AirCraft
Air Handling

AHU Construction Specification (HTM 03.01 - 2021)

Preface

AHU Construction Specification (HTM 03.01) is to be read in conjunction with the accompanying project specific; Technical Schedules / General Arrangement Drawings.

NB; The Health Technical Memorandum 03-01 Specialised ventilation for healthcare premises, makes a distinction in the preface of 'Language usage in Technical guidance' of "Must" is used when indicating compliance with the law. "Should" is used to indicate a recommendation (not mandatory/ obligatory), i.e., among several possibilities or methods, one is recommended as being particularly suitable – without excluding other possibilities or methods. "May" is used for permission, i.e., to indicate a course of action permissible within the limits of the HBN or HTM. Where stated as "Must" AirCraft Air Handling confirm they will meet this requirement. Where stated as "May" we confirm our offering as below.

Casing Construction

Unit framework shall be; 50mm aluminium anodised penta post fame of 2mm thickness, with black powder coated cast aluminium corner pieces.

Casing panels shall be flush fitted into the framework providing a smooth inner and outer finish and be of double skinned tray-in-tray construction comprising 0.7mm goosewing grey plastisol (BS 10 A 05) outer skin, 0.7mm smooth Oyster Granite HDX (RAL 7035) inner skin or 316 Stainless steel (Cooling / Wet section) as standard. Panels shall include 45kg/m^3 mineral wool insulation infill as standard of; 50mm (0.04 W/m^2K), (optional; 60 / 80 / 100kg/m3).

Access doors shall be constructed as per the casing panels and be of fully adjustable hinged design which seat into compression rubber seals, c/w lockable handles on all doors, and where feasible minimum 600mm opening on AHU's less than 1.0m high, and 500mm opening on AHU's over 1.0m high. Doors to fan access chambers to include detachable two-stage cable reinforced nylon retaining strap to prevent the door blowing violently open when unlocked and residual pressure still present within the unit.

200mm diameter polycarbonate viewing points (low level on upper decks for ease of viewing) c/w 240v LED bulkhead lights and single case mounted light switch, to be fitted where specified and indicated on the General Arrangement Drawings. Lights to be powered independently from the main AHU controls provision (if included).

Fixed panels doors shall be constructed as per the casing panels and be seated onto a neoprene foam gasket and retained with rivets or stainless-steel screws.

Units shall be mounted on 100mm x 50mm channel base, of either anodised aluminium or rolled steel channel which is galvanised after manufacture. Base c/w 35mm diameter hole offset 40mm from each corner, and suitable for connection of lifting shackle / D-link by others for craning or lifting.

Weatherproof units will incorporate a cross-pitched roof designed to shed rain and prevent the pooling of water. Joining sections will include a folded up-stand which is c/w covering capping ridge to prevent water ingress.

Acoustically our casework offers the following performance;

- Insertion losses through 50mm casing.

Hz	63	125	250	500	1k	2k	4k	8k
dB	18	23	29	29	27	33	36	33

In accordance with BS EN1886 : 2008, we confirm our AHU construction meets the following criteria;

- Leakage through unit casing: L2
- Thermal transmittance of unit Casing: T2 (50mm panels)
- Deflection of unit Casing: D2
- Thermal Bridging of unit casing: TB4

Fans

Fans shall be single inlet direct drive 'Plug' type with backward curved impellor. Fan impellors shall be statically and dynamically balanced and mounted on a solid steel shaft turning in sealed for life bearings. Mesh guard fitted across fan inlet.

AC (Alternating Current) Direct Drive motors shall be of the TEFC type with class F insulation wound for 415v 3 phase 50Hz electrical supply, to either IE2 / IE3 efficiency class. Fan assembly shall be isolated from unit casing with anti vibration mounts and a flexible connection.

EC (Electronically Commutated) Direct Drive motors shall be wound for either 230v 1 phase 50Hz or 415v 3 phase 50Hz electrical supply, to either IE4 / IE5 efficiency class. ModBus connectivity on request. Fan assembly shall be hard mounted onto the fan bulkhead and do not require vibration isolation as standard.

Motors to be wired (power cable only - control cable excluded) to external case mounted isolators when no local control panel provision is included as part of AirCraft Air Handling's extent of supply. In the event a locally mounted control panel is installed by AirCraft Air Handling, a door interlocked isolator will be included on the control panel door in lieu of separate case mounted isolators.

Panel & Bag Filters

Filters shall be mounted in a galvanised steel front withdrawal holding frames with proprietary retaining clips as per the classification stated on the schedule in accordance with BS EN779.

Media to be c/w 50mm header (panel), and 25mm header (bag), and non-combustible.

Radial; minihelic / magnehelic gauges are fitted as standard, with ranges from 250-500Pa depending on filter grade.

HEPA Filters

Multiwedge HEPA's with efficiencies between H10 to H14 as stated on the Technical Schedule.

Manufactured from non fibre-shedding micro-fibre glass paper, the filter packs are mini pleated with the pleats separated by a continuous thermoplastic cord. The filter packs are then sealed with Polyurethane sealant into a galvanised steel or MDF case. They are then fitted with gaskets and retained to a holding backplate with threaded bar and metal retaining clamps.

Radial; minihelic / magnehelic gauges are fitted as standard, with ranges from 250-500Pa depending on filter grade.

Activated Carbon Filters

Discarb cells contain bonded carbon panels mounted in a V-form arrangement within a galvanised sheet metal casing and mounted on slides with the AHU.

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Dampers

Dampers on either; Supply inlet / outlet, Extract inlet / outlet, Recirculation, Isolation / Mixing dampers, to be of hollow aluminium blade profile, opposed blade operation, nylon (fully recyclable) cog drive, within an extruded aluminium frame c/w edge seals fitted to blades and suitable for motorisation. Optional Stainless steel or painted finish available on request or where stated in our schedule.

Damper torque = 4 Nm per $1m^2$ of damper face area.

LPHW Fog / Frost / Heating / Reheat Coils

Heating coils shall be Low Pressure Hot Water (LPHW) suitable for flow / return temperatures as detailed on the Technical Schedule. Coils to be constructed from seamless copper tubes expanded into copper fins – Bare tube for Fog & Frost coils, and the fin block shall be housed in a galvanised steel casing as standard, and suitable for “slide in” application. Connections shall be threaded male BSP protruding the side of the AHU casework.

Optional 316 Stainless steel or aluminium casing, epoxy, or copper electro-tinned fins are available.

Single piece coils as standard – Split & staggered coils available on request.

A 10% margin in capacity shall be included in all coil selections.

All coils shall be tested to 27 bar under water - test certificates provided on request.

Cooling Coils (Chilled Water)

Cooling coils shall be Chilled Water type suitable for flow / return temperatures as detailed on the Technical Schedule and sized to a maximum fin block face velocity of 2.0m/s. Coils to be constructed from seamless copper tubes expanded into 0.1mm copper electro-tinned or epoxy-coated aluminium fins with 2.0mm minimum spacing, and the fin block shall be housed in 316 Stainless steel casing as standard, suitable for “slide in” application. Connections shall be male BSP. Coil to be complete with fully removable 316 Stainless steel drain tray, and polypropylene moisture eliminator if specified on the Technical Schedule – these are omitted as standard where the face velocity is <2.0m/s in accordance with the HTM03.01 policy to reduce plastics.

Single piece coils as standard – Split & staggered coils available on request.

A 10% margin in capacity shall be included in all coil selections.

All coils shall be tested to 27 bar under water - test certificates provided on request.

Cooling Coils (DX) / Reverse Cycle

DX coils shall be suitable for temperatures, and compatible with refrigerant No. of stages as detailed on the Technical Schedule, and sized to a maximum fin block face velocity of 2.0m/s. Coils to be constructed from seamless copper tubes expanded into 0.1mm copper electro-tinned or epoxy-coated aluminium fins with 2.0mm minimum spacing, and the fin block shall be housed in 316 Stainless steel casing as standard, suitable for “slide in” application. The distribution manifold to be brazed to suit the circuit requirements. Coil to be complete with fully removable 316 Stainless steel drain tray, and polypropylene moisture eliminator if specified on the Technical Schedule – these are omitted as standard where the face velocity is <2.0m/s in accordance with the HTM03.01 policy to reduce plastics.

Single piece coils as standard – Split & staggered coils available on request.

A 10% margin in capacity shall be included in all coil selections.

All coils shall be tested to 27 bar under water - test certificates provided on request.

Gas Heaters

Indirect gas fired heating coils are formed from folded galvanised steel sheet to a rigid structure and c/w two and four pass tubular assembly manufactured from AISI 409 grade stainless steel which is formed, swaged and expanded without recourse to stress inducing welding. All modules have AISI 409 grade stainless steel flue collector boxes complete with condensate drain point.

In-shot burners carefully matched to each tube assembly and manifolded to a common gas valve and multi-start ignition system, itself complete with flame monitoring and safety controls and supplied ready for use with natural gas (G20). Alternative LPG propane (G31) firing available to order.

Heaters provide 91% minimum thermal efficiencies directly at the point of use thereby eliminating the distribution and standby losses normally associated with central boiler plant.

Optimised energy usage and reduced running costs result from;

- High turn down ratio
- Instant response to changing conditions
- Reduced pre-heat period
- Elimination of residual thermal mass on plant shut down

Electric Heaters

Electric heater battery elements constructed from nickel / chrome wire insulated by compacted magnesium oxide powder within a stainless steel sheath and mounted within a cassette frame manufactured from pre-galvanised sheet steel.

Models can be manufactured to suit either thyristor or stepped controls and are available in 240 or 415volts supply, with kW outputs to suit individual requirements in multiples of 3kW of elements.

Recuperators

Recuperator to be of aluminium plate type, (epoxy coated where requested to prevent corrosion), contained within extra strong galvanised steel casing and mechanically sealed. Shall be minimum efficiency of 73% in accordance with ErP2018 / EN308, exact efficiency as stated on the accompanying Technical Schedules. Face and bypass damper c/w nylon (fully recyclable) cog drive fitted, and galvanised fixed condensate drain tray fitted on the extract side.

Thermal Wheels

Thermal wheel to be manufactured from a high-quality aluminium foil, and housed within a zinc-plated steel frame c/w circumference and central brush seal to minimise air leakage, and a variable speed controller. Shall be minimum efficiency of 73% in accordance with ErP2018 / EN308, exact efficiency as stated on the accompanying Technical Schedules. Optional; segmented construction, with epoxy, enthalpy, or sorption rotor options are available.

Runaround (Heat Recovery) Coils

Matched runaround coils shall be suitable for flow / return temperatures as detailed on the Technical Schedule and shall be minimum efficiency of 68% in accordance with ErP2018 / EN308, exact efficiency as stated on the accompanying Technical Schedules.

Supply coil to be constructed from seamless copper tubes expanded into copper fins, and the fin block shall be housed in a galvanised steel casing as standard, and suitable for “slide in” application. Connections shall be threaded male BSP protruding the side of the AHU casework.

Extract coil sized to a maximum fin block face velocity of 2.0m/s. Coils to be constructed from seamless copper tubes expanded into 0.1mm copper electro-tinned or epoxy-coated aluminium fins with 2.0mm minimum spacing, and the fin block shall be housed in a 316 Stainless steel casing as standard, suitable for “slide in” application. Connections shall be male BSP protruding the side of the AHU casework. Coil to be complete with fully removable 316 Stainless steel drain tray, and polypropylene moisture eliminator if specified on the Technical Schedule – these are omitted as standard where the face velocity is <2.0m/s in accordance with the HTM03.01 policy to reduce plastics.

Single piece coils as standard – Split & staggered coils available on request.

A 10% margin in capacity shall be included in all coil selections.

All coils shall be tested to 27 bar under water - test certificates provided on request.

Louvers

Inlet louver fitted with bird mesh screen, with frame and blade manufactured from anodised aluminium extrusion. Unless derogated AirCraft Air Handling will not include for Louvers on an external combined supply & extract AHU where the Fresh air inlet and Exhaust outlet are less than 4.0m apart – we assume the installer will duct both airways to prevent the re-entrainment of vitiated air.

Humidifiers

Humidifiers can be either of the 'Electrode', 'Resistive' or 'Live / Direct Steam' type, to the duty detailed on the accompanying Technical Schedules, and either case mounted or loose supply. AHU section to be of suitable length to permit absorption of the steam into the airstream. Removable 316 Stainless steel drain tray included.

Attenuators

200mm deep Bull-nose splitter pods manufactured from galvanised sheet steel, and mineral wool infill complete with scrim lining or Melinex lining c/w perf case finish. Length / acoustic insertion loss, as stated on the accompanying Technical Schedules, tested in accordance with BS4718.

Length mm	Finish	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
600	Melinex	6	8	9	11	14	14	11	7
900	Melinex	7	11	13	16	19	19	14	10
1200	Melinex	8	13	17	20	23	23	18	12
1500	Melinex	10	17	19	21	24	24	19	13
1800	Melinex	11	19	23	22	24	25	21	14
2100	Melinex	12	21	25	23	25	26	21	16

Coastal Construction

Where specified or requested, AHU's located within a coastal region may have the following construction as a minimum which is over and above our standard HTM 03.01 - 2021; painted or stainless steel dampers / epoxy painted or coated recuperator or thermal wheel.

Control Panels

Where specified the AHU can include a bespoke packaged HVAC control panel mounted within a mild steel enclosure and fitted to the side of the unit and wired out to respective components. Controls to be to an either; basic 'Standalone' design or to a 'fully-integrated' solution complete with BMS (BACnet / ModBus / Free-issue Trend) interface. Project specific wiring diagram refers.

Non-domestic Building Services Compliance Guide

We endeavor to select the most energy efficient components permittable within the physical constraints of the AHU. In accordance with this regulation this generally equates to a Specific Fan Power (SFP) within the

maximum allowance permissible. As an AHU is only part of an 'Air Distribution System', where the external resistance is high, it may be necessary to review the overall design in order to comply.

Ecodesign Energy Related Products (ErP) directive

In accordance with the Ecodesign (ErP) directive, that from 2018, all AirCraft Air Handling AHU's; Unidirectional Ventilation Units (UVU), i.e. Supply only or Extract only units, and Bidirectional Ventilation Units (BVU), Combined Supply & Extract units, will comply with the following;

- Fans to be equipped with, or suitable for, a variable speed drive
- All BVU's to include a Heat Recovery System (HRS); Plate Recuperator / Thermal Wheel / Run-around coils
- All HRS's to be supplied c/w a bypass facility
- Minimum thermal efficiency of HRS; Plate Recuperator 73% / Thermal Wheel 73% / Run-around coils 68%, all in accordance with EN308
- Filters provided to a minimum of Supply; F7, and Extract M5
- All filters to include visual gauge or control switch signal, for the purposes of indicating dirty filter condition
- Minimum fan efficiencies apply when selecting a UVU – figure dependent on whether motor kW size is smaller than / larger than 30kW
- Maximum internal specific fan power (SFPint_limit) – figure dependent on type of HRS fitted, Nominal airflow, Energy recovery bonus, and Filter correction factor

Health Technical Memorandum 03-01 Specialised ventilation for healthcare premises

HTM 03.01 advocates the reduction in single use plastics. Plastics where used in our AHU construction are less than 1% by mass of the overall AHU construction, and where used are fully recyclable. As units are sized with a cooling coil face velocity of less than 2.0 m/s, eliminators will be omitted unless specified.

AirCraft Air handling Ltd offer bespoke AHU solutions, and will endeavor to meet your exacting project specific requirements. Should any element of the foregoing not cover your project needs, or you require any further / additional information, please do not hesitate to contact our Technical Sales office for further assistance.