

Sheet Metal Plenum Design and Installation Instructions

INTRODUCTION

Many Unico System installers use metal duct for the entire main trunk line (plenum). This instruction describes the best method for using metal duct.

DUCT SIZE

There are two types of duct that may be used: rectangular or round. Round duct is used for most systems and is the preferred shape. Rectangular or square duct is used where round duct does not fit, or when the installer wishes to make his own duct. Unico provides plenum adapters for common round and square sizes.

The size of the plenum, as in any duct system, depends on the length of the plenum, airflow rate, and duct layout. Table 1 lists the maximum airflow for various round duct sizes. The maximum airflow is based on a maximum plenum duct of 150 feet (45 m). If longer, increase the size. Normally it is not necessary to decrease the size if shorter. Consult the Duct Layout and Design Manuals (Bulletins 40-30 and 40-40) for more specific information on duct sizing or contact our Design Services for assistance.

For rectangular duct sizes, size the duct for equal friction per the ASHRAE Fundamentals Handbook. If using a tee to split the airflow it is acceptable to reduce the duct size immediately after the tee. Unico has available several reducer tees, part numbers starting with UPC-19.

Note: Each elbow or tee is equivalent to 15 feet (5 m) of straight duct, the first tee being equal to 30 feet (10 m).

INSTALLATION

The metal duct must be designed for 4-inches of water (992 Pa) internal pressure. It can be spiral, seamless, or snap lock. We recommend using sheet metal thickness that is 26 gauge (0.45 mm). The minimum is 28 gauge (0.38 mm) in order to cut the holes for the branch ducts without collapsing the plenum when drilling.

Table 1. Duct Size Limitations

Round Size	Rectangular Equivalent, in. (mm)	Maximum Airflow
7.0 (178)	6-1/2 x 6-1/2 (165 x 165) 6 x 8 (152 x 203) 4 x 12 (102 x 305) 3-1/2 x 14 (89 x 356)	600 CFM (330 L/s)
9.0 (229)	8-1/2 x 8-1/2 (216 x 216) 8 x 10 (203 x 254) 6 x 12 (152 x 305) 4 x 20 (102 x 508) 3-1/2 x 24 (89 x 610)	1000 CFM (472 L/s)
10.0 (254)	9-1/2 x 9-1/2 (240 x 240) 8 x 12 (228 x 305) 6 x 14 (152 x 356) 4 x 24 (102 x 610)	1250 CFM (590 L/s)
11.0 (279)	10-1/2 x 10-1/2 (267 x 267) 10 x 12 (254 x 305) 8 x 14 (203 x 356) 6 x 18 (152 x 457)	1500 CFM (708 L/s)

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 edition of SMACNA *HVAC Duct Construction Standards-Metal and Flexible*, or the latest edition of the ASHRAE *Handbook-HVAC Systems and Equipment*.

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 duct with at least 1.5 inches (38 mm) fiberglass blanket insulation or insulation sleeve. The insulation must include an outer vapor seal. When local codes require a minimum R-factor, it may be necessary to use thicker insulation.

If the 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

If the return duct 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 inches of water (124 Pa) static pressure.