
Ecosmart Mini Duct Trunk and Outlet Design Guide for HVP50, HVP90 and HVP100 Air Handlers



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All technical information subject to change without notice.

OVERVIEW

This document will guide the designer on how to correctly determine the sizing and layout of mini duct systems. The end goal is to provide correct air flow to specific areas of the installation with minimum noise while maintaining comfort.

EQUIPMENT SELECTION

- Determine heat loss/gain for the entire structure.
- Choose an Ecosmart air handler to suit.
- If heating requires more capacity than cooling, choose the heating value to determine number of outlets required.
- Having too few outlets and/or closing down too many outlets will also impact system sound level. The Ecosmart air handlers are equipped with Constant Pressure technology (CPT) to compensate for the opening and closing of outlets. For a detailed description of CPT, refer to the Ecosmart Installation, Operation and Maintenance Manual.
- It is recommended to design the system for the **median** number of outlets. When a cooling coil is installed, the median number of outlets should be used as a minimum to prevent cooling coil freeze up if installed. **Refer to Table 1.**
- Our recommendations are based on approximately 40CFM per outlet.
- Lower CFM rates will result in less outlets and/or different CFM outputs per outlet.
- A freeze stat should be installed on the suction side of the DX coil to disable the condenser should the cooling coil become too cold if insufficient air passes through the system.
- The Ecosmart air handlers have 8 independent heating and cooling CFM settings. Select the setting that best suits your design requirements for each season. This may avoid having to open and close outlets during the summer/winter season.

# of outlets	HVP50 * (580CFM @ 1.5in WC)	CFM per outlet	HVP90 ** (750CFM @ 1.5in WC)	CFM per outlet	HVP100 *** (950CFM @ 1.5in WC)	CFM per outlet
Minimum	13	45	15	50	19	50
Median	15	39	18	42	24	40
Maximum	17	34	21	38	30	32

* 50HVP maximum airflow is 700CFM at 1.5in WC

** 90HVP maximum airflow is 830CFM at 1.5in WC

*** 100HVP maximum airflow is 1140CFM at 1.5in WC

(Refer to air handler manual for CFM at other ESPs)

Table 1 – Outlet recommendations

ZONING EQUIPMENT SELECTION

Zonesmart recommended number of diffusers for HVP50, HVP90 and HVP100 air handlers.

	HVP50		HVP90		HVP100		
Outlets per zone	2 Zone	3 Zone	2 Zone	3 Zone	2 Zone	3 Zone	4 Zone
Minimum	6	4	8	6	12	8	6
Maximum	9	6	10	7	14	10	8

Table 2 – Zoning outlet recommendations

NOTE: Ensure enough outlets are installed and adequate air flow is available to extract the maximum DX cooling capacity of the condenser. Adjust the damper partial open position to achieve proper airflow when all zones are not active or add additional outlets, consult factory.

OUTLET LOCATIONS

- Not necessary to locate above/below windows.
- Can be located on interior walls although exterior wall locations provide for best comfort.
- High velocity airstream combines conditioned and room air together via the venturi effect for good air mix avoiding stratification.
- Try to locate outlets in low traffic areas.
- Distance centre of outlet approximately 8in from walls or ceilings.
- Do not locate outlets near obstructions or under furniture to allow free air flow.
- In problem areas such as kitchens and bathrooms, outlets can be located in the kick space or walls – outlets can be trimmed to fit.
- Do not place outlets where occupants will feel a draft.

TRUNK DESIGN

Best results are achieved with a balanced layout – 2 story example:

- Horizontal and vertical trunks are 8in diameter.
- Horizontal trunks along the central support beam in the basement at right angles to the joists provide the most direct equidistant route.
- Vertical trunks can be run in closets or furred walls.
- Second floor horizontal duct can be located in the attic with outlets dropping into the upstairs rooms.
- Trunk ducts should be insulated to prevent heat losses/gains.
- Trunks located in unconditioned spaces must be insulated and have a vapour barrier as per local code requirements.
- Beyond 30ft in length, trunk duct sizes can be reduced one size every 10ft. **Refer to table 3.**
- To prevent turbulence effects, do not install saddles or tees within 18in of the Ecosmart supply opening. Elbows may be closer than 18in.
- For dual flow at a tee, maintain a 50/50 split in both right angle branch ducts.
- For single flow at a tee, maintain a 70/30 split; approximately 70% passing straight through, approximately 30% at right angles.

Trunk Size (in)	Maximum Length (ft)	Outlet Quantity
4	20	2
5	30	4
6	50	10
7	60	16
8	70	22

Table 3 – Maximum Trunk length per size

BRANCH DESIGN

- Branch ducts come standard in 10ft lengths and 2.5in internal diameter and should preferably be kept the same length for balanced flow. Instead of cutting, fold excess length in an 'S' shape within the wall/ceiling taking care not to pinch/restrict the flexible material to ensure unimpeded air flow.
- Longer runs will cause a reduction in flow (BTU) – **consult Table 4** for correction factors.

Flex Duct length	10ft	15ft	20ft
Correction Factor	1	0.85	0.80

Table 4 – Branch Length Correction

- To ensure the correct amount of heating/cooling BTU in any given area, utilize the correction factors for longer ducts and add more outlets as necessary.

RETURN DUCT DESIGN

- As per local building codes ensure adequate return air. Mini duct systems should be sized at 0.15in WC compared to 0.10in WC for low velocity standard systems.
- Acoustically line the first 5ft to minimize noise.
- Maximum air return length is 50ft.
- Use a 10-20% larger area grill compared to the area of the return duct to reduce air velocity noise.
- Installing return air grills with dampers will allow for easier balancing of the system.
- Flexible duct when used for a return should be sized larger to take into account the friction of the ridged surface.
- When adding fresh air to the system via an HRV or directly, make sure that it is sized properly to match the system to prevent increases in operating costs.

MISCELLANEOUS NOTES

- Indoor air quality is enhanced by regular changing of air filters and having fresh make-up air.
- Maintaining a relative humidity level of 35 – 45% is optimal.
- Continuous running fan circulates the air for a better environment. The Ecosmart features a half-speed fan option which allows for very quiet operation while maintaining comfort.
- Add some ducts in the basement for air circulation and heating. In the summertime, these basement ducts may be closed to prevent over-cooling.
- Additional branch duct insulation is recommended to maintain a reasonable outlet temperature for hydronic systems running low water temperature.

FLEX DUCT SPECIFICATIONS

Suggested Specification:

The lightweight flexible ducting shall be Fabriflex™ Type 6M supplied by Ecosmart. The core shall be constructed of spun nylon having excellent sound attenuation characteristics and be mechanically bonded to a corrosive resistant outside metal helix. The core shall be factory wrapped with thick fiberglass insulation, sleeved with a Mylar vapor barrier and listed in accordance with UL 181 and classified as 'Class 1 Air Duct' by the manufacturer.

Material Specifications:

Core Material: Spun nylon Polyamid

Thermal Resistance: R4.2

Maximum Rated Velocity: 27.9 m/s (5500 fpm)

Maximum Positive Pressure: 1.5 kPa (6in WC)

Maximum Negative Pressure: 1.25 kPa (5in WC)

Temperature Range: -20°F to +250°F (-29°C to +122°C)

Bend Radius: 1 x diameter

Size: 2.5in ID

Standard Lengths: 5 & 10ft

UL 181 Listing: Class 1 Air Duct

NOTE: This UL Class 1 product as approved by the manufacturer has a flame spread rating of not over 25 without evidence of continued progressive combustion and a smoke developed rating of not over 50.

Performance Specifications:

For 10 FT Flex Duct with Diffuser at Trunk design pressure of 0.8in WC

Pressure drop: 0.0076in WC/ft

CFM: 40

Branch Duct CFM Correction Factors:

Flex Duct Length	10ft	15ft	20ft
Correction Factor	1	0.85	0.80