



**AIROVISION**

39HQM

AIR TREATMENT SOLUTIONS



Central Station Air Handling Unit

**39HQM**

Solution to Customized Applications

Component Guide

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## 1 GENERAL

When you choose Carrier products your choice is backed by over 50 years of experience in the field of air handling. For your day-to-day work this means that you will receive a balanced high-quality modular air handling system. A system that can also be easily be integrated with other Carrier systems, such as chilled-water units, fan coil units and roof fans. This means that you always have the assurance of an optimized heating, ventilation and air conditioning (HVAC) installation in your building.

As a user you have every right to demand high efficiency air handling systems. Certification of our processes according to the international quality standard ISO 9001:2015 is your guarantee for the quality of the Carrier product offering and the services provided. For complete peace-of-mind a large number of Carrier products are also Eurovent-certified, giving the customer the assurance that the published product performances are correct. Of course Carrier also complies with all Environment, Health & Safety (EH&S) regulations and takes a responsible and caring approach to environment, health and safety matters. We are fully committed to safeguarding our environment for future generations.

### Carrier and the environment

At Carrier we care for 'everything that lives' and this is emphasized by the use of the most ozone-friendly refrigerants in our units and systems. More and more of our machine components are recyclable, and Carrier is also one of the pioneers in the use of energy-saving technologies and production process. In short, our systems already meet tomorrow's standards today.

### Carrier in short

United Technologies Corporation is a well-known American corporation that is quoted on the stock exchange. Carrier Corporation is just one of the subsidiaries of this large world-wide organization. In the Gulf Carrier Corporation is represented by various Carrier companies that are active in the fields of heating, ventilation, air conditioning, as well as transport and commercial refrigeration. Carrier Saudi Air-Conditioning Manufacturing Company (SAMCO) is a world-wide Carrier expert for air handling units. Carrier SAMCO is the only manufacturing point of 39HQM air handling units for EMEA market.



### Research and Development

To maintain the top position in the area of air treatment in the world, product research and development continues to be one of Carrier's top priorities. Besides its 45 production center's spread all over the world Carrier also has 14 R & D units with a total annual budget of over 400 million Dollars. These carry out continuous research in important sectors such as acoustics, compressor technology, new refrigerants and metallurgy. In the European R&D centers in Montluel, France and SAMCO in the Saudi Arabia conduct pioneering research projects that result in important product innovations. Carrier's innovative approach is underlined by the number of patents we have recently received, including patents in the air treatment area.

### Spotlight on SAMCO

Inside the world-wide Carrier organization SAMCO in Jeddah, Saudi Arabia is the knowledge center for air handling units. Here we develop innovative software programs for the selection and evaluation of components for air handling units- from vibration mounts to fan belts and to operating cost calculations for heat recovery systems and start-up times for fan/motor combinations. But the Carrier SAMCO expertise is also welcomed outside Carrier.



## 2 STANDARDS

There are two European standards on air handling units that describe the characteristics of the casing wall construction and classification and performances of units, components and sections, respectively;

- **EN 1886** “Air handling units – Mechanical performance”
- **EN 13053** “Air handling units – Ratings and performance for units, components and sections”

Both standards have been revised and now also exist as a EN standard.

The characteristic of the casing wall construction must be established in accordance with EN 1886, based on measurements carried out on a model box.

A model box is an air handling unit without its installed components, except the filter, consisting of two sections with a joint. The operating side of each section has one access door, hinge type, and including fixed panel.

A filter holder (with filter media) installed while all measurements are taken, allowing filter bypass leakage to be measured. The filter frame is placed away from the section joints and is accessible on both sides over the access doors. The model box is placed on the base frame.

Mechanical strength, casing air leakage, filter bypass leakage, thermal transmission and acoustic characteristics are determined on the basis of measurements taken on a model box.

### 2.1 Mechanical Strength

There are two test criteria for mechanical strength:

- Relative deflection [ $\text{mm} \times \text{m}^{-1}$ ] of posts and panels under normal design conditions
- Mechanical resistance [no permanent deformation] against maximal fan pressure

When testing the mechanical strength of the model box, the following test pressures apply:

#### Deflection

- 1000 Pa over and under-pressure in accordance with EN 1886

#### Fan pressure

- 2500 Pa over and under-pressure in accordance with EN 1886

The standard differentiates between the following classes:

Mechanical classes in accordance with EN 1886			
Deflection class	Maximum relative deflection $\text{mm} \times \text{m}^{-1}$	resistance against maximum fan pressure	Quality
D1	4	Yes	+ ↑ -
D2	10	Yes	
D3	No requirements	Yes	

In the tables the classes the construction model box complies with are marked in blue .

\* See chapter 4 “Casing”

### 2.2 Casing Air Leakage

Depending on the construction of the model box and the nominal operating pressures air leakage is measure at the following test conditions:

- All sections at 400 Pa negative pressure, if there is only negative pressure in the unit.
- Positive pressure sections at 700 Pa or higher positive pressure, if the operating pressure after the fan is higher than 250 Pa. If the operating pressure that occurs is higher than 700 Pa, the positive pressure sections are tested under actual pressure conditions. The remaining sections are tested at 400 Pa negative pressure.

The permissible air leakage is linked to the filter class in the relevant casing section. The tables below list the air leakage classes together with the associated filter classes.

Air leakage classes in accordance with EN 1886				
Leakage class	Maximum leakage at - 400 Pa $l \times s^{-1} \times m^{-2}$	Maximum leakage at + 700 Pa $l \times s^{-1} \times m^{-2}$	Maximum filter class acc. to En 779	Quality
L1	0.15	0.22	Better than F9	+ ↑ -
L2	0.44	0.63	F8-F9	
L3	1.32	1.90	G1-F7	

In the tables the classes the construction model box complies with are marked in blue .

\* See chapter 4 "Casing"

### 2.3 Filter Bypass Leakage

Filter bypass leakage refers to the total amount of unfiltered air after the filter section. The unfiltered air flow is the sum of

- Air that passes the filter medium outside the filter section
- Air leakage through the walls of the sections after the filter, with negative pressure

Bypass leakage through the filter section is measured at 400 Pa negative and positive pressure over the filter section, and filters are sometimes replaced by dummy plates with an air tightness mechanism identical to the one of the filters.

The tables below list the total admissible bypass leakage k in % of the design air flow over the filters as a function of the built-in filter class.

Maximum admissible filter bypass leakage in accordance with EN 1886					
Built-in filter class	G1 - F5	F6	F7	F8	F9
Total bypass leakage k%	6	4	2	1	0.5

\* Bypass leakage through the filter section is measured at 400 Pa negative pressure.

\*\* Bypass leakage through the filter section is measured at 400 Pa positive pressure.

If marked in blue  in the tables. In accordance with standard EN 1886 this is based on a face velocity of 2.5 m/s over the filter (e.g.: 0.93 m<sup>3</sup>/s for a 610 x 610 mm filter).

In the tables the classes the construction model box complies with are marked in blue .

\* See chapter 4 "Casing"

### 2.4 Thermal Transmission

The thermal transmission of a model box is the average heat transfer coefficient of the construction in  $W \times m^{-2} \times K^{-1}$ , referred to the external surface. The measurement is carried out with heat sources in the model box, where the total power input and the average temperature difference between inside and outside is determined at a stable condition. Thermal transmission is the ratio between the total power input and the internal/external surface temperatures times their surface area. Depending on the measured values the construction has in one of the following classes:

For the casing wall construction thickness 0.6mm and 0.8mm the measured thermal transmission is T2, rest are T3 as shown in the table below.

Thermal transmission U according to EN 1886		
Class	Heat Transfer Coefficient [ $W \times m^{-2} \times K^{-1}$ ]	Quality
T1	$U \leq 0.5$	+ ↑ -
T2	$0.5 < U \leq 1.0$	
T3	$1.0 < U \leq 1.4$	
T4	$1.4 < U \leq 2.0$	
T5	No requirements	

In the tables the classes the construction model box complies with are marked in blue .

\* See chapter 4 "Casing"

## 2.5 Thermal Bridges

The thermal bridging factor of a model box is measured for the same set-up that is used to determine the heat transfer coefficient. At the stable condition the highest detectable surface temperature on the outside surface of the model box is measured.

The thermal bridging factor is the quotient of indoor air temperature minus highest surface temperature and the air temperature difference between inside and outside. The measured value is in one of the classes below and indicates if there is surface condensation or not. As the thermal bridging factor increases, the possibility of condensation decreases.

For classes TB3 and TB4 1% of the external surface may have a higher temperature than the maximum admissible value for the class in question; this does not apply for classes TB1 and TB2.

For the casing wall construction thickness 0.6mm and 0.8mm the measured thermal bridging is TB2, rest are TB3 as shown in the table below.

Thermal bridging factor $k_b$ according to EN 1886		
Class	Thermal bridging factor [ $k_b$ ]	Quality
	EN 1886	
TB1	$0.75 < k_b \leq 1.0$	+ ↑ -
TB2	$0.60 < k_b \leq 0.75$	
TB3	$0.45 < k_b \leq 0.60$	
TB4	$0.30 < k_b \leq 0.45$	
TB5	No requirements	

In the tables the classes the construction model box complies with are marked in blue .  
 \* See chapter 4 "Casing"

## 2.6 Acoustic Casing Insulation

Acoustic casing insulation, as defined by EN 1886, is the attenuation achieved by enclosing a noise source with a model box.

For this purpose the average sound pressure level of a noise source placed on the floor, is measured in an imaginary enclosing area. The measurement is repeated in the same enclosing area, but with the noise source in the model box. The difference in the measured sound pressure levels, divided into octave bands of 125 to 8000 Hz, is the attenuation of the casing wall construction, including the doors and joint.

For the casing wall construction thickness 0.6mm the measured attenuation is shown in the table below.

Acoustic casing insulation in accordance with EN 1886							
Average octave band frequency [Hz]	125	250	500	1000	2000	4000	8000
Attenuation [dB]	12.5	11.0	9.6	13.8	26.6	32.5	41.3

Note: As detailed above this is for a complete AHU construction model box, not just a panel in the wall type test.

In the tables the classes the construction model box complies with are marked in blue .  
 \* See chapter 4 "Casing"

### 3 SIZING/RANGE

- 95 different standard sizes
- Nominal selection range between 0.30 m<sup>3</sup>/s (1,080 m<sup>3</sup>/h) and 31.60 m<sup>3</sup>/s (113,760 m<sup>3</sup>/h)
- Optimized selection possible for each air flow and each configuration
- Insulation types for indoor, outdoor, vertical and ceiling mounting and stacked.

- Flexibility
- Made-to-measure

Height	Width	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	25	Width	Height
2.5		0.3	0.4	0.5	0.6	0.7																	2.5
4		0.6	0.8	1.0	1.2	1.4	1.5	1.7	1.9	2.1													4
6			1.3	1.6	2.0	2.3	2.6	2.9	3.2	3.5	3.7	4.1	4.4	4.7									6
8			1.8	2.3	2.7	3.2	3.5	4.0	4.4	4.9	5.4	5.8	6.2	6.7	7.1	7.4	8.0	8.3					8
10				3.5	4.0	4.6	5.1	5.7	6.2	6.8	7.5	8.1	8.6	9.1	9.7	10.3	10.9	11.9	13.1				10
12					6.2		7.6	8.4	9.1	9.7	10.5	11.1	11.8	12.6	13.3	14.7	16.1	16.7					12
14															14.0	14.8	15.7	17.3	19.0	19.9			14
16															16.1	17.1	17.5	19.7	21.9	22.9			16
18																	19.8	22.3	24.5	25.6			18
20																	22.1	24.9	27.4	28.6			20
22																	24.4	27.5	30.2	31.6			22

39HQM Model Box
39HQM Model Box Range with Heat Wheel Recovery

Module dimension: 160 mm  
 External width: n x module plus 98 mm  
 External height: n x module plus 98 mm  
 Support height: 160 mm, 100mm or 62 mm

Example: Type 39HQM1210  
 Width: 12 x 160 plus 98 = 2018 mm  
 Height: 10 x 160 plus 98 = 1698 mm excl. base frame  
 Nominal air flow: 6.21 m<sup>3</sup>/s

\* Values are in m<sup>3</sup>/s

\*\* Larger sizes are available on request

## 4 CASING

The construction of the 39HQM air handling units consists of a frame and panels, profiled casing sides of aluminum anodized E6 material finish as per DIN 17611.

Aluminum frame holds a 60-mm double-skin casing wall with panels, doors, inspection hatches and removable center posts.

The casing wall construction comes in several options of steel thicknesses (0.6, 0.8, 1.0, 1.5 mm) and material types (GI and SS). The standard casing wall construction consists of internal and external panel thickness with injected polyurethane in between. Panels come with 40kg/m<sup>3</sup> density injected polyurethane insulation as standard. The K value of the polyurethane is 0.019 W/M °C

- Aesthetic styling
- No deformation during transport, installation and operating life due to stable post construction
- Panels removable by using center posts
- Air handling unit surfaces smooth inside and outside without protruding parts

- Durable
- Can be assembled on site
- Maintenance and user-friendly



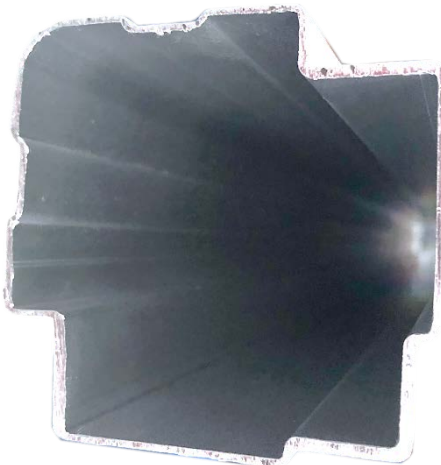
Removable Panels

### 4.1 Frame

#### 4.1.1 Casing Profile

- Aluminum anodized E6 material finish profile as per DIN 17611
- No air circulation
- Profiles are hermetically sealed at the ends
- Resistant against over and under-pressure up to 2500Pa

- Optimal energy efficiency
- Durable
- Corrosion resistant
- Hygienic



Casing Profile

### 4.1.2 Plastic Corners

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• Corner hermetically sealed by airtight bulkheads</li><li>• Shock-proof and stable Acrylonitrile Butadiene Styrene (ABS)</li><li>• Resistant against weather aggression and high and low temperature</li></ul> | <ul style="list-style-type: none"><li>• Corrosion resistant</li><li>• Durable</li><li>• Hygienic</li></ul> |
|---|--|



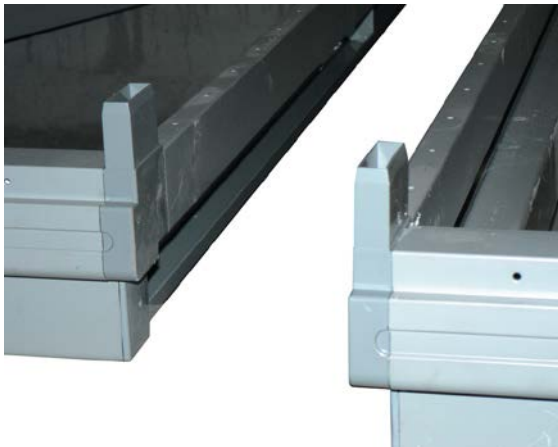
ABS Plastic Corner



Airtight Bulkheads

### 4.1.3 Connection Posts

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• No longer than module size, using unique coupling system</li><li>• Air handling unit stays flat due to the use of coupling strip</li><li>• Connections flat on both sides, air tightness and thermal performances guaranteed after connection</li></ul> | <ul style="list-style-type: none"><li>• Space-saving</li><li>• Made-to-measure</li><li>• Maintenance-Friendly</li><li>• Hygienic</li><li>• Optimal energy efficiency</li></ul> |
|---|--|



ABS Plastic



Connection Post



Connection Strip

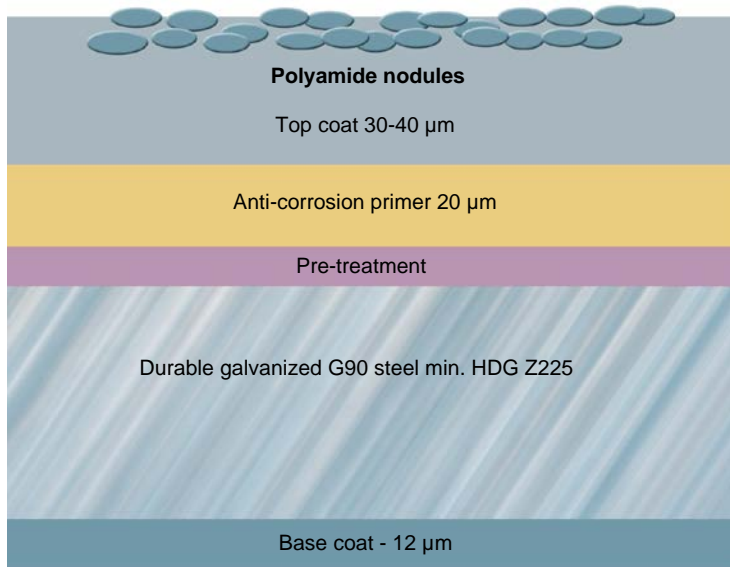


Base Frame

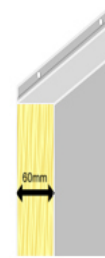
## 4.2 Casing Wall

### 4.2.1 Panels

- Made of durable galvanized sheet steel treated with a weather and scratch-resistant coating on both sides
  - Closed interior using sealing flanges and sealing joints
  - Panels are airtight, vapor-resistant and corrosion-resistant
  - Floor panels filled with PU, can be walked on
  - Panels frequently removable by using quality materials
  - Fire retardant PU class B2 of DIN 4102 insulation material
  - Base color grey (RAL-7035)
- Optimal energy efficiency
  - Durable
  - Maintenance and user-friendly
  - Corrosion-resistant
  - Safe
  - Noise dampening



Panel Coating



60 mm Thick Panel



Closed Interior

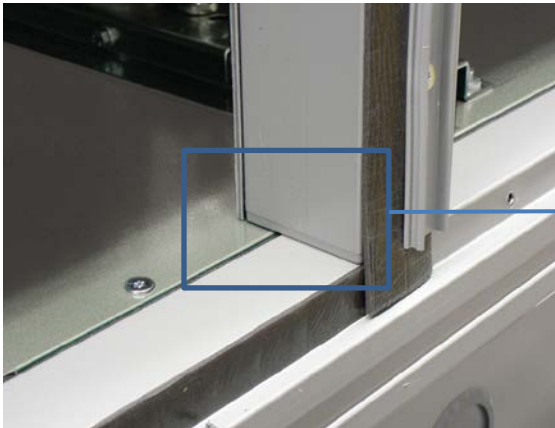


Easy To Remove

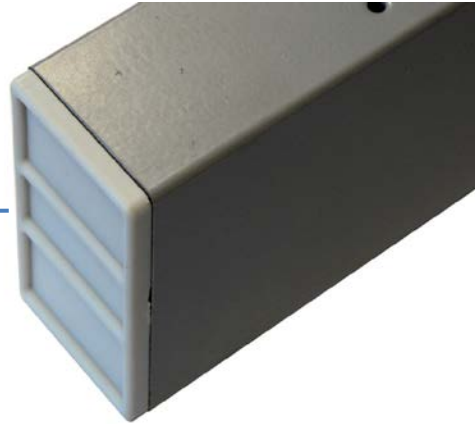
#### 4.2.2 Center Posts

- Easily removable
- Air handling units has easy access, making components easy to reach and replace
- Minimal bypass over the part by sealing
- Airtight sealing by special covers

Maintenance and user-friendly  
Optimal Energy Efficiency  
Durable  
Hygienic



Center Post with Plastic Cover



Plastic Cover

#### 4.2.3 Doors and Inspection Hatches

- Completely smooth inside surface
- Doors and inspection hatches have the same thickness (60 mm) as the panel. The technical specification of the casing wall remains the same when a door or hatch is included
- No thresholds
- Hinge
  - Stable construction makes adjustment unnecessary
  - Durable through use of plastic bearing bushings
  - Fully fixed
- Airtight and vapor-resistant
- Airtight seal using rubber sealing strip
- Easy access with variable dimensions up to 3 meters high
- Minimum of two locking points – one with lock that can only be opened with a special key
- Several types of handles:
  - L grip cylinder lock
  - Overpressure safety device

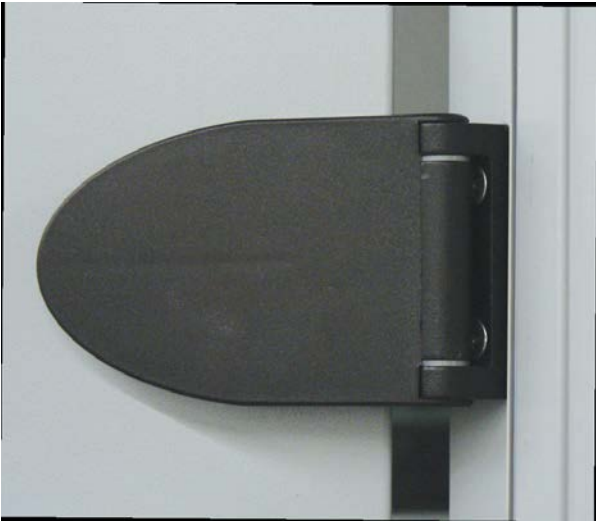
- Durable
- Optimal energy efficiency
- Maintenance and user-friendly
- Hygienic
- Safe



Door Post



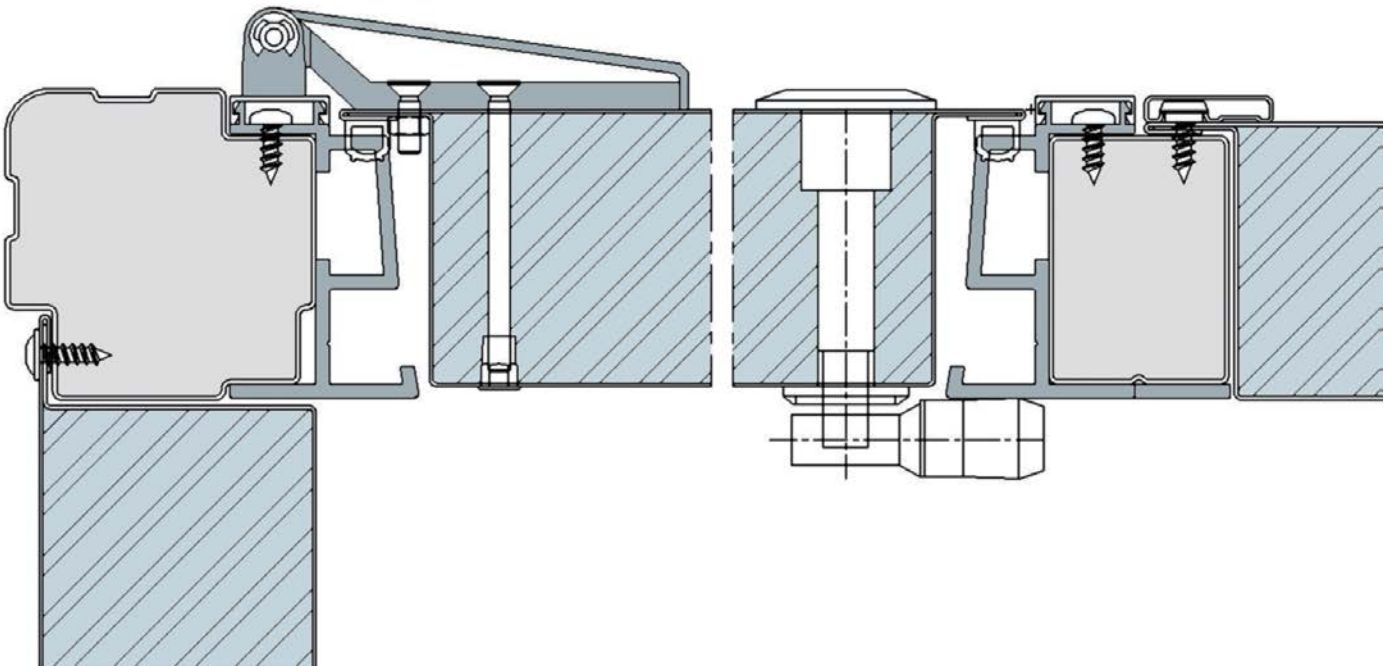
Roller Bearing



Hinge



No Threshold



Fully Fixed



Lock



Special Key



Door



Overpressure Safety

## 5 DAMPERS

- Inlet openings possible in all position:
  - Full face
  - Half face (top, middle, bottom)
  - Roof and floor
  - Service and non-service side
- Shorter length for middle inlet opening for optimal air distribution
- Standard construction flange case frame from 1.5 mm aluminum at both side, galvanized steel dampers as optional.
- Parallel blades with single skin and laminar profile blade design provide low resistance to airflow, Opposed blade offered an option
- Low sound level and low air pressure losses with optional hollow aerodynamic profile damper blades
- Low torque requirement and precise control with external spindle, side linkage with parallel or opposite blade operation
- Non-corrosive bronzed bushing for less resistance
- Low standard leakage
- Non-welded damper blades made of aluminum ensures corrosion resistant
- Dampers are compatible with field supplied and installed actuators

- Made to measure
- Durable
- Minimal air resistance



Dampers

## 6 FILTERS

All possible filter types such as pre-filters, panel, bag, pleated and HEPA are available.

- Bag filters can easily be removed from the outside in one move by using filter frame coupling brackets
- Shorter casing length required
- Slide-in filters possible for all sizes
- Minimal bypass leakage up to and including filter class F9
- Filter pressed against the filter frame by filter positioning bracket
- Use of differential pressure gauge indicates when filters require changing
- Space-saving
- Maintenance-friendly
- Hygienic
- Optimal filter efficiency
- Long life



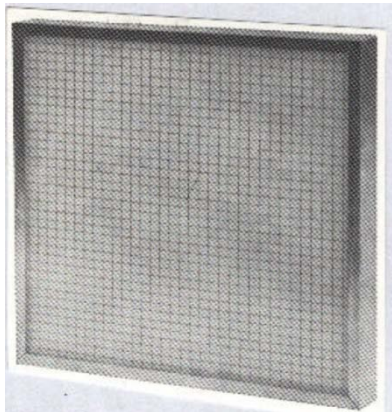
Filter row can be completely pulled out in one move



Filter Profile



Aluminum Filter Wire Mesh Form (G2)



Synthetic Filter Media Flat Form (G3)



Synthetic Filter Media Pleated Form (G4)



Bag Filter (M5, F7, F8 and F9)

## 7 HEAT RECOVERY

### 7.1 Heat Recovery Wheels

- 1) Condensation Rotor
- 2) Hygroscopic Rotor
- 3) Sorption Rotor

- Efficient energy recovery method
- Total energy saving of heat recovery wheel system
- Various installation possibilities: installation with or without inspection hatch and added sections
- Access hinge as an option
- Heat recovery wheel casing connects to air handling unit casing
- Permanent seal using adaptive perimeter seal
- Optimal energy efficiency
- Low operating costs
- Maintenance and user-friendly
- Hygienic



Access Hatches/Inspection Section



Heat Recovery Wheel



Drive



Seal

## 7.2 Plate Heat Exchangers

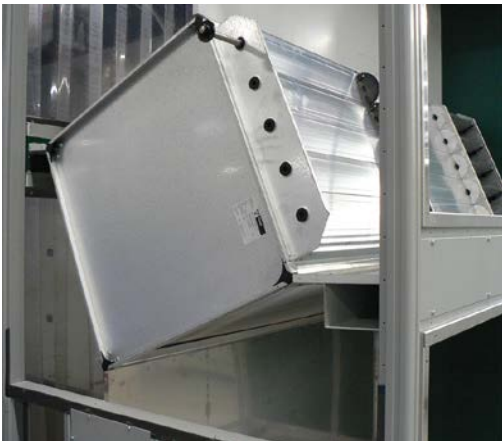
- Optimal use of air handling unit cross section
- Complete separation of supply and return air
- Bulkhead insulated
- Optionally equipped with face and bypass dampers
- Optimal energy efficiency
- Fully controllable



Drain Pan with Drain



Plate Heat Exchanger



Face and Bypass Damper

## 7.3 Heat Pipe

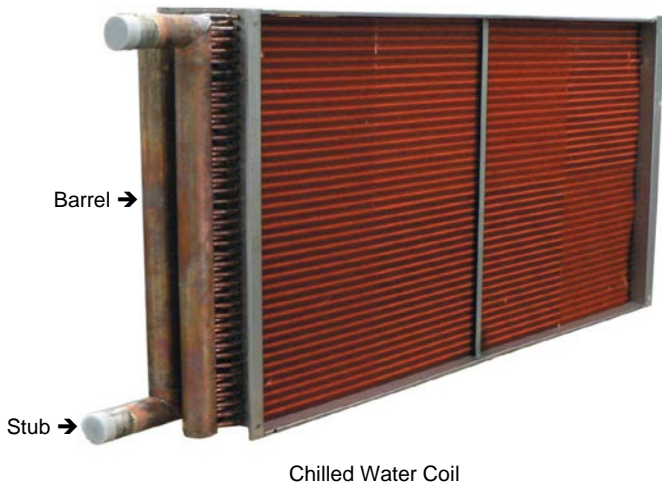
- Refrigerant based medium with Cu/Al or Cu/Cu coil construction
- Complete separation of supply and return air
- Natural refrigerant flow no pump and no motor required
- Less maintenance
- Optimal energy efficiency
- No contamination

## 8 COILS

Carrier 39HQM air handling units offers several different coil applications such as chilled water, hot water, direct expansion (DX).

- Coil designed and manufactured as per *Carrier* standard and according to AHRI and DIN standard
- Optimized coil fin surface as a function of header diameter
- Coils selected based on environmental and economical reasons, water-side pressure drop for low primary energy costs in accordance with the Eurovent recommendations for calculation of energy consumption for air handling units
- Coils come in a cartridge type construction with a single pair as a standard or dual connection pairs as option
- CU- CU, CU-AL and CU- AL Pre coat coils are available, additional coating option available
- Water coils are standard with steel header (steel barrel and steel stub connection, threaded end 11 TPI)
- Different header options are available with copper header (copper barrel and copper sweat connection) or copper steel header (copper barrel and steel stub connection, threaded end 11 TPI)
- All coil headers and stubs are spray painted for additional protection
- All water coil headers are equipped with drain and vent connections
- All coils shall have counter flow arrangement
- Header and connection for DX coil is made of copper with sweat connection

- Optimal energy efficiency
- Low operating costs
- Hygienic
- Maintenance and user friendly



Rubber Seal Internally and Externally



Purge and Vent Valves

## 9 ELIMINATOR

- Cartridge type, fully assemble and directly attach to coil frames
- Frame made of galvanized steel
- Blades made of MRP PVC for highest corrosion resistant
- Blade's profile designed for lower pressure drop and highest efficiency

- Easy to maintain
- Corrosion resistant
- High Efficiency



PVC Eliminator

## 10 FANS

### 10.1 Fans

- The fan quality, air side and acoustic performance are certified to AMCA standard
- Double inlet double width (DIDW) belt drive
- Aerofoil backward and forward curve blades
- Aerofoil blades impeller and shaft balanced as an assembly in accordance with DIN ISO 1940
- The impeller is galvanized steel finished for forward curve blade and epoxy painted for backward aerofoil blade
- Both forward and backward impellers are with laminar design and aerofoil impellers are with aerodynamic design
- Forward and backward impellers are statically and dynamically balanced according to ISO 1940 with grade G4
- Fan bearings are pre-lubricated and maintenance free. Nominal life expectancy is designed up to 40,000 L<sub>10</sub> operating hours (according to DIN ISO281 Section 1).
- Aerofoil performance in accordance with DIN 24166  
Class 1 / BS 848 Class "A" (Size 0315 – 0710) or  
Class 2 / BS 848 Class "B" (Size 0200 – 0280)

- High quality
- Low noise level
- Optimal energy efficiency
- Low operating costs



Dual Fans



Centrifugal Fans

### 10.2 Motors

- High-quality motors in accordance with IEC
- IE1 standard efficiency, IE2 high efficiency and IE3 premium efficiency
- Motors are of totally enclosed fan cooled (TEFC) with finned casing surface
- Index of protection IP 55 that protect motor from dust and water
- Metal frame from aluminum and steel for excellence heat transfer, strength and ruggedness
- 3-phase, DOL, Star-delta induction motor with six terminals  
System with  $\geq 5.5\text{Kw}$  motor run fan motor with soft starter recommended.
- PTO (thermal overload protection – normally closed), protecting motor when temperature reaches  $170\text{ }^{\circ}\text{C}$
- Insulation class F at  $40\text{ }^{\circ}\text{C}$  ambient temperature and continues duty
- Voltage tolerance  $\pm 10\%$  and frequency tolerance  $\pm 5\%$
- Normal operating condition compliance with IEC 34-1 within ambient  $-16\text{ }^{\circ}\text{C}$  and  $+40\text{ }^{\circ}\text{C}$  at below 1000 meter altitudes and at 1050kPa (mbar) atmospheric pressure

- High quality
- Safe
- Optimal energy efficiency
- Low operating costs



Motor

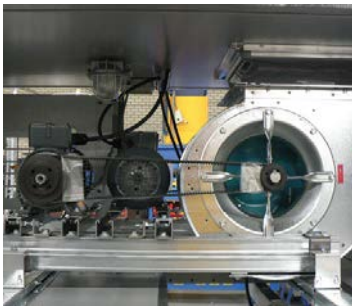
### 10.3 Transmission

- Fan assembly complete with a label with the exact data for belt tensioning
  - Drive package details are available in label, belt tension force, belt deflection, fan pulley part no., motor pulley belt part no. and center to center distance are indicated on a label attached to fan access door
  - Drive selected considering the maximum admissible power on the bearing ring to ensure a bearing life of  $L_{10h}$
  - Tension base adjustable with one bolt
  - The pulleys are taper locked to the fan and motor shaft
  - Optional variable pitch pulley fixed to the motor is available for motor size to 7.5kW
- High quality
  - Optimal energy efficiency
  - Made-to-measure

### 10.4 Mounting

Various mounting possibilities: single, dual, run & standby motors. There are also five fan discharge position available as standard.

- The complete fan assembly is slide-out and vibration-free structure
  - Flexible connections are always used between fan and pressure wall
  - Transport protection
- Noise reduction
  - Maintenance and user-friendly
  - Hygienic



Run and Standby Motor

### 10.5 Options

- Access screen fan section behind the door
  - Various bearing versions
  - Pressure measuring points
  - Lifting frame
  - Air distribution screen
  - Isolator
- Safe
  - Maintenance and user friendly
  - Made-to-measure



Air Distribution Screen



Access Screen

## 10.6 Direct-Drive Centrifugal Fans

- Compact installation
- Special coupling
- No fan belt erosion
- Mandatory to connect with Variable Frequency Drive (VFD)
- Made-to-measure
- High quality
- Optimal energy efficiency



Direct Driven Fan

## 10.7 Plug Fans

- Easy to clean
- No fan belt erosion
- Mandatory to connect with Variable Frequency Drive (VFD)
- Maintenance and user-friendly
- Hygienic



Plug-in Fan

## 11 SOUND ATTENUATORS

- Optimized for module system and full height
- Absorption as well as resonance damper
- Supplied with an erosion-resistant top layer as standard
- Removable using a simple removable comb profile
- Splitters optionally supplied with face profile
- Various splitter lengths are available to provide a range of attenuator performance
- The sides exposed to the air stream are covered with a glass fiber scrim to avoid erosion to the mineral wool by the air stream
- Made-to-measure
- Acoustic
- Maintenance and user-friendly



Comb Profile

## 12 ELECTRIC HEATER

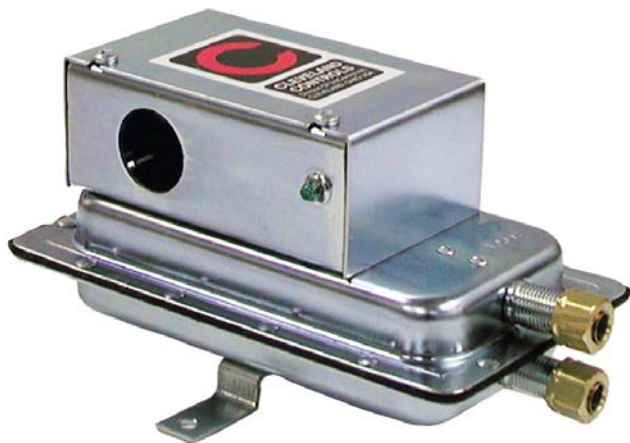
- Electric heater shall be of cartridge type
  - Heaters shall be framed with slide in-out track so that the complete assembly is removable
  - Heating element is made of composition 80% Ni and 20% Cr
  - Assembly of the heating element is secured inside the stainless steel spherical fins copper tube
  - Heating component is according to AISI 321 and AISI 430
  - Heating elements are wire in star or delta according to the power supply and pre-wired to the terminal block in the wiring box
  - Automatic and manual reset thermal overload installed
  - Airflow switch installed to interlock fan with heater, high pressure side to be connected to atmospheric pressure
  - Various kW stages options are available
  - Special heaters are available on request
  - Final wiring diagram for MCC panel, consult factory
  - Thyristor control heater optional, consult factory
- Made-to-measure
  - Maintenance and user-friendly
  - High Quality



Manual Reset Switch



Automatic Reset Switch



Air Pressure Sensing Switch



Anti-Radiation Screen Optional

## 13 HYGIENIC AIR HANDLING UNITS

39HQM Hygienic Air Handling Unit shall be made of materials that do not emit harmful substances and do not provide a nutrient medium for microorganisms. For this purpose it shall be ensured that the selected components used do not release any harmful substances, fibers, or odors into supply air flow and do not stimulate the growth of microorganisms.

39HQM Hygienic Air Handling Unit meeting strictly hygiene standards using materials comply with health requirements and all internal surfaces are smooth to facilitate cleaning and disinfection process.

39HQM Hygienic Air Handling Unit has been designed to meet DIN 1946-4, VDI 6022, EN1886 and EN13053 which guarantee that the Air Handling Unit can provide supply air flow with excellent level of hygiene and air cleanness. Supply air shall be harmless to human health and free of odors.

### 13.1 Design Criteria

Air handling units shall be designed, operated and maintained as to avoid an additional load by harmful substances as well as inorganic and organic contaminants. The following are the major design objectives for the 39HQM Hygienic AHUs

- Closed-pored sealing materials shall not absorb any humidity or release any odors, reduce the accumulation of dirt and bacteria
- Easy to access all internal components through access door or removable panels, for easy inspect, clean and maintenance
- Flat and smooth internal surfaces with no sharp edges, no gap between panels and gap between panels and casing profile
- Access doors coming with Hygienic view port for easy inspection
- Made-to-measure
- Maintenance and user-friendly
- High Quality

### 13.2 Air Handling Unit Construction

- Double-skin injected PU panel with 60 mm panel thickness class D1 meeting EN1886
- Inner skin panel made of Stainless steel
- Outer skin panel made of pre-painted anti scratch steel
- Interior wall surfaces shall be smooth and free of open absorption areas and insulating materials.
- Panel to panel and panels to casing shall be sealed with hygienic sealant, no grooves are allowed for bottom, top and side panels to guarantee easy cleaning.
- Components shall be easily accessible from the upstream and downstream sides, if required.
- Access door can be with hygienic view port, if required.
- Internal metal parts shall be made of corrosion resistance material.
- Internal fasteners shall be made of Stainless steel.
- Easy to maintain
- Corrosion resistant
- Hygienic



Corrosion Resistance Material



Stainless Steel Inner Skin Panel

### 13.3 Air Flow Control Dampers

- Air handling units shall be equipped with airtight dampers in accordance to DIN 1946-par 4
  - Extruded aluminum blades and frames damper with blade seal shall be used
  - Class 4 UNI EN 1751 : 2003
  - Gear mechanism – polypropylene, housed inside the shoulder profile.
  - Gasket and gear materials are according to VDI6022
- Durable
  - Minimal air resistance
  - Air tight



Air Flow Control Dampers

### 13.4 Air Filter

- Filters shall be in accordance with ISO 16890
- Filters can be easily accessed and inspected at any time.
- Stainless steel filter frame, filter lock and clamping bolt.
- Filter holder should be install in the same direction of air flow in accordance with DIN 1946 -4
- For maintenance purposes, the space required for filter change (at least the construction depth of the respective filter) shall be provided upstream of the filter unit ensuring accessibility through the filter access door.
- A multiple stage filtration system is necessary to remove particulate contaminants, including microorganisms as per the following, in accordance to DIN1946-4
  - › 1st filtration stage: at least class ePM1 50% ISO 16890 filters are recommended
  - › 2nd filtration stage: class ePM1 85% ISO 16890 filters
  - › 3rd filtration stage: class H13 HEPA filters

- Durable
- Minimal air resistance
- Air tight



Stainless Steel Filter Frame

### 13.5 Heat Exchanger

- Heat exchangers shall be designed in such a manner that they are not prone to strong contamination, allow easy cleaning and disinfection, if necessary.
- Surfaces in contact with the air shall be smooth and corrosion-resistant.
- The fin spacing shall be matched to the expected dust load.
- Air filtration is recommended in order to reduce contamination and extend cleaning intervals.
- Heat exchangers shall allow sufficient access from both sides for visual inspection.
- Droplet Eliminator downstream cooling coils shall be easily accessible and quickly removable.

- Optimal energy efficiency
- Maintenance and user-friendly



Easily Removable Droplet Eliminator



Heat Exchanger

### 13.6 Air Humidifier

- Humidifier shall be installed with at least an element like coil, fan, heat exchanger, droplet separator between humidifier and final filter or silencers.
- Cooling coil shall not be arranged immediately before air filters or silencers. Fans or heaters shall be installed in between to limit the relative humidity.
- Air-humidifying components shall be easily accessible.
- Stainless steel drain pan should be used with the humidifier section.

- Hygienic
- Maintenance and user-friendly

### 13.7 Fan

- Prefer fans and fan drives which are unlikely to impair the air quality through belt abrasion.
- A filter stage shall be installed in the airflow downstream of supply-air EC or Plug fans.
- Water precipitation in the fan housing shall be prevented.
- Fans shall be accessible for maintenance.
- Free-wheel impellers without housings are recommended for radial fans as they are easy to clean.
- Fans with housing shall have an easily removable inspection lid (applicable for nominal impeller diameters greater than 400mm)

- Low noise level
- Optimal energy efficiency
- Low operating costs



Plug-in Fan

### 13.8 Sound Attenuator

- Silencers and acoustic baffles shall be designed to be replaceable.
  - Silencers should not place in regions with unfiltered outdoor air.
  - Silencers must not be installed directly downstream of coolers with dehumidifiers or heat recovery units with dehumidifiers.
  - Silencers casing should be stainless steel.
  - The sound-absorbent components shall be lined with a material that is permanently abrasion resistant, withstands the effects of cleaning and is harmless to human health.
- Low noise level
  - Optimal energy efficiency
  - Low operating costs



Sound Attenuators

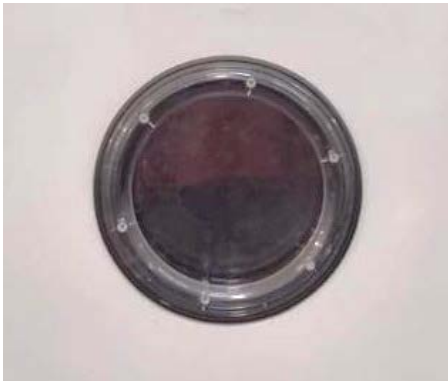
### 14 STARTER PANEL

- Direct Online: or DOL is the type of starter panel which includes providing power to the motor directly with the use of Circuit Breaker, Overload relay and contactor. Silencers should not place in regions with unfiltered outdoor air.
  - Star Delta or S/D is the type of starter panel which operation is such that it will run initially in star connection as motor draws higher current in starting and after motor reaches its rated speed connection is automatically converted to delta connection. This helps to reduce electrical grid load.
  - Variable Frequency Drive or VFD allows the user to fully control the speed and torque of motor for smoother operation and better load control.
  - Degree of protection for shall be IP-54/55,
- Made-to-measure
  - Maintenance and user-friendly
  - High Quality



Starter Panel

## 15 ACCESSORIES



View Port



Dial Gauge

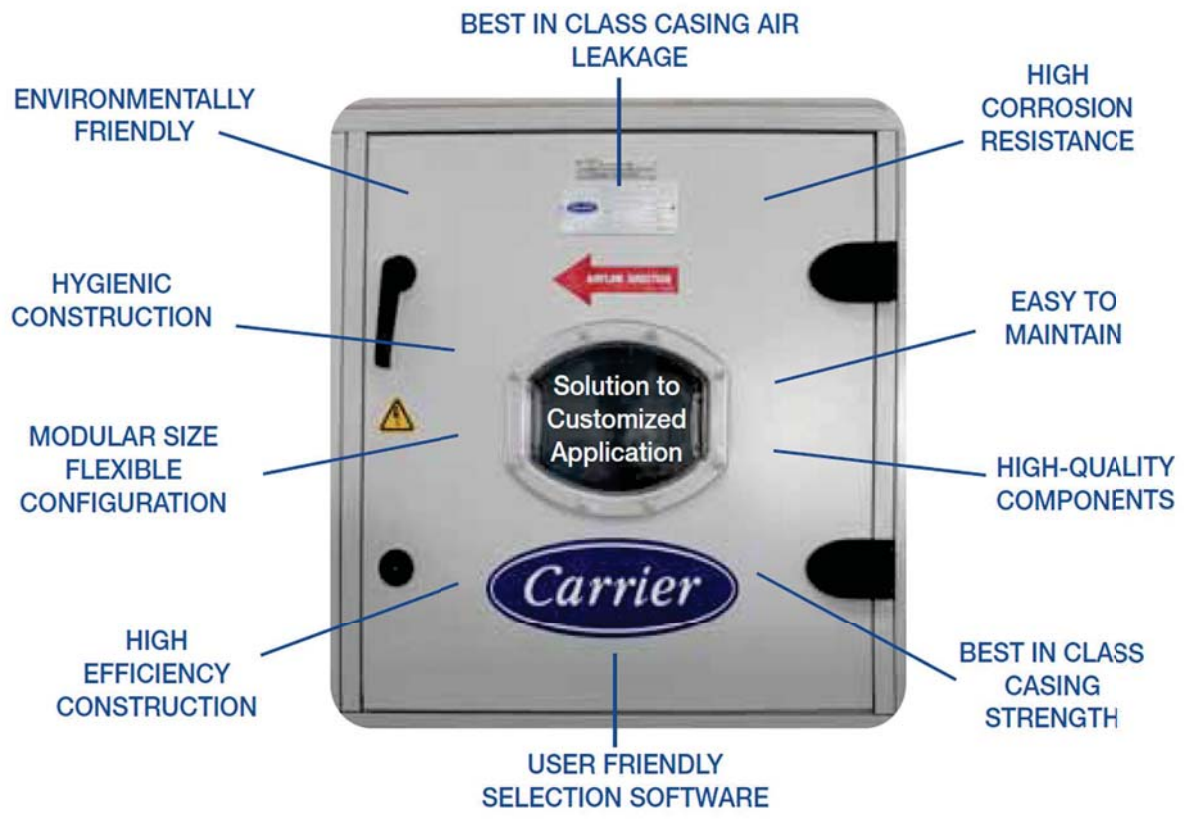
- Differential pressure switch
- Duct connection flange
- Differential pressure gauge
- Measuring point
- Frequency controller
- Lighting with switch
- View Port



Light Fitting

## NOTES

# AIROVISION™



Energy Recovery

Air Management

Air Filter



The manufacturer reserves the right to discontinue , or change at anytime, specification or design without notice and without incurring obligation.

Supersedes: 39HQM-CG12-24

Order Number: 39HQM-CG13-24