EUROPEAN PATENT APPLICATION

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Air tight frame for air handling units with thermal - barrier profiles

Frame consists of metal parts (A and B in FIG 3), with the interpolation of a unique rubber insert with two parts. The multi-winged part C1 and the refolded part C2 (FIG 3).

Wall panels of the air handling unit are in contact with part C1 and fixed through screws with a plastic gasket.

The wings of part C1 are securing air tight function, either in positive or in negative pressure, due to their inclination in different directions.

Part C2 of the rubber insert, is prohibiting thermal bridging between internal and external part (B and A) of the frame.
FIGURE 4
The invention is referring to AIR HANDLING UNITS, supplying conditioned air to any space requiring air-conditioning.

AIR HANDLING UNITS are the units used to change the psychrometric properties of atmospheric air (i.e., temperature and relative humidity) to the desired conditions, performing also air filtration. The conditioned air is supplied, through ductwork systems to any space requiring air-conditioning.

The temperature and humidity difference between internal space of the air handling unit and the ambient, is a factor resulting in:

a. HEAT LOSSES through the frame profiles.
b. UNDESIRABLE CONDENSATION on the casing surface.

c. Elimination of THERMAL BRIDGING in the unit frame and consequently of CONDENSATION appearance, and

d. AIR TIGHTNESS of the units, prohibiting any air leakage through the gap between panels and profiles.

Above mentioned combination, shown in FIG (2) is original and for the first time presented in the Air Conditioning field. It could be constructed from a great variety of metal frame and insulating insert shapes.

There are a lot of advantages as follows:

1. It combines the solution of two main problems, i.e., THERMAL BRIDGING and AIR TIGHTNESS, through the special design of the frame as well as the insert.

2. From the industrial point of view, can be produced easily with a large productivity and minimum labor cost.

3. It can be constructed from cheap, flexible and easily assembling materials, like GALV. STEEL SHEET (or ALUMINIUM or any similar metal), RUBBER and common SCREWS with plastic gaskets.

4. THERMAL BRIDGING is prohibited 100% to the whole length of the frame.

5. AIR TIGHTNESS is secured in the most effective way either in POSITIVE or in NEGATIVE air pressure in the internal space of an air handling unit, as it is proved in the following description.

Frame consists of two simple, formed sheet metal parts. External part (A) and internal part (B), shown in FIG (3), could be constructed from a great variety of metal and shapes. The two parts are joined together, avoiding any metal contact (Thermal Bridge) by means of a special shaped rubber insert (c), which is of unique (one piece) construction with two perpendicular parts C1 and C2.

C1 is a multi-winged part with double wings in two different directions. C2 part has an edge refolding, in order to be perfectly fitted on the metal part A of the frame.

Rubber insert C is fitted on both ends of metal part (A), since metal part (B) is kept in perfect contact on both sides of the profile, as it is shown in FIG (4). The construction of the unit is completed with the fixation of the AIR HANDLING UNIT panels, through screws, on the profiles, as it is shown in FIG (2). In the construction shown in FIG (2), THERMAL BRIDGING as well as AIR TIGHTNESS of the unit, have been secured as follows.

THERMAL BRIDGING

Conditioned air of the internal part of the handling unit, is in contact with the insulated panels as well as the surface of the internal part (B) which is also insulated against the external metal part (A) through the rubber insert (C). There is not any thermal bridging due to the screw, since it has been fixed on the external part (A) only and there is an intermediate plastic gasket too.

AIR TIGHTNESS

In case the air pressure inside the air handling unit, is over the atmospheric (positive pressure), there is a tension of the air to escape, through the joints outside.

In this case the air leakage is prohibited, due
to the mechanical tightening between panels and profiles through screws, as well as from the wings C1a of the rubber insert, the inclination of which is serving as a trap for the escaping air.

[0016] On the contrary, when the air pressure inside the unit is below atmospheric (negative pressure), there is a tension of the air to inflow inside the unit. In this case now, apart from mechanical tightening, there are the wings C1b, which are serving as a trap for the incoming air.

[0017] Thus, the design of the frame works effectively against thermal bridging ensuring also air tightness.

Claims

1. AIR TIGHT FRAME OF THE AIR HANDLING UNITS WITH THERMAL BARRIER PROFILES, which consist of two metal parts with the interpolation of a UNIQUE (one piece) RUBBER INSERT, in order to secure air handling unit’s function, without any THERMAL BRIDGING and AIR LEAKAGE.

2. UNIQUE RUBBER INSERT of SPECIAL SHAPE, like claim (1), with one refolded edge and the other with multi wings of different direction, adapted to the metal frame of an AIR HANDLING UNIT, in order to secure unit’s function without any thermal bridging and air leakage.
FIGURE 1

PANEL INSULATING MATERIAL

AIR TIGHTENING MATERIAL

THERMAL BARRIER INSULATING MATERIAL
FIGURE 2

PANEL INSULATING MATERIAL

AIR HANDLING UNIT-INTERNAL SIDE

C1a

C1b

EXTERNAL SIDE
FIGURE 3
FIGURE 4
### DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document with indication, where appropriate, of relevant passages</th>
<th>Relevant to claim</th>
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<tr>
<td>A</td>
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**TECHNICAL FIELDS SEARCHED (Int.Cl.)**

F24F
E06B
E04B

The present search report has been drawn up for all claims.

<table>
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