SMOKE EXTRACT FANS
and car park ventilation

DYNAIR®
INDUSTRIAL VENTILATION
La ventilazione professionale made in Italy

Technology and expertise for
professional ventilation

DYNAIR® INDUSTRIAL VENTILATION

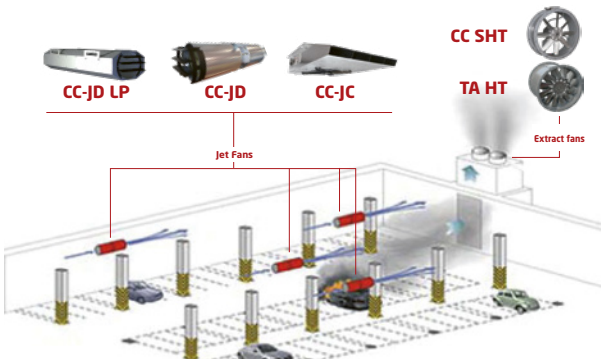
CAR PARK VENTILATION Principles & Solutions

BASIC PRINCIPLE

The ventilation of enclosed or underground car parks fulfils two key requirements: remove the pollutants emitted by cars and, in the event of a fire, control the hot fumes and gases produced by the fire, protecting the escape routes and easing access for the emergency teams.

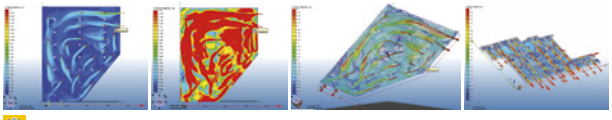
SPECIAL TECHNOLOGY

In recent years, the jet or induction fans **technology has been established** as the new standard for normal ventilation and smoke extraction in case of fire in enclosed car parks. In fact, this technology represents **the most innovative and cost-effective alternative** to traditional ducted mechanical extraction systems.
Carefully managing the project in all its development stages, which requires the fundamental use of fluid dynamics calculation programs, **also ensures that the system is working correctly**.



The system is based on the **distribution along the entire surface of the parking of a series of axial or centrifugal induction accelerators (Jet Fans)** which act in a similar way to a ducting system: installed in the ceiling, **they move air from the upper layers downwards and push it towards the extraction zones,** creating a true continuous air flow.
The fans are able to clean the air from the lower and upper layers thoroughly, preventing the creation of stagnation areas.
The ventilation system is completed with **natural or mechanical air** supply elements (car park access ramp, natural ventilation channels, side openings or inlet fans and supply air) and **extraction elements** (extraction fans). **Jet Fans can be paired with CO** (carbon monoxide) sensors and gas monitoring systems.

FROM DESIGN TO CUSTOMER SERVICE



SUPPORT

DYNAIR® is able to assist you with its know-how and experience during each stage of the ventilation project for car parks, from the calculation set up and scenario analysis through CFD analysis to the final test.

SOLUTION

Compared to a ducted ventilation system, jet fans ensure multiple benefits in terms of economy and efficiency associate with its design installation, operation and use:

DESIGN

- Space optimisation due to the compact dimensions and the flexibility of installation both in new buildings as well as in renovation and/or retrofitting
- Saving of design time as there's no need to plan a complex ducting system
- Measurable system effectiveness thanks to CFD modelling (fluid dynamic analysis)
- Increased support and pre-sales service from the manufacturer
- Preliminary economic evaluation of the project within 24 to 48 hours
- Final costs in line with expected costs

INSTALLATION

- Elimination of expensive and complex ducting and grille systems
- Easy installation of fans able to grant a considerable savings in terms of man-hours
- Reduced footprint of fans facilitating installation of other systems (sprinklers, lighting)
- Ease of routine and extraordinary maintenance

OPERATION

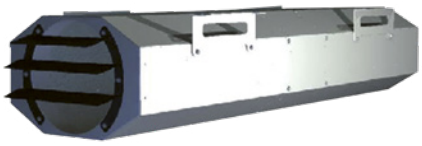
- Important operating economies deriving from the system's peculiarity:
- Possibility of partial ventilation or only if necessary: CO (carbon monoxide) detectors and smoke sensors ensure that fans are activated only in areas where pollution levels have been exceeded or in areas where a fire has started
- Reduced overall power required: thanks to careful design that ensures optimal dimensioning of the ventilation system; in particular, the inlet and extraction fans can be smaller in size as the jet or induction fans generate a negligible pressure drop compared to ducted systems

USE

- Improved quality of breathable air: the system creates a dynamic flow capable of mixing the various air layers and eliminating stagnation zones
- Optimised safety in the event of fire: rapid and effective extraction of toxic fumes provides better protection of escape routes and facilitate access for intervention teams, promotes the safety of people and minimises the effects of the fire on the building structures.

JET FANS FOR CAR PARK VENTILATION

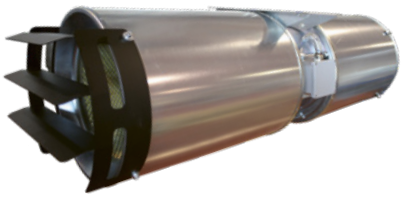
CC-JD LP HT Axial impulse fans - low profile shape



- Suitable for polluted air removal (CO extraction) and smoke extraction in case of fire
- **Octagonal shape and reduced overall dimensions, especially in height**
- Three sizes with **diameters of 310, 350 and 400 mm**, with unidirectional and bidirectional airflow, single and double speed
- Thrust 27 to 68N
- Silencers in galvanized steel sheet inside lined with high performance acoustic insulation material
- Deflector on outlet side for optimum air discharge and air cleaning of all layers, supplied as standard
- Protection guard on inlet side
- Fixing brackets in galvanized steel sheet for ceiling (or wall) installation.
- Housing in electrolytically galvanized steel sheet.
- Hub impeller and airfoil profile blades made in aluminium
- High-temperature-resistant IP54 terminal box supplied as standard and F300-certified
- Fixing structure F400-certified

Applus
F300/120
F400

CC-JD HT Axial impulse fans



- Suitable for polluted air removal (CO extraction) and smoke extraction in case of fire
- Three sizes: **310, 350 and 400 mm diameter,** with unidirectional and bidirectional airflow, single and double speed
- Thrust from 27 to 68N
- Silencers in galvanized steel sheet inside lined with high performance acoustic insulation material
- Deflector on outlet side for optimum air discharge and cleaning of all layers, supplied as standard
- Intake-side protective guard
- Fixing brackets in galvanized steel sheet for ceiling (or wall) installation, supplied as standard
- **Circular silencers**
- Housing in electrolytically galvanized steel sheet
- Hub impeller and airfoil profile blades made in aluminium
- High-temperature resistant IP54 terminal box supplied as standard and F300 certified
- Reversible versions in 350- and 400-mm sizes
- F400-certified fastening structure

Applus
F300/120
F400

CC-JC HT Centrifugal induction fans - car park ventilation

- Suitable for polluted air removal (CO extraction) and smoke extraction in case of fire
- **Extremely small overall dimensions** and ideal for garages with severe height restrictions
- Two sizes with **diameters of 250 and 300 mm**
- Thrust 50 to 110N
- Hub impeller and airfoil profile blades made in steel sheet, balanced according to ISO 1940
- Housing in electrolytically galvanized steel sheet
- Protection guard on inlet side
- Fixing brackets in galvanized steel sheet for ceiling/wall installation supplied pre-assembled
- Service switch mounted, suitable for high temperature

Applus
F300/120
F400

Ancillary monitoring systems for car park ventilation

CE 408
CE 424

CONTROL PANELS CO AND GAS SENSORS

CE 408 – Panel for small systems from 4 to 8 CO sensors

- Equipped with 4 inputs and 5 relays expandable up to 8 inputs and 9 relays
- IP 40

CE 424 - Panel for medium size systems from 4 to 24 CO sensors

- Equipped with 4 inputs and 5 relays expandable up to 24 inputs and 25 relays
- IP 40

CE 700 - Panel for large systems up to 200 sensors

- Equipped with 16 inputs expandable up to 184 for a total of 200 CO sensors
- Wall or rack versions
- IP 40

INDUSTRIAL GAS DETECTORS

(SINGLE OR DOUBLE GAS):

- Replaceable catalytic, electrochemical, pellistor cartridge
- Suitable for CO, petrol vapours and other gases according to the reference Norm
- IP65

DYNAIR INDUSTRIAL VENTILATION

SMOKE EXTRACT FANS

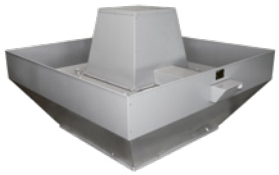
Applus
F300/120 F400
EN12101-3

TAH HT
Very high-performance axial roof fans

- Rooftop installations requiring high performance in terms of flow rates and pressures
- Die-cast aluminium impellers with airfoil blades for high efficiency, long life and robustness
- Long casing for ease of installation
- Galvanised sheet metal cover
- Base, protection guard and casing protected against weathering
- **Available in diameters from 400 mm to 1250 mm**
- **Max. flow rates from 4,000 to 90,000 m³/h and max. static pressures from 85 to 550 Pa**
- The series is suitable for operation at temperatures from -20 °C to + 70 °C

FC HT
Centrifugal roof fans F400

- For direct or duct application
- Upper cover in ABS, with appropriate slots for motor cooling (collapsing controlled cowl in case of fire)
- 8 sizes, from **400 to 800 mm** diameter
- Air flow ranges from **4,400 to 18,000 m³/h** and static pressures from 200 to 700 Pa
- Backward curved wheel in **galvanized steel sheet**, with high efficiency and low noise level, statically and dynamically balanced according to ISO 1940
- Base frame in **galvanized steel sheet**
- Suitable for high temperature smoke extraction, running at the temperature of +80°C



TC HT
Centrifugal roof fans vertical discharge F400 for direct or duct application

- Vertical exhaust conveyor which guarantees optimized safety in case of fire: fast and effective toxic fume extraction, leading to safer escape routes, easier access for the emergency teams, promoting people safety and minimizing the effects of fire on the building structures
- Base frame in galvanized steel sheet protected against atmospheric agents with epoxy finish
- 9 sizes, from **350 to 800 mm** diameter
- Air flow ranges from **3,200 to 21,000 m³/h** and static pressures from 340 to 800 Pa
- Backward curved impeller in **galvanized steel sheet**, with high efficiency and low noise level, designed to resist at high temperature and to ensure the proper cooling of the motor in case of emergency functioning
- Upper cover and vertical exhaust conveyor made in **galvanized steel sheet** protected against atmospheric agents with epoxy finish grey RAL 7001, superficially embossed and corrugated to rise the mechanical resistance to the strain
- Suitable for high temperature smoke extraction: indicated for running at the temperature of +150°C in S1 service

CRP HT | CRPV HT
Centrifugal roof fans vertical and horizontal discharge suitable for F400 applications for direct or duct application

- Base frame in galvanized steel sheet protected against atmospheric agents with epoxy finish
- **10 sizes, from 400 to 1100 mm diameter**
- **Air flow ranges from 3,551 to 52,000 m³/h and static pressures from 221 to 1700 Pa**
- Backward curved impeller in galvanized steel sheet, with high efficiency and low noise level, designed to resist at high temperature and to ensure the proper cooling of the motor in case of emergency functioning
- **CRPV HT:** Vertical exhaust conveyor which guarantees optimized safety in case of fire: fast and effective toxic fume extraction, leading to safer escape routes, easier access for the emergency teams, promoting people safety and minimizing the effects of fire on the building structures. Made of galvanized steel sheet protected against atmospheric agents
- Suitable for high temperature smoke extraction: indicated for running at the temperature of +150°C in S1 service

TA HT
High-efficiency and high-performance ducted axial fans

- **Particularly indicated in those applications that request an absolute conformity** to high specifications in terms of pressure and air volume
- 13 sizes, from diameter **400 to 1,600 mm**
- Air flow range up **to 210,000 m³/h and 1,500 Pa**
- High performance axial impeller with aerofoil blades, totally made in **die-cast aluminium**
- Long casing in **steel sheet** epoxy painted, with fixing flanges manufactured according to UNI ISO 6580-EUROVENT standard
- Reversible models on request
- The series is suitable for operation at temperatures from -20 °C to + 70 °C

VA HT
High performance and increased efficiency duct "vane axial" fans

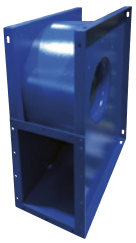
- Ducted vane axial fans with aerofoil impellers and adjustable pitch angle for maximum efficiency
- Particularly indicated in those applications that request an absolute conformity to high specifications in terms of pressure and air volume
- **Vane axial system with air straightener for increased efficiency**
- Available in a wide range of models with diameters from 400 mm to 1600 mm (larger sizes on request) with performance up to **230,000 m³/h and 2,400 Pa.** Higher pressures can be reached with two fans installed in series
- Impeller performance and noise emission comply with Amca Standards 210 and 301, category D Long casing execution in painted sheet steel
- The high-performance axial impeller with aerofoil blades are totally made in die-cast aluminium
- Wide choice of setting angles that can be set during assembly to precisely achieve the optimum working point required for each individual project
- A wide range of pitch angles can be set during assembly thanks to the design of the hub. This allows to accurately meet the optimum reachable working point of each ventilation project
- The series is suitable for air temperatures from -20°C to +70°C

CC SHT
High efficiency duct axial fans F300/120 - F400

- Designed for high temperature smoke extraction
- Specifically dimensioned in a standard range suitable for the performance ratings which are normally requested by the building ventilation fire smoke exhaust rules
- 11 dimensions, **310 to 1,000 mm** diameter
- Air flow range from **2,000 to 40,000 m³/h**
- High efficiency axial impeller in **die-cast aluminium with aerofoil profile blades**, balanced according ISO 1940
- Short casing **in steel sheet**, with fixing flanges manufactured according to UNI ISO 6580-EUROVENT standard. Protected against atmospheric agents by epoxy paint
- Suitable for running at the temperature of +60°C and is CE certified F300, F400 (except 2 poles versions, certified F300/120) according to EN 12101-3:2015

BOX-T HT
Belt driven double inlet box fans F400

- Designed for plants requiring fire smoke exhaust, they have to be installed out of the fire risk area.
- High performance centrifugal fan, double suction with forward curved impeller for transmission drive, coupled to the motor by means of V-belts and pulleys
- Double-intake centrifugal fans with direct drive and soundproofed (plenum lined with sound-absorbing, self-extinguishing technopolymer material)
- 12 sizes **7/7 to 18/18 and 500 to 630**
- Airflow from **2,000 to 30,000 m³/h**
- Transmission protection casing in galvanized sheet metal, with removable cover
- 20 mm thick sound absorbing mat made of self-extinguishing polyurethane foam
- EPDM V-belts with innovative maintenance-free bare sided technology
- The series is suitable for running at the temperature range from -20°C to +115°C in S1 service



PR-QP HT
Backward curved centrifugal fans
F400

- Quadrangular construction, which allows to obtain four orientations (0°-90°-180°- 270°) with the same fan
- Reduced dimensions thanks to the absence of the motor support
- Volute casing with quadrangular frame, manufactured in **galvanized steel sheet** protected against atmospheric agents
- 6 sizes, **350 to 630 mm** diameter
- Air flow ranges from **1,690 to 11,600 m³/h** and static pressures from 167,5 to 1,166 Pa
- Inlet/outlet made according to UNI EN ISO 13351
- Single inlet, backward curved wheel with high efficiency, **manufactured in galvanized steel sheet and steel hub**
- Suitable for high temperature smoke extraction: indicated for running at the temperature of +100°C in S1 service

Testing

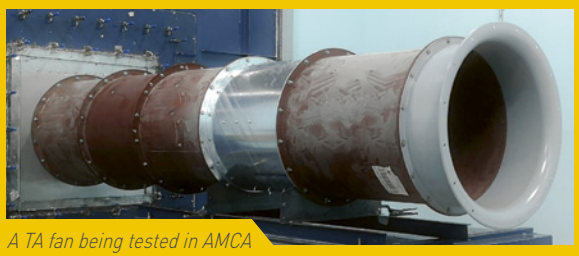
Applus+

As manufacturers of fire-fighting products, evaluating the strength, the stability and the fire-resistance of our fans is of paramount importance. Fire-fighting fan design and installation is regulated by the **European standard EN 12101-3** which establishes the temperature ranges/operation time certified products must comply with. All our fans for smoke extraction comply with such standard and are tested and certified by the independent notify body Applus+, a worldwide leader in the testing, inspection and certification sector and a primary European reference laboratories with over 25 years' experience working in fire-testing.

Maico Italia is a proud member of the North-American AMCA, the Air Movement and Control Association which mission, at global level, is to advance the knowledge of air systems and uphold industry integrity on behalf of AMCA members worldwide.

Certified Ratings Program (CRP)

AMCA International's Certified Ratings Program (CRP) assures that a product line has been tested and rated in conformance with AMCA International's test standards and rating requirements. Performance seals are documented and displayed on equipment after a product has been tested and its cataloged ratings have been approved by AMCA International's staff. Each certified product line is subject to continued check tests in AMCA International's laboratories. All certified products are open to challenge testing that any third party or competing manufacturer may initiate.



A TA fan being tested in AMCA

DYNAIR INDUSTRIAL VENTILATION

SMOKE EXTRACT FANS

Smoke extract fans

PRINCIPLE

There are different potential risk elements subsequent to a fire:

- The release of gas and toxic substances produced by the combustion which creates lachrymation and impossibility to escape
- The diffusion of fi re (the stay of ashes in the air) which leads to a reduced or an impossible visibility
- The diffusion of very high temperature
- The reduction of the oxygen needed by the fi re and the increase of carbon monoxide in the air which lead to lose consciousness and to a death by lack of oxygen (according to statistics, more than 2/3 of fire victims die because of suffocation or poisoning by fire fumes)

SOLUTION

The function and advantages of mechanical ventilation in case of fire can be summarized as follows:

- The mechanical ventilation removes fumes and puts in depression the premise, thus preventing the diffusion of smoke into other rooms. This creates better conditions for the escape of the occupants and simplify the job of the fi remen.
- In case of closed premises, it is possible to easily exceed 1000° C, causing the combustion of any material just for heat radiation: a condition that would make useless any external extinguish operation. To keep the temperature relatively low (300°- 400° C) by extracting hot air, means to avoid the collapse of the support structures. In addition, the higher oxygen rate will cause a better combustion and thus, for most materials, a lower production of toxic smoke.
- The mechanical ventilation allows the location of the exhaust outlets in places away from the one involved.
- The mechanical ventilation allows the extraction of cold fumes, which, remaining at lower level, are extremely dangerous for the occupants and very difficult to be removed by static systems.
- The mechanical ventilation allows the ventilation of the premises also in normal activity situations (clean air), thanks to the possibility of fitting double speed motors: at low speed for normal ventilation (so with lower noise level) and at high speed for emergency conditions. Obviously it is necessary to install the fan with a dedicated power line that automatically operates in case of fire.

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