

AIR HANDLING UNIT SPECIFICATION



British Standards Quality Systems BS EN ISO 9001 : 1994



Certificate No. 890217

Application, Design and Manufacture of Air Handling Units for Air Conditioning and Ventilation Systems

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INTRODUCTION

Units are purpose designed to meet duties and pressures as stated on technical schedules.

Units are supplied as single section or in modular form with the number, size and weight of each section stated on the certified drawings.

Each unit/section is supplied factory assembled on a structural steel base, giving rigidity during lifting and assembly. Generally base frames are attached running longitudinally, however, on larger units frames are fitted longitudinally and transversely. Base frames are provided with lifting points which should always be used when hoisting (see operating and maintenance manuals).

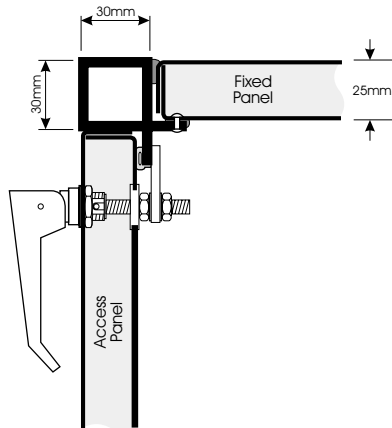
All units/sections are protected for delivery with heavy duty polythene wrapping.

Construction Options:

All construction options offered are subject to availability and at additional cost. Typically construction options would include :-

- Alternative framework colours and finishes.
- Fully insulated framework.
- Alternative panel colours, materials and finishes.
- Alternative panel insulation materials.
- Alternative hinge and lock types.

RANGE SPMA



Reasons for use:

- Low pressure applications.
- HVAC Class 'A' air leakage test standards.
- Good aesthetics.
- Maintenance free, satin anodised finish.
- Lightweight structure, approximately half weight of steel units.
- Internal or external mounting.
- Clean internal lines.
- Food factory applications.

Framework: 30mm extruded aluminium section.
Frame colour: Self colour, satin anodised.

Panels: 25mm thick double skin panels.
Insulation: Rockwool or injected foam.
Inner panel: Natural galvanised mild steel.
Outer panel: Plastisol faced mild steel.
Colours: Ocean Blue (BS18C39)
 Goosewing Grey (BS10A05)
 Moorland Green (BS12B21)

Construction: Riveted construction with plastic or self colour aluminium corners.

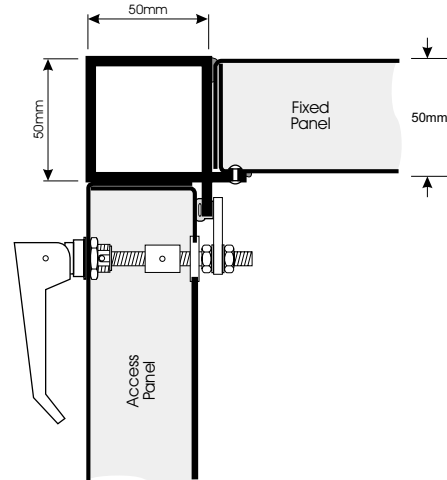
Door Hinges: Plastic butt hinges. Other hinge types available on request.

Door Locks: Dalair reference D.001 or D.002.

Standard 17 standard sizes up to 2,300mm wide

Size Range: by 2,300mm high with intermediate and special sizes available.

RANGE MA50



Reasons for use:

- Low to medium pressure applications.
- HVAC Class 'B' air leakage test standards.
- Good aesthetics.
- Maintenance free, satin anodised finish.
- Lightweight structure, approximately half weight of steel units.
- Internal or external mounting.
- Clean internal lines.
- Food factory applications.

Framework: 50mm extruded aluminium section.
Frame colour: Self colour, satin anodised.

Panels: 50mm thick double skin panels.
Insulation: Rockwool or injected foam.
Inner panel: Natural galvanised mild steel.
Outer panel: Plastisol faced mild steel.
Colours: Ocean Blue (BS18C39)
 Goosewing Grey (BS10A05)
 Moorland Green (BS12B21)

Construction: Riveted construction with plastic or self colour aluminium corners.

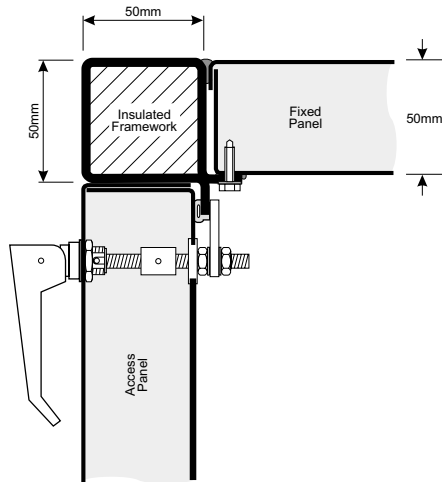
Door Hinges: Plastic butt hinges. Other hinge types available on request.

Door Locks: Dalair reference D.001 or D.002.

Standard 31 standard sizes up to 3,800mm wide

Size Range: by 3,200mm high with intermediate and special, larger sizes available.

RANGE HSF



Reasons for use:

- Low to medium pressure applications.
- HVAC Class 'B' air leakage test standards.
- Substantial strength advantages.
- Internal or external mounting.

Framework: 50mm x 2mm mild steel, cold rolled section. Powder coated finish.
Fully insulated.

Frame colours: Goosewing Grey (BS10A05)
Moorland Green (BS12B21)
Light Blue (RAL2705040)

Panels: 50mm thick double skin panels.
Insulation: Rockwool or injected foam
Inner panel: Natural galvanised mild steel.
Outer panel: Plastisol faced mild steel.
Colours: Ocean Blue (BS18C39)
Goosewing Grey (BS10A05)
Moorland Green (BS12B21)

Construction: Riveted construction with pressed steel or self colour aluminium corners.

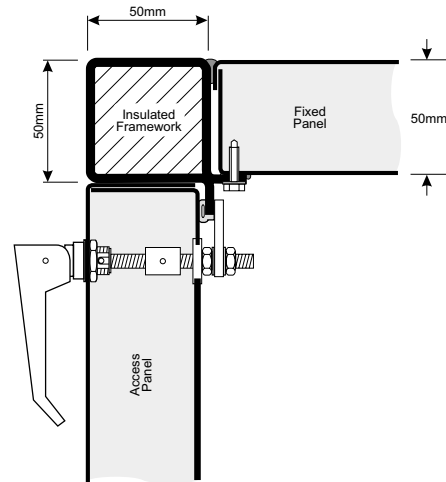
Door Hinges: Plastic butt hinges. Other hinge types available on request.

Door Locks: Dalair reference D.001 or D.002.

Standard 40 standard sizes up to 10,600mm wide

Size Range: by 3,800mm high with intermediate and special, larger sizes available.

RANGE HSFL



Reasons for use:

- Suitable for high pressure, low leakage applications.
- HVAC Class 'C', 'D' or half 'D' air leakage test standards.
- Substantial strength advantages.
- Internal or external mounting.

Framework: 50mm x 2mm mild steel, cold rolled section. Powder coated finish.
Fully insulated

Frame colours: Goosewing Grey (BS10A05)
Moorland Green (BS12B21)
Light Blue (RAL2705040)

Panels: 50mm thick double skin panels.
Insulation: Rockwool or injected foam
Inner panel: Natural galvanised mild steel.
Outer panel: Plastisol faced mild steel.
Colours: Ocean Blue (BS18C39)
Goosewing Grey (BS10A05)
Moorland Green (BS12B21)

Construction: Riveted construction with pressed steel or self colour aluminium corners.

Door Hinges: Double pin floating hinges for low leakage applications.

Door Locks: Dalair reference D.001 or D.002.
Rox locks, Dalair reference D.005, fitted for low leakage applications.

Standard 40 standard sizes up to 10,600mm wide

Size Range: by 3,800mm high with intermediate and special, larger sizes available.

ENCLOSURE PANELS

Panel Construction

Enclosure panels are of double skin construction, tray form, riveted or foam bonded, nominally 25mm or 50mm thick. The panels are internally stiffened, as necessary, with insulation encapsulated within.

Access panels are of hinged or lift off design and close onto compression rubber seals to provide an airtight enclosure.

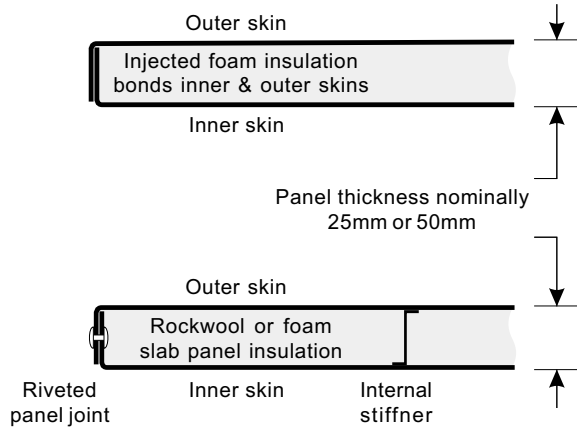
Gauges of materials for panel construction vary between 16SWG and 22SWG, but numerous alternatives are available to suit specification and acoustic requirements. Full tested acoustic data is available as undertaken and certified at the National Engineering Laboratory, East Kilbride and within Dalair's test facilities.

In addition to the insulation materials listed numerous additions, such as sound barrier mat, can be internally added to achieve greater acoustic attenuation. Full tested data is available on request.

Alternative Panel Materials

Plastisol Coated Mild Steel
Galvanised Mild Steel
Stainless Steel
Aluminium
Perforated Galvanised Mild Steel

Sections Through Panels



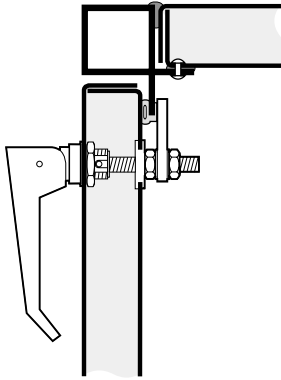
Enclosure Panel Insulation Properties

Insulation Material	Nominal Thickness mm	Density kg/m ³	Thermal Transmission 'U' Value w/m ² °C	Thermal Conductivity 'K' Value	Panel Weight kg/m ²
Rockwool	25	60	1.32	0.033	22.0
Rockwool	50	80	0.66	0.033	26.9
Urethane Foam ¹	25	44	1.05	0.021	21.5
Urethane Foam ¹	50	44	0.42	0.021	24.8
Phenolic Foam ²	25	35	1.00	0.020	21.3
Phenolic Foam ²	50	35	0.40	0.020	24.3

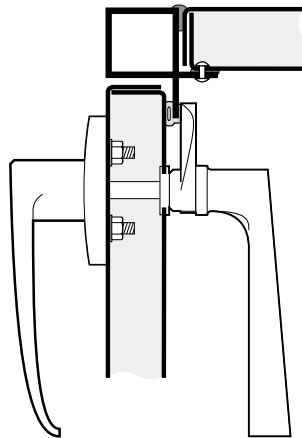
¹ CFC free, injected, polyurethane foam.

² CFC free, slab form, phenolic foam.

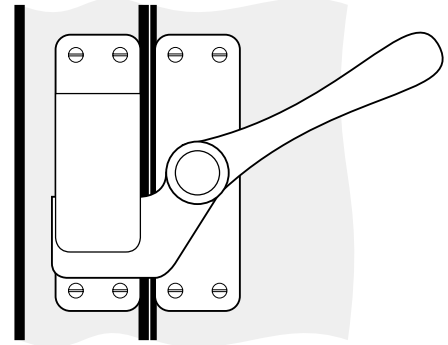
LOCK & HINGE TYPES



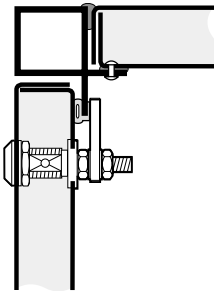
LIFT & TURN HANDLE
Dalair Part No. D002



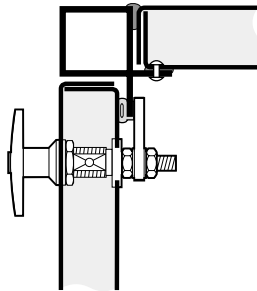
CHROME LEVER
Dalair Part No. D006



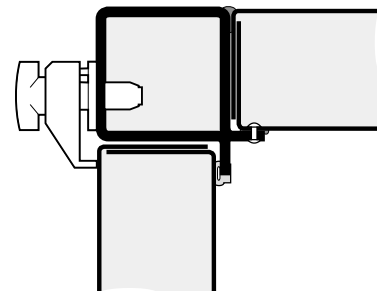
FRIDGE TYPE HANDLE
Dalair Part No. D007



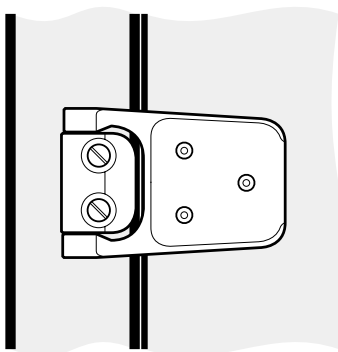
KEY OR TOOL OPERATED TURN & LOCK SOCKETS
Dalair Part No. D003, D004, D008 and D010



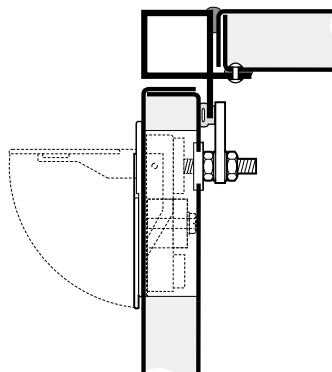
KEY LOCKABLE
Dalair Part No. D009



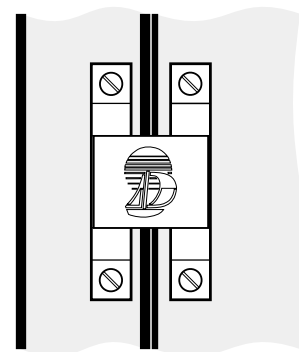
ROX LOCK
Dalair Part No. D007
Suitable for high pressure, low leakage applications



BUTT HINGE



COMPRESSION LEVER LATCH
Dalair Part No. D001



DOUBLE PIN FLOATING HINGE
Suitable for high pressure, low leakage applications

This is our standard range of locks and hinges. Alternative lock and hinge types may be offered, subject to availability and at additional cost.

COMPONENT SECTIONS

GENERAL

Component sections would be factory assembled on a structural steel channel or purlin base frame with lifting points provided for ease of installation.

If, due to physical size, transportation or site access restrictions, it is not possible to supply a single section factory assembled unit, the unit would be supplied as separate sections with base channels or purlins attached for on-site assembly.

WEATHERPROOF UNITS

The unit would be provided with an apex or pent roof, dependant on unit size, of Plastisol faced, galvanised mild steel construction.

External panels would be of Plastisol faced, galvanised mild steel, colour Ocean Blue (BS18C39), Gossewing Grey (BS10A05 or Moorland Green (BS12B21). Other colours available at additional cost.

Steel base frames would be powder coated.

FAN SECTION

Fans selected shall be capable of continuously delivering the specified air volume against the external system resistance. The external resistance, given by the Client, is assumed to include all total, static, velocity and friction pressure losses external to the air handling unit.

It is also assumed that the approach and discharge ductwork, to and from the unit, has been designed in accordance with good practice as stated in C.I.B.S.E. and ASHRAE guides. Poor ductwork design can have a major effect on fan performance.

The fan section would be constructed from chassis frame and panels as previously specified and would house the specified type of fan, either belt or directly driven.

Vee belts would be selected to operate on a continuous basis. The fan/motor would be mounted on a rolled section sub frame and isolated from the unit casing with anti-vibration mountings and flexible connections.

If direct driven motor fans are used, anti-vibration mounts and flexible isolators would not be fitted, unless specifically requested or at the discretion of Dalair.

Fan bearings would be single row, sealed for life ball bearings or double row plummer block type with either ball or roller bearings. Extended lubricators can be provided if specified.

Bearings are selected for a minimum design life of 20,000 hours, giving an average life of 40,000 hours.

MOTOR OUT OF AIRSTREAM

On units which require the motor to be mounted out of the airstream, Dalair's unique mounting arrangement ensures no special builders work requirements.

An extended fan shaft would be specifically designed and manufactured in one-piece, with either polished or ground finish. Both fan shaft and support case extend through the unit casing, and would be fully sealed by means of a shaft seal comprising of spigot, seal housing and oil ring seals. The shaft would be seated on heavy duty bearings.

The impeller and shaft would be statically and dynamically balanced at our works to test number DL7416C and BS 5265, Part 1, Grade Q4 and a test certificate issued.

The fan section would be constructed from chassis frame and panels as previously specified and would house the specified type of fan.

Vee belts would be selected to operate on a continuous basis. The fan/motor would be mounted on a rolled section sub frame and isolated from the unit casing with anti-vibration mountings and flexible connections.

Bearings are selected for a minimum design life of 20,000 hours, giving an average life of 40,000 hours.

HEATER/COOLER BATTERIES

Heaters and coolers would be constructed from copper tubes mechanically expanded into aluminium fins to provide a good mechanical and thermal bond. Copper, electrotinned or polyester coated fins can be provided at an additional cost.

Heaters would be inspected and subject to an air under water test.

Coils are fitted within unit sections on base slide rails. Return bends and headers are fully encased within the unit. Top and side baffle plates are fitted to prevent air bypass.

On DX evaporator and chilled water coils, sloped drain pans are provided, fitted within the unit and terminating with a BSP drain connection.

Drain trays can be supplied in stainless steel and constructed for side removal to allow cleaning if specified or at the discretion of Dalair Limited.

Eliminators shall be manufactured from polypropylene and mounted after the cooling coil. They shall be provided only if specified or as necessary to prevent moisture carry over.

Where flow and return connections penetrate the unit casing, they shall be suitably sealed and fitted with galvanised steel cover plates.

Coils are generally single section, but they can be supplied face split vertically or horizontally, as specified, or at the discretion of Dalair Limited. If vertically face split coils are supplied, connections can be extended to one side of the air handling unit at an optional extra cost.

Common terminating headers for coil branch connections are not included as our supply.

Coil flanges can be supplied at an additional cost.

HUMIDIFIERS

a) Self Generating Type

Electrode boiler type steam humidifiers are fitted to all ranges of units providing dry sterile steam for humidification. A wide range of sizes are available providing on/off, stepped or fully modulating control.

The steam boiler containing the electric heating electrodes is generally a polypropylene moulding. Depending upon the steam output required this would be fitted with a number of electrodes. The steam boiler outlets are connected by steam hose (maximum length 3 metres) to steam distribution pipes mounted within the airstream. Steam distribution pipes are fitted within the air handling unit prior to despatch.

The electric steam generator would either be supplied loose for fitting by others, on internally mounted units or fitted in a purpose made, weatherproof enclosure on externally mounted units.

b) Steam/Injection Type

Electrically or pneumatically operated steam humidifiers are fitted to all ranges of units providing dry sterile steam for humidification. A wide range of sizes/steam outputs are available all basically of the same operating principle :-

Upon entering the separating chamber the steam flow pattern is changed twice, hence reducing its volume and separating the condensate.

Steam then flows around the chamber and through the steam valve (actuated by a remote humidistat fitted by others) and continues into the drying chamber through a special stainless steel material to absorb noise generated by escaping steam.

After leaving the drying chamber, dry steam is then dispersed via steam distribution pipes mounted within the airstream.

All condensate connections must be fitted with steam traps to prevent steam entering condensate collector. Units are normally supplied with a control valve for actuation by others.

c) Evaporative/Spray Coil Type

The casing would be constructed as stated under general construction with watertight seals and internally finished with corrosion resistant paint.

The water storage tank is manufactured from 3mm mild steel plate, of fully welded construction, externally re-inforced and insulated. It is internally hot zinc sprayed and finished with corrosion resistant paint.

Internal fittings include open mesh galvanised walkway, PVC pipework, atomising spray nozzles, stop valve, ball valve, water strainer, light fittings, pressure gauge and bypass regulation.

A re-circulation pump of the required capacity and head is provided, which is externally mounted.

Stainless steel sump tank and internal lining are available as an optional extra cost.

GAS FIRED HEATERS

a) Direct Fired

Direct gas fired heaters are fitted within units. The burner head is positioned at the air entry of the burner section with adjustable baffle/deflector plates fitted to allow the air velocity/pressure to be set across the burner head. In addition a stainless steel target plate is fitted downstream of the burner head to prevent direct flame affecting subsequent components of the air handling unit.

A complete gas train is provided to the burner head, piped to a control panel housing, terminating in BSP connections.

Direct gas fired burners are available with on/off, high/low or modulating control systems.

b) Indirect Fired

Indirect gas fired heaters are fitted within units, fully enclosing the gas burner. The burner vestibule section is fully sealed at burner air entry and leaving faces. The vestibule section is fitted with an aluminium or pressed steel louvre for ventilation to the chamber and burner.

Process air passes across the combustion chamber with a percentage of by-pass air, as necessary, to maintain correct pressure and temperature control. The correct air quantity must be set by a commissioning engineer to the relevant volumes as stated on construction drawings.

The combustion gas outlet (flue) is extended either through the side or top of the vestibule section, terminating at a spigot for site connection by others.

The combustion chamber incorporates a pressure relief door and flame viewing window. The heat exchanger is of tubular construction.

Gas burners are fully automatic and meet British Gas Council, BSS and Corgi recommendations. Flame failure protection, flame rod sensor, sequence control panel and manual reset overheat protection is provided on all burners.

Indirect gas burners are available with on/off, high/low, pulse or modulating control systems. Generally modulating control is for high flame only and should greater turndown and control be required it should be specified.

MIXING/INLET PLENUMS

The section would be constructed as previously stated and fitted with either parallel or opposed blade multi-leaf dampers suitable for motorised control or manual operation.

The dampers would be constructed from aluminium or galvanised mild steel with plated drive spindles and linkages running in bearings.

Internal units would have mixing and face dampers bolted to the outside face of the unit chassis.

Externally mounted units or pressure tested units would have the dampers fitted internally, within the unit chassis and access would be provided.

The access section would be constructed as previously stated with a fully removable or hinged panel fitted to one side of the unit.

On walk-in units the floor would be reinforced and stiffened to allow adequate support for maintenance personnel.

Open steel, durbar or chequer plate flooring will only be fitted if specified or at the discretion of Dalair Limited.

FILTER SECTIONS

The section would be constructed as previously stated from framework chassis and flush fitting panels with a removable or hinged access panel to one side. (Optional front or side withdrawal)

Standard filters fitted are throwaway type, either panel or bag filters, with varying efficiencies.

Other types of filters, however, can be incorporated, namely washable, activated carbon or absolute (HEPA).

FILTER GAUGES

As standard, Dalair include for supplying, as a loose item only for fitting on-site by others, an inclined gauge manometer for each filter bank fitted within the air handling unit. Alternatively a Magnahelic or Minihelic gauge can be fitted in our works, depending on the specification or at Dalair's discretion.

ATTENUATORS

Attenuators incorporated within the unit casing are manufactured from a series of purpose made vertically mounted splitters, each consisting of a galvanised sheet steel frame containing acoustic infill materials, either 200, 300 or 400mm thick.

The surfaces of the splitters are faced to prevent erosion. Subject to velocities and pressures, perforated facings can be added as necessary or to meet specification requirements. Melinex facing is available as an option although this will reduce the performance of the attenuator.

The insulation infill is inert, non-hygroscopic, vermin and rot proof, it does not support bacteriological growth and has a 'Class 1' rating for surface spread of flame.

Splitters are assembled into the unit casings with locating tabs to ensure the correct airway width to give optimum acoustic performance.

Bull nose fairings together with half width side splitters can be fitted as specified or as necessary to reduce air pressure drop.

CONTROLS

We exclude, unless specifically mentioned, supplying or fitting of damper mounting brackets, damper actuators or control stats.

FACTORY PRE-COMMISSIONING & COMMISSIONING

Pre-commissioning checks are carried out in our factory to ensure that the correct and completed product is delivered to site.

Generally commissioning of direct fired burners, indirect fired burners, humidifiers, etc. is carried out by Dalair Limited upon specific request.

TESTING

Dalair Limited can provide (upon specific request) in house test facilities for carrying out the following tests:-

- A.H.U. leakage testing in accordance with DW143/ DW142, classes 'A', 'B', 'C', 'D' and half class 'D'.
- Volumetric rating of fan sections to BS 6583. Noise tests to BS 848, Part 2.

OPTIONAL EXTRAS

The following items are available, if specified or requested :-

- Bulkhead lights and double glazed viewing panels.
- Eddy current coupling, inlet guide vane or frequency inverters.
- Run-around coils, plate heat exchangers or thermal wheels.
- Run and stand-by motors mounted either in or out of the airstream.
- Motors wired to external isolators or terminal boxes.
- Specialised acoustic infill panels to meet specific noise requirements.
- Fully packaged air handling equipment.

HOSPITAL SPECIFICATION AIR HANDLING UNITS

Working closely with specifying authorities designing installations serving operating theatres, and being aware of the problems surrounding Legionnaires disease, Dalair have developed a purpose made range of hospital air handling units.

These have been designed taking into account National Health Service Model Engineering Specifications, CO4, April 1993 & HTM2025

Of paramount importance, in any hospital installation, is the sterilisation of component parts within the air handling unit where moisture will be present in the normal course of operation.

The usual method of sterilisation is to use a chlorine based solution which, whilst effectively killing bacteria, may lead to corrosion of any unprotected surfaces.

With this in mind, Dalair's hospital unit is designed to provide a high degree of resistance to corrosion and to give a simplified method of cleaning coils, humidifiers and associated drain trays.

Features available on Dalair hospital units

- Cooling coils manufactured from copper tube with copper fins (electro tinned if required), or aluminium fins (polyester coated if required), and with galvanised, epoxy painted or stainless steel casework.
- Stainless steel drain tray, removable if specified, and designed with a 1:20 fall.
- Stainless steel isolation dampers or dagger plates to allow complete isolation of cooling coil or humidifier sections whilst sterilisation takes place.
- Melinex lining to in-built silencers, for protection during the sterilisation process and to prevent the migration of fibres into the airstream.
- Motors mounted out of the airstream, usually with run and stand-by facility to give operational safeguard. Dalair's unique, flexible couplings ensure no cross contamination of airstreams, where drive and fan/motor sub-frame penetrate the unit casing.
- Externally mounted, externally maintainable bulkhead lights and switches, and double glazed viewing windows.

SWIMMING POOL SPECIFICATION AIR HANDLING UNITS

It is not always appreciated how corrosive the atmosphere in swimming pools can be, and unless careful attention is given to the design and manufacture of the air handling plant, its operation, efficiency and life expectancy will be dramatically reduced.

Dalair's design department have evaluated the key areas likely to be affected by corrosion, and have produced a unit capable of withstanding the severest pool environment, without the need for expensive maintenance or costly replacements.

The following should be included in any air handling unit serving swimming pools to provide adequate protection from the harsh environment it will be operating in:-

- Slide in coils manufactured from copper tube with copper fins (electro tinned if required), or aluminium fins (polyester coated if required), and with galvanised, epoxy painted or stainless steel casework.
- Damper frames and blades protected with an epoxy paint finish or manufactured from stainless steel.
- Fan cases and impellers protected with an epoxy paint finish.
- Fan case to incorporate a drain at the lowest point.
- Motors to be ARGUSS 55 as standard.
- Unit framework and internal slides/bulkheads to be protected with an epoxy paint finish.
- Unit panels to be finished both internally and externally with British Steel Plastisol coated, galvanised sheet steel.
- Melinex lining to in-built silencers, to prevent acoustic infill becoming saturated and migrating into the airstream.



HEADQUARTERS

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*Due to our policy of continued improvements in
both design and performance, we reserve the right
to alter details without notification*