Quality Assurance Program

Our Quality Control Program ensures a high quality product by closely monitoring the design, production and assembly processes.

- Quality control is ISO 9001:2000 certified.
- ETL and CSA certifications are available.
- Factory leakage, airflow and free field acoustic tests are available.

Overview of features and options

- Nominal airflow from 2,000 to 100,000 CFM.
- Sturdy construction with 2" or 4" thick acoustical panels for indoor or outdoor applications.
- Acoustical performance of the air handler panels tested by an independent laboratory.
- Units are available in galvanized steel, stainless steel or aluminum, with solid or perforated liner.
- AgION™ antimicrobial coated liners.
- Double sloped stainless steel condensate drain pan complies with ASHRAE Standard 62.
- Stacked coils are rack mounted and individually removable.
- The insulation may be optionally protected with a Tedlar® film wrapping or a fiberglass cloth.
- Factory pre-assembled modular construction.
- High pressure constructions up to 10" w.g., with an air leakage rate lower than the maximum permissible by class 3 SMACNA air leakage standard and/or less than 1 % of the nominal airflow.
- Thermal break construction available.
- Units are available with complete sound attenuation packages.
- Internal vibration isolation includes seismic restraints.
- Internally mounted motors with a standard choice of fan types: centrifugal or plenum.
- Dual duct units.
- Special paint and finish available.
- Indoor Air Quality construction.

Description

Racan Carrier air handlers are designed using proven structural principles and leading edge manufacturing technology. Standard cabinets are constructed with G-90 hot dip galvanized steel and are sized for maximum dynamic and static loads.

OPTIMAIR series units with 4" thick double walls are suitable for pressure differentials up to 10" w.g. static pressure with an air leakage rate lower than the maximum permissible by class 3 SMACNA air leakage standard and/or less than 1 % of the nominal airflow.

OPTIMAIR series units with 2" thick double walls are suitable for pressure differentials up to 8" w.g. static pressure with an air leakage rate lower than the maximum permissible by class 3 SMACNA air leakage standard and/or less than 1 % of the nominal airflow.

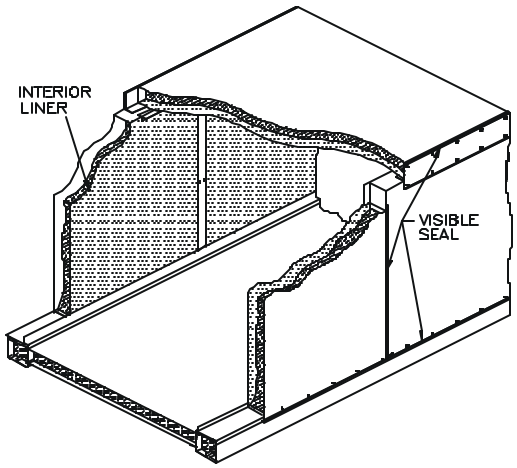

Figure 2: Typical base and wall assembly

Perimeter base frame

The perimeter base frame is specially designed to ensure maximum rigidity during lifting and handling. The perimeter base channel is designed for a deflection of less than 1/300 of the longest module dimension. Intermediate channels and structural supports are spaced at regular intervals and located to support heavy loads such as integral bases and coils. For rigging purposes, the base is

supplied with lifting lugs on each side. The lifting lugs are bolted to full 3/8" thick carbon steel backing plates.

The perimeter frame consists of a double heavy-duty formed galvanized steel channel. To minimize thermal conductivity, the space within the channel is fully insulated. The longitudinal and corner perimeter segments are mechanically fastened to form a sturdy support frame.

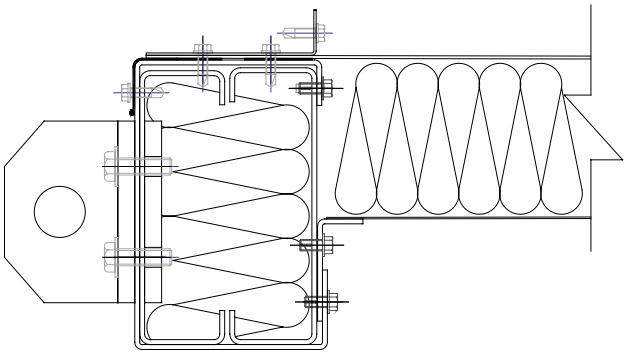

Figure 3: Perimeter base and floor detail

Floor

The standard floor surface is a drainable floor. The top liner is 16 ga. galvanized steel. The floor insulation is protected from underneath with a 22 ga. galvanized steel liner. The floor is thermally insulated with 2" or 4" fiber-glass media. Sectional floor joints form a watertight seal through the unit. Since the floor sections are designed to collect and drain water, 1½"brass drain connection can be installed in any section.

The floor frame includes a heavy-duty structural support grid consisting of formed galvanized steel inverted U-channels at 16" center to center intervals. Internal loads are transferred to the perimeter channels.

Walls and ceiling

Wall and ceiling panels are mechanically fastened with rigid intermediate T-mullions. *See Figure 4*.

Cabinets are designed for minimum deflection at the highest possible operating pressure. Panel widths vary depending on operating pressure, material type and specific application conditions.

Wall and ceiling panels are reinforced with internal galvanized steel stiffeners installed horizontally and at regular intervals. The spacing between the stiffeners is determined by the operating pressure and the combination of panel width and height.

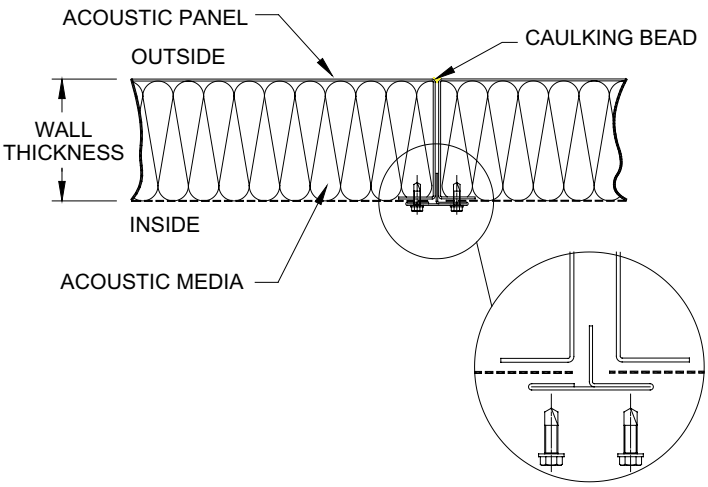

Figure 4: Wall panel assembly

Panels are externally sealed with a visible bead of polyurethane caulking compound.

Reduced conductivity "thermal break" option is available. Closed cell neoprene gaskets are applied between panels to minimize thermal bridging.

Access doors

Access doors are designed for maximum airtightness and optimum acoustical performance. High quality durable doors provide easy access for maintenance of the air handlers.

Doorframes are made out of a single piece of galvanized steel sheet and rounded to provide a single gasket joint, thereby reducing sound and air leakage. All doors are 2" or 4" thick double wall construction, filled with acoustic media, and built with G-90 galvanized steel.

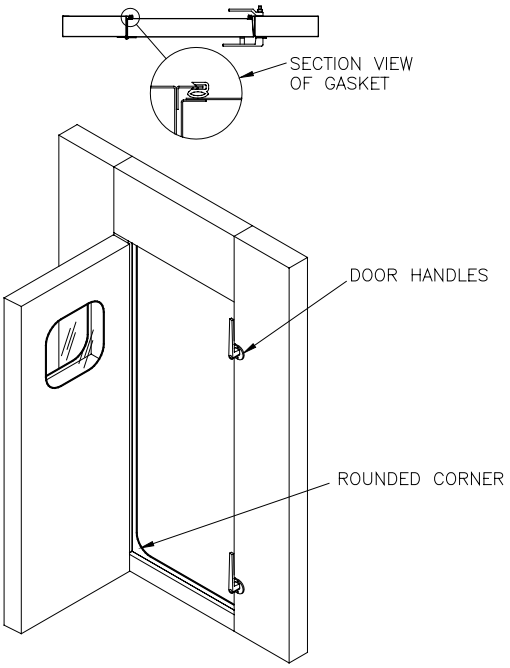

Figure 5: Typical access door details

Door gaskets are neoprene heavy-duty automotive type. The gaskets are self-gripping to the doorframe to ensure a long service life without loss of tightness.

All doors are equipped with a minimum of two heavy-duty hinges and two DYN-AIR type handles. For safety, handles can be operated from both sides and doors always open against the higher pressure side.

As an option, thermal dual pane inspection windows can be provided (not available on doors with free opening width of 14").

For more information on door sizes and free opening dimensions, *see table 12, page 40*.

Access panels

Access panels are used on blow-thru coil sections and on sections with restricted space. They are 2" or 4" thick double wall construction filled with acoustic media and built with heavy gauge galvanized steel for high acoustic performance. A heavy-duty automotive type neoprene gasket self-gripping either on the frame or panel perimeter ensures airtightness and long service life.

Choice of insulation

Racan Carrier air handlers are offered with a variety of panels and two acoustic media thicknesses. All panels are designed to resist deflection or bowing. The acoustic media has long resilient inorganic glass fibers, is non-flammable and is bonded with a thermosetting resin.

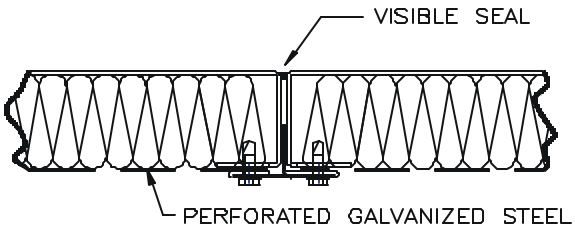

Figure 6: Standard acoustic panel, type A

The OPTIMAIR 4" thick acoustic panel (perforated galvanized steel interior, galvanized steel exterior) provides the highest sound absorption. Its acoustic performances, as tested by an independent laboratory, are the following:

Octave band	125	250	500	1000	2000	4000
Absorption coefficient	.63	.99	1.16	1.06	1.07	1.01
Transmission loss (dB)	27	29	39	49	56	62

Figure 7: Optimair 4" construction

The OPTIMAIR 2" thick acoustic panel has the following performances as tested by an independent laboratory:

Octave band	125	250	500	1000	2000	4000
Absorption coefficient	.20	.51	1.02	1.03	.97	.90
Transmission loss (dB)	24	27	34	43	50	55

Figure 8: Optimair 2" construction

Sound absorption tests conform explicitly to the requirements of the ASTM standard method for sound absorption coefficients by the "Reverberation Room Methods" ASTM C423-90a and E795-93. Sound transmission loss tests

were conducted in explicit conformity with the ASTM designations E90-90 and E413-87.

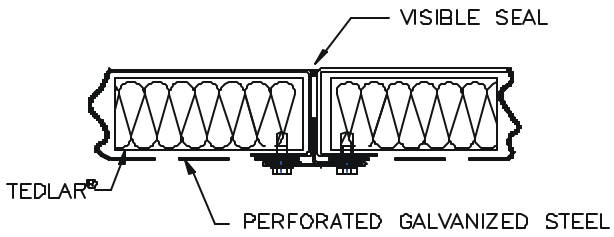

Figure 9: Standard acoustic panel, type M

Acoustic panels are also available with a protective Tedlar® wrapping to provide additional protection against fiber erosion. This offers an ideal option for sound critical applications with high indoor air quality standard.

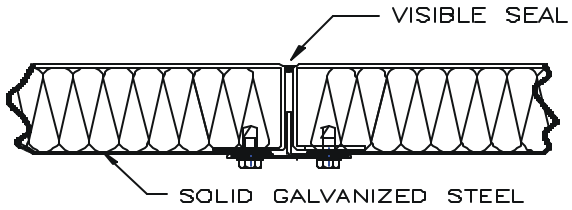

Figure 10: Standard acoustic panel, type D

Double wall panels, complete with acoustic media and solid galvanized steel liner on both sides, provide high sound transmission loss and ensure the highest protection against fiber erosion. The thermal properties of the acoustic media are as follows:

Insulation thickness	Conductivity
4”	0.066 Btu/h•ft^2•^{0}F
2”	0.131 Btu/h•ft^2•^{0}F

Figure 11: Thermal properties of acoustic media

Blower section

The blower section is built according to project specifications and, as a standard, is supplied with an internal motor and internal seismic vibration isolation. A wide access door on the drive side allows for easy servicing and motor removal. Side panels can be disassembled for complete fan removal without affecting the structural integrity of the cabinet. Fans with W and Z motor positions are centered within the casing for best aerodynamics and performance. For special applications, X and Y motor positions are also offered.

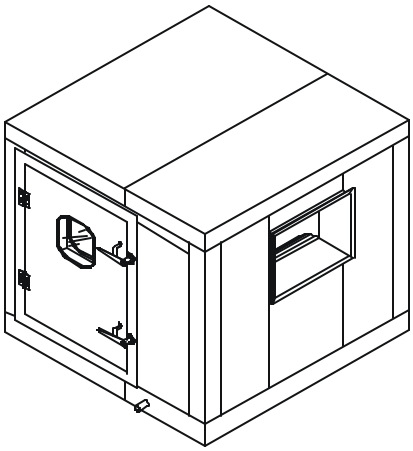

Figure 12: Typical fan section

Internally mounted motor

The air handlers are supplied with factory mounted motors. A double adjustment motor slide base is provided for proper alignment and belt tension adjustment. Unless otherwise specified, motors are standard efficiency, 1800 RPM, open drip-proof (ODP) type and of manufacturers selected by Racan Carrier. Other types of motors are available upon request.

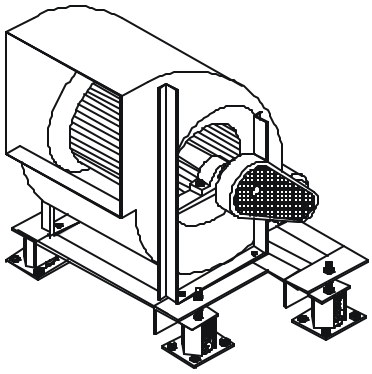

Figure 13: Centrifugal DWDI fan

Internal isolation

An integral base with 2" deflexion seismic isolators and a flexible connection provides full vibration isolation of fan and motor assembly. When required, neoprene mounting restraints are supplied for stable operation and to protect the flexible connection from tearing.

Fans

As energy costs continue to spiral upwards, it is becoming increasingly important to maximize the efficiency of air handling systems. Racan Carrier air handlers meet this challenge by using high quality AMCA® certified fans.

Backward inclined and airfoil centrifugal fans as well as plenum fans are available. Fans are available up to class III construction.

All fan wheels are dynamically balanced and the entire fan is again trim balanced after assembly to ensure smooth operation. Three vibration readings are taken on each bearing in the horizontal, vertical, and axial directions. Vibration amplitude is plotted versus the frequency. The data becomes a permanent record and can be retrieved, via the fan serial number, for future reference. Self-aligning pillow block bearings are also available. Fan housings are provided with airtight lock seams or continuously welded construction. Rigid support members provide a heavy-duty structural strength frame.

Belt guards and inlet screens are offered as options. Due to the open characteristics of the plenum fans, they can be supplied with optional protective enclosures.

Centrifugal fans are installed in accordance with the standard AMCA® arrangements (W, X, Y, and Z motor positions) therefore giving ample space for maintenance of opposite drive side bearings.

Lube lines are available to lubricate both bearings from one side within the casing. Extended lube lines to casing exterior are also available as an option on indoor units. Plenum fans must have an access section upstream of the plenum fan section for maintenance and uniform air distribution.

For fan performance curves and sound data, consult the fan manufacturer's catalogue or contact your local Racan Carrier representative.

As an option, Racan Carrier's air handlers are available with nested inlet guide vanes on both backward inclined and airfoil fans. Mechanisms feature stainless steel rods and bronze oilite bushings. Actuators can be provided and factory installed as an option. For fan selection with inlet vanes, use the appropriate manufacturer's software or contact your local Racan Carrier representative.

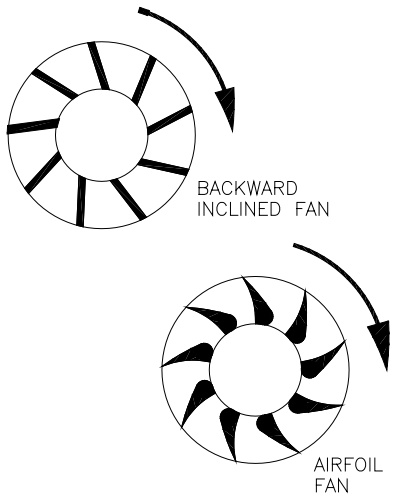

Figure 14: Fan wheel types

Variable frequency drives (VFD's)

Variable frequency drives are used to modulate the fan motor RPM in response to air volume/pressure requirements. VFD's can be factory provided and installed.

Diffuser baffles

Perforated diffuser baffles are standard in blow-thru coil sections to provide uniform airflow over the coils. They are installed downstream of centrifugal fan discharge and upstream of the coil, filter or sound attenuator section.

Draw-thru cooling coil section

Draw-thru cooling coil sections are furnished with one or more I.A.Q. stainless steel double sloped drain pans. An intermediate drain pan is supplied on stacked coil applications. This section is supplied with 1.5" O.D. brass drain sweat connection. Secondary drain pans have a 1"

diameter vertical drain pipe cascading condensate to the main pan. Each sectional drain connection is designed for a maximum of 1.8 gpm water flow.

Unit sizes 64 and over have two (2) or more drain connections.

The coil sections include galvanized steel blank off sheets to hold the coils rigidly and prevent air bypass. All joints between the blank off sheets and the cabinets are caulked.

Coil headers, refrigerant distributors and return bends are completely enclosed within the casing. Piping connections extend through removable panels with rubber grommets to prevent air leakage. Removable panels are heavy gauge double wall with 2" thick insulation. They are gasketed and bolted. Coils are mounted on independent racks and are individually removable.

For maximum flexibility, cooling and heating coil sections are available with the following coil mounting options :

1. The standard coil section arrangement features single, double and triple coil high with their respective individual coil piping connections extended through the cabinet wall.

2. Split coils with coil piping connections extended through the cabinet wall on both sides.

3. Horizontally split and staggered coils with coil piping connections extended through the cabinet wall on the same side or on the opposite side. This arrangement allows for coil removal on the same side. It minimizes coil pull area required.

4. Horizontally split, staggered and overlapped coils with coil piping connections extended through the cabinet wall on the same side or on the opposite side. This arrangement minimizes the coil section width and moderately increases the section length. It also minimizes coil pull area and increases coil face area.

5. Vertically staggered and overlapped coils with piping connections extended through the cabinet wall on the same side. This arrangement minimizes the coil section height and moderately increases the section length. It also minimizes coil pull area and increases coil face area.

Detailed information about coil arrangements can be found in *table 16, page 44*.

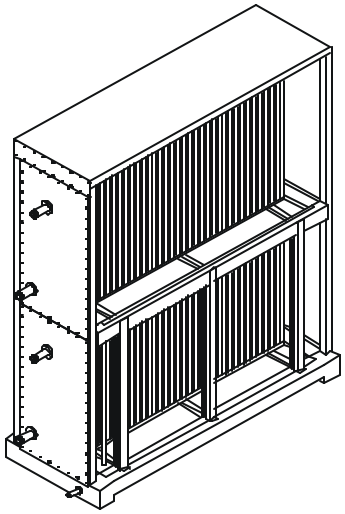

Figure 15: Cooling coil section

Water heating coil

This section has the same features as the cooling coil section without drain pan and drain connection.

Blow-thru dual duct coil section

This section combines a cooling and a heating coil in a double-deck configuration. It always includes a perforated diffuser at the fan outlet to provide even airflow across the coils.

For maintenance purposes, the blow-thru section is supplied with two access panels that permit access to plenums upstream and downstream of the cooling coil.

The cooling coil is furnished with a stainless steel double sloped drain pan for positive drainage. A 1.5" O.D. brass drain connection is provided as standard. Racan Carrier air handlers can accommodate a maximum cooling coil casing depth of 12.5".

The coil sections include galvanized steel blank off sheets to hold coils rigidly and prevent air bypass. All

joints between the blank off sheets and the cabinets are caulked.

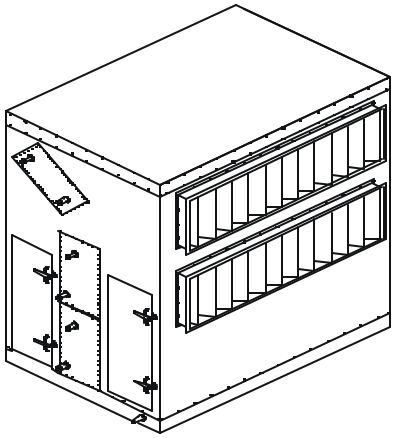

Figure 16: Blow-thru multizone coil section

The heating coil is mounted in the upper deck in an inclined position for proper air distribution across the entire face area. The hot deck can accommodate a maximum coil casing depth of 10".

Both coils have their headers, refrigerant distributors and return bends completely enclosed within the casing. Piping connections extend through removable panels with rubber grommets to prevent air leakage. Removable panels are heavy gauge double wall with 2" thick insulation. They are gasketed and bolted. Coils are rack mounted and are individually removable from multiple coil sections.

Optional zone dampers for multizone system are available to provide air mixing directly at the unit discharge. Damper blades are parallel acting within individual partitions to provide smooth and accurate temperature control. Hot and cold deck dampers are locked together at 90 degrees on a common shaft, so each zone goes from full cooling mode to full heating mode with a quarter turn shaft rotation. Shaft extensions are available on either the cold or hot deck side.

Note: Due to transport and field limitations, cold deck, hot deck and zone dampers may be shipped separately for field re-assembly.

Coils

To provide maximum flexibility, Racan Carrier offers four standard coil face area sizes (small, large, extra-large, and hot deck) on all air handlers, hence permitting the selection of the most economical heat transfer surface.

Coils installed and used by Racan Carrier offer a large variety of fin spacings, rows, and circuiting combinations, thus permitting to accurately meet load requirements.

Coil performances are certified in accordance with ARI standard 410. To select the most efficient coil, contact your local Racan Carrier representative.

Standard coil construction includes galvanized steel casing, aluminum fins, and 5/8" diameter copper tubes. Water coils also have copper headers, steel male pipe connections, a vent connection at the highest point, and a drain connection at the lowest point. Steam coils have headers, steel male pipe connections, and are sloped in their respective casing to ensure positive condensate drainage. Refrigerant coils have brass liquid distributors and sweat copper suction connections.

As an option, tubes, fins, and casings can be of special materials and thicknesses. Contact your local Racan Carrier representative for availability.

Flat filter section

Side loading flat filter sections have access doors on one or both sides. Each door has sturdy hinges and latching mechanisms.

Filter sections include extruded aluminum channel filter guides suitable for side loading of filters. Filter channels accommodate 2" or 4" thick standard panel filters.

Front or rear loading flat filter sections do not have side access doors but include holding frames suitable for front or rear loading accordingly.

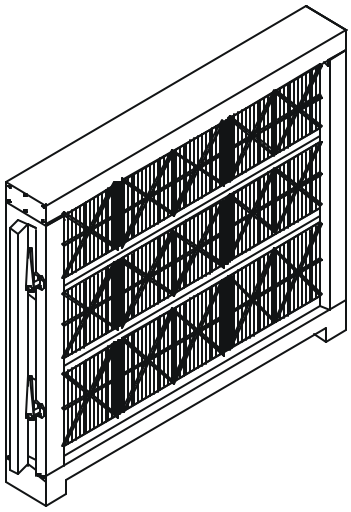

Figure 17: Flat filter section, side access

Angular filter section

Angular filter sections have an oversized face area to extend the filter life. Access doors are provided on one or both sides. Each door has sturdy hinges and latching mechanisms.

Filter channels accommodate 2” or 4” thick standard panel filters.

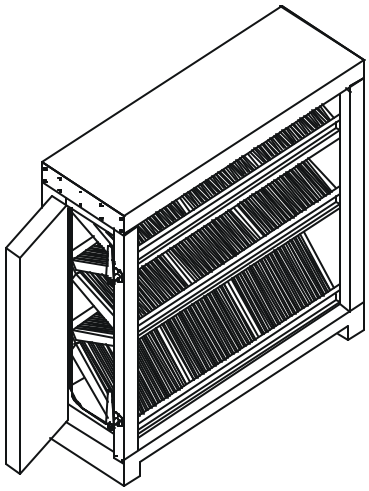

Figure 18: Angular filter section

High efficiency filter section

High efficiency filter sections can be provided either with side access or front loading. Side access has access doors on one or both sides of the section. Each door has sturdy hinges and latching mechanisms. Front loading requires an adjacent access section for servicing; it becomes mandatory for HEPA filters. A high efficiency filter section can also be installed in a blow-thru arrangement for final filtration applications.

Holding frames and aluminum filter racks are factory installed. The basic section can accommodate 2” or 4” thick pre-filters and up to 21” deep final bag filters. If longer filters must be used, a spacer section of appropriate length must be added downstream.

Pre-filters and final filters are of standard dimensions: 12” X 24” and 24” X 24”.

Mixing box section

This accessory section provides a simplified means of modulating any desired ratio of fresh and return air. Dampers use parallel acting blades that are positioned to direct the airstreams into a merging pattern thereby reducing air stratification.

However, a mixing box does not eliminate air stratification. To prevent water coils from freezing and/or low temperature cutouts, special consideration must be taken when the fresh air temperature is below freezing point.

To enhance air mixing, the system designer should specify an air blender section. The use of water/glycol solution in the coils will further reduce the possibility of coil freezing.

Optional doors are available for servicing or to permit access to an adjacent section.

Dampers and their driving rods are normally installed outside the casing. As an option, they can be installed inside. In this case, an access door is mandatory.

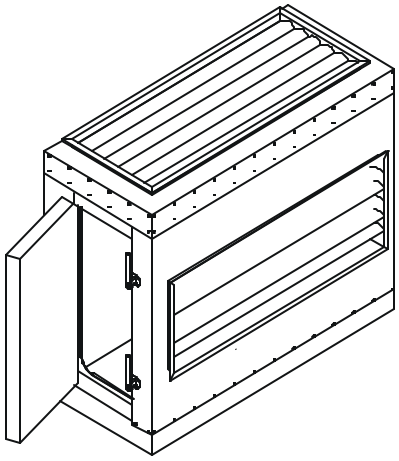

Figure 19: Mixing box

Combination angular filter and mixing box

This compact arrangement combines the basic characteristics of a mixing box and an angular filter section in a space saving configuration. Low temperature outside air applications require special consideration.

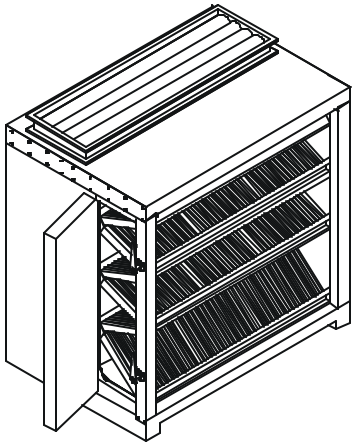

Figure 20: Mixing box section with angular filters

Economizer section

The economizer section is a combination of two mixing boxes in a more compact assembly. It permits an accurate modulation of fresh air, return air, and exhaust air.

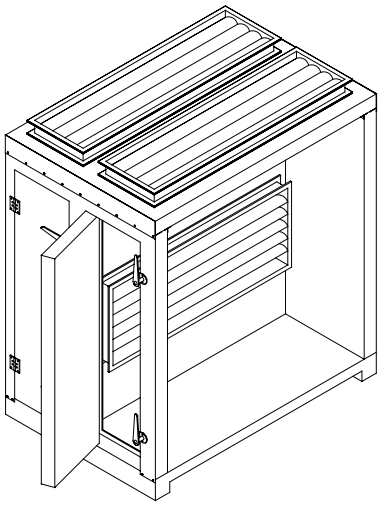

Figure 21: conomizer

Standard mixing box characteristics and options are offered for this section as well. The damper face area sizing and the use of a perforated plate at the inlet of the recirculation damper allow a more linear relation between damper blades' position and airflow.

Combination angular filter and economizer

This basic arrangement combines the characteristics of an economizer and an angular filter section in a space saving configuration. Basic options are available.

Internal face and bypass section

A face and bypass damper section is offered to modulate airflow across a coil. Its use is limited to small face area coils. Dampers are opposed blade type to provide even airflow across the coil surface.

Driving rods are normally extended outside the casing although the actuators can also be installed inside. In the latter case, an access in the upstream section is mandatory.

Full face damper section

A full face damper section is offered for systems that require isolation when in shutdown mode. Dampers are opposed blade type and can be optionally insulated.

Driving rods are normally extended outside the casing, although the actuators can be installed inside. In the latter case, an access in the upstream section is mandatory.

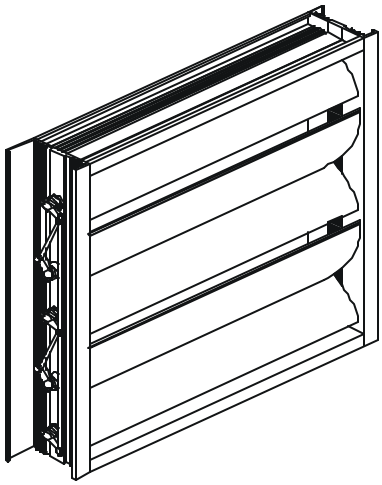

Figure 22: Full face damper assembly

Dampers

All dampers, including multizone, are low leak type with a leakage rate of less than 1% for parallel blades and less than 0.6% for opposed blades, both at 8" static pressure differential. The dampers are extruded aluminum airfoil blades and have hexagonal driving rods stamped in the blades. The blade linkage hardware is installed in the damper frame out of the airstream. As an option, Racan Carrier offers dampers with thermally insulated blades.

Air blender section

Racan Carrier offers an air blender section to reduce air stratification downstream of a mixing box or a face and bypass section. A 75% efficiency air mixer section allows a large volume of fresh air. The following formula gives the maximum outside air volume to maintain the air temperature above 35°F at any point along the air mixer section discharge:

$$\text{Max. \% fresh air} = \frac{0.88TR + 0.12TO - 35}{(TR-TO)} \times 100\%$$

TR = return air temperature (°F)

TO = outside air temperature (°F)

Air blenders are static devices that do not require maintenance. However, an optional access door is offered for access to a downstream section.

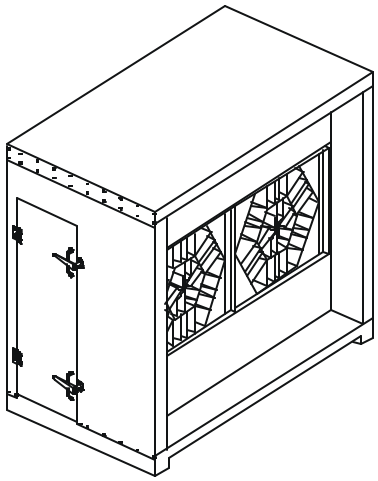

Figure 23: Air blender section

Sound attenuator section

Sound attenuator sections can be provided within the air handlers. Contact your local Racan Carrier representative for further information.

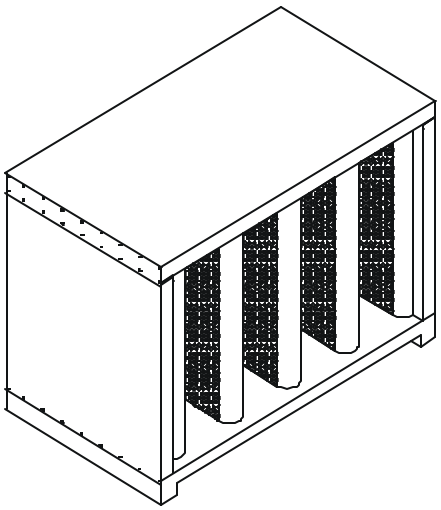

Figure 24: Sound attenuator section

Access section

Where required, access sections allow for service of internally mounted components. For example, they are

often installed between coil sections and upstream from a front loading filter section.

Four section lengths are available:

- 23” Small (14” net opening)
- 25” Standard (16” net opening)
- 29” Large (20” net opening)
- 35” Extra-Large (26” net opening)

Humidifier section

Figure 25 illustrates the standard humidifier section. The nominal section length is 48” with 12” space upstream of the humidifier dispersion tubes and 36” downstream for vapor absorption distance. These lengths can be modified as required by a specific humidifier selection. The floor includes a stainless steel drain pan with a brass drain connection. An access door is required within the section or downstream. The dispersion tubes may be installed at the factory. The humidifier section can accommodate humidifiers from various manufacturers. For available space within the humidifier section, refer *to table 17, page 45.*

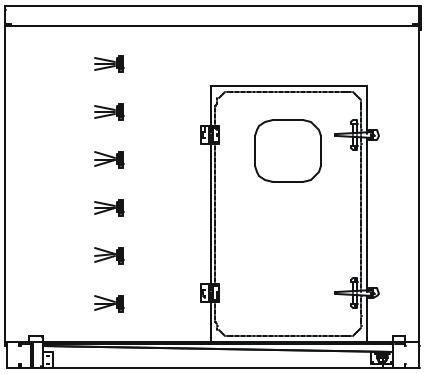

Figure 25: Humidifier section

Spacer section

Spacer sections can be of any length. They can accommodate special accessories which may be field or factory installed. Removable panels can be provided on one or both sides. They are of heavy gauge double wall construction with 2” or 4” thick insulation.

Space limitations dictate the maximum dimensions of special equipment that can be incorporated within this section. For 4” walls, the overall dimensions must be at least 12” shorter than the unit height, 10” narrower than the unit width, and 6” smaller than the spacer section length.

When factory installed, special equipment is properly blanked to prevent air bypass. However, when it is field installed, blanking must be done on the job site by the contractor.

Vertical integral face and bypass coil section

This section is designed to accommodate vertical integral face and bypass coils from various manufacturers. The space available for a given unit size may be evaluated by referring to *table 19, page 47*. When using steam coils, always evaluate the space required for steam trapping. Generally, 18” head is required for proper condensate flow and trap installation.

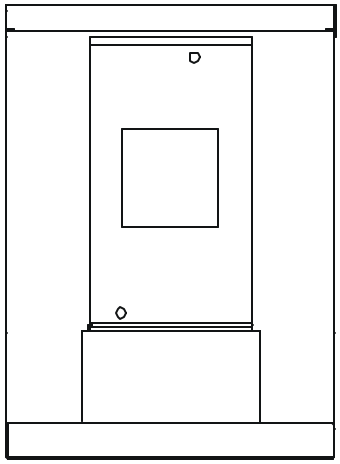

Figure 26: Vertical integral face and bypass section