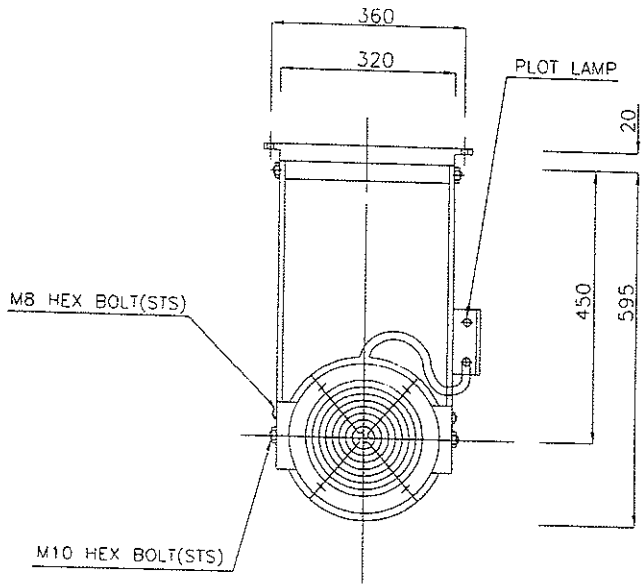
MJ AIRTECH

Pro-Jet Fan Commissioning Report **all right done**

Pro-Jet Fan Unit		**yes**	**no**
Model: ☐ **PFH-40S** ☐ **PFS-40S** ☐ **PFS-30S**		**Serial no:** _____	
Unit power switch	**OFF**	**on** ☐	**off** ☐
Visual check of the unit	clean	☐	☐
Visual check of the unit installation		☐	☐
Check completeness and correctness of electrical wiring - Connection of grounding		☐	☐
- Input of supply voltage		☐	☐
- Check Lamp		☐	☐
- Check NFB		☐	☐
Input of supply voltage		Value: ph V Hz	
Unit power switch	**ON**	**on** ☐	**off** ☐
Operation check			
- Power lamp	**ON**	☐	☐
- Sound	**normal**	☐	☐
- Vibration	**normal**	☐	☐
- Current consumption		**Value:**	**A**
- Sound level (2m distance from wall)		**Value:**	**dB(A)**
- Air Flow at Pro-Jet fan nozzle **m/s**	(Low speed) **Value:**		
	(High speed)**Value:**		**m/s**

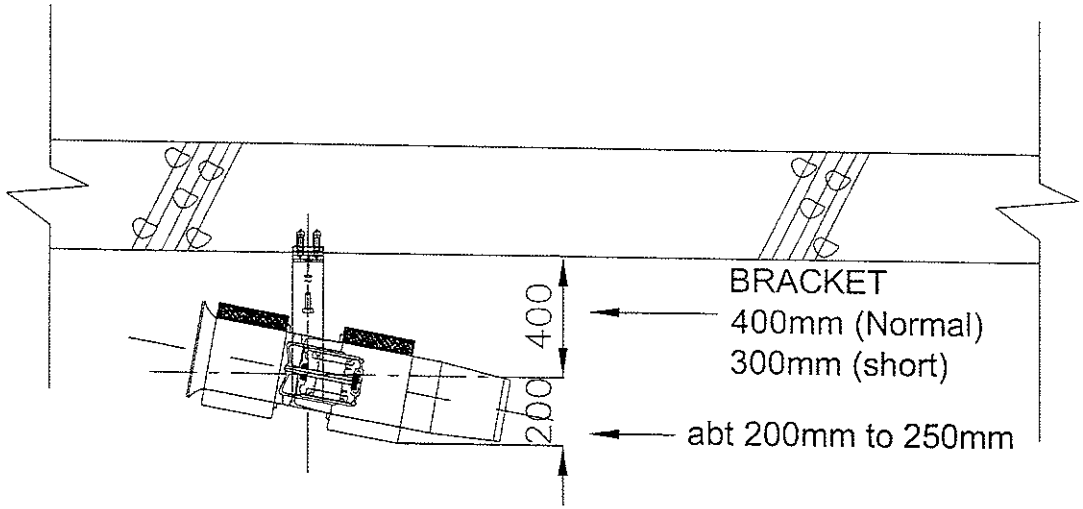
Done by: _____





SPECIFICATION

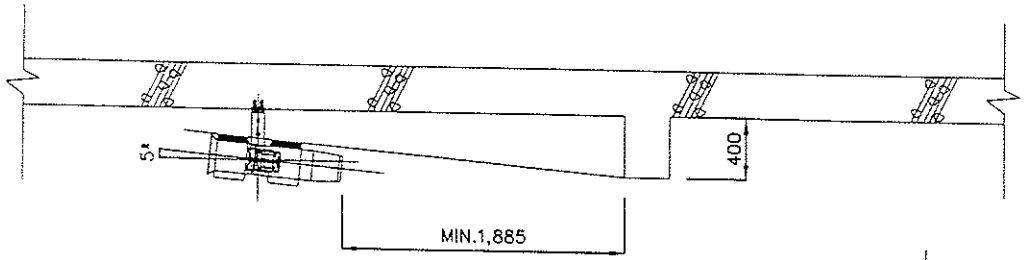
SIZE	mm	885 × ø290
NOZZLE	mm	185
VELOCITY	m/s	14 6
AIR VOLUME	CMM	21
SILENCER	EA	20
POWER		230V/1ø/50HZ/130W
R. P. M		2910
WEIGHT	Kg	14
COVERAGE	m^2	230~330



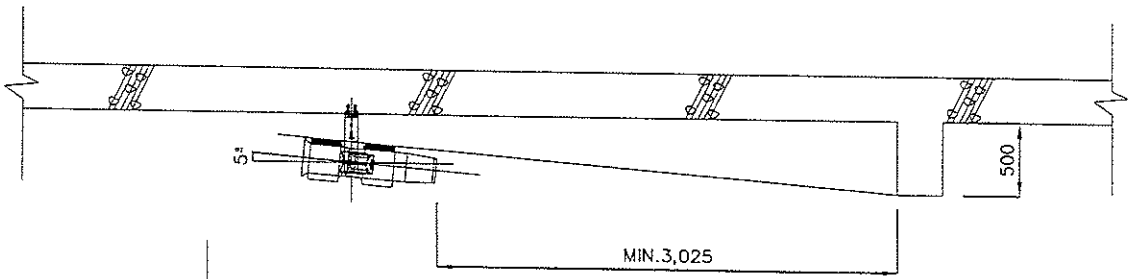
min depth in order to work effectively = 500mm

Scale 1:25

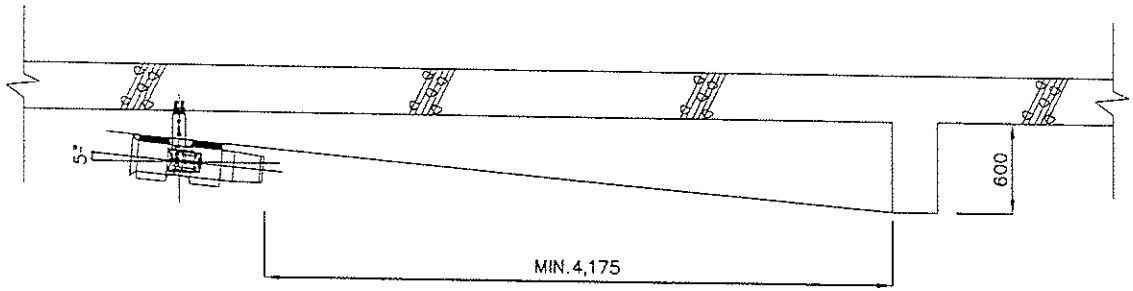
① HEIGHT OF BEAM : 400



② HEIGHT OF BEAM : 500



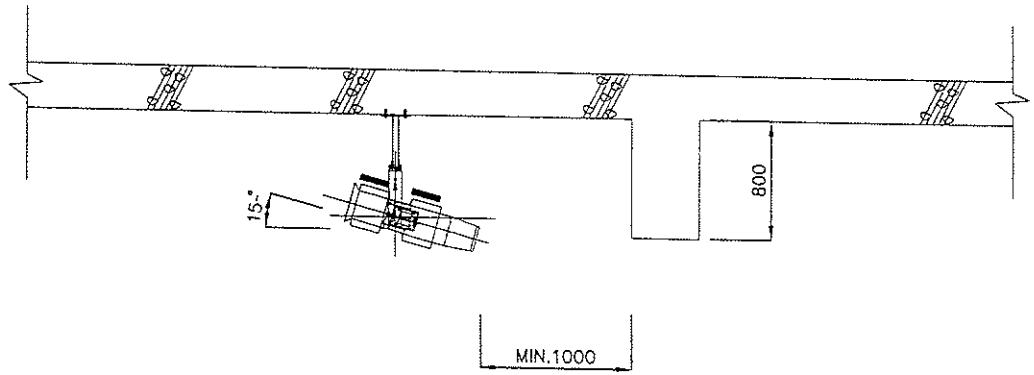
③ HEIGHT OF BEAM : 600



MIN. DISTANCE TO THE FRONT BEAM (5)°

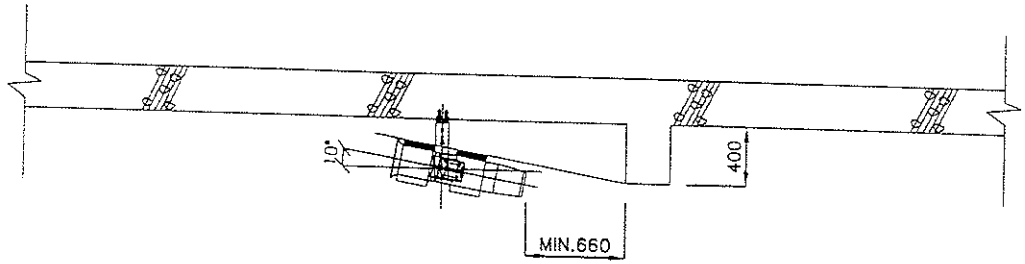
SCALE 1:50

④HEIGHT OF BEAM : 800

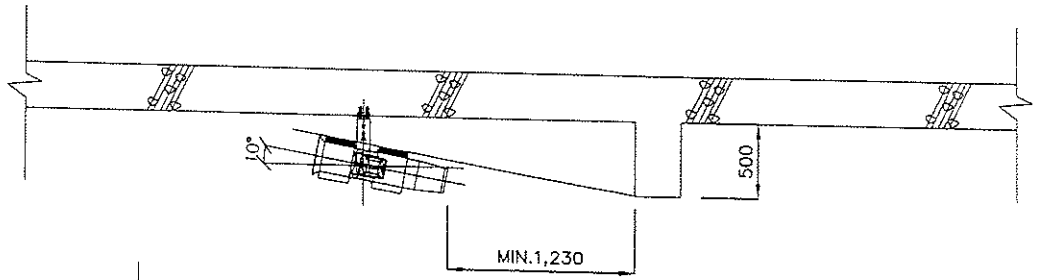


MIN. DISTANCE TO THE FRONT BEAM (15)°
SCALE 1:50

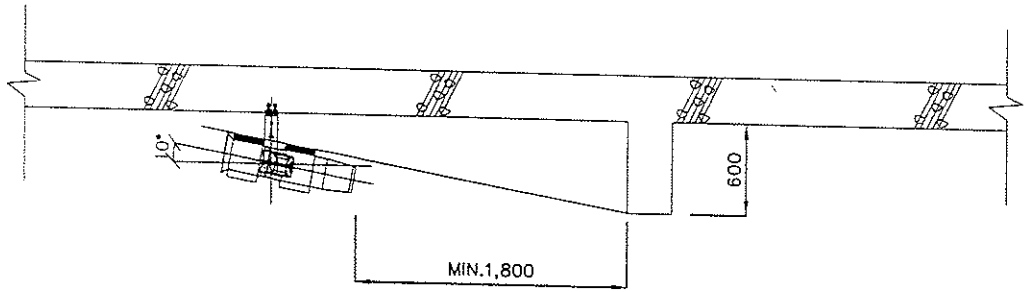
① HEIGHT OF BEAM : 400



② HEIGHT OF BEAM : 500



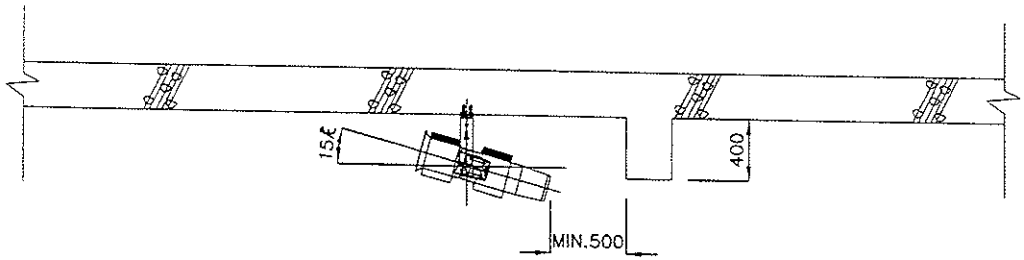
③ HEIGHT OF BEAM : 600



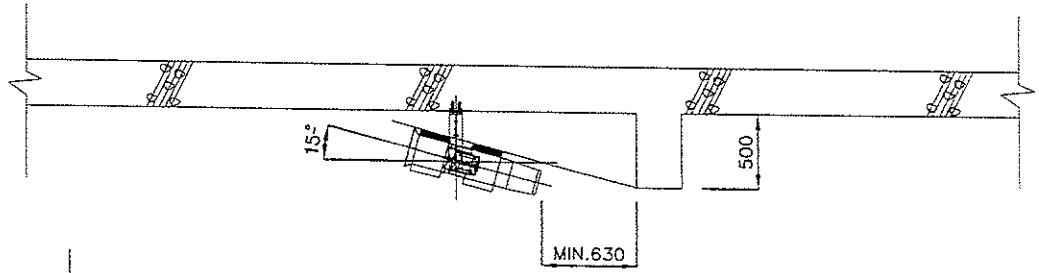
MIN. DISTANCE TO THE FRONT BEAM (10°)

SCALE 1:50

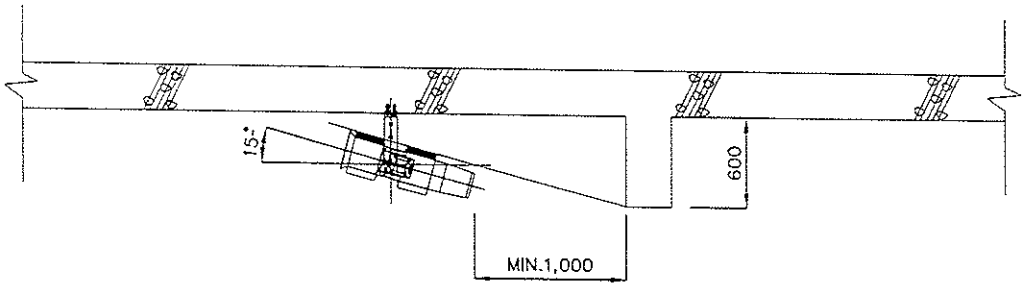
① HEIGHT OF BEAM : 400



② HEIGHT OF BEAM : 500

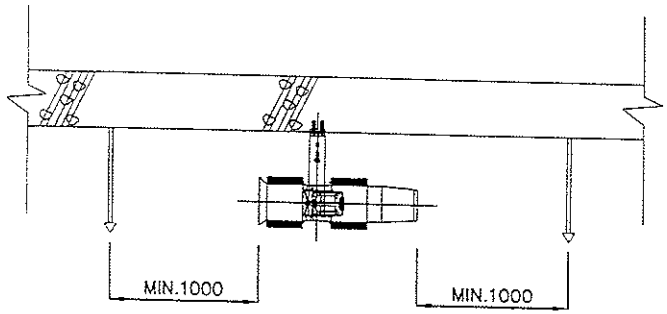


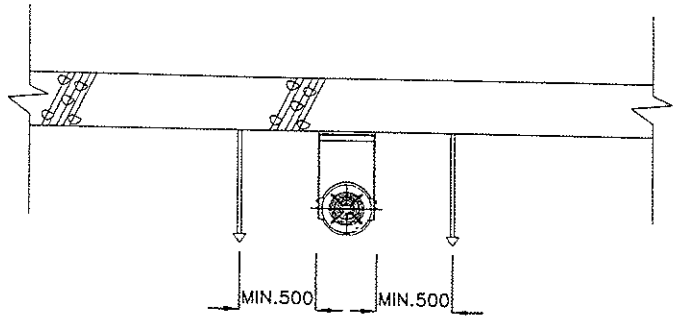
③ HEIGHT OF BEAM : 600

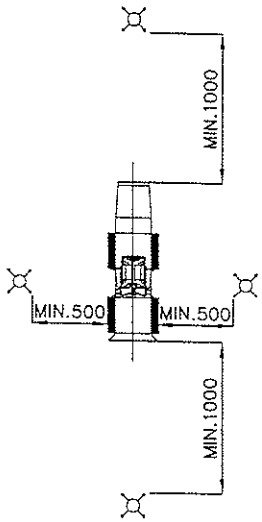


MIN. DISTANCE TO THE FRONT BEAM (15°)

SCALE 1:50



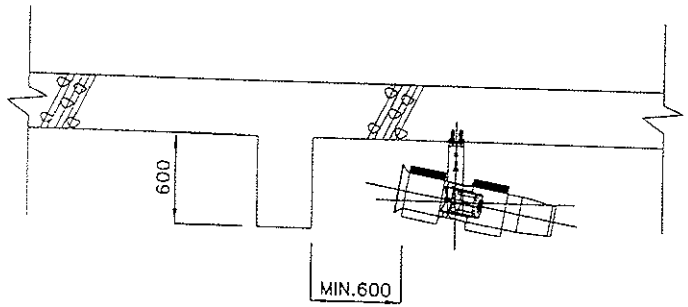




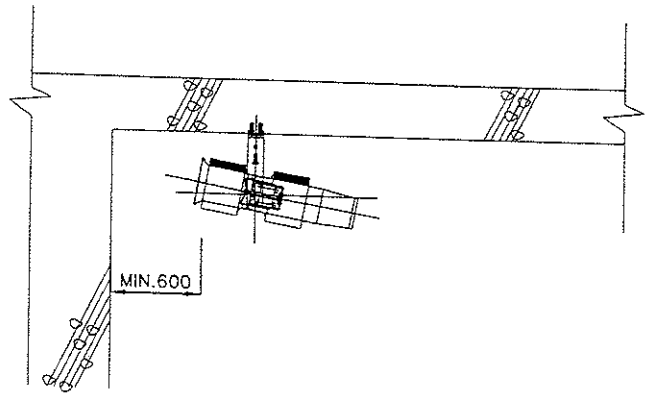
MIN. DISTANCE TO FROM THE SPRINKLER

SCALE 1:50

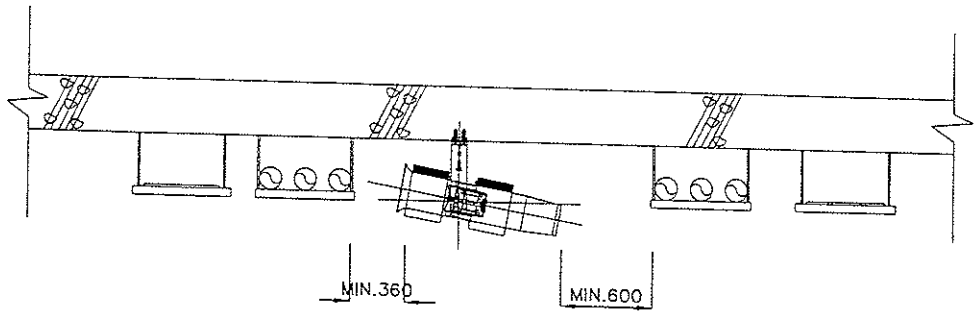
① MIN. DISTANCE TO THE REAR BEAM



② MIN. DISTANCE TO THE REAR WALL

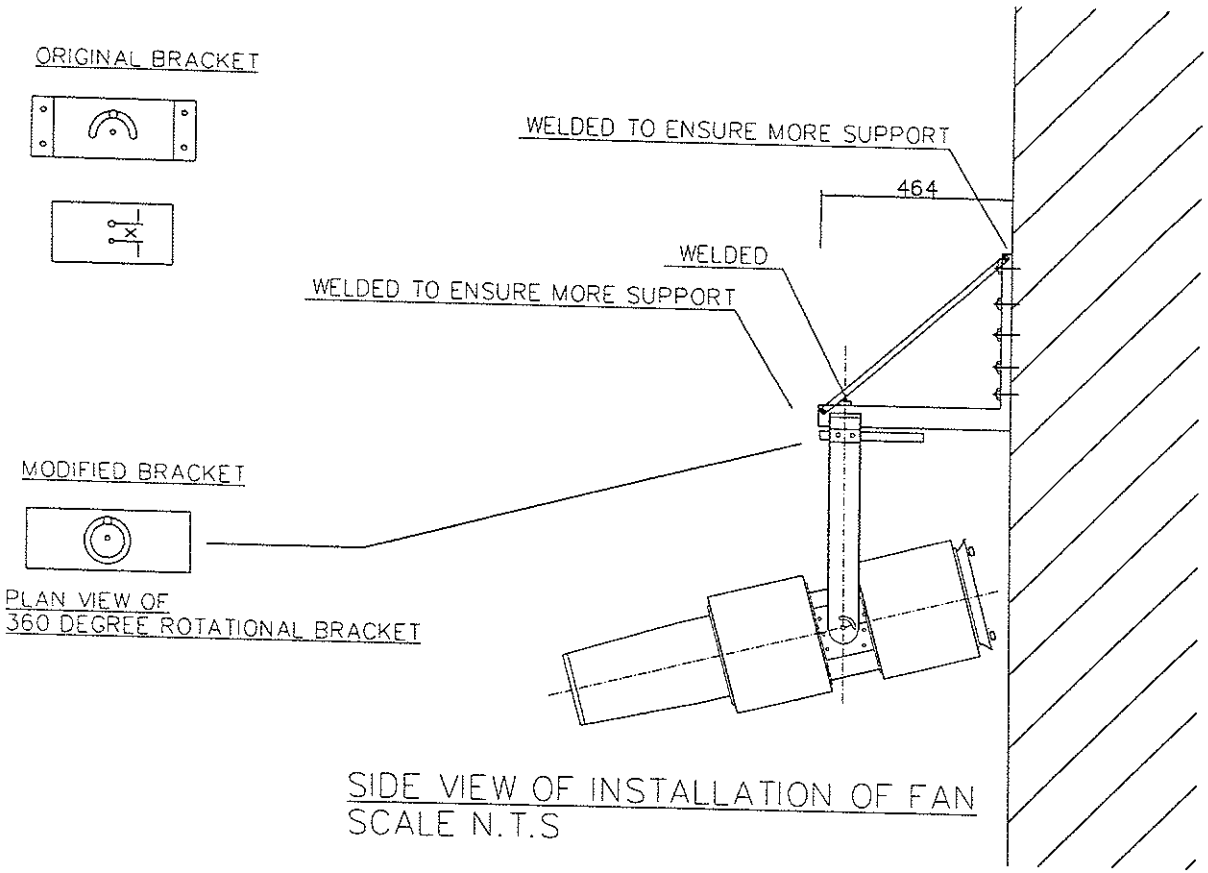


③ MIN. DISTANCE TO THE ADJACENT UNITS

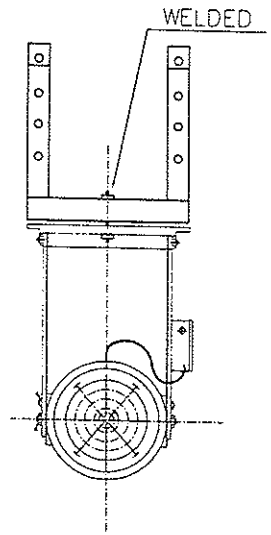


TO THE REAR BEAM & ETC.

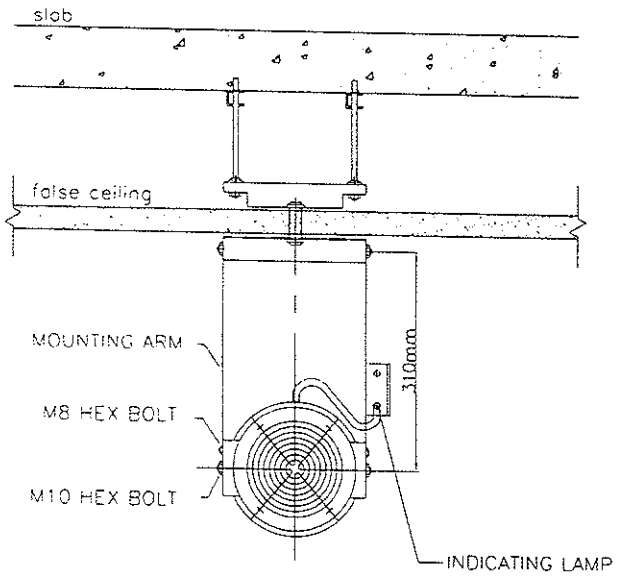
SCALE 1:50

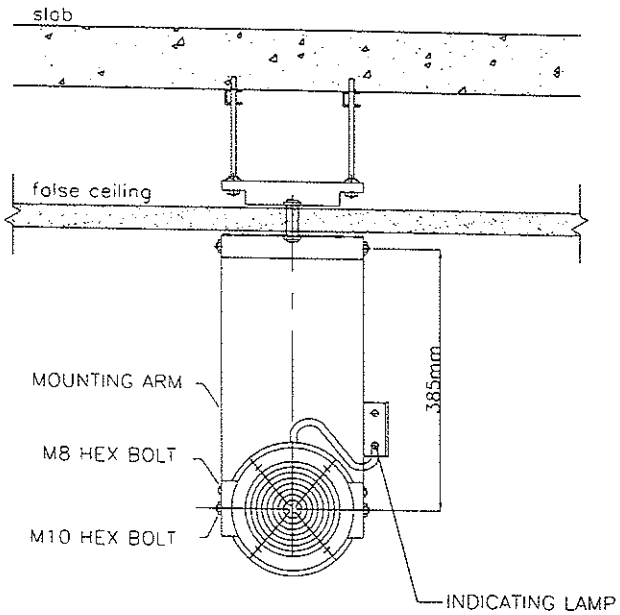


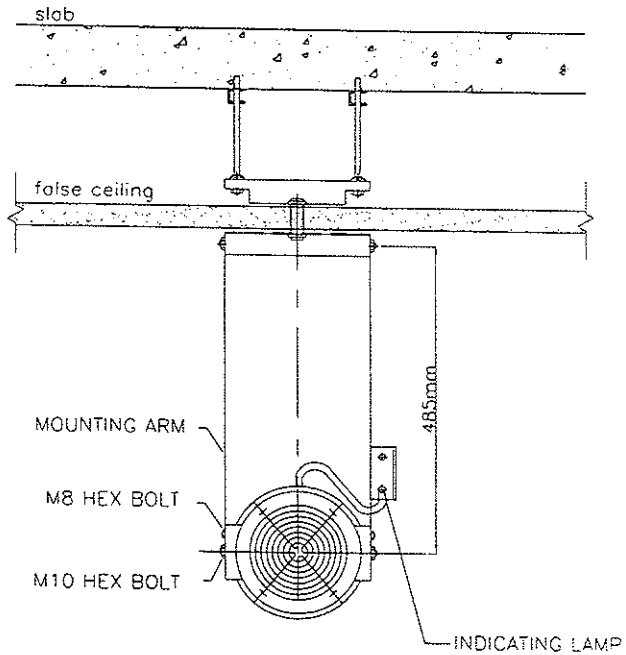
SIDE VIEW OF INSTALLATION OF FAN
SCALE N.T.S



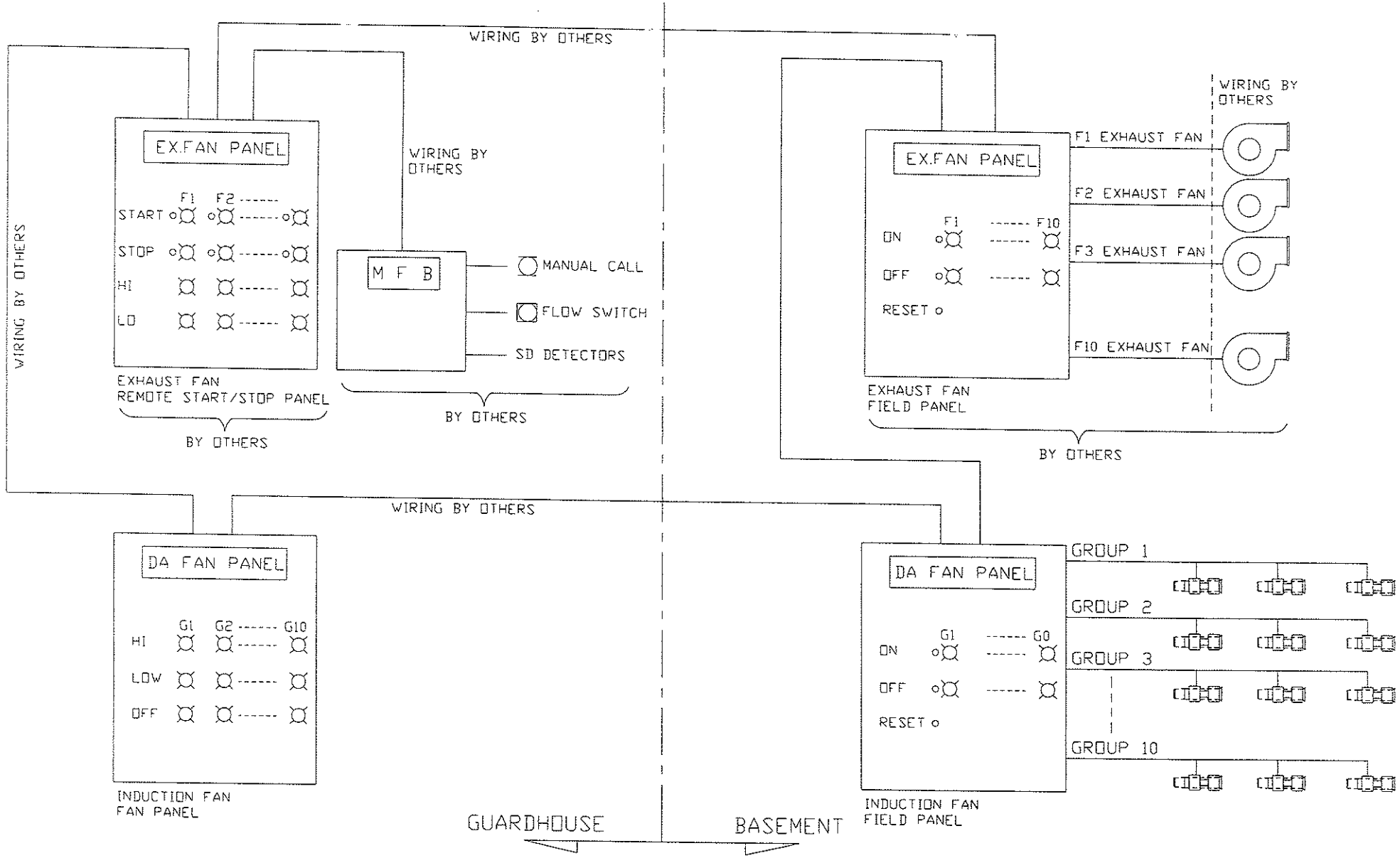
BACK/FRONT VIEW
OF INSTALLATION OF FAN
SCALE N.T.S







DIFFERENT MOUNTING BRACKETS SIZES



TYPICAL DA FAN SYSTEM SCHEMATIC