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Hygienic AHUs

for food production

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Daikin Applied
food production AHUs

Due to the nature of food production facilities, several critical parameters must be considered. Hygiene requirements are significantly higher than those of traditional manufacturing facilities so material choice and surface finish are of critical importance. Temperature and humidity must be carefully controlled to ensure no detriment to food quality, and filtration must be suitable to ensure the high indoor air quality needs of the application are met.

There are 4 main categories of food production which have differing requirements, particularly with regard to filtration expectations. These are categorised as follows:

Production area	Food type	Pre-filter grade	Secondary filter grade	Final filter grade
Low Care	Ambient Stable Packaged Food	ISO 16890: ePM Coarse 60% BS EN 779: G4	N/A	ISO 16890: ePM1 65% BS EN 779: F7/F8
High Care	Salads/Sandwiches	ISO 16890: ePM Coarse 60% BS EN 779: G4	ISO 16890: ePM1 65% BS EN 779: F7/F8	ISO 16890: ePM1 80% BS EN 779: F79
High Risk	Cooked Meats & Ready to Eat Products	ISO 16890: ePM Coarse 60% BS EN 779: G4	ISO 16890: ePM1 65% BS EN 779: F7/F8	H11 HEPA Filtration
Aseptic	Milk & Baby Food	ISO 16890: ePM Coarse 60% BS EN 779: G4	ISO 16890: ePM1 80% BS EN 779: F9	H13 HEPA Filtration

Alongside filtration, to ensure the minimum standards are satisfied, careful consideration must be made with regards to material choice. Daikin Applied UK recommend the following construction for AHUs installed in food production facilities.

Item	Material
External Panel Skins	Tata Advantica L – Food Safe
Internal Panel Skins	SS304
Insulation	120kg/m3 Density Rockwool
Dampers	SS304
Coil Slides/Mounts	SS304
Fan Bulkheads	SS304
Block off plates	SS304
Drain Trays	SS316 – As Per BS EN 13053
Filter Frames	SS304
Coil Tubes	Copper
Heating Coil Fins	Aluminium Vinyl Coated
Cooling Coil Fins	Aluminium Vinyl Coated
Coil Casings	SS304
Plate Heat Exchanger (if applicable)	Epoxy Coated Aluminium
Thermal Wheel (if applicable)	Epoxy Coated Aluminium
Fan Frame	Powder Coated Steel
Fan Support Plate/Inlet	Painted Steel
Sealant	Dowsil 786 – Clear – Food Safe

Wiring
for power and controls

There will always be some wiring that is internal to the airstream for fan power, control, and temperature sensors, however, most wiring should be kept **external to the airstream**. This reduces the amount of internal containment and ridges which helps to maintain hygiene standards and the rigorous cleaning protocols for such applications.

Wiring containment

The containment strategy itself must be carefully considered. Internal cable baskets can easily trap dirt and can be difficult to effectively clean and maintain, however, conduit also has the potential for water ingress during cleaning which can lead to rusting, early material degradation and the growth of bacteria.

By utilising a conduit system, it can also be difficult to maintain electrical components, should cabling need to be withdrawn. This significantly increases the time needed to work with electrical components. For this reason, any wiring that is internal to the airstream should be neatly wired and clipped to the internal of the AHU using stainless steel clips.

External wiring

Externally, we recommend utilising a corrosion-resistant stainless steel cable tray or trunking system with suitable IP-rated cabling. This is the most cost-effective and easily maintainable solution that also provides sufficient mechanical protection for any external wiring whilst ensuring a neat install.

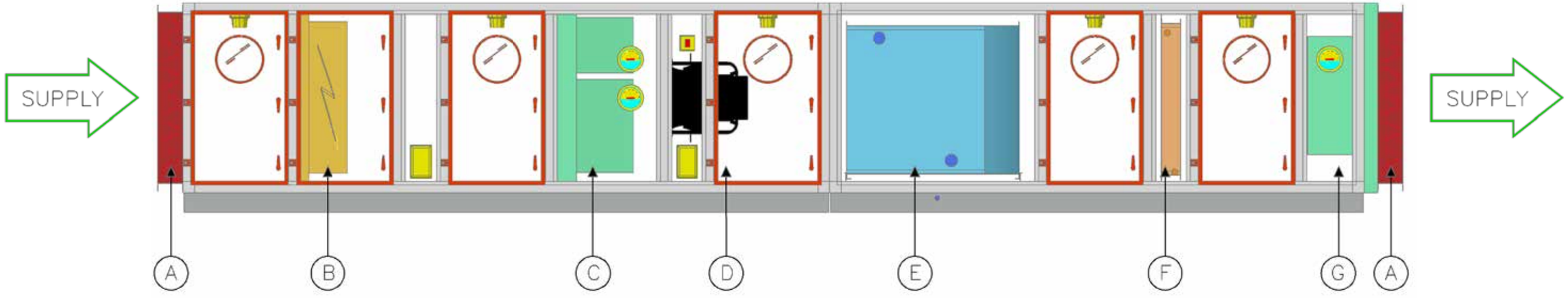
Specification

The Daikin Applied UK construction advisory above carefully considers the nature of the application and the required parameters of the AHU, to ensure a safe and suitable product is installed. However, please note that where an alternative construction is specified as part of a project specific design specification, then Daikin Applied UK will adhere to the specification requirements to ensure full compliance to the end users' expectations.

A full breakdown of Daikin Applied UK's recommended Food Production AHU can be seen on page 6.

DAPUK Hygenic AHU

General features



- 42mm/62mm framework dependent on air volume requirements.
- SS304 internal panel skins.
- Advantica L food-safe external panel skins.
- Euroclass A 120kg/m3 - rockwool insulation
- Stainless steel and epoxy-coated internal parts for high hygiene standards and protection against rigorous cleaning requirements.
- No use of galvanized steel internally due to its poor corrosion resistance.
- Dowsil 786 – Food Safe Sealant
- BS EN 1886 T2/TB2/D2/L2 compliant solution.

Quality management system
Nr. 50 100 9493/3 & 9493/4

A: Stainless steel 304 opposed blade low leakage dampers.

B: Electric or water pre-heat coil for frost protection. All pre-heat coils to come complete with SS304 casing and mounts.

C: Pre & secondary filtration in line with the recommendations dependant on production area highlighted above. Typically, at minimum a coarse 60% G4 pre-filter followed by a ePM1 50% F7 filter. Rigid pocket filters to be utilised due to the extended media life and rigidity in construction v typical soft bag installations. All filter frames to be SS304.

D: High efficiency EC fans complete with on-board VSD that runs off a 0-10v signal. All fans will be painted and mounted on a SS304 bulkhead to ensure the highest corrosion resistance and hygienic construction.

E: Chilled water-cooling coil to meet low temperature set-point requirements. Most CHW cooling coils will include an anti-freeze, typically glycol due to the low water-side temperature requirements to deliver low set-points. All cooling coils will include for copper tubes, aluminium vinyl coated fins and SS304 frame and mounts.

F: Re-heat coil to meet set-point requirements (where required). All cooling coils will include for copper tubes, aluminium vinyl coated fins and SS304 frame and mounts.

G: Final high efficiency HEPA filter (where required as per production area criteria). Generally, a H13 mounted on a DOP arrangement.

Case study

Vitacress Salads

Daikin Applied UK had the pleasure of supplying two food production AHUs across two separate phases for Vitacress Salads, located in Andover, UK. Due to the primary production being salads, the AHU requirements fell under the high care category, requiring careful consideration for filtration, material choice and temperature control.

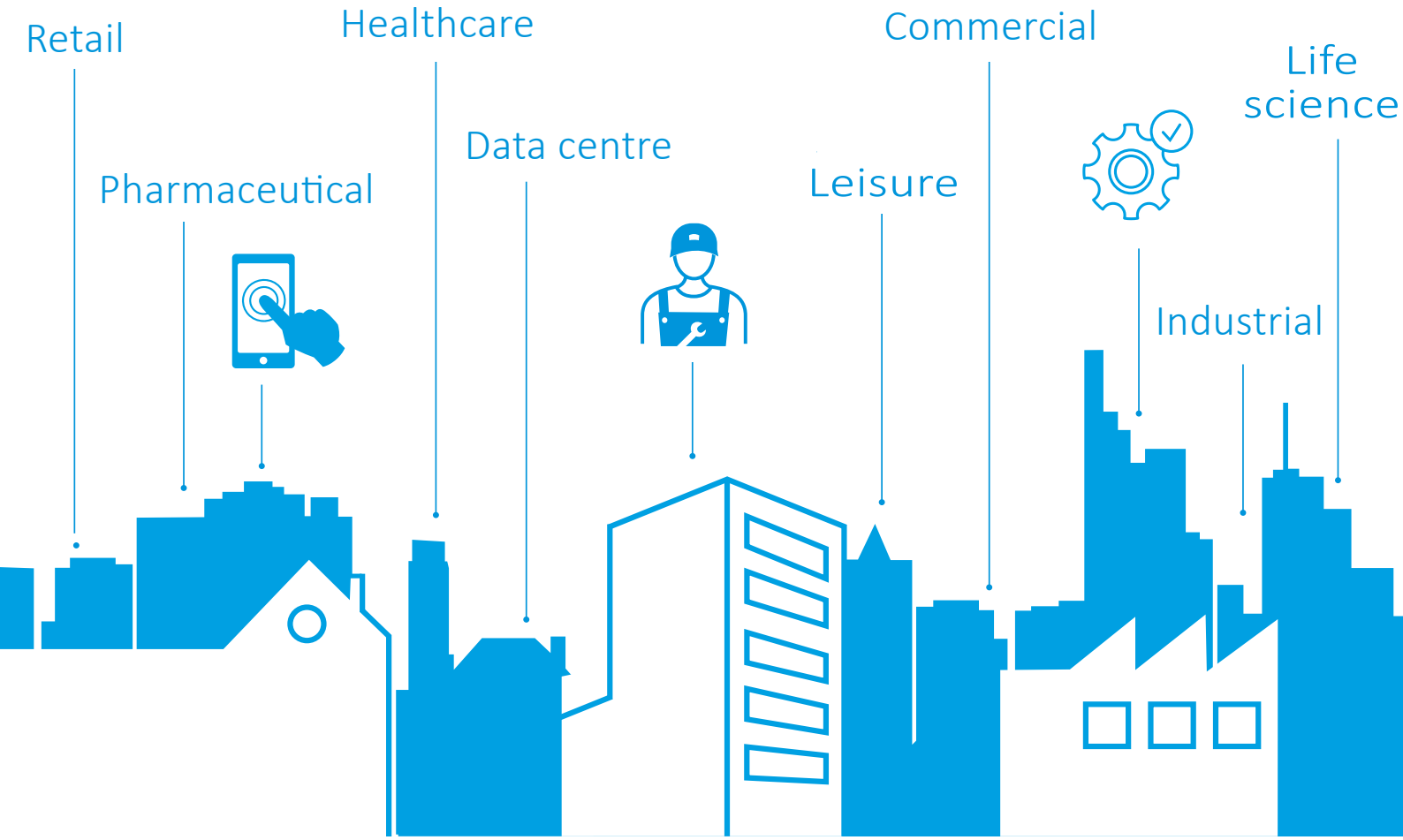
AHU construction featured Stainless Steel SS304 internals throughout, including skins, coil mounts, fan bulkhead, coil casings, filter frames and even shut-off dampers. The use of SS304 ensured a high level of corrosion resistance, mitigating the risk of bacteria growth whilst also ensuring internal surfaces are suitable for clean down - maximising hygiene considerations.

External surfaces were manufactured using a food-safe precoated panel skin. Filtration included for an ePM Coarse 60% pre filter and an ePM1 95% final filter which exceeded the recommended filtration grade highlighted for high-care applications.

A pre-heat SS304 electric coil was included to temper air during winter months, whilst the main set-point for the food production space was a low temperature of only 1^{0}C due to the nature of the food products being produced. Careful consideration and control of temperature had to be made to ensure food production and quality were not affected. To achieve a stable low-temperature supply, a SS304 cased chilled water-cooling coil, complete with copper tubes and aluminium vinyl fins was supplied, sized to deliver the stated set-point. The system was sized with a low flow and return temperature of -3^{0}C/+3^{0}C and consideration for 30% ethylene glycol.

The airflow was delivered via a high-efficiency EC Fan with an IE5 motor and complete with onboard VSD. The integrated motor and small footprint of the fan allows for ease of maintenance, whilst delivering the airflow requirements at the highest possible efficiency. The fan included a painted frame and base plate, and a composite impeller - ensuring no exposed steel that could otherwise be subject to corrosion and harbouring of bacteria.

The thermal performance of the AHU was rated to T2/TB2, and L2 leakage as per BS EN 1886, a Daikin Applied UK construction standard.



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