

GENERAL FEATURES

- The air handling units shall be manufactured in a company certified in accordance with the ISO 9001, version 2000 standard.
The air handling units supplied shall be of the WESPER brand and of “Premi@ir” type, or equivalent.
The unit construction shall comply with the requirements of the European standard EN 1886.

Casing strength:	Class 2A minimum
Casing air leakage:	Class B minimum under negative and positive pressures
Filter air leakage:	Class F9 minimum
Thermal Conductivity:	Class T2 minimum
Thermal Bridge:	Class TB2 minimum
- The AHU's shall be selected with the aid of an **EUROVENT certified** software programme that shall deliver AUTOCAD compatible execution plans, scaled to the AHU's size, fan performance curves with operating points and a printout of the air humidity diagram with the requested change points.
- The noise levels shall be expressed in accordance with EUROVENT standard. The minimum attenuation of the casing shall be **41dB**. An extract of performance data displayed on EUROVENT web site shall be provided in order to validate the mechanical and acoustical performances of the unit.

MODULE CONSTRUCTION/ASSEMBLY

- The AHU's shall be of the self-supporting type without framework, and of perfectly smooth, metallic interior construction (Public Buildings compatible), without any visible screws (panel/panel liaisons).
- The panels shall be of the double skin type with a uniform thickness of 50mm. Insulation shall be:
 - Glass wool 32 kg/m³, M0 fire class, CE certified, k= 0.64 W/m².K , or
 - Rock wool 70 kg/m³, M0 fire class, CE certified, k= 0.7 W/m².K , or
 - Polyurethane foam 40 kg/m³, M1 fire class, k= 0.58 W/m².K
- The inner skin shall be made of galvanized steel, thickness = 0.8 mm. The outer skin shall be made of 1 mm thick sheet steel, pre-painted in RAL 9010 colour with an epoxy primer undercoat and a 25 µm thick polyester topcoat (resistance to salt spray test = 750 hours)
- The panels shall be fastened to each other by means of screws countersunk in the panels (absence of localized thermal bridges). The screws shall be equipped with panel-coloured plastic caps.
- The insulator shall be completely enclosed inside the panels (6 faces covered) in order to prevent any humidity penetration, and any loss of insulation efficiency.
- The construction of the access doors shall be identical to the AHU's panel construction.
- The hinges shall be of the polyamide (anticorrosion) offset type.
- The door locking system shall comprise progressive tightening, “rotor” locking handles for door alignment and perfect seal continuity (on both the positive pressure and negative pressure sides) between the doors and the panels. These handles shall be operated with the aid of a triangular key (in compliance with the EC directive on machinery safety). To avoid creating any localized thermal bridges, the door handles' closing system (cam) does not traverse the panel.
- The liaisons between modules shall ensure perfect continuity of the air passage tunnel with thermal bridge breakage and a smooth interior finish without any rough points at the joining surfaces to prevent any dust build-ups encouraging microbial growth.
- Hexagonal inserts shall be factory-fitted and pre-positioned to ensure perfect compression of the tightness seals between the modules during assembly on site.
- The modules shall be fastened from the outside by means of thermal bridge breakage system (angle pieces and bolts).
- All internal electrical components shall be earthed. The entire AHU shall be earthed.
- The AHU's shall be delivered with a continuous base frame under each module. This base frame shall comprise the required openings of sling hooks / handling as well as openings for attaching rubber pads.
- Fresh air / exhaust air rain hood equipped with bird screen shall be supplied as optional equipment.

INTERNAL EQUIPMENT

FAN MOTOR ASSEMBLY (FMA)

- For « **standard** » application
 - Fans shall be of forward curved or backward curved blade centrifugal double width double inlet type. They shall be statically and dynamically balanced as per VDI 2060 standard.
 - A flexible connector inside the unit and mounted on a removable frame, shall provide the link between the fan-motor assembly and the end panel.
 - The drive shall be of belted pulley type.
 - Belt tension adjustment shall be by way of a single piece sliding platform (or notched rails for motor powers > 22 kW) adjustable by a single screw without having to release the motor fixation. Thus, motor alignment shall remain fixed.
- For « **hygienic** » application
 - Fans shall be of backward curved blade centrifugal single inlet “free wheel” type (plug fans). They shall be used with an electronic frequency inverter, supplied as optional.
 - High density foam shall be provided to ensure air tightness between suction panel and fan wheel inlet cone.
 - Transmission shall be of direct drive type.
- As standard equipment, the fan-motor assembly shall be mounted on rubber vibration isolators (spring anti-vibration mounts supplied as optional).
- This assembly shall be mounted on a metallic base capable of spreading the load generated by fan-motor assembly in an even manner.

Protection and safety devices:

- As standard equipment the motors shall have an internal thermal overload protection (PTO) sensor.
- The minimum motor insulation class shall be IP 55 in compliance with EN 60529, IK08 in compliance with EN 50102, and they shall have a minimum class of efficiency EFF2 in accordance with CEMEP (European Committee of Manufacturer of Electrical Machine and Power Electronics) criteria for single speed motors with powers between 1.1 kW and 75 kW.
- A non-removable, hinge-mounted door guard (supplied as optional), requiring a special tool for opening, in compliance with EN 292.2, shall guarantee personal safety.

FILTERS

- The filtration systems shall meet the requirements of the EN 779 standard in terms of “medium” and “high” efficiency categories and the requirements of the EN 1822 standard for very high efficiency categories.
- The air tightness of the filtering surface shall comply with Class F9 of the EN 1886 standard.
- The filtration surface shall comprise rail-mounted filter cells, with the addition of a foam seal between the frame’s outer surround and the filter cells, and the addition of mastic sealing between the filtration surface frame and the air handling unit tunnel.
- The filtration surface air tightness of “high” efficiency categories shall be ensured by way of a sliding rail actuated by compression handles. The replacement of the filters shall be carried out without tools.
- The filters shall be selected in averagely clogged mode.

COILS**Water coils**

- The coils shall comprise a finned block copper tubes. The copper tubes shall be deoxidised by the phosphorus electrolysis method. The aluminium fins shall be with a pitch of 2.1 mm, 2.5 mm or 3.2 mm.
- The coils shall be tested to a pressure of 16 bar for a service pressure of 10 bar.
- Hydraulic connection shall be of the male threaded type (for diameters smaller or equal to 60.3 mm) or smooth type (for larger diameters).
- The heating coils shall be mounted on slide rails.
- For « **standard** » application
 - The cooling coils shall be placed in a sloped condensate drain pan which eliminates any water retention. Pan shall be slide rail mounted for easy removal.
 - A droplet eliminator shall be used for air velocity > 2.7 m/s. It shall be fixed on the coil.
- For « **Hygienic** » application
 - The cooling coils shall be mounted on independent slide rails.
 - The drain pan shall have a slope and shall be extractable without dismounting the coil.
 - An extractable droplet eliminator shall be used for face velocity > 2.7 m/s. Eliminator shall be supplied with polyamide handle in order to facilitate its withdrawal.

Electric heating coils

- The electric heating coils shall comprise a series of stainless steel sheathed heating resistances. They shall be pre-wired and connected to a terminal block located behind an access door. The coils shall be mounted on sliding rails. The equipment shall be protected by a manual reset safety thermostat.

The power supply to the electric heating coil must be dependent on fan operation.

DAMPERS

They shall be capable of being motorized and be selected from the following versions:

- « Standard » dampers: shall consist of galvanized steel blades driven by polyamide gears or ties rods. Bearings shall be of polyamide type with 1300 Pa admissible pressure for a 1 metre length.
- « Airtight » dampers: shall be at least of class 3 according to EN 1751 standard. Galvanized steel blades shall be driven by ties rods. Admissible pressure for a length of 1m shall be less than 1300 Pa. Dampers shall be equipped with stainless steel gasket on the frame and rubber gasket on the blades in order to guarantee the declared tightness.
- « Heightened airtight » dampers: shall be used as isolation dampers on « **Hygienic** » type AHUs for clean room, operation theatre, laboratory.... Dampers shall be at least of class 4 (total leakage) and class C (frame leakage) in accordance with EN 1751 standard, and shall be suitable for use in the event of disinfection procedure by formalisation.
They shall be composed of galvanized steel blades (stainless steel as optional), driven by galvanized steel (stainless steel as optional) tie rods. Bearings shall be of Teflon (bronze as optional; nylon strictly forbidden).

SILENCERS

- The construction of the silencer section shall be identical to that of the other AHU sections. The acoustic baffles shall be of single piece design, with an even density and a thickness of 200 mm. Standard length shall be 900 mm (600 mm & 1200 mm as optional).
They shall be covered by a protective non-defibrating fibreglass veil, compacted at high temperature and guaranteed for air velocity up to 15 m/s between the baffles.

HEAT RECOVERY➤ **Plate heat exchangers**

Made of aluminium, and adapted for a differential pressure of 1000 Pa.

The leakage rate between the two air streams shall be less than 1%.

A condensate tray with a threaded condensate drainage pipe shall be mounted on the extract air side.

A by-pass shall be available as an option for free cooling, for reducing or eliminating the antifreeze coil upstream of the recuperator or for preventing plate clogging during periods when heat recovery is not required.

➤ **Heat pipes**

Comprising a heat exchanger equipped with a galvanized steel frame, the heat pipe shall be composed of hermetically sealed tubes, inside which a heat carrying fluid is in liquid / vapour phase balance.

Aluminium fins shall be crimped onto the outside of the tubes to increase the heat exchange coefficient.

A central partition shall separate the extracted airflow from the fresh airflow. The heat pipes shall be integrated in stacked air handling units, and shall be equipped, as required, with a bypass damper (as an option).

➤ **Thermal wheels**

They shall comprise a constant speed aluminium hygroscopic rotor driven by belt. The assembly shall be installed in a rail-mounted galvanised steel frame inside the unit. A high performance seal shall provide tightness around the wheel surround and between the air inlet and the air outlet. The thermal wheel shall be equipped with a purge section to enable continuous wheel cleaning.

A speed controller shall be provided as an option.

➤ **Run around coils**

Run around coils shall consist of finned coils placed in the supply and exhaust air units. The supply coil shall comply with the specification for hot water heating coils and the exhaust coil shall comply with the specification for chilled water cooling coils.

HUMIDIFIERS➤ **Wet deck type humidifiers**

The wet deck type humidifier shall be equipped with its own water-recycling pump, entirely integrated inside the section.

The recovery tray located in the lower part of the humidifier shall be equipped with a float tap for the water inlet, an opening for the overflow and a drainage system.

The "Glasdek" type humidification medium shall be 100 mm thick for an efficiency rating of up to 60 % and 200 mm thick for an efficiency rating of 85 %. It shall be classified M1.

➤ **Spray type humidifiers (air washers)**

The air washer shall be equipped with its own water-recycling pump, installed outside the section.

The recovery tray located in the lower part of the washer shall be equipped with a float tap for the water inlet, an opening for the overflow and a drainage system.

The water shall be sprayed through PVC nozzles attached by a clip system onto the distribution rails.

➤ **Steam humidifier**

To enable the steam generator blow pipe to be integrated in the section, it shall be equipped with an empty section of the same construction as the other air handling unit's sections, and equipped with a galvanized or optional stainless steel condensate drain pan.