

## HYGIENIC AIR-HANDLING UNITS





## Quality without a risk

**Cleanroom  
Air conditioning  
Has always been one of the  
Most demanding applications**

Viewing an ever-increasing environmental pollution the quality of air that we breathe is of vital importance. Hygienic air-handling units are designed for essential features and sensitive installations of high-demanding cleanroom air conditioning applications like hospitals, operating rooms, laboratories, pharmacy and electronic facilities, etc. Standards, regulations and guidelines govern the air-handling units calculation, design, manufacture, installation and maintenance.

### DESIGN CRITERIA

When developing, designing and manufacturing air-handling units in hygienic design, the major objectives were :

- to apply only those materials that do not pose any threat to human health and do not facilitate the growth of harmful micro organisms
- internal surfaces of the units must be made of wear-resistant materials and easily accessible for cleaning and disinfection purposes;
- all parts for air movement should allow easy inspection, cleaning and

**Air-handling unit in hygienic design has following differences from standard design:**

#### CASING AND COMPONENTS

- Internal surface and walls are smooth and without open adsorption grooves
- Inside panel surface made of plastic coated galvanized steel sheet, stainless steel sheet or sea-water resistant aluminum sheet (AlMg)
- Seal and gap filling materials are non-porous and not moisture absorbing



- All parts and components of the unit, such as fans, motors, filters, coils (together with droplet separator and drain pan), etc. are resistant to commonly used cleaning and disinfecting agents
- For units height up to 1,3 m, components could be pulled out for cleaning and disinfection purposes. For higher units, both sides of components are accessible from service side through dismantable front panel or service door.

#### AIR INLETS AND OUTLETS

- All units are equipped with airtight dampers according to DIN 1946 Part 4

#### FILTERS

- Bag filters are mounted at the 1st stage of filtration, i.e. the suction side for fresh air class G4 or F5 at least, and at the 2nd stage of filtration, i.e. the unit outlet - not less than air class F7. At each stage, the air humidity should be kept below 80% r.H.
- In less demanding spaces, where return air is used, it is still necessary to maintain the maximum permissible pollutant concentration. It should be noted that filter class G3 and G4 are intended for the protection of coils and heat recovery devices rather than reduction of the dust load in a space. If the ambient air pollution is to be reduced, then filter class F7 or higher are to be installed.
- Differential pressure gauges installed on each filter section

- The section of units higher than 1,3 m is fitted with lighting and an 150 mm inspection glass

### AIR HUMIDIFIERS

- Air humidifiers contain an inclined base pan for water drainage for prevention of a potential microbiological growth, depositions and corrosion. Water can be completely drained when the unit is not operating. According to water hardness grade and air pollution, it is recommended to use a water-softening device or rather a device for germ elimination from water like for e.g. UV lamps
- Drip tubes, condensate pans and water tanks are made of stainless steel
- Drip tubes and condensate pans, water tanks, droplet separators and air deflectors are easily accessible for cleaning and disinfection purposes
- Spray humidifiers (class A,B or C), evaporative humidifiers (class D) or steam humidifiers (class E) could be installed
- Steam humidifiers are dimensioned and designed to prevent water condensation
- The section of units higher than 1,3 m is fitted with lighting and an 150 mm inspection glass

### HEAT EXCHANGERS

- Droplet separators, drip tubes and condensate pans are easily accessible for cleaning and disinfection purposes
- Heat exchanger surfaces are smooth and free from sharp edges. The fin spacing is minimum 2 mm for heaters and minimum 2.5 mm for coolers. In case of larger air-handling units heat exchangers consist of 2 parts interconnected by a heat exchange coil.
- Differential pressure gauges installed on each heat exchanger section
- Base pans below cooling coils are inclined and allow a free drainage of all condensed water, can be easily cleaned and disinfected and are made of stainless steel
- Due to a very high relative humidity coolers are normally not installed upstream filters or a sound attenuator sections. Otherwise, re-heater should be installed in between.
- Considering the pressures present, the siphon of the

cooler base pan equipped with a return flow protection is dimensioned to enable the undisturbed water drainage

### FANS

- Fans are corrosion-protected. Fans with casing always contain a filter. For an easy cleaning the fans have backward curved blades and a condensate drainage on the bottom of the fan casing.
- Fan casing for nominal diameters exceeding 400 mm contains an inspection opening. For hygienic reasons, fans without casings are preferred.
- Differential pressure gauges installed on each fan section
- The section of units higher than 1,3 m is fitted with lighting and an 150 mm inspection glass
- Fans and motors are mounted on sliding frame which may be easily pulled out for cleaning and disinfection purposes

### HEAT RECOVERY DEVICES

- Heat recovery devices are used for exploitation of the exhaust air energy mainly in cases when fresh and return airflows do not mix like in e.g. plate-type recuperators
- Droplet separators, drip tubes and pans may be pulled out for cleaning and disinfection purposes
- Rotating regenerators may only be applied if, due to hygienic conditions, the return air may be used

### SOUND ATTENUATORS

- For prevention of possible sound attenuator shutters pollution with dirt, they are normally preceded by a filter. The air humidity should be kept below 80% r.H.
- For prevention of possible pollution during the transport, sound attenuators are packed separately before dispatchment
- Installation of sound attenuators downstream of the air humidifiers or coolers should be avoided. Otherwise, re-heater should be installed in between.
- The shutter material is wear-resistant, easy for cleaning and disinfection
- Sound attenuators shutters are normally accessible on both sides or can be rather dismantled to facilitate cleaning and disinfection



## CONSTRUCTION

the basic construction of the unit consists of special attenuator shutters pollution with aluminum profiles and aluminum jointing. The panels are of the sandwich type, consisting of an outer and inner cover with an integrated inner thermal and sound insulation.

The covers can be made of galvanized sheet metals with powder coating or of stainless steel. The thickness of the panels is 40 and 60 mm. the hygiene air handling units TANGRA AHU- HYG units meet DIN EN 1886 requirements for class T3 and T2 thermal transmittance

## MULTIPLE LEAF DAMPER

The relief dampers can be operated manually or automatically through the use of an actuator directly connected to the temperature sensor. This way the water section is safe from potential freezing.

## FILTER SECTION

The filters within air handling units Azar Nasim may be cassette or pocket ones, of filtration class G4 and F9. The filters are mounted by conducting guides and a locking mechanism, which allows for their easy removal if necessary.

## HEAT EXCHANGER SECTION

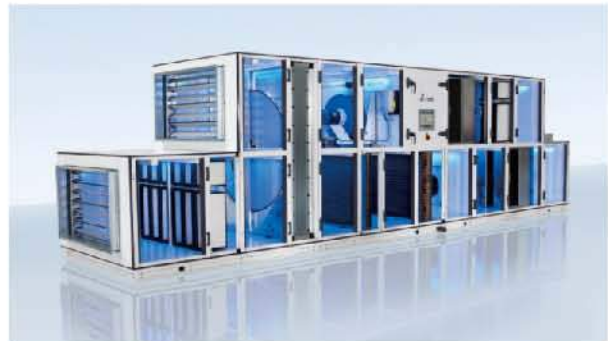
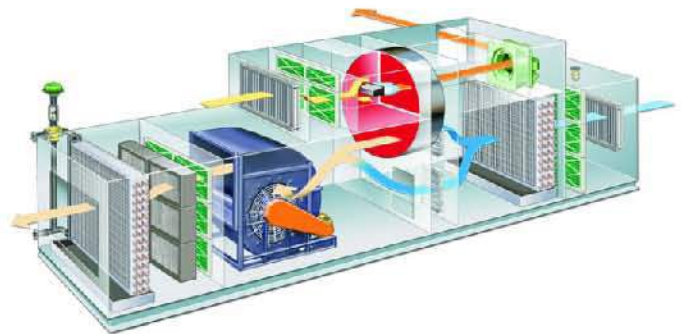
**Heat exchanger system with intermediate heat Transfer** in This application. Two heat exchangers << water air >> are placed within the fresh and exhaust air section ,the heat exchangers are connected via a pipe system where a pump helps transport /circulate water/ propylene glycol constantly.

## PLATE HEAT EXCHANGER A COMPACT UNIT

enables the heating / cooling of fresh air by using energy generated by the exhaust air. Both air flows are fully separate. The plate heat exchangers used in hygiene air handling units Azar Nasim are made of aluminum lamellas and panels of stainless steel. A bypass switch is also available for defrosting purposes during the winter. While giving the option of << free cooling >> during the spring or fall .

## Rotary regenerative heat exchanger the wheel

of this unit rotates, thereby ensuring heat exchange between the outgoing heat air and incoming cold fresh air A partial return of moisture from the discharged air is possible.



### A - Inlet-/Discharge- and Mixing box

Air handling unit with or without damper, for regulation of pressure or air volume flow, with flexible canvas or inlet/outlet hood

### F - Filter section

Air handling unit with standardised filter sizes according to DIN 24185. Filter classes according to EN 779 : G1-G2, G3-G4, F5-F9 and H10-H14. Execution : panel, bag, compact, HEPA or activated carbon filter.

### H - Heating section

Heat exchanger for hot water, glycol, steam or refrigerant. Made of Cu/Al or galvanized steel. Coil connections internally or straight to outside. Electric heater with automatic control elements and safety devices.

### K - Cooling section

Heat exchanger for chilled water, glycol or as refrigerant DX-coil. Made of Cu/Al, Cu/Cu or Cu/Cu tinned coil or galvanized steel. Bottom integrated drain pan made of stainless steel 304L. Droplet eliminator made of PVC profiles in stainless steel 304L frame. Coil connections internally or straight to outside.

### VR/VF - Fan unit

With built-in high efficiency radial fans, double inlet design (VR) for V-belt drive with motor, protection class IP55. Open impeller type (VF) with plug-in motor, mounted on common base frame with anti vibration isolators.

### HUM - Humidifier section

Steam humidifier as self-producing electric type or network dry steam Honeycomb humidifier for contact humidifying, with circulating and fresh water, water tank and pump Spray humidifier with nozzles, water tank and pump

### ER - Heat recovery section

for saving of waste energy :

PWT plate type recuperator with Al fins and cross flow design, sensible heat transfer

RWT rotary wheel regenerator for saving of latent and sensible heat energy

KV twin-coil system with 2 heat exchangers, installed in supply/exhaust air flow

### S - Sound attenuator

with built-in high efficiency acoustic splitters. Splitter casing of galvanized steel and acoustic filling according to DIN 4102, class A2 (non combustible) covered by abrasion resistant tissue (up to 20 m/s)

