



CENTRAL DUCT/PLENUM DESIGN AND INSTALLATION INSTRUCTIONS

Duct Size

The UNICO System can be installed with either round or rectangular duct. Traditional galvanised circular duct is lower in cost but rectangular fibreboard is becoming the preferred option due to enhanced system performance and ease of installation. Unico provides adapters for both types.

The size of the central duct system will vary according to the required airflow and length required. In most cases, where the length is less than 45m, the central duct will require 200mm internal diameter.

However, in certain instances you will need to use larger duct. Specifically, a larger duct is necessary for the 4860 and occasionally for our 3642. You can refer to the Duct Layout and Design Manual for more specific information on duct sizing.

Table 1. Lists the maximum airflow for various duct sizes. For rectangular duct sizes, size the duct for equal friction. If using a tee to split the airflow it is acceptable to reduce the duct size immediately after the tee.

Note: Each elbow or tee is equivalent to 5m (15 feet) of straight duct

Installation

The duct must be designed for 4" of water (992 Pa) internal pressure. A sheet metal thickness of at least 26-gauge (0.45 mm) is recommended in order to cut the 51mm holes for the branch ducts without collapsing the central duct.

Sealing. It is extremely important to seal all of the duct seams and joints, including any longitudinal snap-lock seams. The method of sealing shall be in accordance with the latest UK building regulations

Always consider the fabrication of your building and in particular your timber joists and cavity walls as the location of your UNICO unit, the central duct and outlets is critical to every application.

* Duct Construction & insulation should conform to BESA DW/144 standard specification.

Table 1. Duct Size Limitations (Internal Diameter)

| Model | ID: Round Size | ID: Rectangular Equivalent | Maximum Airflow |
|----------------------|----------------|--|-----------------------|
| 1218 | 160 (6.3") | 127 x 152 (5 x 6) 101 x 203 (4 x 8) 89 x 228 (3.5 x 9) | 190 L/s (400 CFM) |
| 2430 3036 3642 | 200 (7.75") | 152 x 203 (6 x 8) 127 x 254 (5 x 10) 101 x 304 (4 x 12) 76 x 508 (3 x 20) | 355 L/s (750 CFM) |
| 3642 4860 | 250 (9.85") | 203 x 228 (8 x 9) 152 x 304 (6 x 12) 76 x 762 (3 x 30) | 590 L/s (1250 CFM) |

* It is important to allow for the overall outside diameter after 38mm insulation is applied to your galvanised duct: Round 200mm ID will be 276mm OD. Rectangular 101 x 203 ID will be 176 x 276 OD. For fibreboard duct you will also need to allow up to 50mm all round: Rectangular 101 x 203 ID will be 151 x 253 OD.

Insulation

The Unico System is designed to produce a greater temperature drop across the heat exchanger than a conventional system. To prevent condensation or excessive duct losses to the surrounding air, wrap the galvanised duct with at least 38mm or fibreglass blanket insulation or insulation sleeve. The insulation must include an outer vapor seal and be sure to seal the joints with an aluminium tape. (Not required if using pre-insulated fibre board duct)

If the galvanised duct is hung with straps, use a rigid insulation material under the duct where it is supported. This will ensure the duct is fully insulated.

Metal Return Duct

We recommend the Unico return duct tubing on all installations, but if the return duct tubing is made of metal, always add an acoustical lining to the inside of the duct. This is in addition to or instead of the wrapped insulation. The duct should be sealed at the seams and be designed for a negative 0.5" of water (124 Pa) static pressure.



SOME SIMPLE RULES TO FOLLOW WHEN DESIGNING A UNICO SYSTEM

Duct Design & Layout

OUTLETS: Minimum 6 – 51mm outlet, Minimum 5 – 63.5mm (2.5") Per Ton (3.5 kW). For refrigerant cooling applications the airflow must be between 200 and 250 CFM per nominal ton [27 to 33 L/s per nominal cooling kW]. For hot water or chilled water systems, refer to performance charts to determine the required airflow. The allowable airflow range per outlet is 20 to 40 CFM [9.4 and 19 L/s], where the typical outlet will deliver 35 CFM [17 L/s] if the plenum static pressure is 1.5" [0.37 kPa] and the branch duct length is 10-foot (3 metres) without any balancing orifices. Therefore, the average project will require about 6 of 2" outlets per nominal ton [6 outlets per 3.5 kW] although more will be needed if the branch ducts are longer, balancing orifices are used, the plenum static pressure is less than 1.5" of water [0.37 kPa], or it is desirable to make the system as quiet as possible. For example, two runs with 50% balancing orifices are equal to one branch run without any orifices.

- **10% Rule.** For supply ducts longer than 10 feet (3 metres), the air is reduced in that run by 10% for every 5 feet over 10 (every 1.5 metre over 3 metres). For example, a 30 foot [9 metres] run is 60% of an outlet that is 10 foot [3m] yielding a reduction of 40% (30-10=20, 20÷5=4, 4×10=40%).
- **Consider Traffic Pattern.** Place outlets out of traffic pattern. A corner, 127 mm from each wall, is a good location, or along walls, or in soffits blowing horizontally. Consider floor outlets (with screens) for units located in basement. Slotted outlets can be used for high wall locations or in ceilings where there is insufficient room for bending tubing.
- **Allow for Aspiration.** Locate outlets so the air stream does not impinge on any objects or people – at least 1 m away. Use outlet deflectors and outlet balancing orifices sparingly as they disrupt the aspiration.
- **Minimise Length, Minimise Restriction.** Keep the supply duct length as close to 3 m as possible and never less than 1.8 m. Use the fewest number of bends as possible. Maximise the radius of any bends making sure the bend in the sound attenuator tubing near the outlet is at least 152 mm.

Plenum

- **Maximise Length, Minimise Restriction.** Run main trunk (plenum) as long as possible; it is better to lengthen the plenum if you can shorten even two outlet runs. Use full flow tees with turning vanes (when applicable) and full flow elbows. The maximum total plenum length is 45m; consider the first tee equal to 9m and elbows equal to 4.6 m.
- **60/40 Rule.** When using a tee split the flow as close to 50/50 as possible - no more than 60/40. Always use a turning vane.
- **70/30 Rule.** Turn the tee 90° to make a side branch with no more than 30 percent of the air. Do not use a turning vane

610 mm Rule. Use at least 610 mm of straight plenum before any fitting, such as an elbow, tee, or take-off.

- **Space Take-off's Evenly.** Maintain distance between take-offs as evenly as possible. Space the take-offs at least 152 mm apart and 305 mm from end cap. Our design team are on hand to provide further information and guidance on the central duct design specification i.e. Horseshoe, shotgun, H pattern and dog leg options depending on your design requirements.

Sound

- **Sound Attenuators.** Always use at least 1 m of the UNICO supplied sound attenuator supply tubing (UPC-26C or 226C) at the end of each run. For runs up to 3658 mm, you may use the sound attenuator for the entire run. For greater lengths, use the aluminium core supply tubing (UPC-25 or 225) with a 1 m sound attenuator at the end.
- **Return Air Duct Attenuation.** Use the UNICO Return Air Duct (UPC-04), duct-board, or sheet metal with acoustical duct liner. Never use flex duct with a solid plastic liner in place of UPC-04.
- **Isolation.** Isolate the air handler with foam rubber strips under the unit. Either hang the unit from the structure using angle iron framework under unit (do not hang directly with hooks in the cabinet) or set on a platform.

Check airflow before boxing in the Ductwork:

- **Check Total System Airflow.** Check the airflow at each outlet with a Turbometer centred over the outlet. Add up the cfm for all outlets – it should not differ by +/- 5% from the design airflow.

Piping

- **Secondary Drain Pan.** Always use a secondary drain pan wherever overflow of condensate can cause water damage. Do not trap secondary drain line or connect to primary drainpipe. Place secondary drain line exit so that it is apparent when being used. For example, pipe the drain line so it drips on an outdoor windowsill and causes splashing to be noticed.
- **Primary Drain.** Always trap primary drain line and run drain line per local plumbing codes.
- **Refrigerant Lines.** Follow the outdoor section of manufacturer's instructions for running refrigerant lines. Size and trap per the instructions.

UK Partner

Bell Plumbing Solutions, Timmis Road, Stambermill Industrial Estate, Lye, Stourbridge DY9 7BQ

T: 01384 422094 E: unico@bellplumbing.co.uk