Hygienic
Air Handling Unit



EUROVENT CERTIFIED PERFORMANCE
AHU N°: 14.05.003
Range: D-AHU
www.eurovent-certification.com
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TÜV NORD
TÜV NORD Systems GmbH & Co. KG
based on DIN 1946-4:2018 and VDI 6022-1:2018
Voluntary Product Test
Tested
Hygiene Characteristics
Air Handling Unit Range
"D-AHU" (AE)
KKL/1060/19

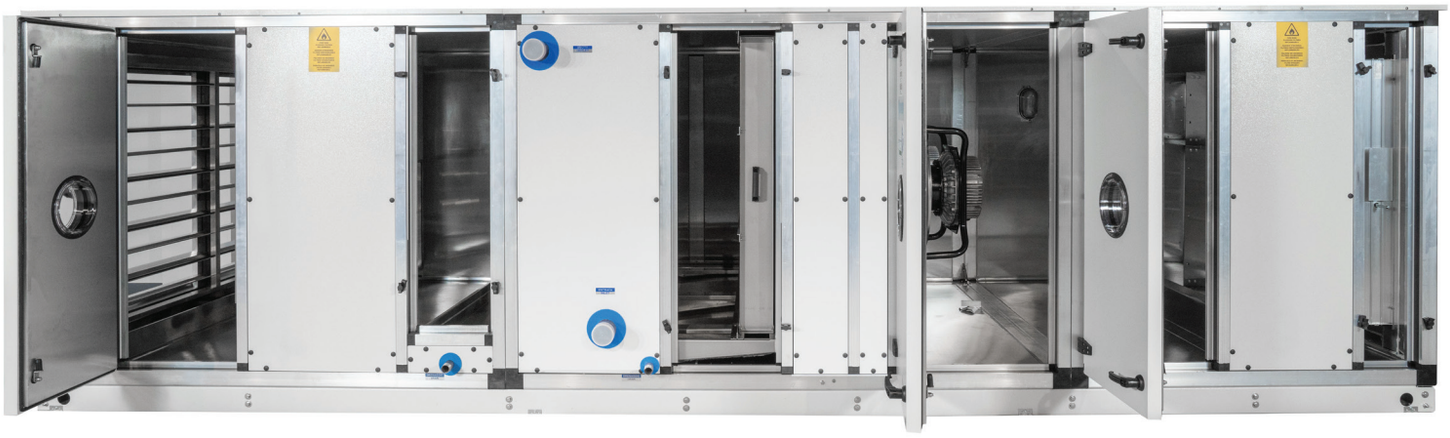
ISO 9001
ISO 14001
ISO 45001
BUREAU VERITAS
Certification

*Daikin is Participating in the Eurovent AHU Program
and not the Eurovent Hygienic AHU Program.
Check ongoing validity of certificate: www.eurovent-certification.com

50/60 Hz

D - AHU Hygienic Version

D-AHU Hygienic Version of Air Handling Units are the synthesis of more than 50 Years of Daikin European AHU Manufacturing experience. Air Handling Units with stringent hygienic features are demanded in Health Care, Pharmaceuticals, Semiconductors and Food & Beverage industries.



Hygienic Air Handling Units differ from a standard unit on lot of aspects like shaping of components, construction, cleanability, accessibility, material specification and component features.

D-AHU Hygienic Version is tested and certified by TÜV NORD Systems GmbH & Co. KG according to German standards VDI 6022/Part 1 and DIN 1946-4 and is a perfect fit to various Hygienic applications.

VDI 6022/Part 1:

This standard applies to all ventilation and air-conditioning systems and units and their central or decentralized components which influence the quality of the supply air. Extract-air systems are only included in the scope if they can influence the quality of the supply air.

DIN 1946-4:

This standard applies to the planning, construction, acceptance and operation of ventilation and air conditioning (VAC) systems in buildings and rooms used in the health sector and which are used for medical examinations, treatments, and operations on humans, as well as in any rooms directly connected to such rooms via doors, corridors/hallways, etc



General Features

01

All Internal sheet metal parts in Stainless steel (SS 304) or Aluminium

02

Smooth internal surface together with shaping of components to prevent adhesion, depositing and release of contaminants

03

AHU casing with high degree of certified Mechanical characteristics

04

Non-metallic materials exposed to Airstream tested for Microbial inertness according to ISO 846 Method A & C

05

Low leakage Dampers, Conforming to leakage Class 2 (in accordance with EN 1751)

06

Filter tested to ISO 16890, with Multiple Filtration Stages

07

Corrosion resistant 3 sloped drain pan to ensure proper drainage

08

Direct Driven Fan without Spiral casing

09

Proper Access for components to facilitate maintenance and cleaning

10

Components should be easily removable for maintenance and cleaning

Sizes

D-AHU Hygienic Version is sized according to following Criteria

Predefined Sizes

Twenty-Seven Predefined sizes, from 850mm to 5,990mm width and height from 550mm to 3,000 mm

Infinitely Variable Sizes

Designed to overcome installation constraints where space requirements of the section **"Width x Height"** must adapt to the available space. The system gives the possibility to tailor the unit sizes through increments/decrements of 5 cm.

The size can be selected by choosing the unit in relation to the Air velocity through the coil surface. The 27 Predefined sizes, considering an Air velocity of 2.5 m/s through coil surface, cover an airflow range of *1100 m3/h - 124000 m3/h*

Size	Air flow capacity [m^3/h] (battery air speed 2.5 m/s)	Height [mm]	Width [mm]
1	1,105	550	850
2	1,550	600	900
3	1,980	650	950
4	2,600	780	1,000
5	3,170	780	1,150
6	3,550	800	1,150
7	4,000	800	1,250
8	4,800	850	1,300
9	5,560	900	1,350
10	6,600	900	1,550
11	7,950	1,100	1,550
12	9,320	1,100	1,650
13	10,050	1,150	1,650
14	13,200	1,400	1,850
15	19,200	1,500	2,100
16	25,300	1,580	2,650
17	31,500	1,750	2,750
18	37,000	1,800	3,240
19	43,400	2,100	3,090
20	51,300	2,250	3,340
21	58,000	2,250	3,820
22	67,500	2,400	4,040
23	78,000	2,450	4,490
24	84,700	2,700	4,490
25	98,000	2,850	4,890
26	111,000	2,850	5,490
27	124,000	3,000	5,990

Component Features

Casing Construction

AHU Frame

- AHU Profile made of extruded aluminum alloy
- Profiles internally rounded (10 mm) ensuring that frame is flush with the internal housing surfaces and completely smooth to avoid dirt accumulation and guarantee excellent cleanability
- AHU Profile with true thermal break layer by adding 35 mm polyamide bars in 62 mm profile)
- AHU Profiles are the double chamber type so that the fasting screws are totally concealed with in the profiles and do not project inside the AHU casing
- AHU structure is completed with three-way connecting corners made of glass-reinforced nylon placed on the corners. Unit base, independent for each section is made of Galvanized steel base frame with Minimum height 100 mm
- Corners made of Nylon reinforced glass fiber, Microbial Inertness certified according to ISO 846 Method A and C



Fig 1: Internally Rounded Profile



Fig 3: Nylon Corner (ISO 846 certified)

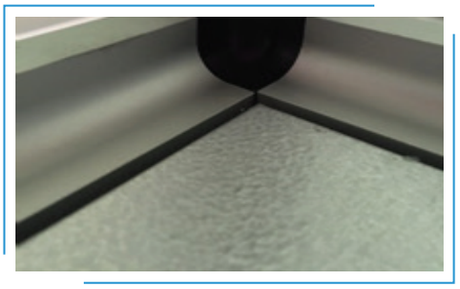


Fig 2: Flush Inner Surface

AHU Panels

- Double skin casing made of 62 mm thick PIR insulation (Polyisocyanurate insulation) CFC free sandwiched between 0.7 mm thick Precoated Steel outer skin and 0.5 mm thick Stainless steel inner skin
- The double skin casing is made of step type panels to obtain a flat surface inside the unit, ensuring continuity between the panel and the profile
- Insulation with overall density of 40-42 kg/m^3 and thermal conductivity of 0.02 W/m °K
- Precoated external skin conforming to 1000 hrs salt spray tested in accordance with ASTM B-117
- The Panels are held to the Frame by stainless steel self-tapping screws. The Screws remain inside the profile and not exposed to both inside and outside air
- The sound absorption through the panel is Eurovent certified conforming to below values:

Hz	Hz	Hz	Hz	Hz	Hz	Hz
125	250	500	1000	2000	4000	8000
8	12	14	13	17	31	39

- Grooves or Gaps inside the unit is sealed properly with Hygienic certified silicone, Microbial Inertness for silicone certified according to ISO 846 Method A and C

Access Section /Doors

- Access doors construction same as AHU casing and assembled to the profiles by using painted metal hinges
- Access door provided with continuous liquid injection foam gasket, Microbial Inertness of gasket certified according to ISO 846 Method A and C
- View port or Inspection window (200 mm diameter) made of double panel poly carbonate material provided for hinged type access door, Microbial Inertness of View port and gasket certified according to ISO 846 Method A and C
- Access doors provided with Nylon reinforced fiberglass external handles
- Access door handle roller cam made of Stainless-steel shafts and roller in glass fibre reinforced Polyamide material, Microbial Inertness of roller certified according to ISO 846 Method A and C
- Safety stop provided for access door handles of fan sections with positive pressure
- Bulkhead lamps are provided in all access sections. Lamp assembly provided with light fixtures in aluminium alloy and prismatic transparent glass diffusers.
- Bulkhead lamps fixtures with IP66 construction and IP55 on/off switches installed on the AHU's outer wall.



Fig 4: Hinged Access Door with View port



Fig 5: Handle Roller Cam



Fig 6: Lamp

Access door/Access Sections to be provided mandatorily for below sections.

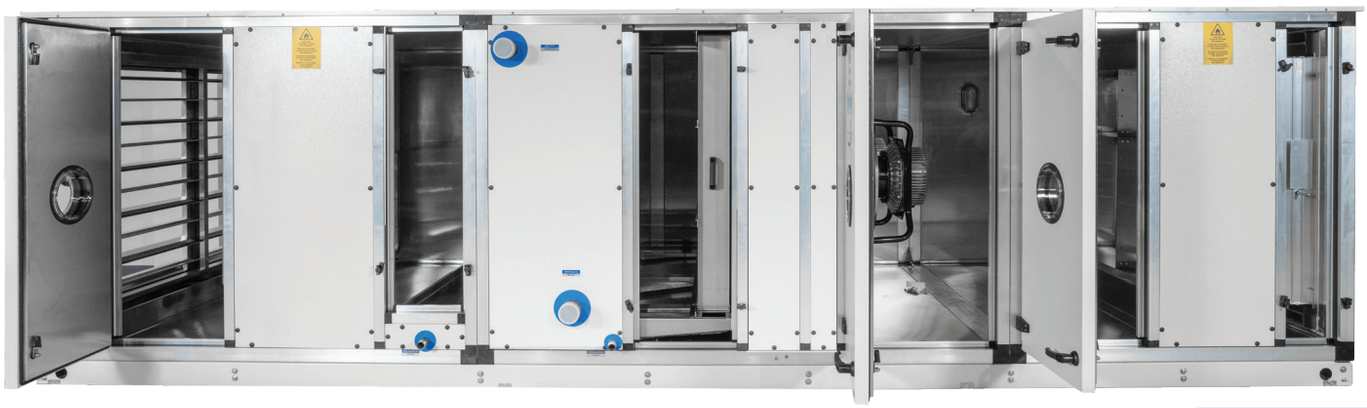


Fig 7: Access Doors/Sections

- Mixing Section
- Filter sections (Front access)
- Fan Sections
- Cooling Coil (Upstream and Downstream)
- Heat Recovery- Upstream and Downstream
- Humidifier Section



Dampers

- Dampers provided for Mixing Section, Inlet Section and Outlet section as required
- Damper construction in aluminium with airfoil profile blades
- Damper casing fabricated of Aluminium with nylon gear system enclosed in the shoulder profile
- Damper blade edges sealed across with EPDM gasket to minimize air leakage between the blades
- Low leakage dampers, Class 2 leakage when tested in accordance with EN 1751
- Microbial Inertness for Damper nylon gear system and blade gasket certified according to ISO 846 Method A and C

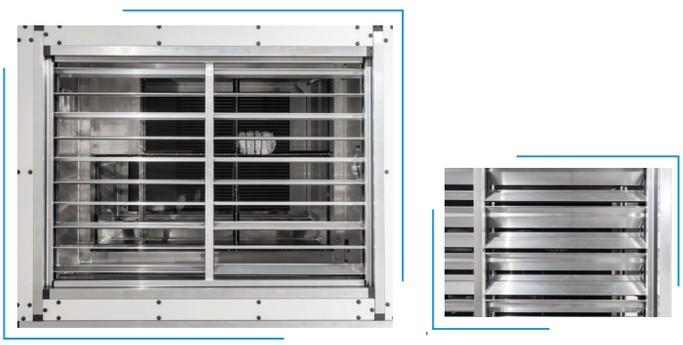


Fig 8: Inlet Section with Dampers

Filters

Prefilter

- Efficiency ISO ePM10≥50% tested as per ISO 16890, Filter depth 48mm
- Filter media shall be made of one continuous sheet of microfine glass fibers media formed into uniformly spaced pleats and formed into a mini-pleat pack configuration
- Thermoplastic pleat separators provided for uniform media separation to promote uniform airflow throughout the media.
- Media frame made of ABS plastic construction and bonded to the entire periphery of the media pack to prevent air bypass.
- Filter Media & Media Frame certified for Microbial inertness according to ISO 846 Method A and C



Fig 9: Prefilter

1st and 2nd Stage Filters

- 1st stage of Filtration stage located near to the air inlet side, efficiency ISO ePM1≥50% tested as per ISO 16890.
- 2nd stage of Filtration stage as last component of AHU, efficiency of ISO ePM1≥80% when tested as per ISO 16890
- Filter media made of high-density air laid lofted micro fine glass media that is chemically bonded to a synthetic micro mesh media support backing forming a lofted filter blanket
- Support members include an ABS plastic header and ABS plastic pocket retainers. The header is joined to the media to prevent air bypass
- Filter Media & Media Frame certified for Microbial inertness according to ISO 846 Method A and C



Fig 10: Bag Filter

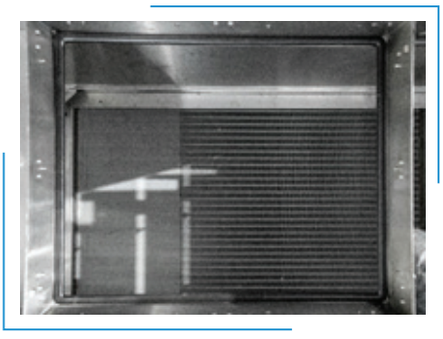


Fig 11: Filter Frame



Fig 12: Filter Gasket



Fig 13: : Magnehelic Gauge

Frame

- Filter Frame fabricated of stainless steel
- Filters Frame in front with drawl arrangement, proper fixing devices provided to ensure filters are tightly fitted throughout the entire operating time
- Filter Frame provided with continuous liquid injection foam gasket, Microbial Inertness of gasket certified according to ISO 846 Method A and C

Filter Monitoring

- Each filter stage provided with Magnehelic Differential pressure gauge for Visual indication of Filter pressure drop.

Coil

- Chilled water cooling coils fabricated from heavy gauge copper tubing of ½" or 5/8" diameter expanded into aluminum fins to give a mechanical bond
- Cooling coil copper Tube thickness 0.36 mm or 0.40 mm
- Aluminum fins with a thickness of 0.10 mm provided, minimum fin spacing of 2.5mm for the cooling coil design
- Coil Headers made seamless copper tubing with external screw threads. Fittings include plugged vent and drain taps

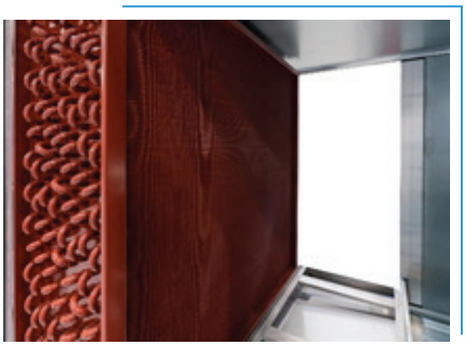


Fig 15: Coils with Herasite Coating

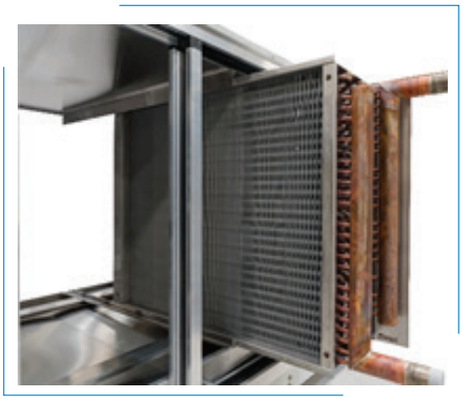


Fig 14: Coils Mounted on Slide Rail for Easy removal

- Coil frame made of AISI304 stainless steel with a minimum thickness of 1.5 mm
- Coils in contact with direct outside provided with Heresite coating on the complete coil including casing
- Coils shall be leak tested according to European directive PED 97/23 CE at 24 bar

- Coils mounted on sliding rails for easy removal through the unit casing.
- Coil header connection through panels equipped with airtight seals
- Moisture eliminator (if required) made of corrosion Resistant material and positioned before the 2nd filter stage in stainless steel frame
- Drain pan made AISI304 stainless steel placed under the coil within the coil section. Three slopped Drain pan with drain connection located at the lowest point to ensure proper condensate drainage.



Fig 16: Moisture eliminator Removable type

Fans

- Direct-drive single inlet centrifugal fans with backwards-curved high-performance centrifugal impellers with radial diffusers, mounted on EC external rotor motor with integrated control electronics

- Impeller made of aluminum, with 5 backwards-curved, continuously welded, hollow-profile blades; impeller sizes 250 and 280 made of plastic; flow-optimized inlet ring made of galvanized sheet steel with pressure tap

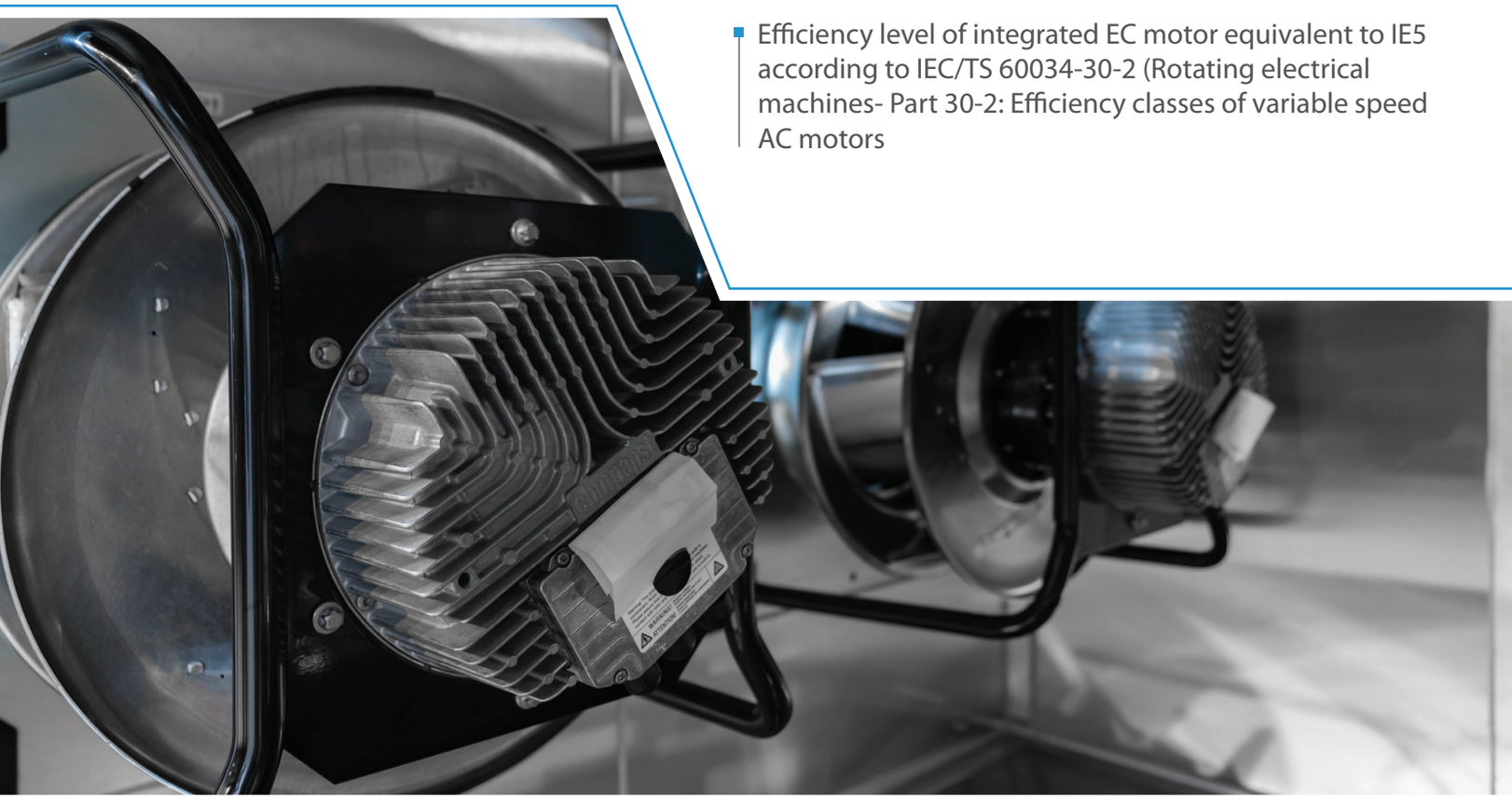
- Motorized impeller statically and dynamically balanced on two planes to balancing grade G 6.3 (motor size 200 to balancing grade G 4.0) in accordance with DIN ISO 21940.

- EC external rotor motors achieve or exceed efficiency class IE5, magnets with no rare earth elements, maintenance-free ball bearings with long-term lubrication, nominal service life of at least 40.000 hours of operation



Fig 17: EC Fan

- Efficiency level of integrated EC motor equivalent to IE5 according to IEC/TS 60034-30-2 (Rotating electrical machines- Part 30-2: Efficiency classes of variable speed AC motors



- All fans have an RS485/MODBUS RTU interface
- Terminal box made of aluminum/plastic with easily accessible connection area with spring-loaded terminals, environment-resistant cable glands, or with external cable (sizes 250 to 280)



Fig 18: Airflow/ Pressure LCD Controller

- For Fan wall arrangement, EC fans are wired to an external junction box with disconnect switch, fuse, and MODBUS / 0-10 V connection.
- Airflow or Pressure LCD controller factory fitted and wired
- Terminal box made of aluminum/plastic with easily accessible connection area with spring-loaded terminals, environment-resistant cable glands, or with external cable (sizes 250 to 280)





Integrated protective devices:

- Alarm relay with zero-potential change-over contacts (250 V AC/2 A, cos w = 1)
- Locked-rotor protection
- Phase failure detection
- Soft start of motors
- Mains under-voltage detection
- Thermal overload protection for electronics and motor
- Short circuit protection

Cross Flow Heat Recovery

- The cross flow plate heat exchangers consisting of exchanger package and casing. The exchanger packet consists of aluminum plates with pressed-in spacer; the thickness of the plate 125 µm. The aluminium plates have high rigidity through the special arrangement of the vertical and horizontal ribs
- The profiles are arranged in such a way that the condensation can drain in every direction.
- The connection of the plates made by a fold which gives several fold materials thicknesses at air entry and exit, also gives good rigidity to the exchanger package
- Casing and side walls made up of Aluzinc Sheet Steel and the exchangers is silicone-free.
- The corners of the exchanger package are sealed into especially rigid aluminium extrusions in the casing with sealing compound. The side walls of Aluzinc sheet steel are bolted tightly to these extrusions



Fig 18: Cross Flow/Counter Flow Heat Recovery



Fig 18: Cross Flow/Counter Flow Heat Recovery

- At the corners, the sections are flattened by 45° which facilitates installation of the exchanger and reduces the diagonal dimension
- The plate heat exchanger is EUROVENT certified
- The exchanger is tested for hygiene conformity in accordance with VDI 6022, VDI 3803, DIN 1946

Eurovent Certified Characteristics

CERTIFIED PERFORMANCE ACCORDING TO EN 1886 STANDARD *

Casing Mechanical Strength	D1
	0.9 mm/m
Casing Air Leakage -400 Pa	L1
	0.06 l/s/m2
Casing Air Leakage +700 Pa	L1
	0.22 l/s/m2
Filter Bypass Leakage	F9
	0.4%
Thermal Transmittance	T2
	0.75
Thermal Bridging of Casing	TB2
	0.63

Results refer to model Box Energy TermiC° S2

EUROVENT CLASSIFICATION ACCORDING TO EN 1886 STANDARD

Casing Mechanical Strength					
Casing Class	D1	D2	D3		
Maximum relative deflection mm × m-1	04	10	Exceeding 10		
Casing Air Leakage 400 Pa Negative Pressure					
Maximum leakage rate (f400)	L1	L2	L3		
Maximum relative deflection l × s-1 × m-2	0.15	0.44	1.32		
Casing Air Leakage 700 Pa Positive Pressure					
Maximum leakage rate (f700)	L1	L2	L3		
Maximum relative deflection l × s-1 × m-2	0.22	0.63	1.9		
Filter Bypass Leakage					
Filter class	F9	F8	F7	F6	G1 to F5
Maximum filter bypass leakage rate k in % of the volume flow rate	0.5	1	2	4	6
Thermal transmittance of casing					
Filter class	T1	T2	T3	T4	T5
Thermal transmittance (U) W × m-2 × K-1	U ≤ 0.5	0.5 < U ≤ 1.0	1.0 < U ≤ 1.4	1.4 < U ≤ 2.0	No requirements
Eurovent Classification according to EN 1886 standard					
Filter class	TB1	TB2	TB3	TB4	TB5
Thermal bridging factor (kb)	0.75 < kb < 1.0	0.60 ≤ kb < 0.7	0.45 ≤ kb < 0.60	0.30 ≤ kb < 0.45	No requirements

Daikin is participating in the EUROVENT Certification Program for Air Handling Units. Astra AHU selection software and performances are Eurovent certified in according to EN 13053

Return Filter

- ISO ePM10≥70%
- Filter Media and Media Frame ISO 846 certified
- SS filter frame Front withdrawal type
- Filter frame Gasket - Liquid Injection Foam Gasket ISO 846 certified

Product Certificates

Hygienic Certificate

TÜV NORD

CERTIFICATE

Permission to use the test mark

VOLUNTARY PRODUCT TEST
BASED ON DIN 1946-4:2018 AND VDI 6022-1:2018

– Tested Hygiene Characteristics –

TÜV NORD Systems GmbH & Co. KG, Hamburg (Germany),

hereby confirms that the Air Handling Unit Range

"D-AHU" in Hygienic Version

conforms to the requirements set by DIN 1946-4 and VDI 6022-1.

DAIKIN Middle East And Africa FZE, Dubai (UAE),

is therefore granted the right to use the test mark shown below
in connection with the above-mentioned product.

TÜV NORD Systems GmbH & Co. KG
Test Laboratory for Ventilation, Air Conditioning, Refrigeration

Dipl.-Ing. Monika Steimle

Essen, 10 May 2021

TÜV NORD
TÜV NORD Systems GmbH & Co. KG
based on DIN 1946-4:2018 and VDI 6022-1:2018
Voluntary Product Test
Tested
Hygiene Characteristics
Air Handling Unit Range
"D-AHU" (AE)
KKL/1060/19

The certification is based upon a type examination of an Air Handling Unit
and not of a complete system installed in a building.
The validity of the certificate is 3 years.
All regulations concerning test mark use are laid down in the corresponding agreement.

Eurovent Certificate

Eurovent Certita CERTIFICATION

CERTIFICATE N° 14.05.003

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

Air Handling Unit / Centrales de traitement d'air

Range Name / Nom de Gamme :
D-AHU

Granted on May 13, 2014 – *Date 1ère admission 13 mai 2014*

This document is valid at the date of issue – Check the current validity on:
Document valable à la date d'émission – Vérifier la validité en cours sur :
www.eurovent-certification.com

Participant/Titulaire

DAIKIN Applied Europe S.p.A
S.S.Nettunense,km 12+300
00040 Cecchina, Italy

This certificate is issued by Eurovent Certita Certification according to the certification rules:

ECP AHU – « Air Handling Unit » in force at established date.

Pursuant to the decision notified by Eurovent Certita Certification, the right to use the mark ECP shall be granted to the beneficiary company for the above Range in the conditions defined by the certification program mentioned.

Unless withdrawn or suspended, this certificate remains valid as long as the requirements for the certification program framework are met. The validity of the certificate is to be verified on www.eurovent-certification.com

THIS CERTIFICATE HAS BEEN ISSUED ON 29/01/2021
THIS CERTIFICATE IS VALID UNTIL 31/12/2021

Ce certificat est délivré par Eurovent Certita Certification dans les conditions fixées par le référentiel :

ECP AHU – « Centrales de traitement d'air » en vigueur à date d'édition.

En vertu de la décision notifiée par Eurovent Certita Certification, le droit d'usage de la marque ECP, est accordé à la société qui en est bénéficiaire pour la gamme visée ci-dessus, dans les conditions définies par le programme de certification mentionné.

Sauf retrait ou suspension, ce certificat demeure valide tant que les conditions du référentiel du programme de certification sont respectées. La validité du certificat est à vérifier sur le site Internet www.eurovent-certification.com

CE CERTIFICAT A ÉTÉ EMIS LE 29/01/2021
CE CERTIFICAT EST VALIDE JUSQU'AU 31/12/2021

cofrac
CERTIFICATION DE PRODUITS ET SERVICES

Organisme accrédité n° 5-0517
Certification Produits et Services selon la norme NF EN ISO/CEI 17065:2012
Portée disponible sur www.cofrac.fr
Accreditation #5-0517 Products and Services Certification according to NF EN ISO/CEI 17065:2012 – Scope available on www.cofrac.fr
COFRAC est signataire des accords MLA d'EA et MLA d'IAF.
COFRAC is signatory of EA MLA and IAF MLA.
list of EA members is available on www.european-accreditation.org/ea-members
list of IAF members is available on www.iaf.nu/articles/IAF_MEMBERS_SIGNATORIES/4

Paris, 29 janvier 2021

MANAGING BOARD MEMBER / MEMBRE DIRECTOIRE

Eurovent Certita CERTIFICATION

CERTIFICATE N° 14.05.003

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

Appendix / Annexe

Granted on May 13, 2014 – *Date 1ère admission 13 mai 2014*

This document is valid at the date of issue – Check the current validity on:
Document valable à la date d'émission – Vérifier la validité en cours sur :
www.eurovent-certification.com

List of certified products and characteristics is displayed on:
La liste des références et caractéristiques certifiées est disponible sur le site :
www.eurovent-certification.com

This certificate is valid for the following trade names:
Ce certificat est valide pour les marques commerciales suivantes:
Trade Name / Marque Commerciale

DAIKIN

This certificate is valid for the following manufacturing places:
Ce certificat est valide pour les sites de production suivants:
Manufacturing Place / Site de Production

Caleppio di Settala (Milan), Italy
Dubai, United Arab Emirates
Cramlington (Newcastle), United Kingdom

This certificate is valid for the following software:
Ce certificat est valide pour les logiciels de sélection suivants:
Software / Logiciel de sélection

ASTRAWEB 10.0.8.1

EUROVENT CERTITA CERTIFICATION SAS au capital de 100 000 € – 48-50 rue de la Victoire 75009 Paris – FRANCE
Tel. : 33 (0)1 75 44 71 71 – 513 133 637 RCS Paris – SIRET 513 133 637 000 35 – TVA FR 59513133637
506D06 TEMPLATE_ECP_RANGE_REV1.1

Factory Certificates



Bureau Veritas Certification

DAIKIN MIDDLE EAST & AFRICA FZE

PLOT MO-0426 [OLD ACER WAREHOUSE],
JEBEL ALI FREEZONE NORTH, P.O. BOX 18674, DUBAI,
UNITED ARAB EMIRATES

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

Scope of certification

MANUFACTURING, SUPPLY AND
TECHNICAL SUPPORT FOR AIR HANDLING UNITS

Original cycle start date:	05 August 2015
Expiry date of previous cycle:	01 August 2021
Certification / Recertification Audit date:	14 June 2021
Certification / Recertification cycle start date:	31 July 2021
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	01 August 2024

Certificate No.: DU004390 Version: 1 Issue Date: 31 July 2021

MARWAN ARIDI

UKAS MANAGEMENT SYSTEMS 0008

Certification Body Address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom

Local Office: Bureau Veritas – Dubai Br., 2nd Floor, Block C, Al Hudaiba Awards Building, Jumeirah Road with 2nd December Interchange, Dubai, U.A.E

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: +971 4 307 4400

1/1



Bureau Veritas Certification

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JEBEL ALI FREEZONE NORTH, P.O. BOX 18674, DUBAI,
UNITED ARAB EMIRATES

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 45001:2018

Scope of certification

MANUFACTURING, SUPPLY AND
TECHNICAL SUPPORT FOR AIR HANDLING UNITS

Original cycle start date:	26 October 2020
Expiry date of previous cycle:	01 August 2021
Certification / Recertification Audit date:	14 June 2021
Certification / Recertification cycle start date:	31 July 2021
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	01 August 2024

Certificate No.: DU004392 Version: 1 Issue Date: 31 July 2021

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ISO 14001:2015

Scope of certification

MANUFACTURING, SUPPLY AND
TECHNICAL SUPPORT FOR AIR HANDLING UNITS

Original cycle start date:	02 August 2018
Expiry date of previous cycle:	01 August 2021
Certification / Recertification Audit date:	14 June 2021
Certification / Recertification cycle start date:	31 July 2021
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	01 August 2024

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MARWAN ARIDI

UKAS MANAGEMENT SYSTEMS 0008

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Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: +971 4 307 4400

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Guide Specifications

1.QUALITY ASSURANCE
1.1 Manufacturer's Qualifications: Firms regularly engaged in manufacture of AHU with Characteristics, sizes and capacities required, whose products have been in satisfactory use in Similar service for not less than 5 years.
1.2 Manufacturers of air handling units shall have ISO 9001, ISO 14001, ISO 45001 certification.
1.3 The inspection of the units shall be carried out at factory before shipment by Client or Consultant representative if required.
1.4 Codes and Standard
a) EUROVENT Compliance: Design, Test, and rate air handling units in accordance with Eurovent Standard EN1886 & EN13053, display certification symbol on units of certified models.
b) AHU shall be Hygienic certified by TUV Nord, or equivalent 3rd Party reputed lab based on DIN 1946-4:2018 and VDI 6022-1:2018, test laboratory shall be accredited in accordance with ISO/IEC 17025.Display Hygienic certification symbol on units. Certification complying to DIN 1946-4 and VDI 6022-1 versions older than 2018 will not be accepted.
c) Valid certificate for the AHU range conformity to both, DIN 1946-4:2018 and VDI 6022-1:2018 to be submitted. Certification to only VDI 6022-1:2018 will not be accepted.

d) The Units should meet as a minimum the below Mechanical Characteristics, Certified and Listed in the Eurovent website

Eurovent Mechanical Characteristics	Eurovent Class
Casing Strength	D1 (M)
Casing Air Leakage -400 Pa	L1 (M)
Casing Air Leakage +700 Pa	L1 (M)
Thermal Transmittance (U)	T2
Thermal bridging factor (Kb)	TB2

e) Classification of Filters as per ISO 16890
f) AHU Fans shall be air performance tested in accordance with ISO 5801 and noise measurements tested in low-reflection acoustic test chamber as per DIN EN ISO 3745
g) AHU Panel insulation should be tested in accordance with ASTME 84 as required in NFPA 90A for Flame spread Index and Smoke developed Index or AHU insulation should have Class 1 Fire reaction as per BS 476 Part 6 & 7
h) Air to Air Plate Heat Exchanger - Tested and Certified as per EN 308
i) All Non-Mettalic Materials within the Airstream should be certified by 3rd Party lab showing Proof of microbiological inertness according to ISO 846 Method A and C: "Evaluation of the action of microorganisms" for all non-metallic material. Intensity of Microbial growth shall have a rating between 0 to 1.
a) Resistance to Fungi (Method A)
b) Resistance to bacteria (Method C)

2.CONSTRUCTION
2.1 Base Frame
a) All units shall be provided with Galvanized steel base frame of Minimum height 100 mm. For Outdoor units painted Galvanized steel base frame shall be provided

b) Base Frame should be C Channel Type with a minimum thickness of 2.8 mm

2.2 PROFILE
a) AHU Profile shall be made of extruded aluminum alloy. Substitutions including galvanized steel painted profile or Frameless design will not be permitted.

b) The profile construction (62 x 62 mm) shall be with thermal break layer (35 mm polyamide in 62 mm profile)

c) Gaskets or insulation on the profile does not guarantee a true metal to metal thermal break and will not be accepted

d) Profiles shall be internally rounded (10 mm) ensuring that frame is flush with the internal housing surfaces and completely smooth to avoid dirt accumulation and guarantee excellent cleanability. Profile shall be externally rounded (10 mm), for safety reasons

e) Alternative rounding internal profile by using silicone or rounded corner seals panel joints on the inner surface will not be accepted

f) All profiles shall be "double chambered" so that the fastening screws on the closure panels remain enclosed inside the profiles

g) Section to section profiles shall be designed in such a way that section joint will have continuous thermal bridging

h) Aluminum profiles shall be connected to corners forming the AHU skeletal, Corners shall be made of Nylon reinforced glass fiber having certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

2.3 CASING
a) The unit casings shall be double skin with 62 mm thick PIR insulation (Polyisocyanurate insulation) CFC free sandwiched between 0.7 mm thick Precoated Steel outer skin and 0.5 mm thick Stainless steel inner skin. Precoated external skin shall meet 1000 hrs salt spray tested in accordance with ASTM B-117.

b) Panel Insulation thickness less than 62mm will not be permitted.

c) The polyurethane foam insulation shall have an overall density of 40-42 kg/m^3 and thermal conductivity of 0.02 W/m °K.

d) The Panels to be held to the Frame by self-drilling / self-tapping screws. The Screws shall remain inside the profile and shall be installed from outside of the unit only. Screws shall not be exposed to both inside and outside air. Stainless steel screws shall be used.

e) The sound absorption through the panel shall be according to Eurovent. The sound reduction through the panel shall conform to the below values:

Hz	Hz	Hz	Hz	Hz	Hz	Hz
125	250	500	1000	2000	4000	8000
8	12	14	13	17	31	39

f) AHU Casing when exposed to 2500 Pa Positive and Negative pressure shall not cause any permanent deflection.

g) Inside the unit there shall be no grooves or gaps, where dirt can accumulate. Silicone shall be applied between frame and panels inside the unit. Silicone shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

accumulate. Silicone shall be applied between frame and panels inside the unit. Silicone shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

3. Access Door
a) Access door shall be provided as required and detailed under specification of
respective components.

b) The Access doors shall be of the same construction as per the AHU casing and assembled to the profiles by using painted metal hinges.

c) Access door Gaskets should be inserted, clamped, or foamed. Glued gaskets will not be permitted. Gasket shall have
certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C.

d) Hinged type access door shall be provided with View port or Inspection window. View port or Inspection window and gaskets shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

e) Nylon reinforced fiberglass external handles shall be provided. Internal access door roller cam shall be provided with Stainless steel shafts and roller in glass fibre reinforced Polyamide, roller in glass fibre reinforced Polyamide shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

f) Access door Handles for fan sections with positive pressure have safety stop.

g) Access door to be provide mandatorily for below sections.
- Mixing Section
- Filter sections
- Fan Sections
- Cooling Coil and Heat Recovery- Upstream and Downstream
- Humidifier Section

4. MIXING BOX / DAMPERS
a) Mixing Box sections should be provided as applicable and should consist of opposed blade type Dampers.

b) The damper blades and casing should be fabricated of Aluminium with nylon gear system enclosed in the shoulder profile. Dampers fabricated of galvanized steel blades and casing will not be
permitted.

c) Damper blade edges shall be sealed across with EPDM gasket to minimize air leakage between the blades.

d) Damper nylon gear system and blade gasket shall have
certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

e) Damper control shaft shall be suitable for receiving field installed actuators.

f) Dampers Air leakage class shall comply to Class 2 leakage as minimum, dampers shall be type tested for leakage as per EN 1751 in 3rd Party competent labs.

5. FILTER SECTION
5.1 Prefilter

a) Filter media shall be of one continuous sheet of microfine glass fibers media formed into uniformly spaced pleats and formed into a mini-pleat pack configuration.

b) Thermoplastic pleat separators shall provide uniform media separation to promote uniform airflow throughout the media.

c) The enclosing frame shall be of ABS plastic construction and bonded to the entire periphery of the media pack to prevent air bypass.

d) Filter Shall be Free of harmful chemical components such as Formaldehyde, Phtalates and Bisphenol-A

e) The filter shall have an efficiency of ISO ePM10≥ 50% when tested as per ISO 16890.

f) Filter Sizes shall be according to Dimension standard EN 15805.

g) Individual components of Filter including filter Media & Media Frame shall be tested for microbiological inertness according to ISO 846 Method A and C

h) Filter Shall be tested resistance to common chemicals (H2O2 or other agents) used for cleaning and decontamination processes in clean rooms.

5.2 1st and 2nd Stage Filtration
a) Filter media shall consist of high-density air laid lofted micro fine glass media that is chemically bonded to a synthetic micro mesh media support backing forming a lofted filter blanket

b) Pockets shall be formed into tapered pleats, supported by controlled media space stitching, to promote uniform airflow across the surface of the media. At any point, the sizes of the upstream and downstream passages shall be proportional to the volume of filtered air. The pockets shall also have a conical configuration to minimize contact with HVAC system components.

c) Support members shall include an ABS plastic header and ABS plastic pocket retainers. The header shall be joined to the media to prevent air bypass. Individual pocket retainers shall be attached to the header frame with anchor ports allowing for visual confirmation. Bypass between pockets shall be eliminated through a snap-to-seal pocket retainer that shall be an integral part of the two-piece header design. The frame shall form a rigid and durable support assembly.

d) The air exiting side of the air tunnels include a pocket flange to ensure pocket integrity throughout the life of the filter.
A downstream pocket-to-pocket partition shall provide additional pocket separation to ensure full flow through the entire media area

e) 1st stage of Filtration stage shall be located near to the air entry side in the AHU, the 1st stage of Filtration shall have an efficiency of ISO ePM1≥50% when tested as per ISO 16890.

f) 2nd stage of Filtration stage shall be located as last component of AHU, the 2nd stage of Filtration shall have an efficiency of ISO ePM1 ≥80% when tested as per ISO 16890.

g) Filter Sizes shall be according to Dimension standard EN 15805.

h) Individual components of Filter including filter Media & Media Frame shall be tested for microbiological inertness according to ISO 846 Method A and C

i) Filter Shall be tested resistance to common chemicals (H2O2 or other agents) used for cleaning and decontamination processes in clean rooms.

5.3 Filter Frame

a) Filters Frame shall be stainless steel construction. Filter frame gaskets should be inserted, clamped, or foamed. Glued gaskets will not be permitted. Gasket shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

b) Filters Frame shall be front with drawl type with proper fixing devices to ensure filters are tightly fitted throughout the entire operating time. Side withdrawal filter frames are not permitted.

c) Minimum depth of the access section upstream of the filter shall be atleast the depth of respective filter.

5.4 Filter Monitoring
a) Each filter stage shall be provided with Magnehelic Differential pressure gauge for Visual indication of Filter pressure drop.

b) Maximum Pressure drop indicated on the Magnehelic Differential pressure gauge shall correspond to dirty filter pressure drop or higher.

6. COOLING COIL
a) Coils shall be designed, rated, and certified following to AHRI 410.

b) Chilled water cooling coils of capacities as indicated on schedules shall be fabricated from heavy gauge copper tubing of ½" or 5/8" diameter expanded into aluminum fins to give a mechanical bond.

c) 3/8" coil diameters will not be permitted.

d) Cooling coil copper Tube thickness shall be minimum 0.36mm, alternative smaller Tube thickness will not be permitted.

e) Headers shall be seamless copper tubing with external screw thread. Fittings shall include plugged vent and drain taps. Steel headers will not be permitted.

f) The Aluminum fins used shall be having a thickness of 0.10 mm with minimum fin spacing of 2.5 mm. alternative smaller Tube thickness will not be permitted.

g) Coils in contact with direct outside air shall be provided with Heresite coating on the complete coil including casing. Aluminium blue fins will not be permitted.

h) Coils shall be leak tested according to European directive PED 97/23 CE at 24 bar.

i) The Coil frame shall be built AISI304 stainless steel with a minimum thickness of 1.5 mm.

j) Coils shall be selected considering face velocities to prevent moisture carry over. If Moisture eliminator cannot be avoided, they should be corrosion Resistant and removable type with stainless steel frame positioned before the 2nd filter stage.

k) All the coils shall be mounted on sliding rails so that they can be removed easily through the unit casing. Coil headers through panels shall be equipped with airtight seals.

l) Drain pans shall be internal and made AISI304 stainless steel placed under the coil within the coil section. Drain pans shall have drain connection to the service side. Drain pan shall be 3 slopped and drain connection located at the lowest point to ensure proper condensate drainage.

7. FAN SECTION
a) Single inlet: direct drive EC Plug Fans shall be provided.

b) High-performance radial impeller shall be with circumferential diffuser mounted on an electronically commutated external rotor

c) Motor shall be with integrated control electronics. Radial impeller shall be made of aluminium with backward curved, AF, continuously welded blades

d) Aerodynamically optimized inlet nozzle with bleeder connection for pressure relief shall be made of zinc-coated sheet steel

e) Complete unit shall be statically and dynamically balanced in two planes as per DIN / ISO 1940 to balancing grade G 6.3. Shock load tests shall be carried out in compliance to DIN IEC 68, parts 2-27

f) Vibration test in operation and at stand-still shall be according to DIN IEC 68, parts 2-6

g) EC external-rotor motor efficiency class shall be IE4 without "rare earth" magnets being used, with maintenance-free ball bearings and permanent lubrication. Type of protection shall be IP54; soft start; integrated current limitation

h) Compact integrated electronics: with adjustable PID controller shall meet all relevant EMC directives and all requirements as to circuit feedbacks; require no complicated installation with shielded cables; very low-noise commutation logic; 100 % speed-controllable

i) Motors with an output of 750W or higher shall have an RS485/-MODBUS RTU interface integrated

j) Air performance measurements shall be carried out on suction side and on chamber test beds conforming to the specifications as per ISO 5801 and DIN 24163

k) In case of multiple parallel arrangement, EC fans shall be wired to an external junction box with disconnect switch, fuse, and MODBUS / 0-10 V connection.
l) Airflow and/or pressure LCD controller/reader shall be factory fitted and wired.
Protective features:
Alarm relay with zero-potential change-over contacts
250 V AC/2 A, cos = 1)
Locked rotor protection
Phase failure detection
• Soft start of motors
• Mains under-voltage detection
• Over-temperature protection of electronics and motor
• Short-circuit protection.

Soft start of motors
Mains under-voltage detection
Over-temperature protection of electronics and motor
Short-circuit protection.

8. VIEW PORT & LAMP

a) Hinged access doors shall be equipped with 200 mm diameter, double-walled polycarbonate windows to ensure transparency and integrity and shall be fitted with EPDM seals. View ports shall not have screws exposed in the Airstream.

b) View ports polycarbonate windows and gaskets shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

c) Bulkhead lamps shall be provided in all access sections. Lamp assembly shall be provided with light fixtures in aluminium alloy and prismatic transparent glass diffusers. Bulkhead lamps fixtures shall have IP66 construction and with IP55 on/off switches installed on the AHU's outer wall

9.Electrical cabling
a) Cable glands shall be provided for all electrical cables (e.g., Lamp cables, Fan Cables etc.)

b) Inside the AHU cables shall not be laid in conduits and cable routing should be as short as possible
b) Filters Frame shall be front with drawl type with proper fixing devices to ensure filters are tightly fitted throughout the entire operating time. Side withdrawal filter frames are not permitted.

c) Minimum depth of the access section upstream of the filter shall be atleast the depth of respective filter.

5.4 Filter Monitoring
a) Each filter stage shall be provided with Magnehelic Differential pressure gauge for Visual indication of Filter pressure drop.

b) Maximum Pressure drop indicated on the Magnehelic Differential pressure gauge shall correspond to dirty filter pressure drop or higher.

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a) Coils shall be designed, rated, and certified following to AHRI 410.

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f) The Aluminum fins used shall be having a thickness of 0.10 mm with minimum fin spacing of 2.5 mm. alternative smaller Tube thickness will not be permitted.

g) Coils in contact with direct outside air shall be provided with Heresite coating on the complete coil including casing. Aluminium blue fins will not be permitted.

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k) All the coils shall be mounted on sliding rails so that they can be removed easily through the unit casing. Coil headers through panels shall be equipped with airtight seals.

l) Drain pans shall be internal and made AISI304 stainless steel placed under the coil within the coil section. Drain pans shall have drain connection to the service side. Drain pan shall be 3 slopped and drain connection located at the lowest point to ensure proper condensate drainage.

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h) Compact integrated electronics: with adjustable PID controller shall meet all relevant EMC directives and all requirements as to circuit feedbacks; require no complicated installation with shielded cables; very low-noise commutation logic; 100 % speed-controllable

i) Motors with an output of 750W or higher shall have an RS485/-MODBUS RTU interface integrated

j) Air performance measurements shall be carried out on suction side and on chamber test beds conforming to the specifications as per ISO 5801 and DIN 24163

k) In case of multiple parallel arrangement, EC fans shall be wired to an external junction box with disconnect switch, fuse, and MODBUS / 0-10 V connection.

per ISO 5801 and DIN 24163

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l) Airflow and/or pressure LCD controller/reader shall be factory fitted and wired.
Protective features:
Alarm relay with zero-potential change-over contacts
(250 V AC/2 A, cos = 1)
Locked rotor protection
Phase failure detection
Soft start of motors
Mains under-voltage detection
Over-temperature protection of electronics and motor
Short-circuit protection.

8. VIEW PORT & LAMP

a) Hinged access doors shall be equipped with 200 mm diameter, double-walled polycarbonate windows to ensure transparency and integrity and shall be fitted with EPDM seals. View ports shall not have screws exposed in the Airstream.

b) View ports polycarbonate windows and gaskets shall have certificate/test report showing proof of microbiological inertness according to ISO 846 Method A and C

c) Bulkhead lamps shall be provided in all access sections. Lamp assembly shall be provided with light fixtures in aluminium alloy and prismatic transparent glass diffusers. Bulkhead lamps fixtures shall have IP66 construction and with IP55 on/off switches installed on the AHU's outer wall

9.Electrical cabling
a) Cable glands shall be provided for all electrical cables (e.g., Lamp cables, Fan Cables etc.)

b) Inside the AHU cables shall not be laid in conduits and cable routing should be as short as possible

10. ROOF
AHU's that are to be installed outdoor, protective flat roof in precoated steel shall be provided.

11.HEAT RECOVERYxCross Flow Heat Exchanger
a) The cross flow plate heat exchangers shall consist of exchanger package and casing. The exchanger packet shall consist of aluminum plates with pressed-in spacer; the thickness of the plate shall be 125 µm. The aluminium plates shall have high rigidity through the special arrangement of the vertical and horizontal ribs.

b) The profiles shall be arranged in such a way that the condensation can drain in every direction.

c) The connection of the plates shall be made by a fold which gives a several fold material thickness at air entry and exit, also gives good rigidity to the exchanger package.

d) Operational temperature of the exchanger shall be -40 to +80°C.

e) The exchangers shall resist up to 2500 Pa pressure difference between the air streams.

f) The heat releasing and heat absorbing air streams shall pass along the joint state, through which heat can be directly transmitted.

g) Casing and side walls shall be made up of Aluzinc Sheet Steel and the exchangers are silicone-free.

h) The corners of the exchanger package shall be sealed into especially rigid aluminium extrusions in the casing with sealing compound. The side walls of Aluzinc sheet steel shall be bolted tightly to these extrusions.

i) other components shall be bolted or riveted directly to the hollow sections without affecting the rigidity of the exchanger or damaging the exchanger package.

j) At the corners, the sections shall be flattened by 45° which facilitates installation of the exchanger and reduces the diagonal dimension.

k) The side walls of all compound plate heat exchangers have a special profile foe a sealing bead

l) The plate heat exchanger shall be EUROVENT certified.

m) The exchanger shall be tested for hygiene- conformity in accordance with VDI 6022, VDI 3803, DIN 1946-4. Valid test certificate from reputed European agency shall be provided.

Annexure-1 Checklist AHU Hygienic Construction

Item	Specification	Compliance (By Manufacturer)	Site Verification (By Contractor)
Certification	Valid Hygienic certificate for the AHU range conformity to DIN 1946-4:2018 and VDI 6022-1:2018 to be submitted. Certification symbol shall be Displayed on the unit		
Certification	Rounded Aluminium Profile		
	Thermal break Profile (polyamide bars in profile)		
	Properly Sealed grooves or gaps inside the unit		
	All Internal Sheet Metal parts in Stainless Steel or Aluminium 1) Panel Inner Skin 2) Dampers 3) Heat Recovery 4) Filter and Coil Frame 5) Drain Pan 6) Blank off sheets 7) Section to Section connections (If internal) etc…		
	Gaskets on access door and filter frame inserted, clamped, or foamed (Glued gaskets are not allowed)		
	Microbial Inertness Tested and Certified to ISO 846 Tested for below components. Test certificates shall be provided as part of submittal. 1) AHU Corners (Connecting Aluminium Profile) 2) Access Door & Filter Frame Gaskets 3) Inspection Window polycarbonate Glass & Gasket 4) Door Lock - Roller cam roller glass fibre reinforced Polyamide 5) Damper Gasket & Damper Nylon gear system 6) Filter Media & Filter Frame 7) Sealant 8) Fan Flexible (if applicable)		
Dampers	Damper Blades and Casing - Aluminium Construction		
	Damper Leakage Class 2 or better (Leakage Class displayed on damper name plate)		
	Spring return type actuators for dampers		
Filters	Filters tested to ISO 16890 (displayed on filter name plate)		
	1st filtration stage: ISO ePM1 ≥ 50 % 2nd filtration stage: ISO ePM1 ≥ 80 % (Last component of AHU after Fan) (Efficiency value displayed on respective filter name plate)		
	Front withdrawal filter frame (Side Withdrawal Filter frames not permitted)		
	Magnehelic pressure gauge for each filter stage		
Cooling Coil	Coils Fin Spacing ≥ 2.5 mm		
	Cooling Coil Frame: Stainless Steel		
	Cooling Coil Header: Copper		
	Cooling Coil mounted on rails and should be easily removable		
	Moisture eliminator Corrosion Resistant and removable type mounted on stainless steel frame (if Applicable)		

Annexure-1 Checklist AHU Hygienic Construction

Item	Specification	Compliance (By Manufacturer)	Site Verification (By Contractor)
Drain Pan	Stainless Steel drain – 3 Slopped		
	Drain pan shall be meet the condensate drainage criteria required i.e after filling the drain pan with 5 litres of water per m^2 of pan area, more than 95 % of the filled water should be drained off over a period of 10 min with the system in operation		
	Drain Pan Provided on below sections. 1) Air inlet Section/Mixing section 2) Cooling Coil 3) Humidifier 4) Heat Recovery - Supply and extract Side		
Heat Recovery (If Applicable)	Cross flow Heat recovery system or Run Around Coil		
	Cross flow Heat exchanger with Aluminium or Aluminium Painted construction		
	Cross flow Heat exchanger Plate spacing ≥ 2mm		
	Cross flow Heat exchanger VDI 6022 / DIN 1946 certified (Certification displayed on respective name plate)		
	Run Around coils comply with Cooling Coil specification		
Fans	Direct driven EC Fans		
	Supply Fan positioned between the 1st and 2nd filter stages		
	Pressure controller on Fan section with indication of Airflow		
Access	AHU casing clearance height< 1.6 meters easy pull out the components possible (Dampers, Coils, Fans etc..)		
	Below Components access section provided from both upstream and Downstream 1) Coils 2) Heat Recovery Devices		
	Access doors provided for below sections. 1) Mixing Section 2) Filters 3) Humidifiers 4) Fan Section		
	Inspection window & internal lighting to be provided for all sections with access doors		
	Lamp assembly light fixtures in aluminium alloy with prismatic trans parent glass diffusers. Bulkhead lamps fixtures - IP66 Rating On/off switches - IP55 Rating installed on the AHU's outer wall.		
Cabling	Cable glands for all electrical cables (e.g. Lamp cables, Fan Cables etc..)		
	Inside the AHU cables should not be laid in conduits and cable routing should be as short as possible		

Daikin's AHU Factory









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