# Technical Submission and Sample Form
# Design Intent Verification

| | |
|---|---|
| **Project Name and No:** | Manchester Metropolitan University Science & Engineering - 25716 |
| **Submission No:** | 1338B-NGB-ZZ-ZZ-TS-M-013 |
| **Material/Product Reference:** | Flaktwoods Air Handling Units |
| **Manufacturer's Name, Address and Contact No:** | Dolphin House, Moreton Business Park, Moreton-on-Lugg, Hereford. HR4 8DS. UK |
| **Proposed Location of Material/Plant on Project:** | Air Handling Units – AHU07, AHU08 & AHU09 |
| **Specification References** | 1388B-HOL-XX-XX-SP-V-000001 MEP Generals Spec (New Build)<br>1388B-HOL-XX-XX-SP-V-000002 MEP Performance Spec (New Build)<br>1388B-HOL-XX-XX-SP-V-000010 MEP Generals Spec (Refurb)<br>1388B-HOL-XX-XX-SP-V-000011 MEP Performance Spec (Refurb)<br>9.14.1 MMU EMAP 54 Mandatory Equipment Schedule<br>1338B-5PA-XX-XX-SP-A-000001 Architectural Specification |
| **List of Attachments:** | Flaktwoods Tech Sub 281021 |
| **Sample Included (Y/N)** | No |
| **Compliant with Specification (Y/N)**<br>**If No state Non-Compliance** | No – Change to AHU07 with the specification requesting a Plate Heat Exchanger used, whereas the proposed uses a thermal wheel and purge sector |

| | |
|---|---|
| **Date:**<br><br>**02/11/2021** | Name (Printed) **Martin Edwards**<br>On behalf of NG Bailey |

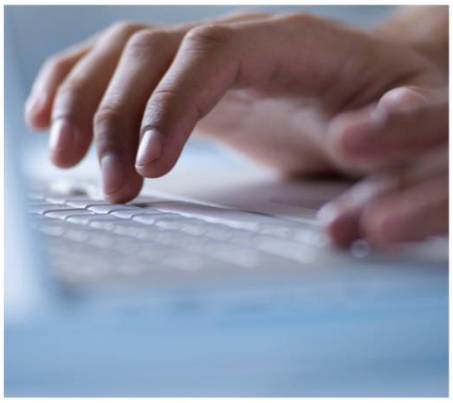
| Approved/Approved with Comments | Name (Printed) | Representative of: | Date: |
|---|---|---|---|
| Comments: | | | |

# NG BAILEY
# Manchester Metropolitan University – Science & Engineering

Technical Submission

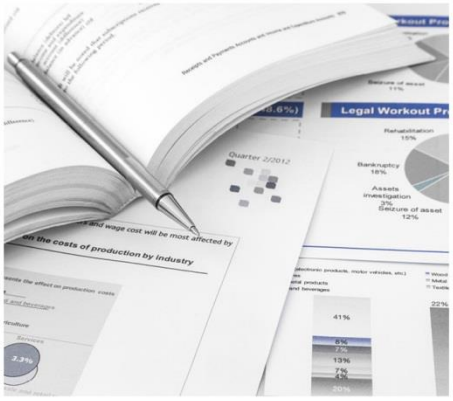
1338B-NGB-ZZ-ZZ-TS-M-013

Air Handling Units – AHU07, AHU08 & AHU09



BOWMER + KIRKLAND

Manchester Metropolitan University



NG Bailey

# TECHNICAL SUBMISSION FOR – Mechanical

## SUMMARY

| | |
|---|---|
| **Technical Submission No.** | 1338B-NGB-ZZ-ZZ-TS-M-013 |
| **Revision:** | 0 |
| **Package Description:** | AHU07, AHU08 & AHU09 |
| **Package Equipment:** | Air Handling Units |
| **Proposed Supplier:** | **Flaktwoods** |
| **Supplier Address:** | Dolphin House, Moreton Business Park, Moreton-on-Lugg, Hereford. HR4 8DS |
| **Building Locations:** | MMU – Science & Engineering Refurbishment JDC Roof Level 2, JDT Level 1 Plantroom and JDT Level 0 Riser |
| **Compliance with Specification:** | No – Change to AHU07 with the specification requesting a Plate Heat Exchanger used, whereas the proposed uses a thermal wheel and purge sector |
| **NGB Contact:** | Martin Edwards |
| **NGB Contact Tel:** | 07971157798 |
| **NGB Contact E-mail:** | Martin.edwards2@ngbailey.co.uk |
| **Raised By:** | Martin Edwards |
| **Date Raised:** | 02/11/2021 |
| **Response Required By:** | 16/11/2021 |

# OVERVIEW

| SUPPORTING DOCUMENTS: |
| --- |
| This technical submittal is for the manufacture, supply & installation of the Air Handling Units within the Refurbishment.<br><br>The Hoare Lea Mechanical Specification “1338B-HOL-XX-XX-SP-V-000012” details the requirements for the AHU’s and also contains the EMAP 54 – MANDATORY EQUIPMENT SCHEDULE of which Flaktwoods are the preferred manufacturer. |

# SUPPORTING DOCUMENTS

| SUPPORTING DOCUMENTS: |
| --- |
| Flaktwoods Tech Sub 281021 |

# APPROVAL STATUS

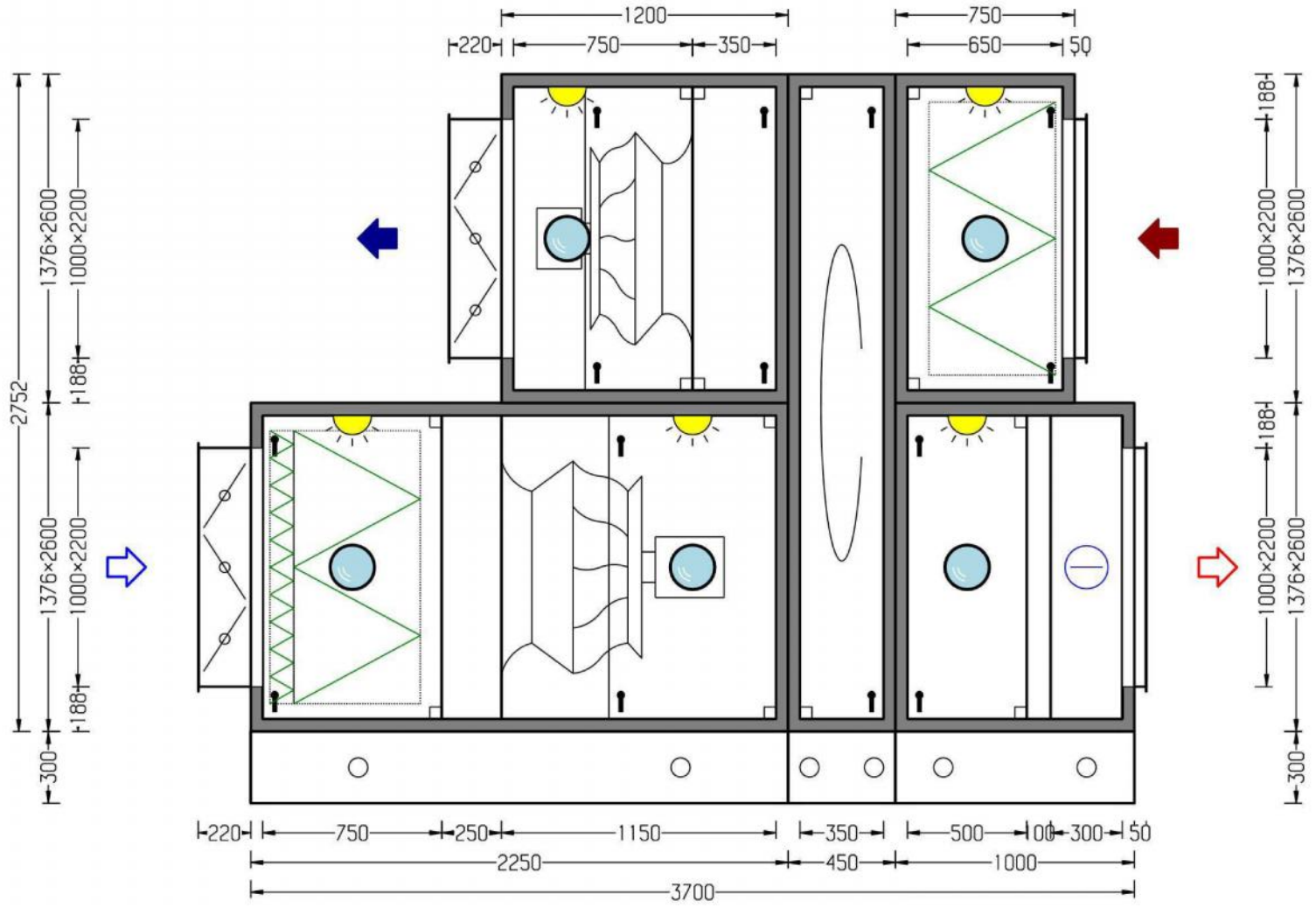
| COMMENTS: | | | | |
|---|---|---|---|---|
| | | | | |
| STATUS: | A | B | C | (Please Circle) |
| MADE BY: | | | | |
| DATE: | | | | |

STATUS KEY

A – Approved

B – Approved with comments

C – Rejected with comments




From Inspection Side

2021-10-28
*Acon 3.03.56121*
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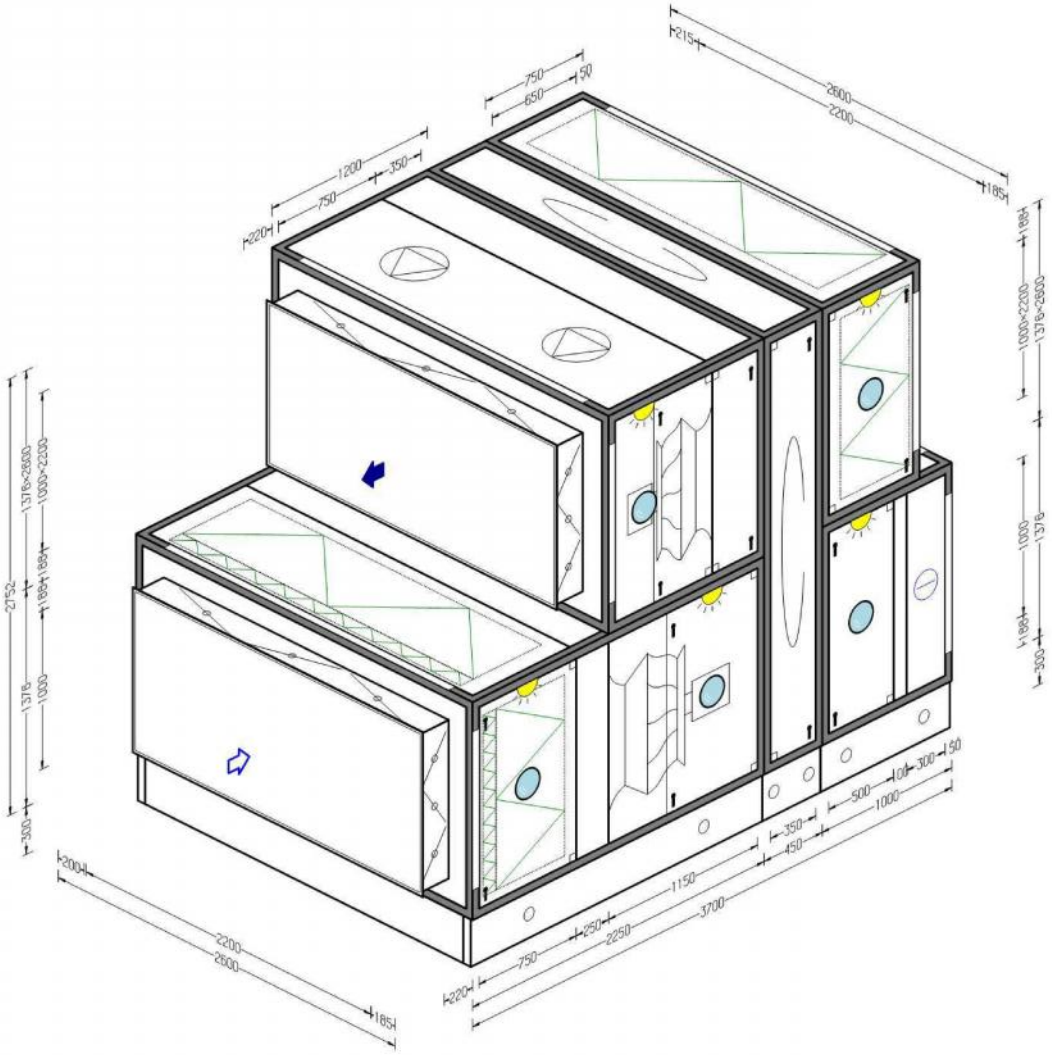
| | | | | |
|---|---|---|---|---|
| **Customer id** | 2459 | **Project name** | | (121138842A03) / ManMet S & E |
| **Project** | 30504 | **Unit name** | | (A2) / AHU07 (No Controls) |
| **Unit** | 6 | **Supply air** | eQ-072 | 6400 l/s |
| **AOC** | ACON-02873108 | **Exhaust air** | eQ-072 | 6510 l/s |

FläktGroup




Isometric South West

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*Acon 3.03.56121*
Page 2/10

| | | | |
|---|---|---|---|
| **Customer id** | 2459 | **Project name** | (121138842A03) / ManMet S & E |
| **Project** | 30504 | **Unit name** | (A2) / AHU07 (No Controls) |
| **Unit** | 6 | **Supply air** eQ-072 | 6400 l/s |
| **AOC** | ACON-02873108 | **Exhaust air** eQ-072 | 6510 l/s |

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**AIR HANDLING UNIT eQ**

| | | |
|---|---|---|
| Project | 30504 (121138842A03) / ManMet S & E | *Acon 3.03.56121* |
| AOC | ACON-02873108 | |
| Unit | 6 (A2) / AHU07 (No Controls) | 2021-10-28 |
| Size | 072 | Page 3/10 |
| Customer | NG Bailey | |
| Customers ref. | Martin Edwards | |
| Our ref. | Andy Window | |

| | | | |
|---|---|---|---|
| Supply air volume flow rate | 6400 l/s | Exhaust air volume flow rate | 6510 l/s |
| External static pressure | 305 Pa | External static pressure | 360 Pa |
| Mains electricity | 3x400VAC±10%+N+PE, 50Hz | Weight | 2472 kg |
| Specific el. power demand (SFPv) | 1.95 kW/(m³/s) | Dimensioned for wet condition | |
| Ref. density | 1.2 kg/m³ | Ref. altitude above sea level | 0 m |

## SUMMARY

| **Functional sections in direction of air flow** | **v0 (m/s)** | **Et (%)** | **tw (°C)** | **ts (°C)** | **dP* (Pa)** |
|---|---|---|---|---|---|
| **Supply air:** | | | | | |
| Connection section | 3.6 | | | | 6 |
| Filter | 2.5 | | | | 187 |
| Inspection section | | | | | 0 |
| Plenum fan | | 74.9 | -5 / -4.2 | 28 / 29 | 713 |
| Heat exchanger | 2.9 | 75.0 | -4.2 / 14.7 | 29 / 23.8 | 150 |
| Inspection section | | | | | 0 |
| Inspection section | | | | | 0 |
| Reverse Cycle DX Coil | | | | 28 / 16 | 63 |
| Connection section | 3.2 | | | | 2 |
| Fan system effect | | | | | 0 |
| Supply outlet | | | | | 305 |
| **Exhaust air:** | | | | | |
| Exhust inlet | | | | | 360 |
| Connection section | 3.3 | | | | 2 |
| Filter | 2.3 | | | | 78 |
| Heat exchanger | 3.1 | | 21 / 4 | 22 / 27.1 | 151 |
| Inspection section | | | | | 0 |
| Plenum fan | | 66.8 | | | 591 |

*Refers to the fan design case
Fan system effect is taken into account in fan performance

## SOUND POWER LEVELS

(standard: EN13053 ISO/CD 13347-2)

| | **Lw per octave band (dB)** | | | | | | | | **LwA** |
|---|---|---|---|---|---|---|---|---|---|
| Octave band (Hz) | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | **dB(A)** |
| Fresh air connection | 77 | 83 | 78 | 74 | 73 | 75 | 70 | 69 | 80 |
| Supply air connection | 79 | 84 | 82 | 85 | 78 | 80 | 74 | 66 | 86 |
| Extract connection | 80 | 80 | 75 | 69 | 61 | 59 | 54 | 59 | 71 |
| Exhaust connection | 85 | 89 | 86 | 86 | 82 | 79 | 75 | 75 | 88 |
| To surroundings | 74 | 73 | 64 | 53 | 52 | 55 | 49 | 41 | 62 |

# TECHNICAL SPECIFICATION
(components listed in direction of air flow)

## SUPPLY AIR

### End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 6 | Pa |
| **Casing end wall** | **EQVA-072-1-1-22-1-1** | |
| **Damper** | **EQAZ-12-220-100-3-2-1-01-2-0-8** | |
| Width cm : 220 | | |
| Height in cm : 100 | | |
| Tightness class : CEN 3 | | |
| Connection: Flange | | |
| Function : Outdoor air | | |
| Location: externally end wall | | |
| Damper type: 200 mm blade | | |
| Material : AlZn | | |
| **Damper actuator** | **STAZ-30-1-14-2-0-2-1-1** | |
| Type: 2-Point with spring return | | |
| Delivery options: Mounted on current sub | | |
| Voltage: 24V | | |

### Filter — EQPB-072-07-33-4-1-1-1-8-0-8-1

| | | |
|---|---|---|
| Inspection side: right | | |
| **Filter selection** | | |
| Filter class: F7 - ePM1 60%, glassfibre | | |
| Filter frame : galvanized sheet steel | | |
| Prefilter: G4 – coarse, synthetic | | |
| **Design** | | |
| Connection side : inlet in end wall | | |
| Location: negative pressure | | |
| Drain tray: without | | |
| Number of filters | 8x592x592 | |
| Pressure drop, start | 112 | Pa |
| Pressure drop, dimensioning | 187 | Pa |
| Pressure drop, end | 262 | Pa |
| Face area | 2.9 | m² |
| Face velocity | 2.5 | m/s |
| **Inspection window** | **EQAZ-01-1-1** | |
| Design: standard | | |
| **Bulkhead light** | **EQAZ-09-072-2-3-2-2** | |
| Type: LED | | |
| Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel. | | |
| **Differential pressure sensor type Dwyer Magnehelic** | **EQPZ-25-3-0-1-1** | |
| Pressure range, first sensor: 0-500 Pa | | |
| Design: flush mounted in door | | |
| **Filter monitoring** | **STAZ-24-3-1** | |

### Empty section — EQTC-072-025-0-0-0-0-0-0-1-2

| | | |
|---|---|---|
| Unit size : 072 | | |
| Length: 025 | | |
| Inspection side : right | | |

### Plenum fan — EQLA-072-2-0-1-1-6-1-1-2-8-1-2

| | | |
|---|---|---|
| Inspection side: right | | |
| **Fan selection** | | |
| Impeller type: Bluefin Floor mounted | | |
| Fan size: size 2 | | |

Anti-vibration mountings: rubber

**Motor selection**

Motor type: PM-motor IE4

IEC Size: 132

**Motor control**

Manufacture, type: FläktGroup separate

Housing protection: IP54

Design: on panel

Delivery options: mounted on current sub

**Motor / VSD-accessories**

Connection accessories: mounted cable

Length: 350

**Dimensioning data**

| | | |
|---|---|---|
| Speed | 1561 | Rpm |
| Max speed | 1670 | Rpm |
| Total efficiency | 67.9 | % |
| Total static pressure, dimensioning (wet coil) | 713 | Pa |
| Dynamic pressure | 98 | Pa |
| Fan system input power (absorbed electrical power) | 8.64 | kW |
| Temperature rise | 1 | °C |
| K factor | 6.79 | |
| Fan wheel size | 071 | |

**SFP Calculation**

| | | |
|---|---|---|
| Fan system input power (absorbed electrical power) according to SFP | 6.88 | kW |
| Pressure rise | 604 | Pa |
| Speed | 1426 | Rpm |

**Motor**

| | | |
|---|---|---|
| Motor output | 11 | kW |
| Electric current | 23.0 | A |

**Frequency converter**

| | | |
|---|---|---|
| Efficiency | 97.0 | % |

**Inspection window** **EQAZ-01-1-1**

Design: standard

**Bulkhead light** **EQAZ-09-072-2-3-2-2**

Type: LED

Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

**Frequency converter** **STRR-1-4-0230-3-0-2-1-33-1**

**Motor accessories** **APAC-5-1-0-0-1-0230-350-4-0-0**

**Fan + PM motor** **GAPM-071-1150-4-1-1-0-00-1-1-1**

## Rotary heat exchanger EQRO-072-01-170-0-10-1-8-1-02

Size: 072

Voltage: 3 x 400 V

Rotor type: Regoterm

Edge-reinforced: no

Foil spacing: Outputvariant 5 (1.7 mm, 200 mm wheel)

Delivery version: Whole rotor

Function lenght: standard

Material: galvanized sheet steel/AlZn

Inspection side: right

**Efficiency**

| | | |
|---|---|---|
| Temperature efficiency according to standard EN 308 | 75.0 | % |
| Temperature efficiency at 0°C outdoors | 75.0 | % |
| Cooling recovery | 74.4 | % |
| Humidity efficiency, Summer | 0.0 | % |
| Humidity efficiency, Winter | 40.6 | % |

| **Supply air** | **Summer** | **Winter** |
|---|---|---|

| | | | |
|---|---|---|---|
| Pressure drop | 150 | 133 | Pa |
| Air temperature | 29 / 23.8 | -4.2 / 14.7 | °C |
| Relative humidity | 47.2 / 64.2 | 92.2 / 44.4 | % |
| Capacity reduction | 41 | 188 | kW |
| Air flow transfer | 619 | 617 | l/s |
| Face velocity | 3.0 | 2.9 | m/s |
| **Exhaust air** | **Summer** | **Winter** | |
| Pressure drop | 151 | 142 | Pa |
| Air temperature | 22 / 27.1 | 21 / 4 | °C |
| Relative humidity | 45 / 33.1 | 50 / 100 | % |
| Additional throttling | 0 | 0 | Pa |
| Face velocity | 3.1 | 3.1 | m/s |

## Empty section — EQTC-072-050-0-0-0-0-0-2-1-2

Unit size : 072
Length: 050
Inspection side : right

**Inspection window** — **EQAZ-01-1-1**

Design: standard

**Bulkhead light** — **EQAZ-09-072-2-3-2-2**

Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

## Empty section — EQTC-072-010-0-0-0-0-0-0-1-2

Unit size : 072
Length: 010
Inspection side : right

## Reverse Cycle DX Coil — EQNP-072-2-1-1-1-01-3-0-1-1-X

| | | | | | |
|---|---|---|---|---|---|
| | | | Coil Code | 1/2-34-4-10-2215(17)R3.68 | |
| Air Volume (Std.) | 5.82 | m3/s | Dry Weight | 180 | kg |
| Air On Dry Bulb | 28.0 | °C | Fin Material | Aluminium | |
| Air On Wet Bulb | 20.0 | °C | Tube Material | 1/2" o.d. Copper x 0.51 | |
| Air On R.H. | 48.1 | % | Casing Material | Pre-Galv. Steel | |
| Air Off Dry Bulb | 16.0 | °C | No. Sections | 2 Interlaced | |
| Air Off Wet Bulb | 14.2 | °C | Liquid Conn. | 2x7/8" | |
| Air Off R.H. | 82.9 | % | Suction Conn. | 2x1,5/8"(1,5/8"x14swg+Domed Cap) | |
| - | - | - | Connection Type | Plain O.D. | |
| Cooling Load | 120.9 | kW | Coil Type | AHU + d/tray | |
| S.H.Ratio | 70 | % | Drain Size | 3/4" | inches |
| Refrigerant | 32 | | Moisture Extraction | 50 | kg/hr |
| Evaporating(Dew) Temp | 5.0 | °C | Rows | 4 | |
| Liquid Temp. at TEV | 45.0 | °C | Circuits | 17 | |
| Superheat | 5.0 | °K | Fin Spacing | 2.54mm(10/inch) | |
| Refrigerant P.D.(Pressure) | 35 | kPa | Air Flow | Horizontal | |
| Refrigerant P.D.(Temperature) | 1.2 | °K | Eliminators | needed - fit P400 | |
| Finned Height | 1080 | mm | Face Velocity | 2.4 | m/s |
| Finned Length | 2215 | mm | Air p.d. | 89 | Pa |
| Internal Volume | 38.8 | litres | | | |
| Max Working Pressure (DX) | 33 | Bar(g) | | | |
| | | | Test Pressure | 47 | Bar(g) |
| Overall Height | 1176 | mm | Overall Depth | 400 | mm |
| Overall Length | 2400 | mm | Connection Orientation | Standard | |

Heating Duty  Air On: 5.0°C  Air Off: 25.0°C  Duty: 152.7kW  Condensing Temp.: 40.0°C

Notes: USE 0.71mm RETURN BENDS

| | | |
|---|---|---|
| Pressure drop evaporative refrigerant | 23.9 | kPa |
| Oversizing | 1.9 | % |

## End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 2 | Pa |
| **Casing end wall** | **EQVA-072-2-1-22-1-1** | |
| **Duct connection piece** | **EQAZ-26-220-100-2-1-1** | |

Width cm : 220
Height in cm : 100
Connection type: flange connection
Material: galvanized sheet steel / AlZn

# EXHAUST AIR

## End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 2 | Pa |
| **Casing end wall** | **EQVA-072-1-1-22-2-1** | |
| **Duct connection piece** | **EQAZ-26-220-100-2-1-1** | |

Width cm : 220
Height in cm : 100
Connection type: flange connection
Material: galvanized sheet steel / AlZn

## Filter — EQPB-072-05-31-4-1-1-1-0-0-8-2

Inspection side: left

**Filter selection**

Filter class: M5 - ePM10 50%, synthetic
Filter frame : galvanized sheet steel
Prefilter: without

**Design**

Connection side : inlet in end wall
Location: negative pressure
Drain tray: without

| | | |
|---|---|---|
| Number of filters | 8x592x592 | |
| Pressure drop, start | 39 | Pa |
| Pressure drop, dimensioning | 78 | Pa |
| Pressure drop, end | 117 | Pa |
| Face area | 2.9 | m² |
| Face velocity | 2.3 | m/s |
| **Inspection window** | **EQAZ-01-1-1** | |

Design: standard

**Bulkhead light** — **EQAZ-09-072-2-3-2-2**

Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

**Differential pressure sensor type Dwyer Magnehelic** — **EQPZ-25-3-0-1-1**

Pressure range, first sensor: 0-500 Pa
Design: flush mounted in door

**Filter monitoring** — **STAZ-24-2-1**

## Empty section — EQTC-072-035-0-0-0-0-0-1-2-2

Unit size : 072
Length: 035
Inspection side : left

## Plenum fan — EQLC-072-3-2-1-2-4-2-2-1-8-2-1

Inspection side: left

**Fan selection**

Impeller type: Bluefin (composite)

Fan size: size 3
Anti-vibration mountings: wall mounted

**Motor selection**
Motor type: EC-motor

**Motor control**
Manufacture, type: EC-motor ZA
Housing protection: IP55
Design: on motor
Delivery options: mounted on current sub

**Motor / VSD-accessories**
Connection accessories: safety switch with quick connection
Length: 451

**Dimensioning data**
Two fan wheels in parallel

| | | |
|---|---|---|
| Speed | 1643 | Rpm |
| Max speed | 1780 | Rpm |
| Total efficiency | 66.8 | % |
| Total static pressure, dimensioning (wet coil) | 591 | Pa |
| Dynamic pressure | 35 | Pa |
| Fan system input power (absorbed electrical power) | 6.88 | kW |
| Temperature rise | 0.8 | °C |
| K factor | 5.07 | |
| Fan wheel size | 056 | |

**SFP Calculation**

| | | |
|---|---|---|
| Fan system input power (absorbed electrical power) according to SFP | 5.84 | kW |
| Pressure rise | 548 | Pa |
| Speed | 1535 | Rpm |

**Motor**

| | | |
|---|---|---|
| Motor output | 2 x 4.6 | kW |
| Electric current | 2 x 5.8 | A |
| Output margin, minimum | 10 | % |

**Inspection window** **EQAZ-01-1-1**
Design: standard

**Bulkhead light** **EQAZ-09-072-2-3-2-2**
Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

**Damper actuator** **STAZ-30-8-14-2-0-2-1-1**
Type: 2-Point with spring return
Delivery options: Mounted on current sub
Voltage: 24V

**Frequency converter** **STRR-2-4-0058-3-0-3-9-51-1**

**Motor accessories** **APAC-6-4-6-0-1-0058-451-4-0-0**

**Frequency converter** **STRR-4-4-0058-3-0-3-9-51-1**

**Fan + EC motor** **GAEC-056-0460-4-0-1-0-00-0-1-1**

**Help code fan + EC-motor** **AQEA-056-0460-0-1-0-02-1-000-1**

**Damper** **EQAZ-12-220-100-3-2-4-01-2-0-8**
Width cm : 220
Height in cm : 100
Tightness class : CEN 3
Connection: Flange
Function : extract air
Location: externally end wall
Damper type: 200 mm blade
Material : AlZn

## BLOCK LIST

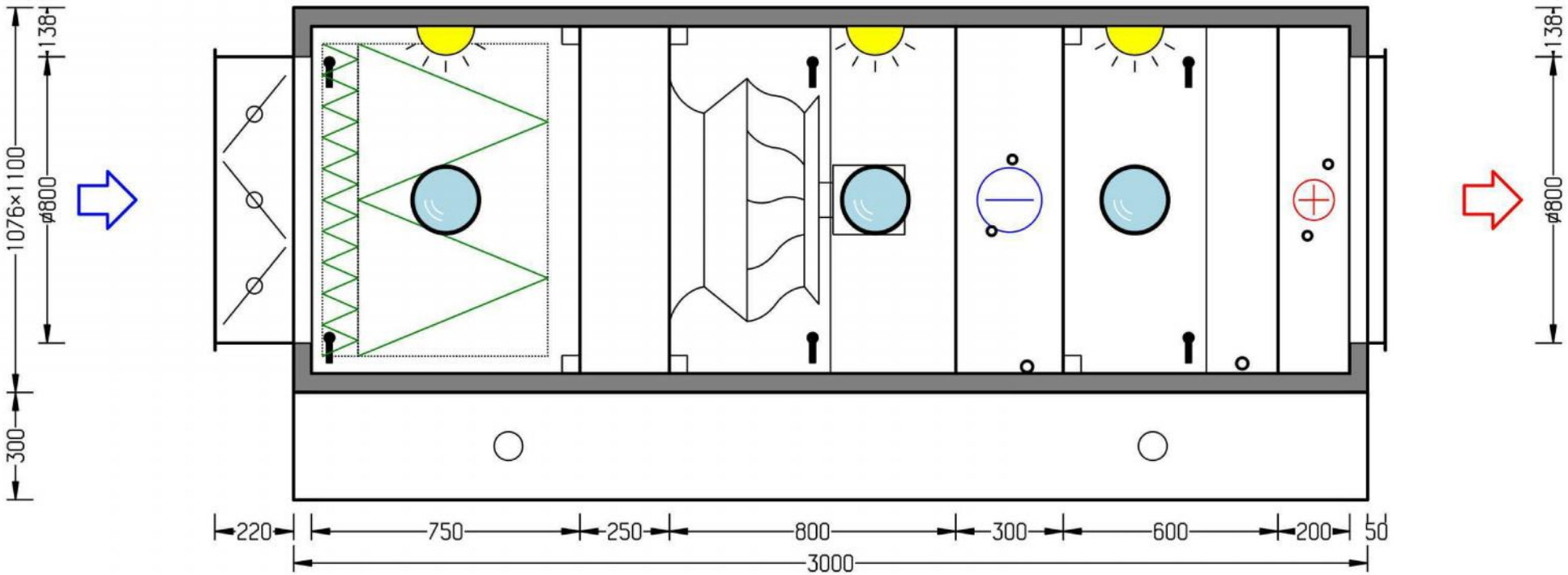
| | LENGTH (mm) | WIDTH (mm) | HEIGHT (mm) | VOLUME (m³) | WEIGHT (kg) |
|---|---|---|---|---|---|
| EQGB-072-225-22-1-1-2-1-2-1-1<br>Unit casing (frame, module)<br>Model box code: EQ 2111<br>Material: AlZn sheet steel<br>Thermal insulation: T3<br>Condensation insulation: TB3<br>Leakage class: L2(R)*<br>Casing strength: D1(M)<br>Casing end wall<br>Filter<br>Empty section<br>Plug fan floor mounted | 2300 | 2750 | 1846 | 11.68 | 890 |
| EQHB-072-045-22-1-1-2-1-3-1-1<br>Unit casing (frame, unit)<br>Model box code: EQ 2111<br>Material: AlZn sheet steel<br>Thermal insulation: T3<br>Condensation insulation: TB3<br>Leakage class: L2(R)*<br>Casing strength: D1(M)<br>Rotary heat exchanger | 500 | 2750 | 3222 | 4.43 | 512 |
| EQGB-072-100-22-1-1-2-1-4-1-1<br>Unit casing (frame, module)<br>Model box code: EQ 2111<br>Material: AlZn sheet steel<br>Thermal insulation: T3<br>Condensation insulation: TB3<br>Leakage class: L2(R)*<br>Casing strength: D1(M)<br>Empty section<br>Empty section<br>Air cooler for evaporative refrigerant<br>Casing end wall | 1050 | 2750 | 1846 | 5.33 | 376 |
| EQGB-072-075-22-1-1-2-1-2-1-1<br>Unit casing (frame, module)<br>Model box code: EQ 2111<br>Material: AlZn sheet steel<br>Thermal insulation: T3<br>Condensation insulation: TB3<br>Leakage class: L2(R)*<br>Casing strength: D1(M)<br>Casing end wall<br>Filter | 800 | 2750 | 1546 | 3.4 | 236 |
| EQGB-072-120-22-1-1-2-1-4-1-1<br>Unit casing (frame, module)<br>Model box code: EQ 2111<br>Material: AlZn sheet steel | 1470 | 2750 | 1546 | 6.25 | 457 |

Thermal insulation: T3
Condensation insulation: TB3
Leakage class: L2(R)*
Casing strength: D1(M)
Empty section
Plug fan wall mounted

| | | |
|---|---|---|
| | 31.09 | 2472 |

The dimensions are transport dimensions including packaging

*Flakt Group eQ AHUs are leakage class L2 real unit as certified by Eurovent.
CAL class @-400Pa and @+700Pa. For units were the casing has; (i) a customised or special design that differs from standard module box, (ii) nonstandard components penetrating the casing that is non-standard for a real unit, and (iii) where holes or penetrations are made in casing after delivery to site, the leakage class cannot be guaranteed. This also includes damage to the unit from handling and transportation.




From Inspection Side

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| | | | |
|---|---|---|---|
| **Customer id** | 2459 | **Project name** | (121138842A03) / ManMet S & E |
| **Project** | 30504 | **Unit name** | (B1) / AHU/08 (No Controls) |
| **Unit** | 7 | **Supply air** eQ-020 | 1720 l/s |
| **AOC** | ACON-02873117 | **Exhaust air** | |

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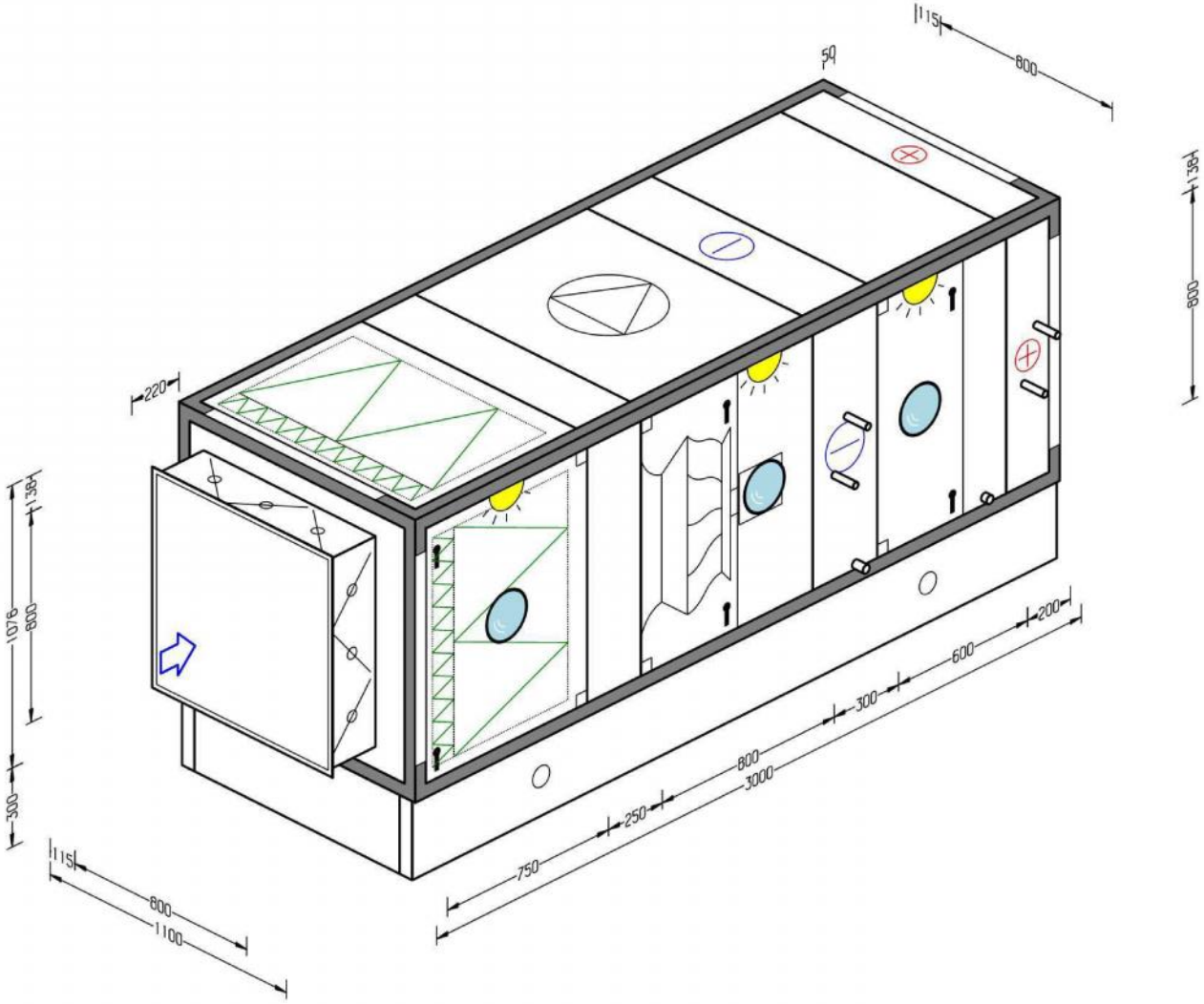


Isometric South West

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| | | | |
|---|---|---|---|
| **Customer id** | 2459 | **Project name** | (121138842A03) / ManMet S & E |
| **Project** | 30504 | **Unit name** | (B1) / AHU/08 (No Controls) |
| **Unit** | 7 | **Supply air** eQ-020 | 1720 l/s |
| **AOC** | ACON-02873117 | **Exhaust air** | |

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**AIR HANDLING UNIT eQ**

| | | |
|---|---|---|
| Project | 30504 (121138842A03) / ManMet S & E | *Acon 3.03.56121* |
| AOC | ACON-02873117 | |
| Unit | 7 (B1) / AHU/08 (No Controls) | 2021-10-28 |
| Size | 020 | Page 3/7 |
| Customer | NG Bailey | |
| Customers ref. | Martin Edwards | |
| Our ref. | Andy Window | |

| | | | |
|---|---|---|---|
| Supply air volume flow rate | 1720 l/s | Exhaust air volume flow rate | 0 l/s |
| External static pressure | 255 Pa | External static pressure | 0 Pa |
| Mains electricity | 3x400VAC±10%+N+PE, 50Hz | Weight | 573 kg |
| Specific el. power demand (SFPv) | 0.69 kW/(m³/s) | Dimensioned for wet condition | |
| Ref. density | 1.2 kg/m³ | Ref. altitude above sea level | 0 m |

## SUMMARY

| Functional sections in direction of air flow | v0 (m/s) | Et (%) | tw (°C) | ts (°C) | dP* (Pa) |
|---|---|---|---|---|---|
| Connection section | 2.8 | | | | 4 |
| Filter | 2.2 | | | | 164 |
| Inspection section | | | | | 0 |
| Plenum fan | | 65.6 | -5 / -4.4 | 28 / 28.7 | 499 |
| Air cooler | 2.3 | | | 28 / 24 | 39 |
| Inspection section | | | | | 0 |
| Air heater | 2.1 | | -5 / 20 | | 36 |
| Connection section | 2.7 | | | | 1 |
| Supply outlet | | | | | 255 |

*Refers to the fan design case
Fan system effect is taken into account in fan performance

## SOUND POWER LEVELS

(standard: EN13053 ISO/CD 13347-2)

| | Lw per octave band (dB) | | | | | | | | LwA |
|---|---|---|---|---|---|---|---|---|---|
| Octave band (Hz) | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | **dB(A)** |
| Fresh air connection | 72 | 73 | 71 | 66 | 60 | 58 | 58 | 60 | 69 |
| Supply air connection | 73 | 81 | 80 | 76 | 74 | 67 | 62 | 62 | 78 |
| To surroundings | 65 | 66 | 66 | 62 | 46 | 37 | 32 | 30 | 62 |

# TECHNICAL SPECIFICATION
(components listed in direction of air flow)

## SUPPLY AIR

### End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 4 | Pa |
| **Casing end wall** | **EQVA-020-1-1-22-1-1** | |
| **Damper** | **EQAZ-12-080-080-3-2-1-01-2-0-8** | |
| Width cm : 080 | | |
| Height in cm : 080 | | |
| Tightness class : CEN 3 | | |
| Connection: Flange | | |
| Function : Outdoor air | | |
| Location: externally end wall | | |
| Damper type: 200 mm blade | | |
| Material : AlZn | | |
| **Damper actuator** | **STAZ-30-1-09-2-0-2-1-1** | |
| Type: 2-Point with spring return | | |
| Delivery options: Mounted on current sub | | |
| Voltage: 24V | | |

### Filter — EQPB-020-07-33-4-1-1-1-8-0-8-1

| | | |
|---|---|---|
| Inspection side: right | | |
| **Filter selection** | | |
| Filter class: F7 - ePM1 60%, glassfibre | | |
| Filter frame : galvanized sheet steel | | |
| Prefilter: G4 – coarse, synthetic | | |
| **Design** | | |
| Connection side : inlet in end wall | | |
| Location: negative pressure | | |
| Drain tray: without | | |
| Number of filters | 1x592x592, 1x287x592, 1x592x287, 1x287x287 | |
| Pressure drop, start | 89 | Pa |
| Pressure drop, dimensioning | 164 | Pa |
| Pressure drop, end | 239 | Pa |
| Face area | 0.8 | m² |
| Face velocity | 2.2 | m/s |
| **Inspection window** | **EQAZ-01-1-1** | |
| Design: standard | | |
| **Bulkhead light** | **EQAZ-09-020-2-3-2-2** | |
| Type: LED | | |
| Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel. | | |
| **Differential pressure sensor type Dwyer Magnehelic** | **EQPZ-25-3-0-1-1** | |
| Pressure range, first sensor: 0-500 Pa | | |
| Design: flush mounted in door | | |
| **Filter monitoring** | **STAZ-24-3-1** | |

### Empty section — EQTC-020-025-0-0-0-0-0-0-1-2

Unit size : 020
Length: 025
Inspection side : right

### Plenum fan — EQLC-020-2-4-1-2-3-1-1-2-8-1-1

Inspection side: right
**Fan selection**
Impeller type: Bluefin (composite)
Fan size: size 2

Anti-vibration mountings: wall mounted

**Motor selection**

Motor type: EC-motor

**Motor control**

Manufacture, type: EC-motor ZA
Housing protection: IP55
Design: on motor
Delivery options: mounted on current sub

**Motor / VSD-accessories**

Connection accessories: safety switch with quick connection
Length: 308

**Dimensioning data**

| | | |
|---|---|---|
| Speed | 2147 | Rpm |
| Max speed | 2360 | Rpm |
| Total efficiency | 65.6 | % |
| Total static pressure, dimensioning (wet coil) | 499 | Pa |
| Dynamic pressure | 33 | Pa |
| Fan system input power (absorbed electrical power) | 1.44 | kW |
| Temperature rise | 0.7 | °C |
| K factor | 20 | |
| Fan wheel size | 040 | |

**SFP Calculation**

| | | |
|---|---|---|
| Fan system input power (absorbed electrical power) according to SFP | 1.2 | kW |
| Pressure rise | 415 | Pa |
| Speed | 2021 | Rpm |

**Motor**

| | | |
|---|---|---|
| Motor output | 2.1 | kW |
| Electric current | 2.7 | A |
| Output margin, minimum | 10 | % |

**Inspection window** **EQAZ-01-1-1**

Design: standard

**Bulkhead light** **EQAZ-09-020-2-3-2-2**

Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

**Frequency converter** **STRR-1-4-0027-3-0-3-9-51-1**
**Motor accessories** **APAC-4-4-6-0-1-0027-308-4-0-0**
**Fan + EC motor** **GAEC-040-0210-4-0-1-0-00-0-1-1**
**Help code fan + EC-motor** **AQEA-040-0210-0-1-0-01-1-000-1**

## Air cooler for chilled water EQNN-020-02-1-1-10-01-0-1-1-3

Size: 020
Inspection side: right
Material: galvanized sheet steel
Droplet eliminator: without
Design variant: version 3

**Coil selection**

Use as: Cooling Coil
Calculation principle: input data
Output variant: 2
Fluid passes: 10
Fin spacing: 2 mm
Design: normal face area
Material, coil: Cu/Al, MS header

**Shunt selection**

Shunt control: without

| | | |
|---|---|---|
| Nom. pipe size | 25 | |
| Liquid volume | 7.0 | l |
| Ethylene glycol | 20 | % |

| | | |
|---|---|---|
| Pressure drop, dimensioning | 39 | Pa |
| Pressure drop, wet coil | 39 | Pa |
| Pressure drop, dry coil | 34 | Pa |
| Output | 10.9 | kW |
| Air temperature | 28 / 24 | °C |
| Relative humidity | 50 / 60.7 | % |
| Face velocity | 2.3 | m/s |
| Water temperature | 6 / 12 | °C |
| Water flow | 0.46 | l/s |
| Water velocity | 0.8 | m/s |
| Pressure drop water | 11.4 | kPa |
| Oversizing | 116.6 | % |

## Empty section adjacent to cooling coil — EQTB-020-6-1-1-1-1

Unit size: 020
Section length, mm: 600
Position: upstream of EQH(N,P)
Material, droplet eliminator mountings: Galvanized steel
Inspections side: Right

**Inspection window** — **EQAZ-01-1-1**
Design: standard

**Bulkhead light** — **EQAZ-09-020-2-3-2-2**
Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

## Air heater for hot water — EQEE-020-2-01-1-08-1-1-1-3

Size: 020
Inspection side: right
Material: galvanized sheet steel

**Coil selection**
Calculation principle: input data
Output variant: 2
Fluid passes: 08
Fin spacing: 2 mm
Design: normal face area
Material, coil: Cu/Al, MS header

| | | |
|---|---|---|
| Nom. pipe size | 25 | |
| Liquid volume | 6.8 | l |
| Pressure drop, dimensioning | 35 | Pa |
| Output | 52.1 | kW |
| Air temperature | -5 / 20 | °C |
| Face velocity | 2.1 | m/s |
| Control principle for water heater | flow control | |
| Water temperature | 75 / 50 | °C |
| Water flow | 0.51 | l/s |
| Water velocity | 0.7 | m/s |
| Pressure drop water | 4.8 | kPa |
| Oversizing | 51.4 | % |

## End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 1 | Pa |

**Casing end wall** — **EQVA-020-2-1-22-1-1**

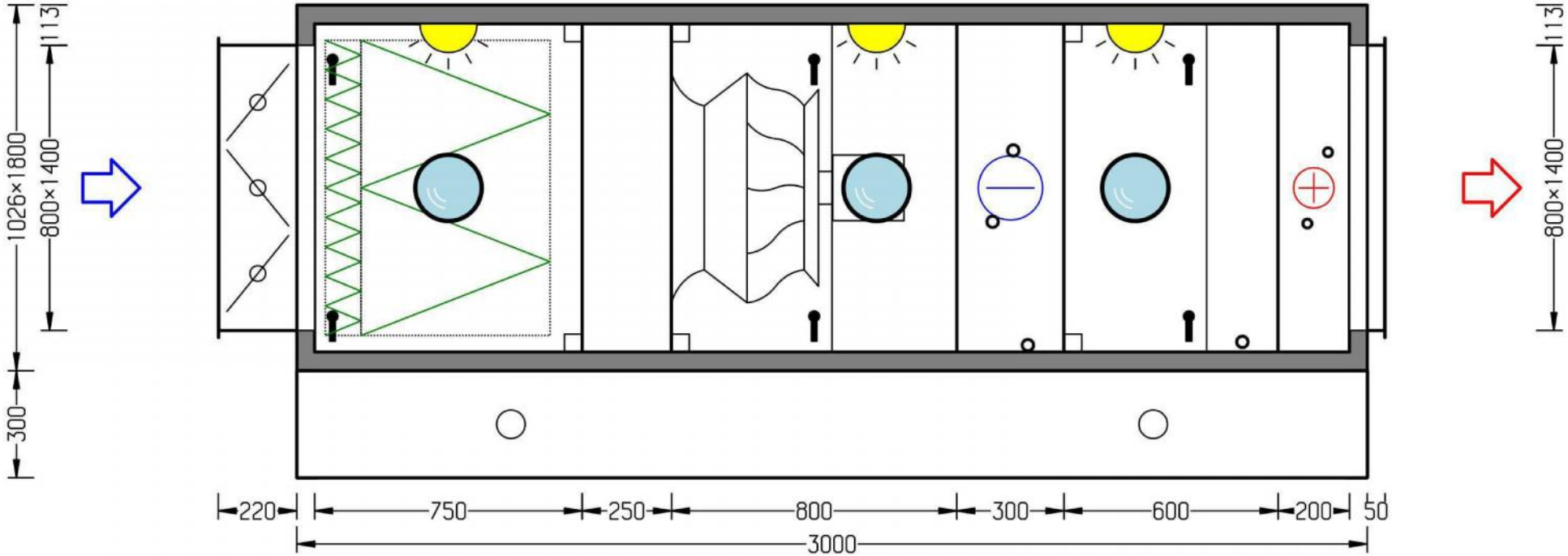
**Duct connection piece** — **EQAZ-26-080-080-2-1-1**
Width cm : 80
Height in cm : 80
Connection type: flange connection
Material: galvanized sheet steel / AlZn

## BLOCK LIST

| | LENGTH (mm) | WIDTH (mm) | HEIGHT (mm) | VOLUME (m³) | WEIGHT (kg) |
|---|---|---|---|---|---|
| EQGB-020-300-22-9-1-2-4-1-1-1 | 3050 | 1250 | 1546 | 5.89 | 573 |
| Unit casing (frame, module) | | | | | |
| Model box code: EQ 2192 | | | | | |
| Material: AlZn sheet steel | | | | | |
| Thermal insulation: T2 | | | | | |
| Condensation insulation: TB2 | | | | | |
| Leakage class: L2(R)* | | | | | |
| Casing strength: CEN D2 | | | | | |
| Casing end wall | | | | | |
| Filter | | | | | |
| Empty section | | | | | |
| Plug fan wall mounted | | | | | |
| Air cooler for chilled water | | | | | |
| Empty section adjacent to cooling coil | | | | | |
| Air heater for hot water | | | | | |
| Casing end wall | | | | | |
| | | | | 5.89 | 573 |

The dimensions are transport dimensions including packaging

*Flakt Group eQ AHUs are leakage class L2 real unit as certified by Eurovent.
CAL class @-400Pa and @+700Pa. For units were the casing has; (i) a customised or special design that differs from standard module box, (ii) nonstandard components penetrating the casing that is non-standard for a real unit, and (iii) where holes or penetrations are made in casing after delivery to site, the leakage class cannot be guaranteed. This also includes damage to the unit from handling and transportation.

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| | | | |
|---|---|---|---|
| **Customer id** | 2459 | **Project name** | (121138842A03) / ManMet S & E |
| **Project** | 30504 | **Unit name** | (C1) / AHU/09 (No Controls) |
| **Unit** | 8 | **Supply air** eQ-032 | 2490 l/s |
| **AOC** | ACON-02873122 | **Exhaust air** | |

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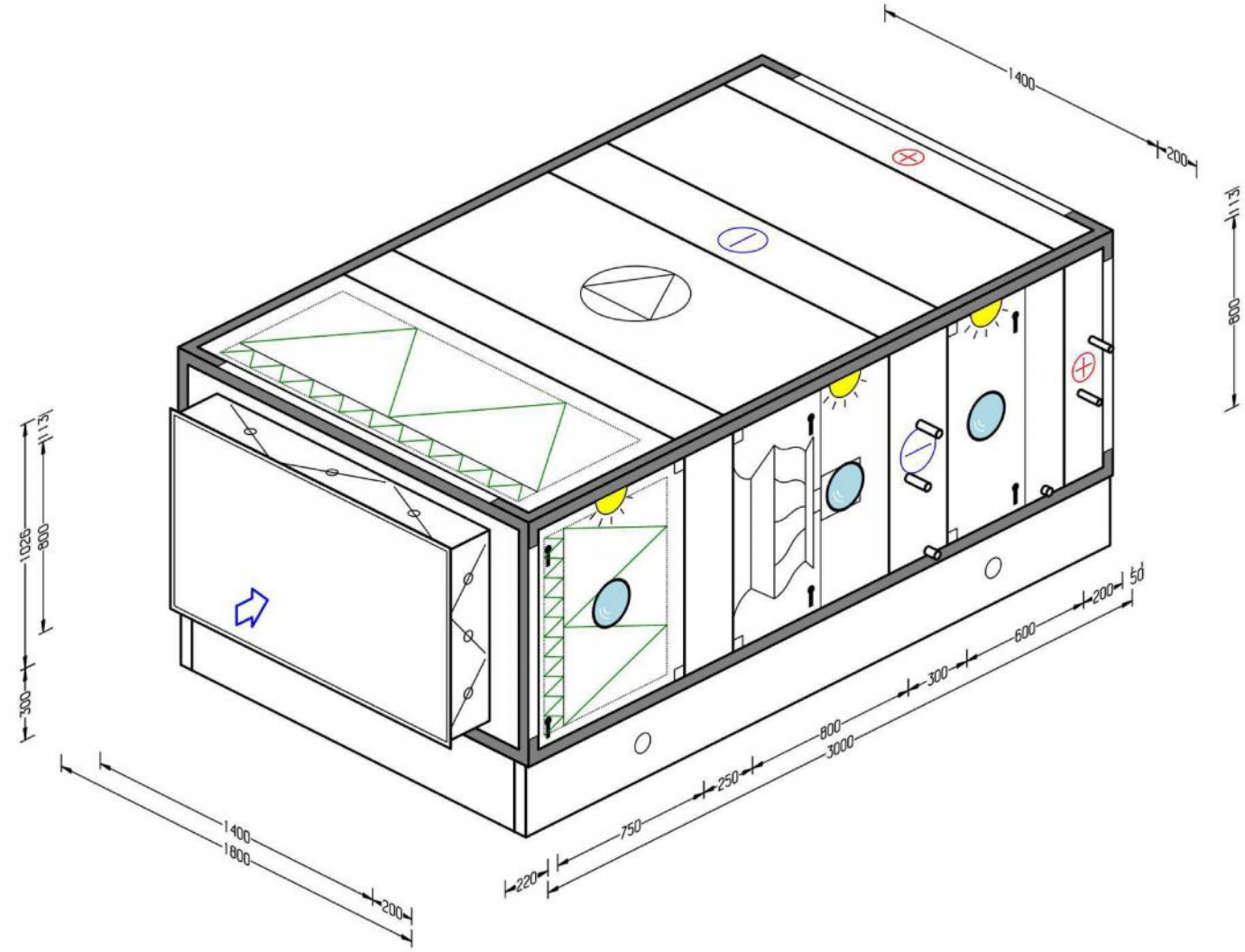


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| | | | | |
|---|---|---|---|---|
| **Customer id** | 2459 | **Project name** | | (121138842A03) / ManMet S & E |
| **Project** | 30504 | **Unit name** | | (C1) / AHU/09 (No Controls) |
| **Unit** | 8 | **Supply air** | eQ-032 | 2490 l/s |
| **AOC** | ACON-02873122 | **Exhaust air** | | |

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**AIR HANDLING UNIT eQ**

| | | |
|---|---|---|
| Project | 30504 (121138842A03) / ManMet S & E | *Acon 3.03.56121* |
| AOC | ACON-02873122 | |
| Unit | 8 (C1) / AHU/09 (No Controls) | 2021-10-28 |
| Size | 032 | Page 3/7 |
| Customer | NG Bailey | |
| Customers ref. | Martin Edwards | |
| Our ref. | Andy Window | |

| | | | |
|---|---|---|---|
| Supply air volume flow rate | 2490 l/s | Exhaust air volume flow rate | 0 l/s |
| External static pressure | 333 Pa | External static pressure | 0 Pa |
| Mains electricity | 3x400VAC±10%+N+PE, 50Hz | Weight | 781 kg |
| Specific el. power demand (SFPv) | 0.72 kW/(m³/s) | Dimensioned for wet condition | |
| Ref. density | 1.2 kg/m³ | Ref. altitude above sea level | 0 m |

## SUMMARY

| Functional sections in direction of air flow | v0 (m/s) | Et (%) | tw (°C) | ts (°C) | dP* (Pa) |
|---|---|---|---|---|---|
| Connection section | 2.3 | | | | 3 |
| Filter | 2.0 | | | | 152 |
| Inspection section | | | | | 0 |
| Plenum fan | | 69.4 | -5 / -4.4 | 28 / 28.7 | 549 |
| Air cooler | 2.0 | | | 28 / 24 | 31 |
| Inspection section | | | | | 0 |
| Air heater | 1.8 | | -5 / 20 | | 29 |
| Connection section | 2.3 | | | | 1 |
| Supply outlet | | | | | 333 |

*Refers to the fan design case
Fan system effect is taken into account in fan performance

## SOUND POWER LEVELS

(standard: EN13053 ISO/CD 13347-2)

| | Lw per octave band (dB) | | | | | | | | LwA |
|---|---|---|---|---|---|---|---|---|---|
| Octave band (Hz) | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | **dB(A)** |
| Fresh air connection | 76 | 75 | 71 | 65 | 60 | 58 | 55 | 56 | 68 |
| Supply air connection | 77 | 81 | 75 | 76 | 73 | 69 | 64 | 59 | 78 |
| To surroundings | 69 | 68 | 66 | 61 | 46 | 37 | 30 | 30 | 61 |

# TECHNICAL SPECIFICATION
(components listed in direction of air flow)

## SUPPLY AIR

### End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 3 | Pa |
| **Casing end wall** | **EQVA-032-1-1-22-1-1** | |
| **Damper** | **EQAZ-12-140-080-3-2-1-01-2-0-8** | |
| Width cm : 140 | | |
| Height in cm : 080 | | |
| Tightness class : CEN 3 | | |
| Connection: Flange | | |
| Function : Outdoor air | | |
| Location: externally end wall | | |
| Damper type: 200 mm blade | | |
| Material : AlZn | | |
| **Damper actuator** | **STAZ-30-1-10-2-0-2-1-1** | |
| Type: 2-Point with spring return | | |
| Delivery options: Mounted on current sub | | |
| Voltage: 24V | | |

### Filter — EQPB-032-07-33-4-1-1-1-8-0-8-1

| | | |
|---|---|---|
| Inspection side: right | | |
| **Filter selection** | | |
| Filter class: F7 - ePM1 60%, glassfibre | | |
| Filter frame : galvanized sheet steel | | |
| Prefilter: G4 – coarse, synthetic | | |
| **Design** | | |
| Connection side : inlet in end wall | | |
| Location: negative pressure | | |
| Drain tray: without | | |
| Number of filters | 4x392x792 | |
| Pressure drop, start | 77 | Pa |
| Pressure drop, dimensioning | 152 | Pa |
| Pressure drop, end | 227 | Pa |
| Face area | 1.3 | m² |
| Face velocity | 2.0 | m/s |
| **Inspection window** | **EQAZ-01-1-1** | |
| Design: standard | | |
| **Bulkhead light** | **EQAZ-09-032-2-3-2-2** | |
| Type: LED | | |
| Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel. | | |
| **Differential pressure sensor type Dwyer Magnehelic** | **EQPZ-25-3-0-1-1** | |
| Pressure range, first sensor: 0-500 Pa | | |
| Design: flush mounted in door | | |
| **Filter monitoring** | **STAZ-24-3-1** | |

### Empty section — EQTC-032-025-0-0-0-0-0-0-1-2

| | |
|---|---|
| Unit size : 032 | |
| Length: 025 | |
| Inspection side : right | |

### Plenum fan — EQLC-032-1-3-1-2-3-1-1-2-8-1-1

| | |
|---|---|
| Inspection side: right | |
| **Fan selection** | |
| Impeller type: Bluefin (composite) | |
| Fan size: size 1 | |

Anti-vibration mountings: wall mounted

**Motor selection**

Motor type: EC-motor

**Motor control**

Manufacture, type: EC-motor ZA
Housing protection: IP55
Design: on motor
Delivery options: mounted on current sub

**Motor / VSD-accessories**

Connection accessories: safety switch with quick connection
Length: 356

**Dimensioning data**

| | | |
|---|---|---|
| Speed | 1680 | Rpm |
| Max speed | 1950 | Rpm |
| Total efficiency | 69.4 | % |
| Total static pressure, dimensioning (wet coil) | 549 | Pa |
| Dynamic pressure | 28 | Pa |
| Fan system input power (absorbed electrical power) | 2.14 | kW |
| Temperature rise | 0.7 | °C |
| K factor | 12.86 | |
| Fan wheel size | 050 | |

**SFP Calculation**

| | | |
|---|---|---|
| Fan system input power (absorbed electrical power) according to SFP | 1.81 | kW |
| Pressure rise | 467 | Pa |
| Speed | 1580 | Rpm |

**Motor**

| | | |
|---|---|---|
| Motor output | 3.5 | kW |
| Electric current | 4.4 | A |
| Output margin, minimum | 10 | % |

**Inspection window** **EQAZ-01-1-1**

Design: standard

**Bulkhead light** **EQAZ-09-032-2-3-2-2**

Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

**Frequency converter** **STRR-1-4-0044-3-0-3-9-51-1**

**Motor accessories** **APAC-4-4-6-0-1-0044-356-4-0-0**

**Fan + EC motor** **GAEC-050-0350-4-0-1-0-00-0-1-1**

**Help code fan + EC-motor** **AQEA-050-0350-0-1-0-01-1-000-1**

## Air cooler for chilled water EQNN-032-02-1-1-06-01-0-1-1-3

Size: 032
Inspection side: right
Material: galvanized sheet steel
Droplet eliminator: without
Design variant: version 3

**Coil selection**

Use as: Cooling Coil
Calculation principle: input data
Output variant: 2
Fluid passes: 06
Fin spacing: 2 mm
Design: normal face area
Material, coil: Cu/Al, MS header

**Shunt selection**

Shunt control: without

| | | |
|---|---|---|
| Nom. pipe size | 32 | |
| Liquid volume | 11.3 | l |
| Ethylene glycol | 20 | % |

| | | |
|---|---|---|
| Pressure drop, dimensioning | 31 | Pa |
| Pressure drop, wet coil | 31 | Pa |
| Pressure drop, dry coil | 27 | Pa |
| Output | 15.8 | kW |
| Air temperature | 28 / 24 | °C |
| Relative humidity | 50 / 60.7 | % |
| Face velocity | 2.0 | m/s |
| Water temperature | 6 / 12 | °C |
| Water flow | 0.66 | l/s |
| Water velocity | 0.7 | m/s |
| Pressure drop water | 7.2 | kPa |
| Oversizing | 128.5 | % |

## Empty section adjacent to cooling coil — EQTB-032-6-1-1-1-1

Unit size: 032
Section length, mm: 600
Position: upstream of EQH(N,P)
Material, droplet eliminator mountings: Galvanized steel
Inspections side: Right

**Inspection window** — **EQAZ-01-1-1**
Design: standard

**Bulkhead light** — **EQAZ-09-032-2-3-2-2**
Type: LED
Delivery form: Lamp fitted with cable to outside of casing if there is a fixed panel.

## Air heater for hot water — EQEE-032-2-01-1-06-1-1-1-3

Size: 032
Inspection side: right
Material: galvanized sheet steel

**Coil selection**
Calculation principle: input data
Output variant: 2
Fluid passes: 06
Fin spacing: 2 mm
Design: normal face area
Material, coil: Cu/Al, MS header

| | | |
|---|---|---|
| Nom. pipe size | 25 | |
| Liquid volume | 10.2 | l |
| Pressure drop, dimensioning | 29 | Pa |
| Output | 75.4 | kW |
| Air temperature | -5 / 20 | °C |
| Face velocity | 1.8 | m/s |
| Control principle for water heater | flow control | |
| Water temperature | 75 / 50 | °C |
| Water flow | 0.74 | l/s |
| Water velocity | 0.8 | m/s |
| Pressure drop water | 8.3 | kPa |
| Oversizing | 63.7 | % |

## End connection frame

| | | |
|---|---|---|
| Pressure drop, dimensioning | 1 | Pa |

**Casing end wall** — **EQVA-032-2-1-22-1-1**

**Duct connection piece** — **EQAZ-26-140-080-2-1-1**
Width cm : 140
Height in cm : 80
Connection type: flange connection
Material: galvanized sheet steel / AlZn

## BLOCK LIST

| | LENGTH (mm) | WIDTH (mm) | HEIGHT (mm) | VOLUME (m³) | WEIGHT (kg) |
|---|---|---|---|---|---|
| EQGB-032-300-22-9-1-2-4-1-1-1 | 3050 | 1950 | 1496 | 8.9 | 781 |
| Unit casing (frame, module) | | | | | |
| Model box code: EQ 2192 | | | | | |
| Material: AlZn sheet steel | | | | | |
| Thermal insulation: T2 | | | | | |
| Condensation insulation: TB2 | | | | | |
| Leakage class: L2(R)* | | | | | |
| Casing strength: CEN D2 | | | | | |
| Casing end wall | | | | | |
| Filter | | | | | |
| Empty section | | | | | |
| Plug fan wall mounted | | | | | |
| Air cooler for chilled water | | | | | |
| Empty section adjacent to cooling coil | | | | | |
| Air heater for hot water | | | | | |
| Casing end wall | | | | | |
| | | | | 8.9 | 781 |

The dimensions are transport dimensions including packaging

*Flakt Group eQ AHUs are leakage class L2 real unit as certified by Eurovent.
CAL class @-400Pa and @+700Pa. For units were the casing has; (i) a customised or special design that differs from standard module box, (ii) nonstandard components penetrating the casing that is non-standard for a real unit, and (iii) where holes or penetrations are made in casing after delivery to site, the leakage class cannot be guaranteed. This also includes damage to the unit from handling and transportation.