PRODUCT CATALOGUE 2013

T C F Termoventilatori Condizionatori Felsinea S.r.l.

TCF Srl was founded in 1977 and is based on the Cadriano di Granarolo Emilia industrial estate to the north of Bologna. The production facility currently occupies an area of approximately 7000 m2. The company continues to grow, as it always has done for more than twenty years, by optimising its resources. It is now an important player in the air treatment market. Constant technical developments and the research done in co-operation with university laboratories ensure technologically advanced products. Manufacturing techniques in line with the highest European standards mean that the TCF trademark has become synonymous with specialist products of the highest quality.

The quality system certification, in accordance with UNI EN ISO 9001 - 94 standards, by the SINCERT - CERMET organisation is a further guarantee of the company's reliability and professionalism. In accordance with its policy of flexibility, TCF analyses specific customer requests to offer customised products.

CERMET
Certificazione e ricerca per la qualità

A further step forward, in search for cutting-edge technological solutions always in line with the International standards, has been achieved with the Eurovent certification for the ZAE range of air-handling units. Such certification guarantees for the correctness of the technical data, both on the datasheets and on the selection software, after accurate tests carried out at the independent TÜV laboratories in Munich, Germany, and successively evaluated and confirmed by the Eurovent Commission in Paris.

EUROVENT
CERTIFIED
PERFORMANCE
AHU -09.07.436
Range -EURO
www.eurovent-certification.com

"The customer satisfaction, achieved by supplying high-quality air-handling units, carefully selected and manufactured following the specific requests of the client."

how:

- By creating personal relationships between the manufacturer and the distributor based on correctness and transparency, to face the difficulties with which the competitive world of business faces us every day.

- By being able to listen and understand the customer's needs, expressed or understated, in order to prevent potential problems connected to a superficial approach to the product to be supplied.

- By designing AHUs customised on the specific request of the client, thus solving problems of installation in narrow spaces or of extremely complex executions.

- By always favouring cutting-edge technical choices thanks to the cooperation with the primary components manufactures present on the market, which at TCF's often test their prototypes before releasing them officially to the market.

- By offering numberless personalised solutions maintaining one unique standard: quality, thanks to our experience and continuous technical research.

- By offering the experience of concrete solutions executed over 35 years in the field of ventilation and air handling.

AIR HANDLING UNITS

AZ / AZB
Air-handling units with panel thickness 25, 50, 100mm or 45mm with thermal bridge. Combinable modular structure. Customised executions on request.

ZAE
Air-handling units with 60mm panel thickness with thermal cut. Performances certified according to Eurovent norms.

AZS
Air-handling units with internal invisible frame and 50 or 100mm panels. Exclusive joints between the panels and The frame for total thermal bridge.

AZH
Air-handling units with internal invisible frame in stainless steel and 50 or 100mm panels also in stainless steel for hospital and food.

AZV
Air-handling units with 60mm glass-resin panels specifically designed for food industry clean rooms applications.

AZ-I, AZE-I, AZS-I
Air-handling units complete with power and control control board with microprocessor for “plug & play” supply.

HEAT RECOVERY UNITS

URE
Aluminium frame and 20 mm panels
Air volumes from 290 to 4000 m³/h
Efficiency 50-55%.

URP
Aluminium frame and 25mm panels
Air volumes from 1500 to 5500 m³/h
Efficiency 60-65% with by-pass

URPX
Aluminium frame and 25mm panels.
Air volumes from 1000 to 5000 m³/h.
Efficiency 90-95% with option for by-pass

URE-I, URP-I, URPX-I
Heat recovery units complete with power and control board, "plug & play".

AIR EXHAUST UNITS

CV
Air exhaust units from 500 to 38000 m³/h with 3-phase motor and pulley-belts transmission.
Aluminium frame and 25mm panel.

CVM
Air exhaust units from 300 to 4500 m³/h with directly-coupled single-phase motor.
Aluminium frame and 25mm panels.

EV
Air exhaust units from 400 to 4300 m³/h.
Self-supporting panels. Low-profile units.

AIR CONDITIONING UNITS

PA
Self-supporting panels. Low-profile units.
Air volumes from 930 to 4350 m^3/h.

TS
Aluminium frame and 25mm panels.
Air volumes from 700 to 4000 m^3/h

TA
Aluminium frame and 25mm panels.
Air volumes from 600 to 7000 m^3/h with self-adjusting fans.

T
Aluminium frame and 25mm panels.
Air volumes from 1.500 to 30.000 m^3/h

NEW

TS low profile
Aluminium frame and 25mm panels. Height 450mm.
Air volumes from 1300 to 3500 m^3/h with self-adjusting fans. Possibility to install a complete “plug&play” control board.

Alenia Aerospatial Production Facility

Grottaglie (Taranto), Italy

Air-handling in one of the largest clean rooms in Europe, such as to require AHUs with air volumes of 240.000 m^3/h with triple fans. Units on two levels with internal ladders, walkable grids and technical compartments. Complete plug-&-play Siemens control in an integrated room. Hydraulic components manufactured on request and applied on the units. Special reinforced weatherproof canopy, made in accordance with the customer's demand.

Russian State Library

Moscow, Russia

An imposing collection of volumes and ancient books, located in the centre of the Russian capital, the largest of the Russian Federation and one of the biggest in the world with over 270 km of shelves and bookcases. TCF has supplied the air handling units of the AZ range for the ventilation of the public areas, among which the reading hall and the service rooms.

Masdar Institute of Science and Technology

Masdar, UAE

Scientific and technological research centre, at the forefront on a global level for both the university research and for the eco-friendly architecture, developed following all the latest technologies in the field of green buildings. TCF has participated to the project by supplying specially-manufactured air-conditioning units of the 'TS' range designed on request with low profile, equipped with self-adjusting fans at constant flow, with thermo-mechanical control with Climatix microprocessor from Siemens, to integrate with the local Building Monitoring System (BMS).

Hospital Unit USL 11

Empoli, Italy

For hospital applications TCF offers a wide range of solutions, according to the specific requirements of the customer: starting from the standard modular AHUs with aluminium frame and panels in galvanised metal sheet, aluminium or stainless steel, for which in any case AISI 304 is used as standard for all the condensate drain pans and the closing pads, slides and frames of the cooling coils and humidification sections, up to the specific AZ-H series. These are units entirely manufactured in AISI 304 stainless steel, for total sanification (panels, corner pieces, roof, base frame, slides, screws) and equipped with sloping bottom panels with drain discharge on all sections, to avoid the accumulation of condensate which, in hospitals, increases the risk of generation and transmission of bacterial charges.

THE WEBSITE

The new year 2012, which sees TCF celebrating its first 35 years of activity since the foundation back in 1977, also welcomes a new period in the company communication, first of all with the realisation of the new website. Surfing to the known address www.tcf.it you may now have access to a new panorama of information, news, pictures, references and novelties related to the TCF world.

You will find all the catalogues and manuals, easily downloadable in the 'Products' section, as well as a wide list of references of supplied installations and technical points to consider, based on the direct experience of TCF personnel.

We will be waiting for you on www.tcf.it !

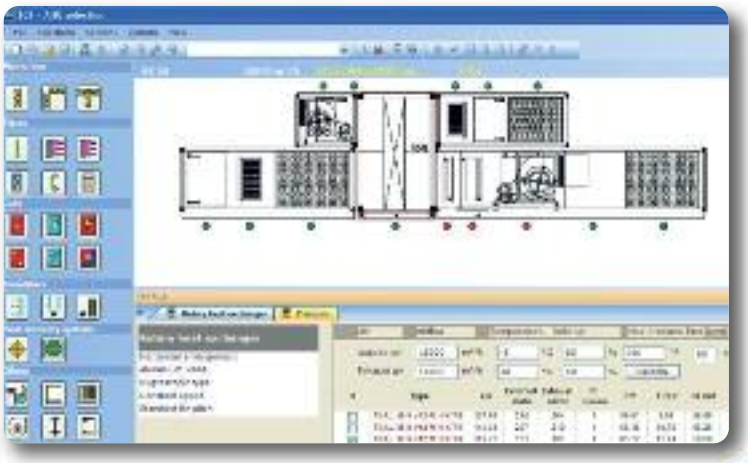
THE SELECTION SOFTWARE

Innovative selection software, easy to use and complete, for the selection of all the air-handling units components. Possibility to select components such as:

- dampers and mixing boxes
- filters from G2 to H12 (panel type, soft bags, rigid bags, rotary type);
- heat exchangers with hot water, cold water, steam, superheated water, direct expansion (R22, R134a, R407C, R404A, R410C, R507);
- glycol heat recovery coils;
- cross-flow plate heat recovery units and rotary wheels;
- several type of humidification systems;
- centrifugal fans with forward- or backward-curved blades, airfoil profile, directly-coupled plug fan type and with high-efficiency brushless motor;

Moreover, the software allows, with the maximum speed and ease, to:

- calculate the cost of the AHU;
- modify the thickness of the panels and the range of the unit (AZ,ZAE,AZSAZH);
- add the cost for the plug&play controls;
- make a copy of the selection just ma within a group of selections;



Series AZ Pag. 13

Series AZB Pag. 17

Series ZAE Pag. 21

Series AZS Pag. 25

Series AZH Pag. 29

Series AZV Pag. 33

Series AZ-I/ZAE-I/AZS-I Pag. 37

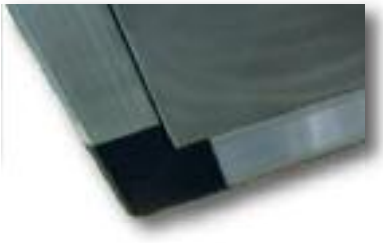
SERIES
AZ

Air-handling units with panel thickness 25mm, 45mm or 50mm and air volumes from 1.000 to 130.000 m³/h.

The air-handling units of the AZ series have been developed in order to allow for the maximum flexibility of selection and use, thanks to the modular structure and to a versatile and complete selection software. Specific executions have been realised to serve the most different ambiences, from hospitals, to pharmaceutical-biomedical processes, to food industry, as well as numberless solutions for domestic and industrial applications.

Base features:

- 24 main sizes; bespoke executions according to the customer's specifications, with modifications from the standard, in terms of both dimensions and capacities;
- modular structure with aluminium frame;
- sandwich panels with 25 or 50mm thickness or 45mm with thermal cut, available in:
  - galvanised steel
  - pre-plasticised galvanised steel
  - aluminium
  - stainless steel AISI 304
- condensate drain pans in AISI 304 stainless steel as standard;
- insulation material available in hot-injected polyurethane with density 45kg/m³ or rock wool with density 80 or 120 kg/m³;



The main **bearing frame** of our air-handling units is made out of extruded aluminium profiles. By means of three-way joints in hot-dip aluminium, the containing frames for the elements are obtained, and the support on which the panels and fixed, thus constituting the bearing assembly of the containing shell. The structure thus realised is free from welding but equally resistant from the mechanical point. On request, it is possible to manufacture the AHUs in dismountable version, in case of specific space requirements or restrictions, to be later re-assembled on site.

The **panels** are metal boxes carried out with the coupling of two 6/10 mm thick metal sheets, previously sheared and shaped on the four sides; successively, they are injected with polyurethane foam (or insulated with specific rock wool pads) which, when stabilising, constitute a finished product of excellent mechanical strength. The panels are fixed with self-tapping screws to the main frame of the air-handling unit.

The standard range of panels include the following configurations:

1. **pre-plasticised galvanised external / galvanised internal:** the external sheet is constituted by a plasticized galvanised sheet, the internal one by a simple galvanised sheet – this is the standard execution which is most commonly used – the external plastic coating is made from polyvinyl chloride (PVC) with a thickness of 150 microns. The standard colour is light grey code N1 (on request, other colours could be used, within the RAL range). The plastic coating, having protective anti-oxidising and anti-scratch function, is made from a plastic film applied at hot temperature (around 160°C) on the metal sheet and it is self-extinguishing, non-toxic, anti-mould and non-hygroscopic. Our plasticisation is suitable also for external installation, its resistance having been tested with positive results at temperatures between -35°C and +80°C. for more than 3 hours (according to the general disposition on metal sheets or plasticized sheets contained in the articles 2-5 of the D.M. 21/03/1973 – Gazzetta Ufficiale n°104 dated 24/04/1973).
2. **aluminium external / galvanised internal:** the external sheet is constituted by an aluminium sheet, the internal one by a simple galvanised sheet – a solution appropriate for applications where a good resistance to weathering is requested.
3. **aluminium external / aluminium internal:** the external sheet is constituted by an aluminium sheet, the internal one by a simple galvanised sheet – a solution appropriate for applications where a good resistance to weathering is requested, together with a competitive price.
4. **stainless steel external / stainless steel internal:** both sheets are in AISI 304 stainless steel at a very elevate mechanical resistance and absolute inalterability to external agents, weathering, ambiences with high salt concentration, applications in chemical, pharmaceutical and food industry.

Perimetric **base frame**, constituting a continuous support to the units under all sides and allowing to unload the weight on a larger surface reducing the load on the structure on which our units are placed. The base frame is manufactured in two ways: by coupling a galvanised cold-rolled metal profile, 30/10 thickness, with special 2-way joints, in aluminium alloy, with 100mm height, or with welded 30/10 galvanised metal corners and 180mm height (normally for larger air-handling units). On request it is possible to supply additional support feet, with different height to be defined when ordering, to combine with a perimetric base frame or alternatively as the sole support for the unit.

Condensate drain pans exclusively in stainless steel material: AISI 304 stainless steel with 15/10mm thickness, with very elevate mechanical performances. Also the support frames for cooling coils and humidification systems and, in general, all the wet surfaces inside the unit, are manufactured in AISI 304 stainless steel with 10/10 mm. Each condensate drain pan is equipped with one or more discharge points complete with pipe, also manufactured in stainless steel.

Inspection doors made with the same process as the panels and in the thickness 25mm and 50mm according to the used profile and with the same insulating material (polyurethane or rock wool). The doors are fixed to the frame with an opening system of handles and hinges, or closing latches, according to the requirements and specific possibilities of the application. The accessible areas in negative pressure will have outwards-opening doors - the accessible areas operating under positive pressures will have inwards-opening doors. In compliance with the CE 89/392 Machine Directive, related to the safety in motor-fan sections, a counter-door is installed behind the fan access door, named "anti-accident grid" with the same dimensions of the first one but made from 50% micro-perforated metal sheet, duly enforced at the edges and fixed on 4 points with M10 nuts. In this way we grant: inaccessibility to the area with moving devices, unless using the appropriate wrench, quick inspection of the section through the grid for a safe confirmation of a still unit and a sufficiently long time to remove it.

Integrated control systems

TCF can supply control and power boards for the management of the air-handling units. The supply of air-handling units complete with controls may include: control components integrated in a dedicated technical compartment, complex solutions for precision control, possible combination with power boards, control board for 'niche' installation for heat recovery units, air-conditioning units and low profile AHUs, controls for indoor installations with components 'at sight as well as customisations and logos available upon specific customer's request. All AHUs with controls are tested in the factory, so as to guarantee the perfect operation of all the elements when finally commissioning the unit on site.

Selection software

An innovative selection program, easy to use and complete, allows the selection of all the components o fan air-handling unit, from dampers to filters, water and DX heat exchangers, heat recovery systems (plates, rotary wheels, run-around-coils), humidification systems, fans and silencers.

The software may be downloaded from internet and installed on the pc, for a total autonomy of management and selection also when off-line, and it provides the technical datasheet (in formats .rtf, .pdf and .dwg drawings) complete with all the selection data, operating diagrams and psychrometric charts showing the selected air treatment.

SERIES
AZB

Air-handling units with panel thickness from 50 to 100mm and air volumes from 100.000 to 250.000 m³/h.

The air-handling units of the AZB series have been developed thanks to the thirty-years experience of TCF in this field. These are units which are released from the traditional construction features, with design and manufacturing exclusively on demand, for what concerns the air volumes, dimensions, configurations, versions and used materials. They are therefore particularly suitable for the most different application, both domestic and industrial.

Base features:

- exclusively bespoke manufacturing, according to the customer's specifications, for both dimensions and performances;
- modular structure with aluminium frame and several structure reinforcements and welded joints, for increased mechanical robustness; alternatively AZS-type structure with internal invisible frame, for an ideal structural resistance;
- sandwich panels with thickness from 50mm to 100mm, available in:
  - galvanised steel
  - pre-plasticised galvanised steel
  - aluminium
  - stainless steel AISI 304
- condensate drain pans in AISI 304 stainless steel as standard;
- insulation material available in hot-injected polyurethane with density 45kg/m³ or rock wool with density 80 or 120 kg/m³;

The main **bearing frame** of our air-handling units is made out of extruded aluminium profiles. By means of three-way joints in hot-dip aluminium, the containing frames for the elements are obtained, and the support on which the panels and fixed, thus constituting the bearing assembly of the containing shell. On such structure, the internal frames are fixed by welding, making the whole frame particularly robust from the mechanical point of view. Since this range is totally customisable, numberless variations are possible with respect to the traditional manufacturing standard. Alternatively the frame may be constituted by a square section tubular profile with thickness 20/10mm realised in cold-rolled galvanised steel but on request it is also available in AISI 304 stainless steel. Globally, the frame is joined together uniting the various segments of tubular by robust welding joints in the same material as the frame itself. Once the frames, making up the various modules of the unit, are obtained, they are welded in turn to the perimetric base frame of the unit, consistently manufactured in the same material of the frame.

The **panels** are metal boxes carried out with the coupling of two 6/10 mm thick metal sheets, previously sheared and shaped on the four sides; successively, they are injected with polyurethane foam (or insulated with specific rock wool pads) which, when stabilising, constitute a finished product of excellent mechanical strength. The panels are fixed with self-tapping screws to the main frame of the air-handling unit.

The supply of AZB air-handlers may be completed with a wide range of accessories and customisations, among which technical cabinets to combine with the electrical and hydraulic parts of the unit, which might as well include water pipes and recirculation pumps, walkable grids, access doors of different dimensions, internal ladders, specific roofs for outdoors installation.

Perimetric **base frame**, constituting a continuous support to the units under all sides and allowing to unload the weight on a larger surface reducing the load on the structure on which our units are placed. The base frame is manufactured by coupling a galvanised cold-rolled metal profile, 30/10 thickness, with welded 30/10 galvanised metal corners and 180mm height. On request it is possible to supply additional support feet, with different height to be defined when ordering, to combine with a perimetric base frame or alternatively as the sole support for the unit.

The protection roof for outdoors installation may be manufactured with a simple aluminium sheet, adequately moulded and fixed in order to avoid rain water leakages, or on demand, with special characteristics to be defined for the case.

Condensate drain pans exclusively in stainless steel material: AISI 304 stainless steel with 15/10mm thickness, with very elevate mechanical performances. Also the support frames for cooling coils and humidification systems and, in general, all the wet surfaces inside the unit, are manufactured in AISI 304 stainless steel with 10/10 mm. Each condensate drain pan is equipped with one or more discharge points complete with pipe, also manufactured in stainless steel.

Possibility to arrange for specific fan sections, with more fans, in version run & stand-by, or with capacity control so as to better control the air volume, a frequent application in some food industry or pharmaceutical applications (the picture on the side shows a 'fan wall' specifically made for this purpose).

Specific walkable grids may be manufactured for the sections where a frequent access of authorised personnel would damage standard bottom panels, such as technical cabinets where control and power boards, or hydraulic components, are installed.

Where very large-duty fans and motors have to be used, it is possible to install special support bars where a pulley or lifting hook may be attached, for the substitution of those components whose weight is particularly remarkable.

Integrated control systems

TCF can supply control and power boards for the management of the air-handling units. The supply of air-handling units complete with controls may include: control components integrated in a dedicated technical compartment, complex solutions for precision control, possible combination with power boards, control board for 'niche' installation for heat recovery units, air-conditioning units and low profile AHUs, controls for indoor installations with components 'at sight as well as customisations and logos available upon specific customer's request. All AHUs with controls are tested in the factory, so as to guarantee the perfect operation of all the elements when finally commissioning the unit on site.

Selection of the components

In consideration of the constructive features of this range of air-handling units, of the size of the components used and of the mechanical and performance requirements, the selection of all the elements is made using specific selection software supplied by the very manufacturers. Industrial type fans, heat exchangers for low and high temperature applications, specific filtration, it is all sized as bespoke by our technical people who, at the same time, also develop the technical datasheet and the production drawings in CAD version.

SERIES
ZAE

Air-handling units with panel thickness 60mm and air volumes from 1.000 to 130.000 m³/h, certified according to the norms of the EUROVENT program.

The air-handling units of the ZAE series have been designed to allow the maximum flexibility of selection and use, thanks to the modular structure and a complete and versatile selection software. To guarantee for the reliability and correctness of the data supplied by the selection software and by the components used, the range has been certified according to the Eurovent criteria.

Base features:

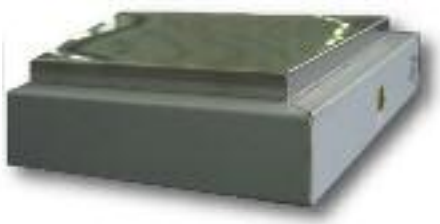
- 24 main sizes; bespoke executions according to the customer's specifications, with modifications from the standard, in terms of both dimensions and capacities;
- modular structure with aluminium frame;
- sandwich panels with 60mm thickness and thermal cut, available in:
  - galvanised steel
  - pre-plasticised galvanised steel
  - aluminium
  - stainless steel AISI 304
- condensate drain pans in AISI 304 stainless steel as standard;
- insulation material available in hot-injected polyurethane with density 45kg/m³ or rock wool with density 80 or 120 kg/m³;

EUROVENT CERTIFIED PERFORMANCE
AHU -09.07.436
Range -EURO
www.eurovent-certification.com

The main **bearing frame** of our air-handling units is made out of extruded aluminium profiles with thermal cut. By means of three-way joints in hot-dip aluminium, the containing frames for the elements are obtained, and the support on which the panels and fixed, thus constituting the bearing assembly of the containing shell. The structure thus realised is free from welding but equally resistant from the mechanical point. On request, it is possible to manufacture the AHUs in dismountable version, in case of specific space requirements or restrictions, to be later re-assembled on site.

The **panels** are metal boxes carried out with the coupling of two 6/10 mm thick metal sheets, previously sheared and shaped on the four sides; successively, they are injected with polyurethane foam (or insulated with specific rock wool pads) which, when stabilising, constitute a finished product of excellent mechanical strength. The panels are fixed with self-tapping screws to the main frame of the air-handling unit.

The standard range of panels include the following configurations:



1. **pre-plasticised galvanised external / galvanised internal:** the external sheet is constituted by a plasticized galvanised sheet, the internal one by a simple galvanised sheet - this is the standard execution which is most commonly used - the external plastic coating is made from polyvinyl chloride (PVC) with a thickness of 150 microns. The standard colour is light grey code N1 (on request, other colours could be used, within the RAL range). The plastic coating, having protective anti-oxidising and anti-scratch function, is made from a plastic film applied at hot temperature (around 160°C) on the metal sheet and it is self-extinguishing, non-toxic, anti-mould and non-hygroscopic. Our plasticisation is suitable also for external installation, its resistance having been tested with positive results at temperatures between -35°C and +80°C. for more than 3 hours (according to the general disposition on metal sheets or plasticized sheets contained in the articles 2-5 of the D.M. 21/03/1973 – Gazzetta Ufficiale n°104 dated 24/04/1973).
2. **aluminium external / galvanised internal:** the external sheet is constituted by an aluminium sheet, the internal one by a simple galvanised sheet - a solution appropriate for applications where a good resistance to weathering is requested.
3. **aluminium external / aluminium internal:** the external sheet is constituted by an aluminium sheet, the internal one by a simple galvanised sheet - a solution appropriate for applications where a good resistance to weathering is requested, together with a competitive price.

4. **stainless steel external / stainless steel internal:** both sheets are in AISI 304 stainless steel at a very elevate mechanical resistance and absolute inalterability to external agents, weathering, ambiences with high salt concentration, applications in chemical, pharmaceutical and food industry.

Perimetric **base frame**, constituting a continuous support to the units under all sides and allowing to unload the weight on a larger surface reducing the load on the structure on which our units are placed. The base frame is manufactured in two ways: by coupling a galvanised cold-rolled metal profile, 30/10 thickness, with special 2-way joints, in aluminium alloy, with 100mm height, or with welded 30/10 galvanised metal corners and 180mm height (normally for larger air-handling units). On request it is possible to supply additional support feet, with different height to be defined when ordering, to combine with a perimetric base frame or alternatively as the sole support for the unit.

Condensate drain pans exclusively in stainless steel material: AISI 304 stainless steel with 15/10mm thickness, with very elevate mechanical performances. Also the support frames for cooling coils and humidification systems and, in general, all the wet surfaces inside the unit, are manufactured in AISI 304 stainless steel with 10/10 mm. Each condensate drain pan is equipped with one or more discharge points complete with pipe, also manufactured in stainless steel.

Inspection doors made with the same process as the panels and in the thickness 60mm and with the same insulating material (polyurethane or rock wool). The doors are fixed to the frame with an opening system of handles and hinges, or closing latches, according to the requirements and specific possibilities of the application. The accessible areas in negative pressure will have outwards-opening doors – the accessible areas operating under positive pressures will have inwards-opening doors. In compliance with the CE 89/392 Machine Directive, related to the safety in motor-fan sections, a counter-door is installed behind the fan access door, named 'anti-accident grid' with the same dimensions of the first one but made from 50% micro-perforated metal sheet , duly enforced at the edges and fixed on 4 points with M10 nuts. In this way we grant: inaccessibility to the area with moving devices, unless using the appropriate wrench, quick inspection of the section through the grid for a safe confirmation of a still unit and a sufficiently long time to remove it.

Integrated control systems

TCF can supply control and power boards for the management of the air-handling units. The supply of air-handling units complete with controls may include: control components integrated in a dedicated technical compartment, complex solutions for precision control, possible combination with power boards, control board for 'niche' installation for heat recovery units, air-conditioning units and low profile AHUs, controls for indoor installations with components 'at sight as well as customisations and logos available upon specific customer's request. All AHUs with controls are tested in the factory, so as to guarantee the perfect operation of all the elements when finally commissioning the unit on site.

Selection software

An innovative selection program, easy to use and complete, allows the selection of all the components o fan air-handling unit, from dampers to filters, water and DX heat exchangers, heat recovery systems (plates, rotary wheels, run-around-coils), humidification systems, fans and silencers.

The software may be downloaded from internet and installed on the pc, for a total autonomy of management and selection also when off-line, and it provides the technical datasheet (in formats .rtf, .pdf and .dwg drawings) complete with all the selection data, operating diagrams and psychrometric charts showing the selected air treatment.

The Eurovent Certification

In the air handling units market the certifications, and in particular the Eurovent certification, once requested only seldom, are more and more required in the design phase, in order to comply with the new National and International requirements for energy saving. By choosing a product with the Eurovent label, the designer is sure to rely on a product designed and manufactured respecting the European norms with the performances of the various elements (fans, heat exchangers, silencers etc.) guaranteed and certified. TCF has submitted its ZAE range of air-handling units to the controls of the prestigious and demanding Eurovent criteria, whose tests on the model boxes are performed at the TUV laboratories in Germany, a san additional guarantee of a total independence of judgement and evaluation, in order to be able to offer the customers a product which responds unequivocally to the requests of an everyday more demanding market.

EUROVENT CERTIFIED PERFORMANCE
AHU -09.07.436
Range -EURO
www.eurovent-certification.com

On the grounds of the performed tests, the Air Handling Units of the ZAE series have been classified with the following Eurovent classes:

Certified characteristic (Diploma n°09.07.436)	Class
Casing mechanical resistance	D1
Casing air leakage with test pressure -400Pa	L1
Casing air leakage with test pressure +700Pa	L1
Filter by-pass leakage	F9
Thermal conductivity "U"	T2
Thermal bridging factor of standard execution	TB2

SERIES
AZS

Air-handling units with panel thickness from 50mm to 100mm and air volumes from 1.000 to 130.000 m³/h.

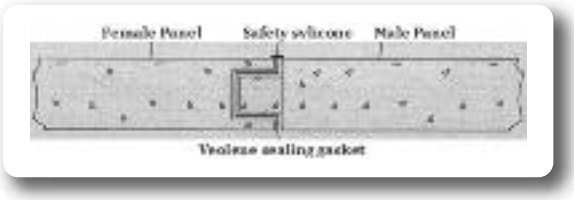
The air-handling units of the AZS series have been studied to guarantee the maximum reliability and mechanical strength in units destined to specific applications, such as low or high temperatures, food processes or, thanks to the peculiar internal welded frame, for executions in which high available pressures or particularly demanding treatments are requested.

Base features:

- 24 main sizes; bespoke executions according to the customer's specifications, with modifications from the standard, in terms of both dimensions and capacities;
- internal invisible welded bearing frame, for total separation of metallic contact between the inside air and the external one, guarantee of a total thermal cut;
- sandwich panels with thickness from 50mm to 100mm, available in:
  - galvanised steel
  - pre-plasticised galvanised steel
  - aluminium
  - stainless steel AISI 304
- condensate drain pans in AISI 304 stainless steel as standard;
- insulation material available in hot-injected polyurethane with density 45kg/m³ or rock wool with density 80 or 120 kg/m³;

The **bearing frame** is constituted by a square section tubular profile with thickness 20/10mm in cold-rolled galvanised steel but on request it is also available in AISI 304 stainless steel. Globally, the frame is joined together uniting the various segments of tubular by robust welding joints in the same material as the frame itself. Once the frames, making up the various modules of the unit, are obtained, they are welded in turn to the perimetric base frame of the unit, consistently manufactured in the same material of the frame. The manufacturing phases are several and complex but the final result is of a unit at the top of the performances for what concerns the mechanical characteristics of the structures, which may be obtained nowadays with the materials available on the market.

The **panels** are constituted by metal boxes carried out with the coupling of two 6/10 mm thick metal sheets, previously sheared and shaped on two sides according to a special male/female profile; successively, they are injected with polyurethane foam which, when stabilising, constitute a finished product of excellent mechanical strength and with premium sound-absorbing capacity. The extremely low air leakage factors are reached also thanks to the special male/female joint between panel and panel, as proved by the tests carried our in our laboratories with test pressures up to 2000Pa. The panels are produced in 50mm and 100mm thickness and are applied externally to the frame.



The standard range of panels include the following configurations:

1. **pre-plasticised galvanised external / galvanised internal:** the external sheet is constituted by a plasticized galvanised sheet, the internal one by a simple galvanised sheet – this is the standard execution which is most commonly used – the external plastic coating is made from polyvinyl chloride (PVC) with a thickness of 150 microns. The standard colour is light grey code N1 (on request, other colours could be used, within the RAL range). The plastic coating, having protective anti-oxidising and anti-scratch function, is made from a plastic film applied at hot temperature (around 160°C) on the metal sheet and it is self-extinguishing, non-toxic, anti-mould and non-hygroscopic. Our plasticisation is suitable also for external installation, its resistance having been tested with positive results at temperatures between -35°C and +80°C. for more than 3 hours (according to the general disposition on metal sheets or plasticized sheets contained in the articles 2-5 of the D.M. 21/03/1973 – Gazzetta Ufficiale n°104 dated 24/04/1973).
2. **prepainted external/ galvanised internal:** the external sheet is constituted by a prepainted metal sheet, the internal one by a simple galvanised sheet –a solution appropriate for applications where a good resistance to weathering is requested.
3. **stainless steel external / stainless steel internal:** both sheets are in AISI 304 stainless steel at a very elevate mechanical resistance and absolute inalterability to external agents, weathering, ambiences with high salt concentration, applications in chemical, pharmaceutical and food industry.

Perimetric **base frame** constituting a continuous support to the units under all sides and allowing to unload the weight on a larger surface reducing the load on the structure on which our units are placed. The base frame is manufactured by coupling a galvanised cold-rolled metal profile, 30/10 thickness with welded 30/10 galvanised metal corners and 180mm height.

Condensate drain pans exclusively in stainless steel material: AISI 304 stainless steel with 15/10mm thickness, with very elevate mechanical performances. Also the support frames for cooling coils and humidification systems and, in general, all the wet surfaces inside the unit, are manufactured in AISI 304 stainless steel with 10/10 mm. Each condensate drain pan is equipped with one or more discharge points complete with pipe, also manufactured in stainless steel.

Inspection doors made with the same process as the panels and in the thickness 60mm and with the same insulating material (polyurethane or rock wool). The doors are fixed to the frame with an opening system of handles and hinges, or closing latches, according to the requirements and specific possibilities of the application. The accessible areas in negative pressure will have outwards-opening doors - the accessible areas operating under positive pressures will have inwards-opening doors. In compliance with the CE 89/392 Machine Directive, related to the safety in motor-fan sections, a counter-door is installed behind the fan access door, named "anti-accident grid" with the same dimensions of the first one but made from 50% micro-perforated metal sheet , duly enforced at the edges and fixed on 4 points with M10 nuts. In this way we grant: inaccessibility to the area with moving devices, unless using the appropriate wrench, quick inspection of the section through the grid for a safe confirmation of a still unit and a sufficiently long time to remove it.

Integrated control systems

TCF can supply control and power boards for the management of the air-handling units. The supply of air-handling units complete with controls may include: control components integrated in a dedicated technical compartment, complex solutions for precision control, possible combination with power boards, control board for "niche" installation for heat recovery units, air-conditioning units and low profile AHUs, controls for indoor installations with components 'at sight as well as customisations and logos available upon specific customer's request. All AHUs with controls are tested in the factory, so as to guarantee the perfect operation of all the elements when finally commissioning the unit on site.

Selection software

An innovative selection program, easy to use and complete, allows the selection of all the components o fan air-handling unit, from dampers to filters, water and DX heat exchangers, heat recovery systems (plates, rotary wheels, run-around-coils), humidification systems, fans and silencers.

The software may be downloaded from internet and installed on the pc, for a total autonomy of management and selection also when off-line, and it provides the technical datasheet (in formats .rtf, .pdf and .dwg drawings) complete with all the selection data, operating diagrams and psychrometric charts showing the selected air treatment.

The advantages of the AZS series:

- Superior thermal insulation capacity, constant and stable on the whole surface of the panel.
- Extremely elevate structural rigidity of the units, suitable also for applications at the limits, such as industrial applications with continuous elevate differential operating pressures and use of remarkably heavy components, such as heat exchangers with pipes/fins in iron or stainless steel etc.
- Superior sound absorbing capacity.
- Total absence of thermal bridges since all the profiles and supports in aluminium have been eliminated, homes of dangerous condensations specially in applications at the limit, such as in outdoor units, or units serving low temperature technological cycles (for example in food conservation or in pre-rest or resting cells for hams seasoning etc.).
- Total absence of screws.
- Maximum pneumatic tightness in the most different operating conditions.

SERIES
AZH

Air-handling units with panel thickness from 50mm to 100mm and air volumes from 1.000 to 40.000 m³/h.

The air-handling units of the AZH series have been specifically designed for applications in hospital and pharmaceutical processes, being entirely manufactured in AISI 304 stainless steel. Specials executions allow for the total sanification and cleaning of the internal parts, mandatory condition for application in such ambience.

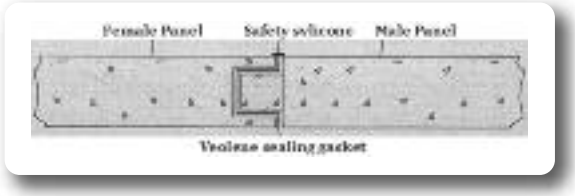
Base features:

- 16 main sizes; bespoke executions according to the customer's specifications, with modifications from the standard, in terms of both dimensions and capacities;
- internal invisible welded bearing frame in stainless steel, for total separation of metallic contact between the inside air and the external one, guarantee of a total thermal cut;
- sandwich panels with thickness 50mm or 100mm, available in:
  - AISI 304 stainless steel internal;
  - galvanised steel, aluminium or AISI 304 stainless steel external;
- condensate drain pans in AISI 304 stainless steel as standard;
- insulation material available in hot-injected polyurethane with density 45kg/m³ or rock wool with density 80 or 120 kg/m³;

The **bearing frame** is constituted by a square section tubular profile with thickness 20/10mm in AISI 304 stainless steel. Globally, the frame is joined together uniting the various segments of tubular by robust welding joints in the same material as the frame itself. Once the frames, making up the various modules of the unit, are obtained, they are welded in turn to the perimetric base frame of the unit, consistently manufactured in the same material of the frame. The manufacturing phases are several and complex but the final result is of a unit at the top of the performances for what concerns the mechanical characteristics of the structures, which may be obtained nowadays with the materials available on the market.

The internal surfaces are perfectly smooth and without visible screws.

The **panels** are constituted by metal boxes carried out with the coupling of two 6/10 mm thick metal sheets, previously sheared and shaped on two sides according to a special male/female profile; successively, they are injected with polyurethane foam which, when stabilising, constitute a finished product of excellent mechanical strength and with premium sound-absorbing capacity. The extremely low air leakage factors are reached also thanks to the special male/female joint between panel and panel, as proved by the tests carried our in our laboratories with test pressures up to 2000Pa. The panels are produced in 50mm and 100mm thickness and are applied externally to the frame.



The standard range of panels include the following configurations:

1. **pre-plasticised galvanised external / stainless steel internal:** the external sheet is constituted by a plasticized galvanised sheet, the internal one by an AISI 304 stainless steel sheet – this is the standard execution which is most commonly used – the external plastic coating is made from polyvinyl chloride (PVC) with a thickness of 150 microns. The standard colour is light grey code N1 (on request, other colours could be used, within the RAL range). The plastic coating, having protective anti-oxidising and anti-scratch function, is made from a plastic film applied at hot temperature (around 160°C) on the metal sheet and it is self-extinguishing, non-toxic, anti-mould and non-hygroscopic. Our plasticisation is suitable also for external installation, its resistance having been tested with positive results at temperatures between -35°C and +80°C. for more than 3 hours (according to the general disposition on metal sheets or plasticized sheets contained in the articles 2-5 of the D.M. 21/03/1973 – Gazzetta Ufficiale n°104 dated 24/04/1973).
2. **stainless steel external / stainless steel internal:** both sheets are in AISI 304 stainless steel at a very elevate mechanical resistance and absolute inalterability to external agents, weathering, ambiences with high salt concentration, applications in chemical, pharmaceutical and food industry.

Perimetric **base frame** constituting a continuous support to the units under all sides and allowing to unload the weight on a larger surface reducing the load on the structure on which our units are placed. The base frame is manufactured by coupling an AISI 304 stainless steel , 30/10 thickness cold-rolled with welded 30/10 stainless steel corners and 180mm height. Possible combination with support feet, also in AISI 304 stainless steel.

Condensate drain pans exclusively in stainless steel material: AISI 304 stainless steel with 15/10mm thickness, with very elevate mechanical performances. Also the support frames for cooling coils and humidification systems and, in general, all the wet surfaces inside the unit, are manufactured in AISI 304 stainless steel with 10/10 mm. Each condensate drain pan is equipped with one or more discharge points complete with pipe, also manufactured in stainless steel.

Inspection doors made with the same process as the panels and in the thickness 60mm and with the same insulating material (polyurethane or rock wool). The doors are fixed to the frame with an opening system of handles and hinges, or closing latches, according to the requirements and specific possibilities of the application. The accessible areas in negative pressure will have outwards-opening doors – the accessible areas operating under positive pressures will have inwards-opening doors. In compliance with the CE 89/392 Machine Directive, related to the safety in motor-fan sections, a counter-door is installed behind the fan access door, named "anti-accident grid" with the same dimensions of the first one but made from 50% micro-perforated metal sheet, duly enforced at the edges and fixed on 4 points with M10 nuts. In this way we grant: inaccessibility to the area with moving devices, unless using the appropriate wrench, quick inspection of the section through the grid for a safe confirmation of a still unit and a sufficiently long time to remove it.

Integrated control systems

TCF can supply control and power boards for the management of the air-handling units. The supply of air-handling units complete with controls may include: control components integrated in a dedicated technical compartment, complex solutions for precision control, possible combination with power boards, control board for "niche" installation for heat recovery units, air-conditioning units and low profile AHUs, controls for indoor installations with components 'at sight as well as customisations and logos available upon specific customer's request. All AHUs with controls are tested in the factory, so as to guarantee the perfect operation of all the elements when finally commissioning the unit on site.

Selection software

An innovative selection program, easy to use and complete, allows the selection of all the components o fan air-handling unit, from dampers to filters, water and DX heat exchangers, heat recovery systems (plates, rotary wheels, run-around-coils), humidification systems, fans and silencers.

The software may be downloaded from internet and installed on the pc, for a total autonomy of management and selection also when off-line, and it provides the technical datasheet (in formats .rtf, .pdf and .dwg drawings) complete with all the selection data, operating diagrams and psychrometric charts showing the selected air treatment.

The advantages of the AZH series:

- Superior thermal insulation capacity, constant and stable on the whole surface of the panel.
- Extremely elevate structural rigidity of the units, suitable also for applications at the limits, such as industrial applications with continuous elevate differential operating pressures and use of remarkably heavy components, such as heat exchangers with pipes/fins in iron or stainless steel etc.
- Superior sound absorbing capacity.
- Total absence of thermal bridges since all the profiles and supports in aluminium have been eliminated, homes of dangerous condensations specially in applications at the limit, such as in outdoor units, or units serving low temperature technological cycles (for example in food conservation or in pre-rest or resting cells for hams seasoning etc.).
- Total absence of screws.
- Maximum pneumatic tightness in the most different operating conditions.

SERIES
AZV

Air-handling units with panel thickness 60mm in glass-resin and air volumes from 1.000 to 35.000 m³/h.

The air handling units of the AZV range have been specifically designed for applications in food industry, suitable for ventilation in clean rooms, ham-slicing laboratories and ambiences dedicated to similar activities. These are rooms served by AHUs for which the following features are of the maximum importance: accessibility to all internal components, possibility to extract such components for quick substitution and the total sanification of all sections.

Base features:

- 6 main sizes: bespoke executions according to the customerís specifications, with modifications from the standard, in terms of both dimensions and capacities;
- sandwich panels with thickness 53mm in self-extinguishing glass resin specific for food process applications;
- rounded internal corners on all surfaces;
- draining panels in each section;
- insulation material in hot-injected polyurethane with density 42kg/m³;

In short, these are air handling units with nominal air volumes from 1.000 m^3/h to 35.000 m^3/h, a limit imposed by the necessity to create single-shell units, whose surfaces are coated with a special glass-resin Gelcoat which makes them perfectly cleanable and hygienisable.

Because of the need to maintain the AZV units compact in one single block, for this type of applications the available components may be grouped as follows:

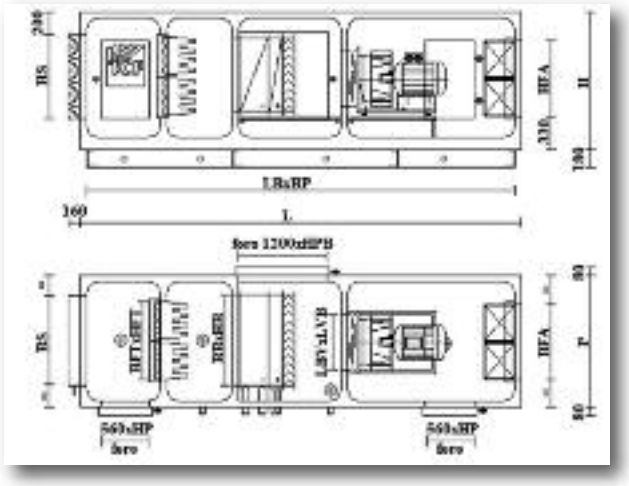
- **Air intake and filters section:** constituted by the air intake damper/s and by a first stage of G4 filters followed, on request, by a second filtrating stage class F7;

- **Air-handling section:** constituted by a water heating coil (in copper pipes/pre-coated aluminium fins or pipes and fins in stainless steel, to withstand the frequents jets of water used in the sanification operations, for which reason the aluminium fins are not suitable and might easily damage) and a water cooling coil or direct expansion coil (in copper pipes/pre-coated aluminium fins or pipes and fins in stainless steel);

- **Fan and absolute filters section:** constituted by a directly-coupled 'plug' fan (to avoid the micro losses of particles from the belts, typically used with the traditional centrifugal belt/pulley transmission) with special food-process epoxy coating and, upon request, a final stage of absolute HEPA filters class H13 (normally recommended for air-handling units destined to ham-slicing areas and alike).

All the bearing frames of filters, heat exchangers and fans, are "embedded" within the glass resin-coated panels, in order to reduce to the minimum the presence of elements standing in the air flow and complicating the cleaning and sanification operations.

Here follows a typical scheme of an air-handling unit of the AZV series:



The panels: for installation dedicated to food industry where, not only the hygienic cleaning of the units but also it is requested to ensure the absence of sharp edges in sight and an internal shell completely rounded, smooth, cleanable also manually and with total hydraulic and aeraulic tightness, we are able to design and manufacture air handling units entirely in alimentary and self-extinguishing PRFV (glass resin) using SELF-SUPPORTING panels with male/female joint with minimum thickness of 53mm.

These characteristics allow to obtain a PRFV with superior qualities than both materials considered as insulating and other traditional materials; in short, the qualities of our glass resin are:

- suitable for food applications
- lightness
- dimensional stability also with elevate Dt
- resistance to chemical and weather agents
- resistance to moulds and micro-organisms
- excellent electric and thermal properties
- easiness to be repaired
- waterproof and easy to clean

■ Perimetric **base frame** constituting a continuous support to the units under all sides and allows to unload the weight on a larger surface reducing the load on the structure on which our units are placed. The base frame is manufactured by coupling an AISI 304 stainless steel , 30/10 thickness cold-rolled with welded 30/10 stainless steel corners and 180mm height. Possible combination with support feet, also in AISI 304 stainless steel.

■ The **inspection doors** are made with the same process as the panels and in the thickness 60mm. We use specific handles, hinges and pins taken from freezing cells of the food and conservation industry, to which this series of air-handling units is destined. The operating conditions to guarantee are an easy and quick opening of the door itself, in order to access the area to be inspected, and an air tightness class same or superior to the design values taken as reference (Class B – Class C).

■ **Integrated control systems**

TCF can supply control and power boards for the management of the air-handling units. The supply of air-handling units complete with controls may include: control components integrated in a dedicated technical compartment, complex solutions for precision control, possible combination with power boards, control board for "niche" installation for heat recovery units, air-conditioning units and low profile AHUs, controls for indoor installations with components 'at sight as well as customisations and logos available upon specific customer's request. All AHUs with controls are tested in the factory, so as to guarantee the perfect operation of all the elements when finally commissioning the unit on site.

SERIES

AZ-I
ZAE-I
AZS-I

Integrated control systems for air-handling units, with combined power board.

A series of AHUs complete with controls arranged in twenty-four management systems which may be combined with any motor capacity and all humidification systems. Thanks to our skilled and autonomous internal technicians, we are able to make whatever customisation on both the hardware and the software.

The whole control and power system is installed and wired on board the unit in the factory, to be then tested and thoroughly checked before despatching. The power and control board are made from a metal box with protection class IP65. The LCD display is illuminated from behind and the signal LED lights allow a quick and immediate view of the state of the AHU.

The installation of all the internal components is carried out at a state-of-the-art level. Our experts, in cooperation with our Technical Office, detect the most suitable position where each component will be installed, in order to guarantee the correct operation, precision of parameters reading and easiness of access for the normal maintenance operations.

■ **Microprocessor control** integrated with customised software, for the complete control of the AHU. TCF keeps in its archives a copy of the software installed and customised for each unit: if needed, TCF is able to send the customer, within the 48 hours from the request, a copy of the microprocessor which will just need to be substituted using the appropriate connectors. To facilitate the control and management operations, it is possible to remote an LCD semi-graphic display, available for both wall and niche-type installation.

On request, it is possible to supply the card integrating a week clock program and the different communication card (Modbus®, BACnet®, LonWorks®, LAN TCP/IP) compatible with the most common supervision systems.

If the AHUs are manufactured in more sections, specific connection devices are provided for, simple and reliable, of the one-way-joint type.

According to the application, valves with flanged or threaded connection, with press-type joints for pipes up to 2" diameter. Starting from the diameter 2"- ½ TCF uses the "Victaulic" coupling system which guarantees flexibility of use, reliability and extreme friendliness of use during maintenance operations

The supply of the unit may also be completed with a complete series of probes for duct or room installation , to achieve whatever type of AHU control.

On request, the supply of the control components may be completed with the following devices: AFSC system (Air Flow System Control) which allows the AHU, once connected to the network, to start up and automatically guarantee the designed air flow regardless of the real pressure drops of the installation (within the performances limits of the fan-motor assembly). Such a system, by nature, automatically compensates the increase of the pressure drop due to the clogging of the filters also when, such as the case is for hospital applications, they are installed outside of the AHU.

Further to an analysis from our technical office, it is also possible to complete the delivery with some components of the hydraulic circuits, such as control valves and related pipes, totally insulated and easily accessible, pumping kits with installation and control of twin pumps, water temperature control, charging lines, expansion vessels….

Distributor

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