

ECO COOLER

Heat Recovery

Air Flow from 1700 m^3/h to 100000 m^3/h



ECO COOLER

AIR CONDITIONER

MULTI STAGE EVAPORATIVE COOLING





Special Public places
Commercial, Office, Hospital, Restaurant,
Coffee shop & Etc .

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GENERAL

Knowledge of our customers' needs, European regulations (Eurovent), and local regulations in different countries, combined with the extensive experience of our team, has enabled us to develop and launch a new generation of air-handling units. This new generation features not only significantly better parameters but also greater reliability. The new Eco Cooler air-handling units significantly enhance the quality level of RIC air-handling units and set a new, higher standard.

ECO COOLER air handling units enable us to offer customers reliable and high-quality equipment whose technical parameters allow for the creation of not only comfortable microclimates in various premises but also alignment with modern ecological and energy-efficient requirements

INTRODUCTION

Given the increasing environmental pollution, the quality of the air we breathe is of vital importance. Air-handling units are designed with essential features for sensitive installations in high-demand air conditioning applications such as hospitals, shopping malls, oil refineries, industries, electronic facilities, etc.

The purpose of this catalog is to assist consulting engineers in the preliminary selection of ECO COOLER Air Handling Units. However, if necessary, our local sales office will assist in conducting a computerized selection to confirm or complete your preliminary choice.

FLEXIBILITY

ECO COOLER AHUs offer the ultimate in dimensional, material, and component flexibility.

ECO COOLER AHUs have the same appeal for both 'standard' and 'custom' markets. The design and construction of an air-handling unit determine its performance.

Engineering Flexibility:

- Variety of case sizes.
- Material and component flexibility.
- Variable-sized inlet and discharge openings.
- Stacked and custom configurations.
- Panels are individually removable without affecting structural integrity.

Dimensional Flexibility:

We can design our AHUs to fit the application and space. With up to 30 case sizes and hundreds of cross-sectional possibilities, we can create the best match for your application.

Material Flexibility:

A complete line of construction materials is available, including galvanized steel, aluminum, painted steel, stainless steel, and more. ECO COOLER AHUs can handle a multitude of environments, from the most benign to the most corrosive.

MODULAR DESIGN

Based on modularity and a flexible approach, the unique ECO COOLER Air Handling Unit allows you to choose the exact level of functionality required by a specific project. The modules are joined together and with all the functionalities contained in just one unit. Installation and maintenance, therefore, have never been seen so easier.

RELIABLE BRAND



OUTSTANDING FEATURES

Heat Recovery Unit

- We offer 30 different models of units within an airflow range of 1000-60000 CFM, categorized into Hygienic and Non-Hygienic types.
- The design, manufacturing, and equipment provision procedures adhere to VDI 6022 standards.
- The unit casing consists of panels and frames. The panel construction features a double-skin sandwich panel with 50-mm injected polyurethane foam at a density of 40 kg/m³, compliant with DIN EN 13053-6.2. In the Hygienic models, the panel's inner skin is made of stainless steel, while in the non-hygienic models, it's constructed from galvanized steel sheet coated with polyester electrostatic powder. The panel's outer skin is composed of a galvanized steel sheet coated with 200-micron-thick PVC. The frame is built using PROLAM aluminum profiles certified by **DIN EN 13779-8.2**. The inner surface is curved and smooth to prevent contamination deposition.
- Construction frame classifications following **EN1886** are:
 - Mechanical strength (–1,000 Pa): D1 (M)
 - Mechanical strength (+1,000 Pa): D1 (M)
 - Casing air leakage (–400 Pa): L1 (M)
 - Casing air leakage (+700 Pa): L1 (M)
 - Thermal transmittance class: T2
 - Thermal bridging class: TB1
 - Filter class: F9



OUTSTANDING FEATURES

Heat Recovery Unit

- The access door is equipped with an adjustable polyamide lock and hinge and sealing gasket suitable for negative and positive pressure conditions in accordance with **VDI 3803/1-5.1**.
- The minimum width of the access door to access and inspect all sections of the unit is 40 cm, complying with DIN EN 13053-6.2.
- The fan type includes low-noise forward double-inlet centrifugal or plug type manufactured by **Nicotra-Gebhardt** or **Comefri**, meeting manufacturing standard **DIN 19464-6.5.10** and testing standard **AMCA 210**.
- The fan and motor assembly are mounted on a common base with a shock absorber, and the fan outlet is isolated from the casing by a flexible connection, completely separated from moving parts. Moreover, the forward or plug fan may be selected according to the total air pressure drop and volume.
- The fan motor features IP55 and type F insulation.
- Dampers are made of aluminum airfoil-shaped profiles with fibered polypropylene gears, enabling easy motor installation in accordance with **VDI 3803/1-5.2.9**.
- Cooling and heating coils have copper tube material and copper or aluminum fin material. The fin arrangement is a V-waffled louvered enhanced type. The coating can be blue, gold, Here site, or hydrophilic to enhance resistance against corrosion and humid and acidic environments in accordance with **DIN EN 13053-6.4.4**.
- Filters of various filtering levels are available, ranging from primary filters (Panel type, efficiency: G2-G4) to medium filters (Bag type, efficiency: M6 – F9) and high filters (H13-H14-U15). Special filters such as active carbon filters and UV lamps can also be provided. Filters are tested in accordance with DIN EN 779 and installed in accordance with **DIN EN 13053-6.9.2**.
- The drain pan is made of painted galvanized steel or stainless steel sheet, equipped in all sections of the unit.

Certificates / Quality

EC Directives



With the CE mark, the manufacturer declares that, pursuant to EU Regulation 765/2008, the product complies with the applicable requirements laid down in the Community harmonization legislation.

VDI 6022



VDI guideline for hygienic engineering, design and maintenance of air handling equipment. Guideline VDI 6022 largely corresponds to Swiss standard SWKI VA 104-1 and Austrian standard H 6021.

EMC Directive



These products comply with Directive 2004/108/EC Electrical compatibility of electrical and electronic products

TS EN 61000-6-2:2019 IEC 61000-6-2:2016 RLV
TS EN 61000-6-2:2019 IEC 61000-6-2:2018 RLV

ISO 9001 ISO 14001



Certification by the International Standardization Organization (ISO) ensures that an organization can consistently deliver a product or service that meets the customer's contractual requirements by following documented processes. The ISO 9001 quality assurance model establishes the requirements for an organization whose business processes range from design and development to production.

GMP



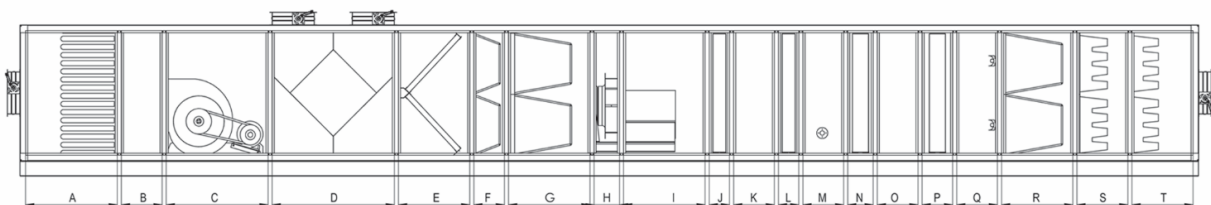
Good Manufacturing Practice (GMP) is a system for ensuring that products are consistently produced and controlled according to quality standards. It is designed to minimize the risks involved in any production that cannot be eliminated through testing the final product.

CUSTOMIZED SOLUTION FOR INDOOR AIR QUALITY

Customized Applications Include:

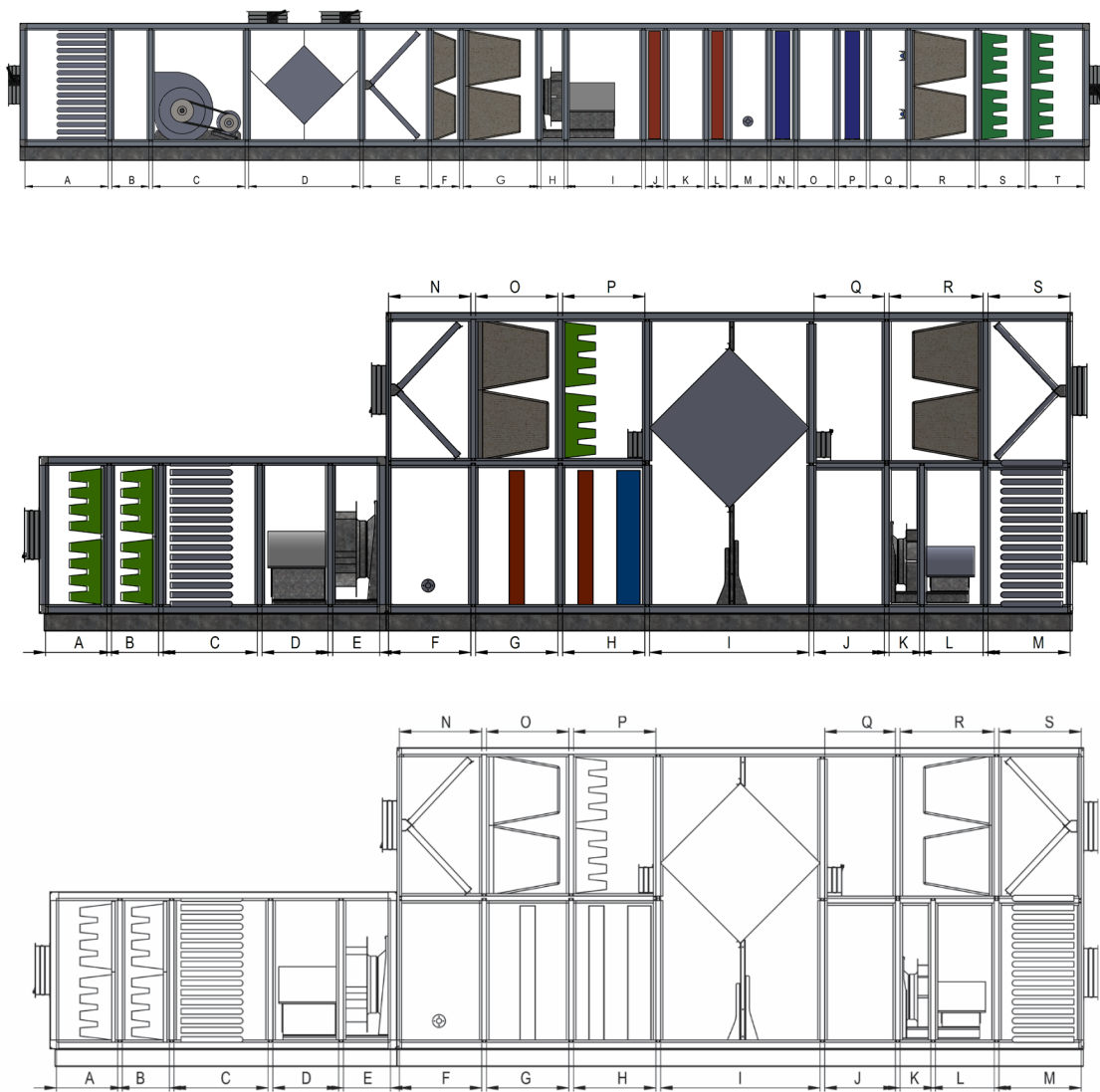
Flexible Cabinet Sizing

- Galvanized, Aluminum or Stainless-Steel Panels with the various thickness such as 1.0, 1.2 &1.6
- Inner Painted GI Panels.
- Selection of Drain Pan Materials.
- Mixing Boxes / Economizers.
- Multiple Coil Section Depths.
- Integral face and By-Pass Dampers.
- Variety of fans - Belt or Direct Drive, Forward or Backward curved or Airfoil , Plug Fans.
- Motors – Standard and Energy Efficient (IE1-IE2-IE3)
- Humidifier and De-Humidifier sections.
- Filters – Flat Filters, Bag Filters, HEPA Filters
- Digital Controls
- Optional Accessories – View Port, Hinge Door, Lights, etc.



	HEAT RECOVERY UNIT																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Section	Slencer	Plenum Box	Return Fan	Heat Recovery	Prefilter	Bag Filter M4/M6	Bag Filter F7/F9	Fan Fixed Door	Supplyn Fan	Preheater	Coil Service Door	Electrical Coil / Water Heating Coil	Humidifier	Cooling Coil	Coil Service Door	DX Coil	UV Lamp	Bag Filter F9	Carbon Active Filter	HEPA / ULPA Filter H1 /U15
Dimension (mm)	1000	400	1000	2000	700	400	800	300	700	300	500	300	500	400	500	400	500	700	400	700

CUSTOMIZED SOLUTION FOR INDOOR AIR QUALITY



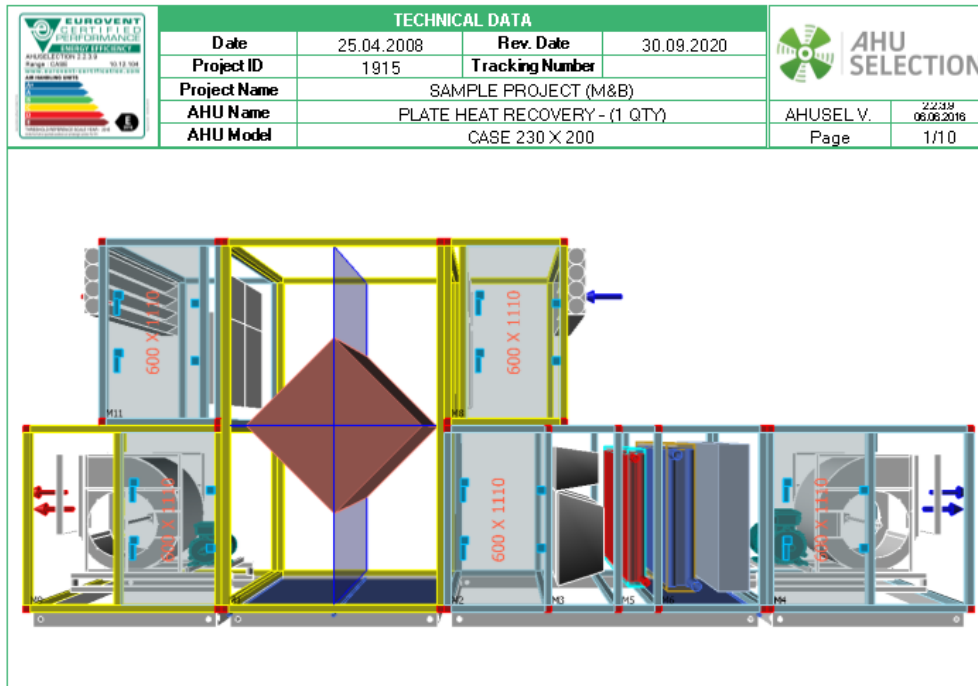
	HEAT RECOVERY UNITE																		
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Section	Carbon Active Filter	HEPA Filter H13	Silencer	Supply Fan	Fan Fixed Door	Humidifier	Electrical Heating Coil	Cooling & Heating Coil	Heat Recovery	Plenum Box	Fan Fixed Door	Exhaust Fan	Silencer	Prefilter	Bag Filter F9	HEPA Filter H13	Plenum Box	Bag Filter F9	Prefilter
Dimension (mm)	400	400	1000	700	300	500	300	400	1200	400	300	700	1000	700	400	400	400	700	700

AIR HANDLING UNIT SELECTION SOFTWARE

To select air handling units, we utilize a multi-language selection program called AHU SELECTION. This powerful software package is developed to provide quick and comprehensive service to customers, enabling the proper technical choices and economic evaluations for each AHU. It's a complete tool capable of configuring any type of product and precisely meeting the most stringent design requirements.











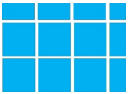





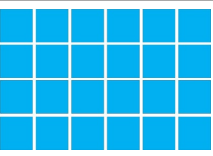
The software serves as an excellent tool for sales engineers and project designers of air handling unit systems. The outcome is a comprehensive economic offer that includes all technical data, drawings, psychometric diagrams with fan performance curves. In addition to calculations, the program also facilitates the creation of sketches that can be exported to AutoCAD.

All units are designed and developed with special attention to achieving high efficiency in coils, filters, and motors. Case sizes are offered in two categories: A and B for hygienic applications, and C, D, and E for non-hygienic applications.















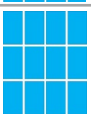
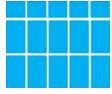
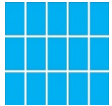
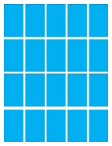
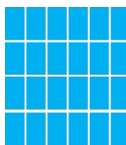
STANDARD SELECTION

Air Handling Unit series A , B

Model	Nominal air flow rate [m³/h]	Filter arrangement	Internal dimensions		External dimensions	
			(mm)		(mm)	
			Width	Height	Width	Height
2000	4 250		612	612	723.4	723.4
3000	6 375		922	612	1033.4	723.4
4000	8 500		1222	612	1333.4	723.4
4500	9 562		922	922	1033.4	1033.4
6000	12 750		1222	922	1333.4	1033.4
8000	17 000		1222	1222	1333.4	1333.4
10 000	21 250		1533	1222	1644.4	1333.4
12 000	25 500		1833	1222	1944.4	1333.4
14 000	29 750		2143	1222	2254.4	1333.4
16 000	34 000		2443	1222	2554.4	1333.4
17 500	37 185		2143	1533	2254.4	1644.4
20 000	42 500		2443	1533	2554.4	1644.4
24 000	51 000		2443	1833	2554.4	1944.4
25 000	53 125		3053	1533	3164.4	1644.4
30 000	63 750		3053	1833	3164.4	1944.4
40 000	85 000		3053	2442	3164.4	2553.4
48 000	102 000		3663	2442	3774.4	2553.4

STANDARD SELECTION

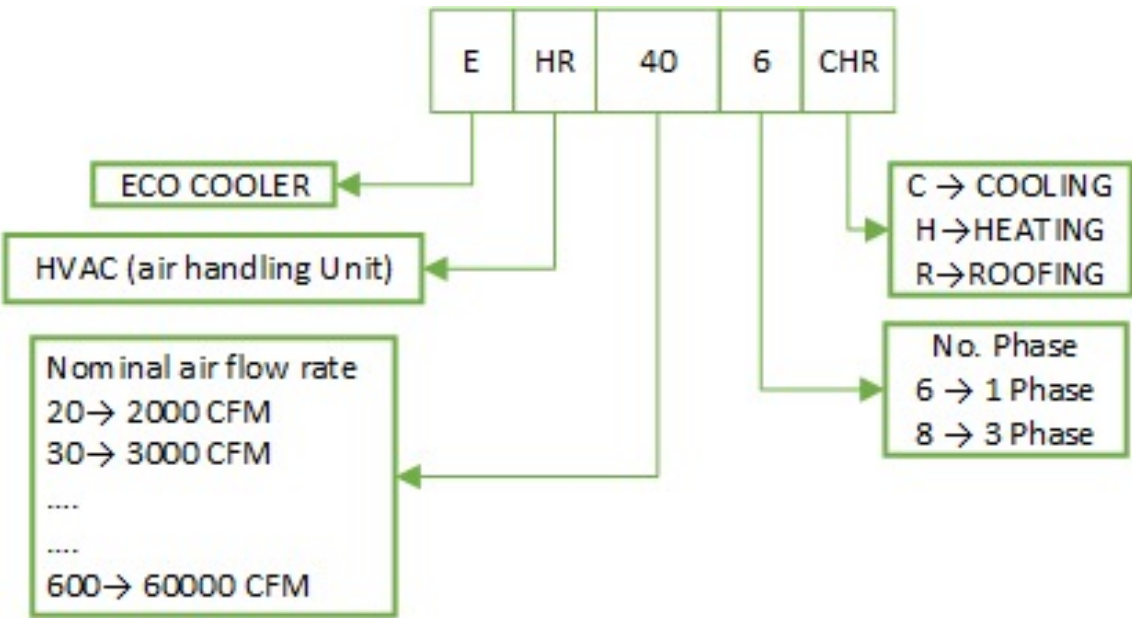
Air Handling Unit series C , D

Model	Nominal air flow rate [m ³ /h]	Filter arrangement	Internal dimensions		External dimensions	
			(mm)		(mm)	
			Width	Height	Width	Height
2000	4 250		592	660	703.4	771.4
3000	6 375		880	660	991.4	771.4
4000	8 500		1185	660	1393.4	703.4
4500	9 562		880	977	991.4	1088.4
6000	12 750		1185	977	1296.4	1088.4
8000	17 000		1185	1282	1296.4	1393.4
10 000	21 250		1472	1282	1583.4	1393.4
12 000	25 500		1777	1282	188.4	1393.4
14 000	29 750		2065	1282	2176.4	1393.4
16 000	34 000		2370	1282	2481.4	1393.4
17 500	37 185		2065	1600	2176.4	1711.4
20 000	42 500		2370	1600	2481.4	1711.4
24 000	51 000		2370	1911	2481.4	2022.4
25 000	53 125		2960	1600	3071.4	1711.4
30 000	63 750		2960	1911	3071.4	2022.4
40 000	85 000		2960	2540	3071.4	2651.4
48 000	102 000		3553	2540	3664.4	2651.4

RANGE

A wide standard range covers airflow rates from 1,000 cfm up to 60,000 cfm, offering the possibility to select the most appropriate transverse velocity based on the required treatment. Moreover, for the same airflow, the flow section (width x height) can be adjusted to fit the dimensional constraints of the installation. All sizes are modularly constructed to ease transport and simple assembly on-site. With no welding points, the AHU units can be supplied completely dismantled upon request, allowing for direct assembly on-site.

NOMENCLATURE



Airflow rate coverage range of models based on velocity

Model	Nominal air flow rate [m³/h]	Velocity* m/s					Internal dimensions		External dimensions	
		1.5	2	2.5	3	3.5	(mm)		(mm)	
							Width	Height	Width	Height
2000	4 250	2009	2679	3349	4019	4688	612	612	723	723
3000	6 375	3014	4019	5023	6028	7033	922	612	1033	723
4000	8 500	4019	5358	6698	8037	9377	1222	612	1333	723
4500	9 562	4521	6028	7535	9042	10549	922	922	1033	1033
6000	12 750	6028	8037	10047	12056	14065	1222	922	1333	1033
8000	17 000	8037	10716	13396	16075	18754	1222	1222	1333	1333
10 000	21 250	10047	13396	16745	20093	23442	1533	1222	1644	1333
12 000	25 500	12056	16075	20093	24112	28131	1833	1222	1944	1333
14 000	29 750	14065	18754	23442	28131	32819	2143	1222	2245	1333
16 000	34 000	16075	21433	26791	32149	37508	2443	1222	2554	1333
17 500	37 185	17582	23442	29303	35163	41024	2143	1533	2245	1644
20 000	42 500	20093	26791	33489	40187	46885	2443	1533	2554	1644
24 000	51 000	27591	36787	45984	55181	64378	2443	1833	2554	1944
25 000	53 125	25545	34060	42575	51090	59605	3053	1533	3164	1644
30 000	63 750	30654	40872	51090	61308	71526	3053	1833	3164	1944
40 000	85 000	40872	54496	68120	81744	95368	3053	2442	3164	2553
48 000	102 000	48909	65212	81516	97819	114122	3663	2442	3774	2553


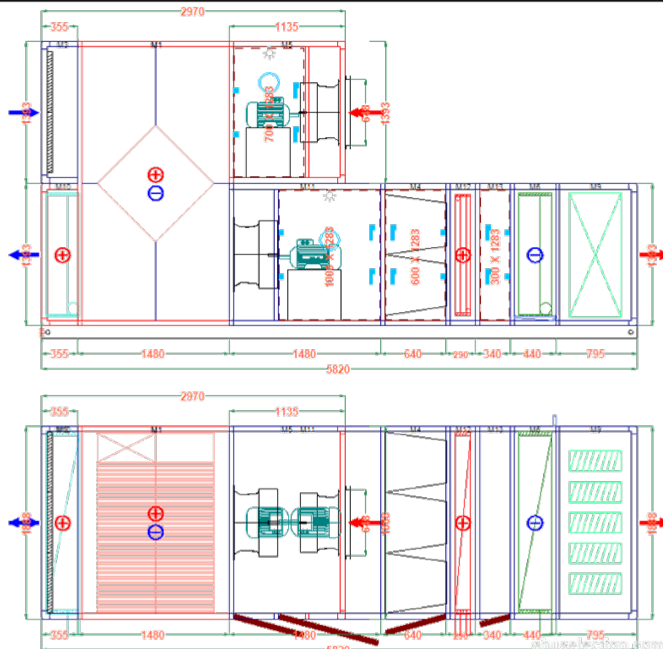
* Air velocity is based on internal dimension of models. For coil face velocity, the air flow rate is almost 10% smaller than one presented in the table.

MODEL SELECTION CHART

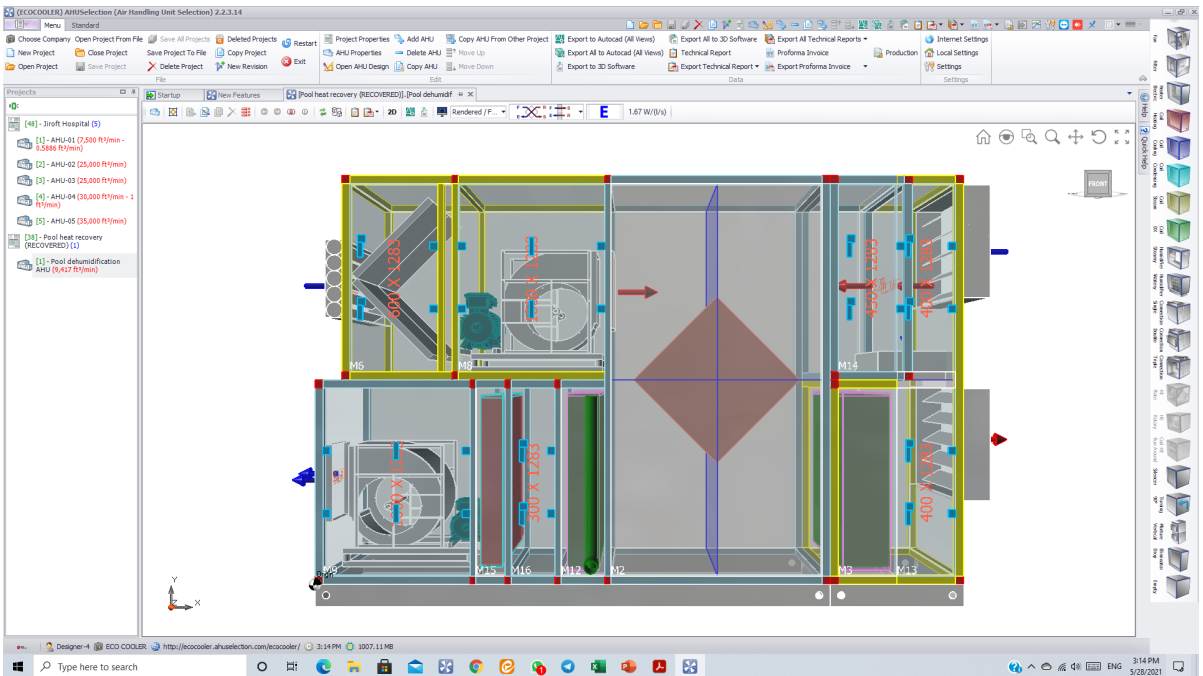
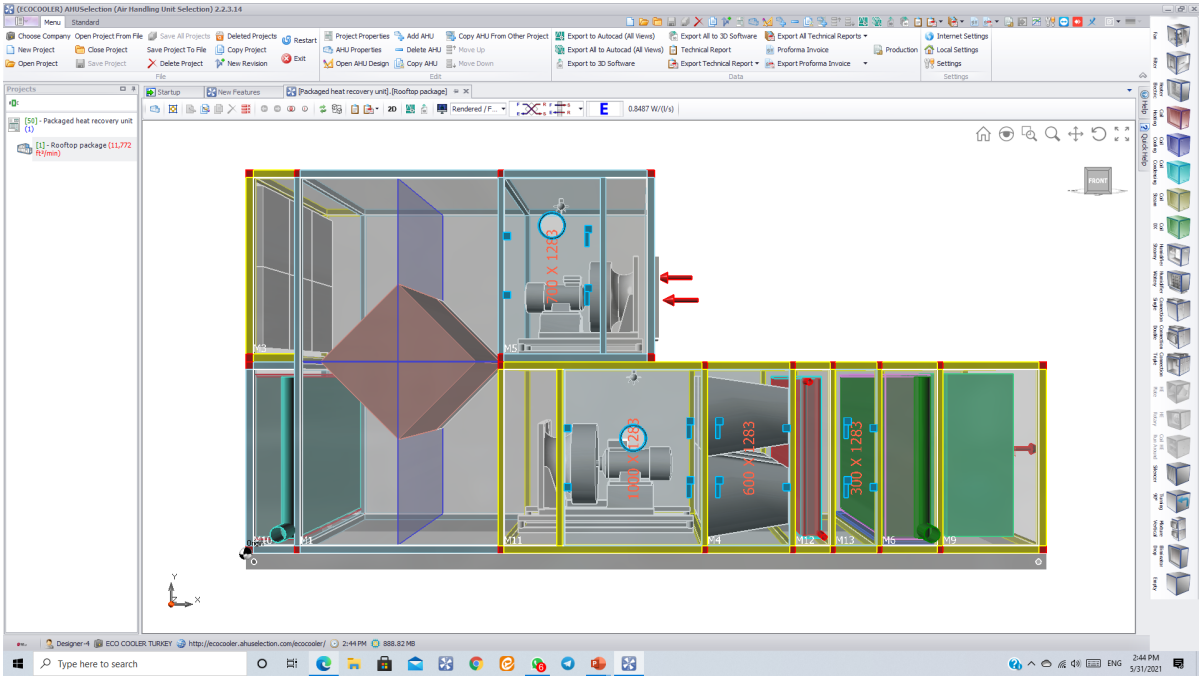
Model	Nominal air flow rate [CFM]	Velocity* FPM					Internal dimensions		External dimensions	
							(mm)		(mm)	
		300	400	500	600	700	Width	Height	Width	Height
		(CFM)								
2000	2500	1201	1602	2002	2402	2803	612	612	723	723
3000	3750	1802	2402	3003	3603	4204	922	612	1033	723
4000	5000	2402	3203	4004	4805	5605	1222	612	1333	723
4500	5625	2703	3603	4504	5405	6306	922	922	1033	1033
6000	7500	3603	4805	6006	7207	8408	1222	922	1333	1033
8000	10000	4805	6406	8008	9609	11211	1222	1222	1333	1333
10 000	12500	6006	8008	10009	12011	14013	1533	1222	1644	1333
12 000	15000	7207	9609	12011	14414	16816	1833	1222	1944	1333
14 000	17500	8408	11211	14013	16816	19619	2143	1222	2245	1333
16 000	20000	9609	12812	16015	19218	22421	2443	1222	2554	1333
17 500	21874	10510	14013	17517	21020	24523	2143	1533	2245	1644
20 000	25000	12011	16015	20019	24023	28027	2443	1533	2554	1644
24 000	30000	16493	21991	27488	32986	38484	2443	1833	2554	1944
25 000	31250	15270	20360	25450	30540	35631	3053	1533	3164	1644
30 000	37500	18324	24432	30540	36649	42757	3053	1833	3164	1944
40 000	50000	24432	32576	40721	48865	57009	3053	2442	3164	2553
48 000	60000	29237	38983	48728	58474	68219	3663	2442	3774	2553

* Air velocity is based on internal dimension of models. For coil face velocity, the air flow rate is almost 10% smaller than one presented in the table.

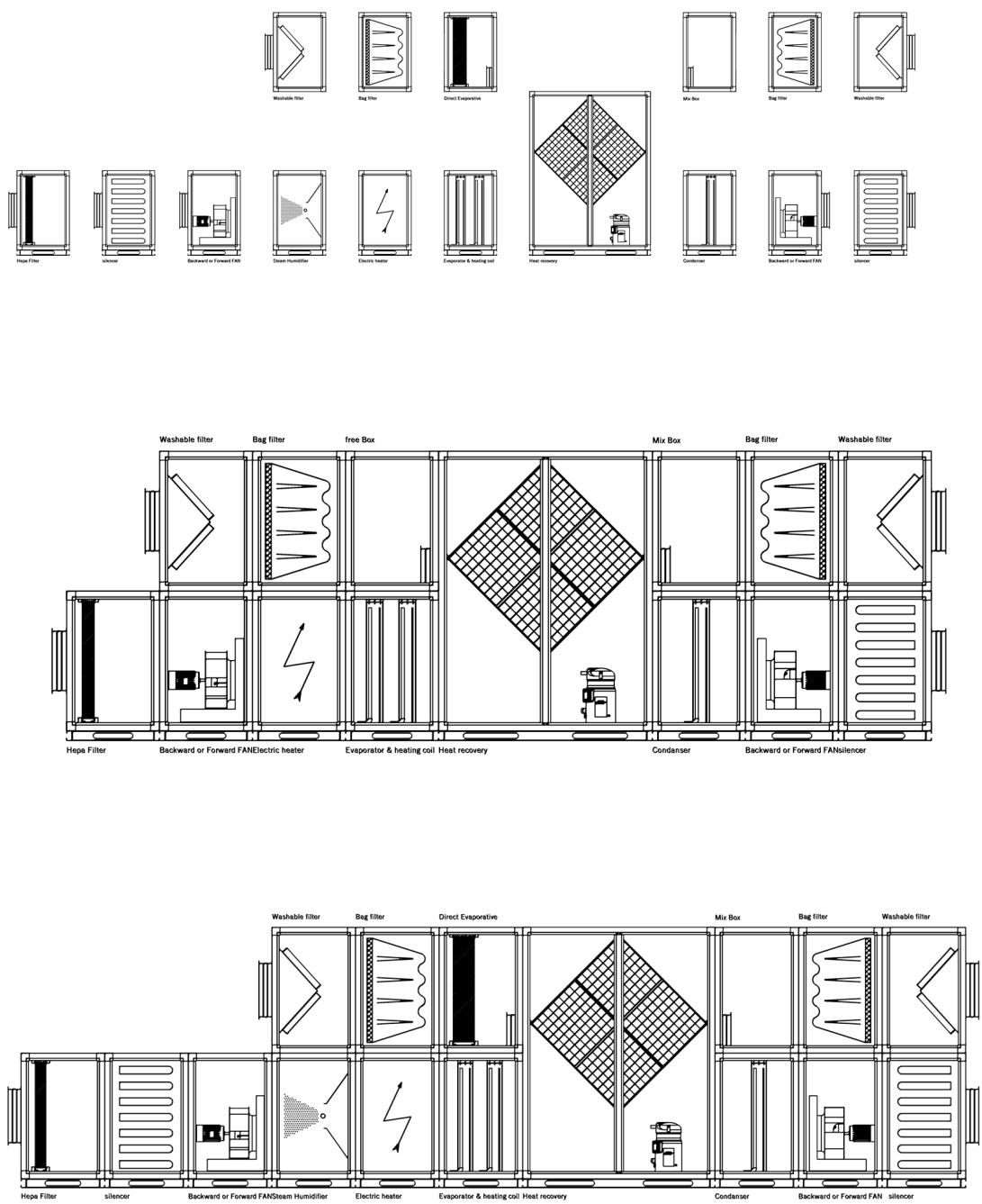
PERFORMANCE REPORT FROM SELECTION SOFTWARE

TECHNICAL DATA										
Date	21/05/2021	Rev. Date	25/05/2021							
Project ID	50	Tracking Number	PT-21-140118-FK							
Project Name	Packaged heat recovery unit									
AHU Name	Rooftop package - (1 QTY)									
AHU Model	EH12008-CHR				AHUSEL V.	2.2.3.14 23/05/2021				
					ECOCOOLER	1/7				
RIGHT VIEW										
										
TOP VIEW										
GENERAL SPECIFICATIONS										
Air Flow	Return Air Flow		Frame		Dimensions cm					
11,772 ft³/min	11,772 ft³/min		55 Oval Profile		W 188.8 x H 290.6 x L 582					
Air Velocity	Return Air Velocity		Insulation Material		Total Weight					
479 ft/min	479 ft/min		5 cm Polyurethane		1,912 kg					
Coil Air Velocity	Air Density		Outside Sheet Material		Base Height	Roof (Inside)				
547 ft/min	1.1943 kg/m³		0.06 cm Painted Galvanize		12 cm	N/A				
Design Outdoor Temp.(W-S)	HRS Capacity (W-S)		Inside Sheet Material		Motor Power					
(10.4°F/90%)-(93.20°F/36.7%) (KONYA)	59.87 kW - 15.69 kW		0.06 cm Painted Galvanize		11 kW / 11 kW					
Total Heating Capacity	Total Cooling Capacity		Total Sensible Capacity		Total Absorbed Power					
244.7 kW	134.3 kW		91.94 kW		16.80 kW					
Specific Fan Power(SFP Total)	ErP Code		Real Unit CAL Class -400 Pa		Real Unit CAL Class +400 Pa					
0.8487 W/(l/s)	NRVU - BVU									
SOUND POWER LEVEL (dB)										
Frequency Hz		125	250	500	1000	2000	4000	8000	LwA-tot	
Airborne Sound Power Level		83.0	79.0	79.0	79.0	77.0	75.0	72.0	83.5	dBA
Air Outlet Induct Sound Power Level		72.4	60.0	60.8	59.2	59.2	60.8	58.2	66.3	dBA
Air Inlet Induct Sound Power Level		78.0	73.0	70.0	68.0	68.0	66.0	63.0	74.5	dBA
Return Air Outlet Induct Sound Power Level		83.0	79.0	79.0	79.0	77.0	75.0	72.0	83.5	dBA
Return Air Inlet Induct Sound Power Level		81.0	78.0	75.0	73.0	72.0	70.0	67.0	79.0	dBA
ACCESSORIES										

DRAWING VIEW FROM SELECTION SOFTWARE



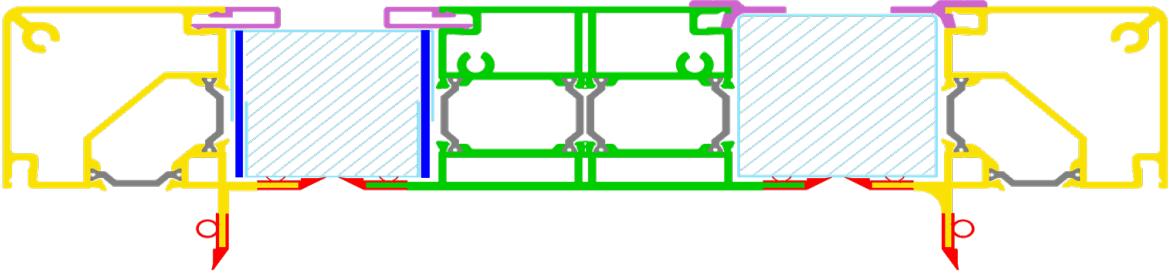
AIR HANDLING UNIT DETAILS



ULTIMATE CASING DESIGN AND CONSTRUCTION

Frame & Panels

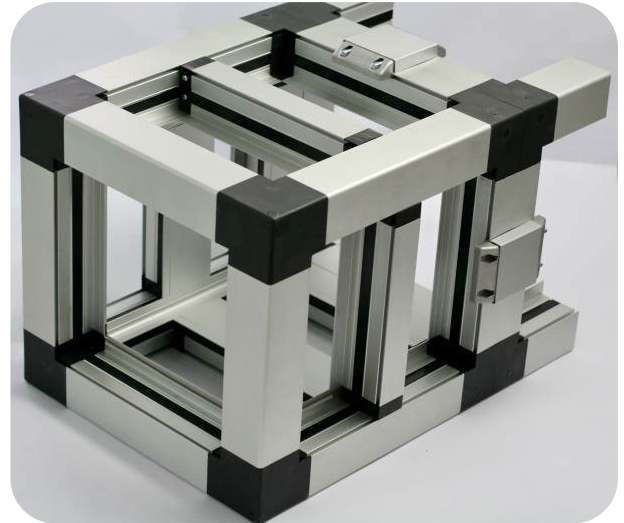
THERMAL BREAK SYSTEM 50 WITH "PANEL STOP" PROFILES



DESCRIPTION:

The new thermal break system ensures high thermal insulation through the use of specially shaped 25 mm long polyamide bars. One notable feature of this system is the half-omega profile, enabling the connection of two or more units and ensuring thermal bridging between them. This profile, with its 40 mm section, provides exceptional solidity. The 'panel stop' profiles secure the panels without requiring screws. The system is adaptable to traditional panels made with double-bent steel sheets and also to sandwich panels, which are more cost-effective and offer superior insulation compared to traditional ones.

The use of a patented gasket system ensures smooth internal surfaces, allowing easy cleaning of the AHU, and ensuring perfect airtightness inside the unit. Additionally, the interior of the frame has been designed with rounded corners and a radius shape using nylon, simplifying maintenance for cleanliness inside the unit. To enhance the mechanical and airtight properties of the frame, the nylon and omega joint corners have special grooves for screws that secure the aluminum profile with the plastic components. Furthermore, nylon caps conceal the screws, preventing the accumulation of dust and dirt around the screw heads.



ULTIMATE CASING DESIGN AND CONSTRUCTION

Frame & Panels

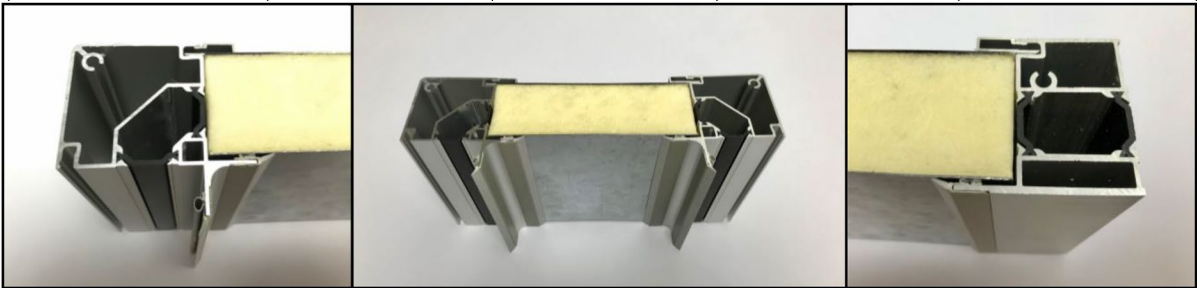
Summary table of the results obtained from specific software:

PROFILE TYPE	Ti	t s-max	ta	kb	Thermal Class
System 60/50 – P 160/50 PS TB IR	12	14.52	45	0,92	TB1
System 60/50 – P 260/50 PS TB	12	14.29	45	0,93	TB1
System 60/50 – P 260/50 2 PS TB	12	14.75	45	0,92	TB1

TRIALS AND TESTS CARRIED OUT IN THE LABORATORY

The high thermal insulation class of this thermal brake system has been confirmed by trials and tests performed in the laboratory on an AHU assembled with corner post and omega thermal break profiles, panel stop profiles, and a patented gasket system. The tables below show the test results that completely meet thermal insulation specifications in compliance with EN 1886.

THERMAL PERFORMANCE	EN 1886	REFERENCE VALUES	RESULT	THERMAL CLASS
THERMAL TRANSMITTANCE	Class T1 Class T2 Class T3 Class T4 Class T5	$U \leq 0,5$ $0,5 < U \leq 1,0$ $1,0 < U \leq 1,4$ $1,4 < U \leq 2,0$ No requirements	0,43	CLASS T 1
THERMAL BRIDGING	Class TB1 Class TB2 Class TB3 Class TB4 Class TB5	$0,75 < k_b < 1,00$ $0,60 < k_b \leq 0,75$ $0,45 < k_b \leq 0,60$ $0,30 < k_b \leq 0,45$ No requirements	0,81	CLASS TB 1



ULTIMATE CASING DESIGN AND CONSTRUCTION

Frame & Panels

AIR TIGHTNESS FEATURES

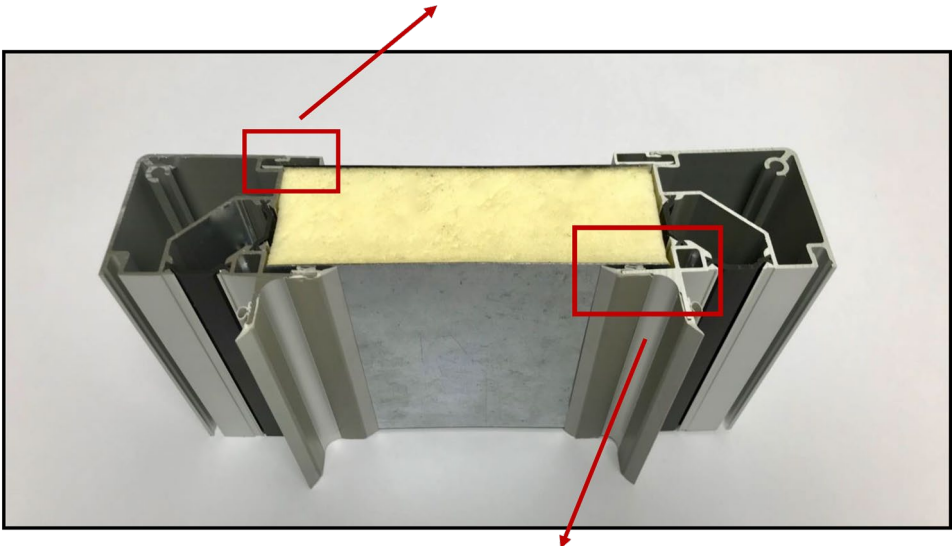
THERMAL BREAK SYSTEM 60/50 WITH “PANEL STOP” PROFILES

The tests carried out on a "model box" have highlighted the excellent air tightness of the AHU examined. The results obtained are shown in the tables below.

CASING AIR LEAKAGE	- 400 Pa	Class L1	$\leq 0,15 \text{ (l * s}^{-1} * \text{m}^{-2})$	0,13 = CLASS L1
		Class L2	$\leq 0,44 \text{ (l * s}^{-1} * \text{m}^{-2})$	
		Class L3	$\leq 1,32 \text{ (l * s}^{-1} * \text{m}^{-2})$	
	+ 700 Pa	Class L1	$\leq 0,22 \text{ (l * s}^{-1} * \text{m}^{-2})$	
		Class L2	$\leq 0,63 \text{ (l * s}^{-1} * \text{m}^{-2})$	0,19 = CLASS L1
		Class L3	$\leq 1,9 \text{ (l * s}^{-1} * \text{m}^{-2})$	

MECHANICAL STRENGTH	TEST PRESSURE	EN 1886	REFERENCE VALUES	RESULT
DEFLECTION	-1000 Pa	Class D1 Class D2 Class D3	$\leq 4 \text{ mm * m}^{-1}$ 10 mm * m^{-1} $>10 \text{ mm * m}^{-1}$	0,51 = CLASS D1

The **panel stop profiles** fix the panel without using screws and **guarantee air tightness** around the perimeter of the frame.



The **gasket** adheres perfectly to the panel and it **creates a smooth inner surface between profiles and panels**.

Access Doors

Handle / Hinges



Explanation

The inspection and internal service doors can be configured with either outward or inward opening mechanisms for pressurized sections. Various solutions are available, including hinges that enable left or right openings, cam handles for door locking and opening, or complete door removal.

Inspection Window

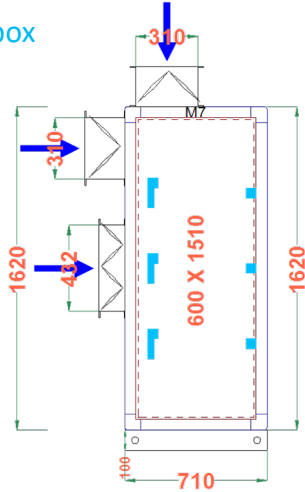


Explanation

The portholes are of a double-wall type, constructed from polycarbonate and equipped with sealing gaskets. The fastening system uses locking screws that only penetrate the polycarbonate structure (thus avoiding contact with the sandwich panel), and the continuous internal-external gasket prevents condensation formation while ensuring maximum sealing.

MIXING BOX SECTION

Mixing box



Dampers



Construction

An intake/mixing box is available with a damper section based on the project Requirement.

Construction

Aluminum extruded frames (1.8 mm thick), with aero foil design blades. Special gaskets are fixed at the blade edges to avoid the leakage. Gear wheels are made from polypropylene material. Galvanized steel shaft 12mm x 12 mm (square) with aluminum handles for opening and closing the damper. The damper working condition is - 20°C / +80°C, tested and certified by TUV Sud / Munich.aerofoil

Function

Dampers are used to control or to shut down the air moving in or out of the air handling system. Dampers can be operated manually or can be supplied or fitted with actuators to regulate the flow.

- Airfoil design
- Opposed blade
- Fitted with neoprene gasket in between blades to reduce leakage
- 316L Stainless steel dampers (Optional)

FILTERS

Always take special care during the configuration of the unit to consider the position of the filters in the airflow to maximize their effectiveness. All filters are mounted on aluminum filter fixing frames, which are provided with a seal to ensure effective filtration efficiency.

Flat Filters



Explanation

Polyester fiber media panel filters, class G3 supplied as standard. Aluminum washable filters, class G2 will be provided upon customer request.

The G4 rating indicates the "dust holding capacity" of the filter and is defined according to the EN 779 standard. The G4 class signifies that these filters are capable of removing at least 80% of particles sized 2.5 micrometers and larger. In other words, G4 filters effectively capture and remove particles such as dry dust, hair, fibers, and larger-sized particles.

Bag Filters



Explanation

Synthetic or glass-fiber media bag filters, ranging from class M5 to M6 and F7 to F9, are fixed in an aluminum frame with gaskets to prevent air bypass. Bag filters are available in two different lengths: the standard version is 380mm long, and the optional version is 600mm long. Filters with a larger filtration surface area will have a longer lifespan. The filters are fastened using a clamping mechanism that ensures tightness and simplifies the filter replacement procedure.

FILTERS

Always take special care during the configuration of the unit regarding the position of the filters in the airflow to maximize their effectiveness. All filters are mounted on aluminum filter-fixing frames, which are provided with a seal to ensure effective filtration efficiency.

HEPA Filters



Explanation

HEPA Filters of H13 and H14 classes have excellent air cleaning efficiency due to their advanced design. A rigid media with aluminum or PVC separators provides high-efficiency air filtration at the lowest possible resistance. Rated in accordance with EN1822.

Pressure switch



Optional Components

- Stainless steel filter frame
- Differential pressure switch
- Inclined gauge manometer
- Magnehelic gauge with contact 0-2500 Pa
- Magnehelic gauge without contact -0 -2500 Pa

FILTER standards

The determination of the filter performance of particulate filters for general room air technology has been described by the industry standard EN779:2012.

EN 779:2012 standard is a certification programmer applicable to air filter elements rated and sold as “Medium and Fine Class M5,M6, and F7 to F9”

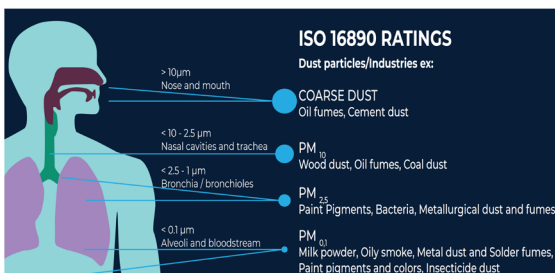
For coarse filters, the filter effect is evaluated by measuring the initial gravimetric arrestance when challenging the filter with synthetic test dust using ASHRAE-test dust.

For fine filters, the filter effect is evaluated by measuring the efficiency against 0.4 micron DEHS droplets, the classification of classes defined in EN779:2012 is shown in Table 1.

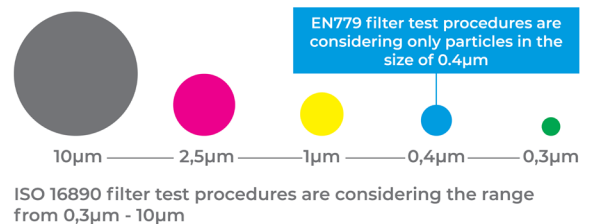
Classification of Coarse, Medium and Fine filters according to EN 799:2012					
Type of filter	EN 779:212 Efficiency Class	Average arrestance with synthetic Dust (Am%)	Average efficiency of 0.4 µm particles (Em%)	Final pressure drop (Pa)	Medium efficiency 0.4 µm (%)
Coarse filters	G1	50≤Am≤65	-	250	
	G2	65≤Am≤80	-	250	
	G3	80≤Am≤90	-	250	
	G4	90≤Am	-	250	
Medium filters	M5	-	40≤Em≤60	450	
	M6	-	60≤Em≤80	450	
Fine filters	F7	-	80≤Em≤90	450	35
	F8	-	90≤Em≤95	450	55
	F9	-	95≤Em	450	70

ISO 16890 is the new global standards for air filter testing and classification and replaces the existing EN779:2012 standard. This new standard represents a major turning point in the evaluation of filter efficiency.

ISO 16890 classification are based on where particles are deposited in the human lung.



The new international ISO 16890 standard defines four new filter groups based on dust particle size



FILTER standards

The essential feature of the new test is the broad particle size distribution. The new ISO 16890 standard focuses on the filtration efficiency of different sizes of fine particles. It is listed as below 4 different filter classification:

- ISO Coarse (assessment of the separation of ISO A2 dust)
- ISO PM10: particle size $\leq 10 \mu\text{m}$
- ISO PM2.5: particle size $\leq 2.5 \mu\text{m}$
- ISO PM1: particle size $\leq 1 \mu\text{m}$

ISO 16890 is therefore a much more concrete standard on the subject than the theoretical EN779:2012 which used particle of 0.4 micron to measure the effectiveness of filters from M5 to F9. With the new ISO 16890 filter standard, filtration effectiveness are determined based on the different PM1, PM2.5 and PM 10 fine particle sizes. The same parameters are used as those deployed by the World Organization (WHO) or the Federal Environmental Agency.

Filter groups according to ISO 16890			
Filter Class	Efficiency range	Particle Size (μm)	Examples for fine dust
ISO ePM1	ePM1,min $\geq 50\%$	$0.3 \mu\text{m} \leq x \leq 1.0 \mu\text{m}$	Ultra fine dust with a diameter of less than $1 \mu\text{m}$: Viruses, Bacteria, nanoparticles, soot (from fossil fuels)
ISO ePM2.5	ePM2.5,min $\geq 50\%$	$0.3 \mu\text{m} \leq x \leq 2.5 \mu\text{m}$	Fine dust with a diameter of less than $2.5 \mu\text{m}$: pollen, rock dust from field cultivation
ISO ePM10	ePM10 $\geq 50\%$	$0.3 \mu\text{m} \leq x \leq 10.0 \mu\text{m}$	Fine dust with a diameter of less than $10 \mu\text{m}$: Bacteria, fungal and molds pores, pollen, toner dust
ISO Coarse	ePM10 $\leq 50\%$	$0.3 \mu\text{m} \leq x \leq 10.0 \mu\text{m}$	Visible coarse dust: sand, hair sand leaves, lint, air born seed lings,etc.

The testing and evaluation procedures of ISO 16890 and EN 779 differ greatly. Therefore use of tables or calculations which claim to convert G1-F9 filter classes into ISO filter groups cannot be recommended. Between EN779 and ISO 16890, there are similarities below that

Filter Class	ISO 16890-Average Efficiency			
EN 779:2012	ePM1	ePM2.5	ePM10	Coarse
G2	-	-	-	30%-50%
G3	-	-	-	55%-75%
G4	-	-	-	80%-95%
M5	5%-35%	10%-45%	40%-70%	-
M6	10%-40%	20%-50%	60%-80%	-
F7	40%-65%	65%-75%	80%-90%	-
F8	65%-90%	75%-95%	90%-100%	-
F9	80%-90%	85%-95%	90%-100%	-

FAN SECTION

Rigid Fan Assembly with Standard AHU Components

Fans

EXPLANATION



- Centrifugal Forward Curved DIDW Fans are manufactured in a Galvanized Steel Sheet. The impellers are manufactured in galvanized sheet steel and are statically and dynamically balanced in accordance with VDI 2060 and ISO 1940/1, grade G 6.3. The impeller diameters are in series R20 according to DIN 323.



- Shafts are manufactured from high-quality steel. Centrifugal Backward Curved DIDW/AEROFOIL Fans are manufactured in a Galvanized Steel Sheet with structurally reinforced housing.

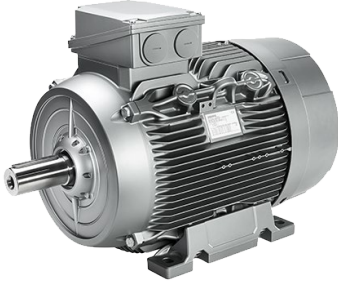


- The impeller is manufactured in glass-reinforced polyamide with a backward-curved design and is balanced both statically and dynamically to an accuracy grade of $G = 6.3$ in accordance with DIN ISO 1940-1 (VDI 2060).
- Shafts are manufactured from high-quality steel, precision-ground, and polished.
- The plug-type plenum fan is a direct-driven, single-inlet centrifugal fan without a volute fan casing.
- The impellers are manufactured in steel, with either backward-curved or backward-curved airfoil blades and a painted finish.
- The impellers are directly mounted on the shaft end of a single-speed motor.

FAN SECTION

Rigid Fan Assembly with Standard AHU Components

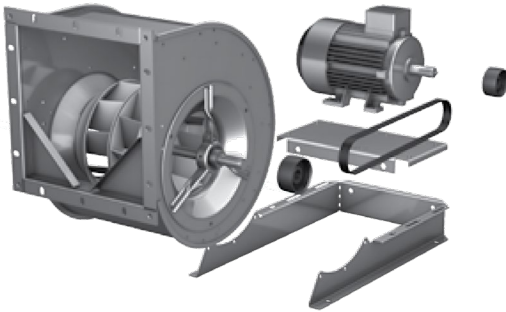
Motors



Explanation

- Motor protection is ensured by an enclosed, fan-cooled type with class F insulation rated to IP55.
- Fans are delivered with single-speed motors.
- The control box is mounted at the top.
- Optional: EFF1 (IE2) or EFF2 (IE1).

Fan & Motor Assembly



Construction

The entire fan assembly is fixed on a separate galvanized steel frame, isolated from the unit structure by rubber anti-vibration mounts (spring as an option). This arrangement guarantees that the AHU does not transmit vibrations to any flat surface on which it is installed.

EC Fan



Construction

Realistic performance specifications are provided as the performance data of the entire fan is continuously measured utilizing its components: high-performance impeller, GreenTech EC motor, and control electronics.

FAN SECTION

Rigid Fan Assembly with Standard AHU Components

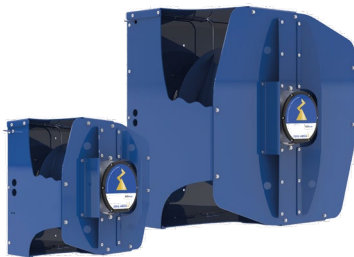


Customized Fan Assembly Includes:

The customized Fan assembly design includes the following optional features:

- Stand by motors for 24 x 7 operations
- Double fan with double motor
- Spark-proof fans
- Inlet guide vanes for VAV control
- Explosion-proof motors
- Stainless steel shaft fans
- Extended lubrication fittings
- Fans with drain plug
- Fans with inspection window
- Bulk Headlight

Fan Mounting in the Different Orientation:



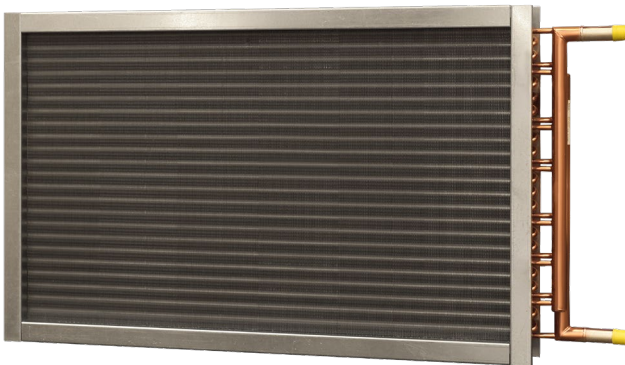
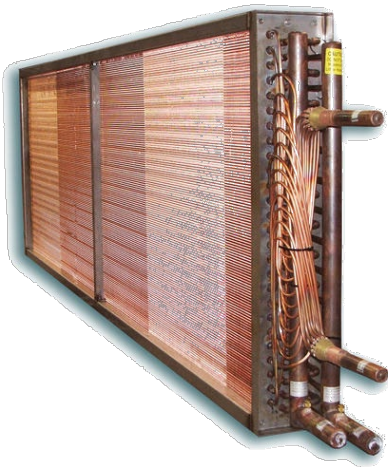
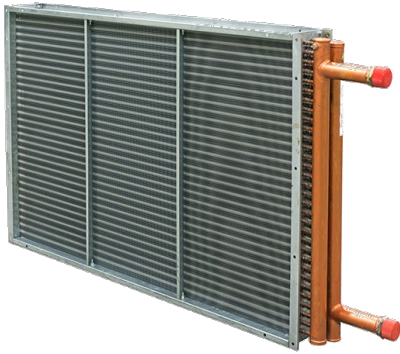
Sizes 315 and 560 mm



Parallel mode of fans

COIL SECTION

Cooling & Heating Coil

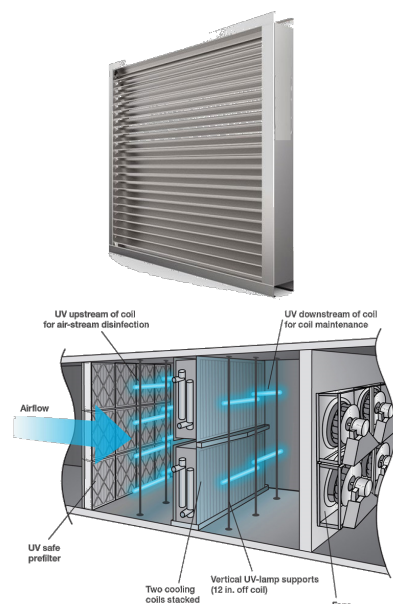


Construction

- Computer-selected cooling and heating coils are designed to achieve optimum thermal and psychometric efficiency with low-pressure drops for water and air.
 - A variety of coils, including water, direct expansion (R22, R134a, R407C, and R410A), and steam coils, are available to meet a wide range of application requirements.
 - The coils comply with AHRI 410 standards. They are mechanically bonded to aluminum fins and copper tubes, with aluminum end sheets arranged in a staggered form in the direction of airflow.
 - Headers are made from copper. Air vents are fixed at the top of the coil headers. The coil's leak was tested at 350 psi air pressure.
- Cooling coil assembly is mounted on the top of sliding rails for easy drawl. The entire coil section is covered by a stainless steel drain pan with an inclined angle design. Drain pans are insulated against condensation with an MPT drain connection as a standard.

COIL SECTION

Moisture Eliminator



Explanation

Moisture eliminators fixed after the cooling coil when velocity exceeds 2.5 m/s.

Optional Features of Coil:

The customized coil design includes the following optional features.

- Copper or Blue fins.
- Anti corrosive protection coating for fins
- Stainless steel sliding rails.
- Stainless steel coil casing.
- Galvanized (painted) drain pans
- Coil with by-pass dampers.
- U.V. Lights for high level of air purification and deodorization.

Construction

The patented Coil Clean IL UV Systems are designed to prevent and destroy mold and other microbial growth from growing on the evaporator coil and surrounding areas. The benefits include eliminating biological "blow-off" of bacteria, viruses, spores and odors into the building while maintaining a clean coil eliminating the need for conventional coil cleaning. Typically, bio-film coats the coil reducing heat transfer negatively impacting coil efficiencies, the Coil Clean IL maintains a clean coil maximizing system performance enabling the coil to work at optimum efficiency saving energy. Equipped with High-Intensity 19 mm. Quartz UVC Lamps and High-Output Electronic Ballasts paired to Anodized Aluminum Parabolic Reflectors make the Coil Clean Series incredibly effective. By using Anodized Aluminum Parabolic Reflectors, UV Coil Clean Purifiers are able to direct virtually all the UV Energy onto the coil without losing UV on the back-end top and bottom of the UV Lamp. The Reflector also protects plastics and wiring from destructive UV rays. The Coil Clean Parabolic Reflector maximizes UV energy much the same way a flashlight or a car's headlight uses a reflector to direct the UV energy where it is needed most, the coil. Using any other UV Lamp / Emitter will result in losing more than half the UV energy.

LED Status Display

Each Coil Clean IL system includes an LED Status Display incorporated into each Ballast. The 3 color LED notifies the end-user on the status of the UV system and when the UV Lamp needs to be replaced.

Dry Contacts

Each UV Coil Clean IL system includes a pair of Dry Contacts (NO & NC). Dry Contacts make it possible for the Coil Clean ILs to be easily tied to building automation systems.

COIL SECTION

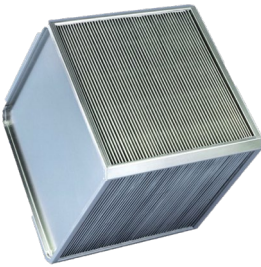
Electric Heater



Construction

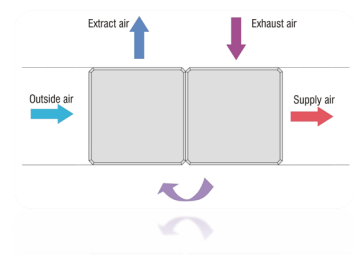
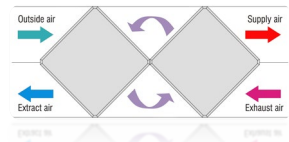
Electric heaters are available wide range of capacity (KW) and steps. Electric heaters frame are made of GI. As a standard heater RA provided open type finned heater construction from 80/20 nickel chrome resistance via anti thermal shock, moisture resistant steatite free floating holding ceramics. Electric heater provided in a separate section.

Heat Recovery



Construction

Fins are aluminum as a standard. Upon request, marine aluminum, industrial pre-coated epoxy or hydrophilic fins can be also used. Frame can be manufactured from special aluminum profile covers can be manufactured from galvanized sheet metal or aluminum. Cross-flow heat recovery plate exchangers can be connected in series to increase the efficiency



CONTROL EQUIPMENT

To have a great control over running cost, ECO COOLER AHUs are fitted with low noise, high output, Space saving, less weight, long bearing life induction motors. VFD is used to drive the fan at designed RPM to create the required air flow. Fans are driven by motors with V-Belt drive.

VFD Drive Inverter



Construction

ECO COOLER AHUs are compatible to fit with variable-frequency drive (VFD). Controlling Fan volume with a VFD offers the user low noise generation and high energy efficiency when regulating flow to within 80 percentage of design or less. A variable-frequency drive is a system for controlling the rotational speed of an AC electric motor by controlling the frequency of the electrical power supplied to the motor. A variable frequency drive is a specific type of adjustable-speed drive.

Control Valve



Construction

Three-way and Two-way valves can be provided as an optional feature in AHUs. Control valves are factory fitted on the headers of the coil heat exchangers and located inside the casing of AHUs. Control valves are fitted with actuator controls to precisely control the required flow across the coil. Valves are available in Brass up to specific diameter of pipes and the cast iron.

CONTROL EQUIPMENT

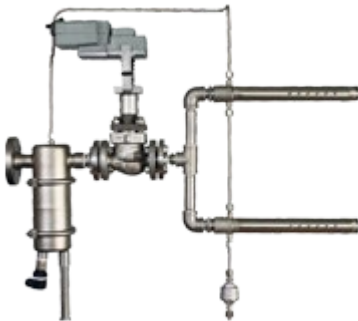
Damper Actuator



Construction

Actuators are designed for long lasting, reliable and quiet operation of air control dampers. All actuators feature a universal self centering mounting clamp and anti-rotation strap as well as durable brushless DC motor technology and easy manual positioning. Actuators provide high quality, cost effective solution for all environments, with a complete selection for high humidity, wide temperature extremes and outdoor applications, without requiring costly additional enclosures.

Steam Humidifier



Construction

Air handling units can be equipped with a self-contained humidifier, which is electronically controlled to sense and control the humidity.

The steam is generated in a polypropylene cylinder mounted onto the outside of the humidifier section within a special enclosure. A stainless steel distributor suitable in length passes through the unit casing to inject steam in the air stream to reach the needed humidity conditions.



ECO COOLER
AIR CONDITIONER

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