

ICC-ES Report

PMG-1002

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Reissued 08/2018
This report is subject to renewal 08/2019

EVALUATION SUBJECT:

THE UNICO SYSTEM SMALL- DUCT, HIGH-VELOCITY HEATING AND COOLING SYSTEMS

DIVISION:

23 00 00—HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION:

23 31 00—HVAC DUCTS AND CASINGS

Report Holder:

UNICO, INCORPORATED

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ICC-ES PMG Product Certificate

PMG-1002



Effective Date: August 2018

This listing is subject to re-examination in one year.

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CSI: DIVISION: 23 00 00—HEATING, VENTILATING AND AIR CONDITIONING (HVAC)
Section: 23 31 00—HVAC Ducts and Casings

Product certification system:

The ICC-ES product certification system includes testing samples taken from the market or supplier's stock, or a combination of both, to verify compliance with applicable codes and standards. The system also involves factory inspections, and assessment and surveillance of the supplier's quality system.

Product: The Unico System small-duct, high-velocity heating and cooling systems

Listee: Unico, Incorporated
1120 Intagliata Drive
Arnold, Missouri 63010

Compliance with the following codes:

2018, 2015, 2012 and 2009 *International Mechanical Code*® (IMC)
2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
2018, 2015, 2012 *International Energy Conservation Code*® (IECC)
2018, 2015, 2012 and 2009 *Uniform Mechanical Code*® (UMC)*

**Uniform Mechanical Code* is a copyrighted publication of the International Association of Plumbing and Mechanical Officials

Compliance with the following standards:

ICC-ES LC1001-2009 PMG Listing Criteria for Small-Duct, High-Velocity Air Distribution System
UL 181-2013 (11th Edition), Factory Made Air Ducts and Connectors
ASTM D635-2014 Test Method for Rate of Burning and/or Extent and Time of Burning of Self-supporting Plastic in a Horizontal Position
ANSI/AHRI Standard 210/240-2008 with Addendum 2 (approved December 2012), Performance Rating of Unitary Air Conditioning and Air-source Heat Pump Equipment

Identification:

The Unico System must be permanently and legibly marked with the manufacturer's name or trademark, unit information, and the model number. External duct insulation and factory-insulated flexible duct must be legibly printed or identified at intervals of 10 feet (3.0m) or fractions thereof with the name of the manufacturer, the rated air velocity, the rated negative and positive pressure, the thermal resistance *R*-value at the specified installed thickness, and the flame spread and smoke-developed indexes of the composite materials. Duct must be labeled with UL 181 Class 0 or Class 1. The product must also bear the ICC-ES PMG listing mark.

Installation:

All components of the system, including the condensing unit, must comply with and be installed in accordance with the manufacturer's instructions and the applicable codes.

Listings are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the listing or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this listing, or as to any product covered by the listing.

Selection of the outdoor units and or heating devices must be according to the manufacturer's published installation instructions.

Ducts must be sized according to the manufacturer's published sizing tables.

The Unico System is permitted to be installed in buildings of any occupancy and any type of construction. The units must be sized to satisfy the anticipated loads according to the applicable code. The larger trunk duct must be as long as possible to minimize the length of the smaller run-out ducts. The duct system must be designed according to Unico Bulletin 40-40.

The blower provides conditioned air at a high pressure into a 7-, 9-, or 10-inch-diameter main trunk made from rigid Class 0 or Class 1 Air Duct material.

To this trunk duct, either 2-inch or 2¹/₂-inch-diameter, flexible, Class I Air Ducts are attached and lead to diffusers. Typical installations include at least five supply tubes for each ton of cooling. The maximum supply for the 2-inch-diameter duct is 40 cfm per supply line and outlet. The maximum supply for the 2¹/₂-inch-diameter duct is 52 cfm per supply line and outlet. The quantity of conditioned air supplied by each diffuser is dependent on the length of the supply tubing from the main trunk line to the diffuser. To compensate for the smaller duct size, the system fan is rated at a higher static pressure. Systems are sized using Unico Bulletin 40-40. The 2-inch and 2¹/₂-inch-diameter duct is such that it can be installed within a nominally 4-inch cavity wall. In order to supply the required air flow to condition a space, the pressure and velocity are increased by the unit.

Models:

The Unico System small-duct high-velocity heating and cooling system consists of an indoor unit (fan and evaporator coil) with a high-capacity fan, trunk ducts, small-diameter supply ducts and diffusers. The system is designed as a heating and cooling system.

The Unico System Small-Duct high-Velocity heating and cooling system meet the minimum efficiency requirements specified in the International Energy Conservation Code section 403.2.3 when tested and rated in accordance with AHRI 210/240.

Duct models 25 and 26 are of the same air duct material except that the lining of the 25 models is corrugated aluminum and the inner layer of the 26 models is spun bound nylon with a helical wire. Both models are then covered with insulation.

R-value equivalence: To make the *R*-value comparison, the small-diameter Unico ducts are compared to the equivalent amount of insulation on conventional 6-inch-diameter ducts which would produce the same percentage of heat loss. Several factors are significant in this calculation, including the Unico System's greater coil temperature drop, smaller duct diameters (curvature factor) and faster air velocity. Calculations considered unconditioned attics at both 140°F (Table 1) and 120°F (Table 2) with various lengths of ducts.

The indoor unit consists of three modules:

- Blower module
- Cooling coil module
- Heating module

All units contain a blower module, and the other two modules can be installed together or individually for combined cooling and heating; cooling only; or heating only. The unit can be configured for horizontal or vertical air flow.

The blower provides conditioned air at a high pressure into a 7-, 9-, or 10-inch-diameter main trunk made from rigid Class 0 or Class 1 Air Duct material.

The diffusers UPC-56B-XXX are plastic complying with UL standard 94, and satisfy CC2 plastic requirements.

The installation kits UPC-89-XXX include Meta connectors and plastic diffusers.

A condensing unit is not included in the Unico System. The manufacturer's instructions must be used to select the condensing unit.

Conditions of listing:

1. The design and installation of the proprietary air handling unit described above is beyond the scope of this listing.
2. The indoor unit must bear the seal of an accredited third party certification agency showing conformance to ANSI/UL 1995.
3. All components of the system, including the condensing unit, must comply with and be installed in accordance with the applicable code.
4. Ducts must be sized according to the manufacturer’s published sizing tables.
5. This listing is not valid unless group 1A refrigerants are used.
6. The Unico System small-duct, high-velocity heating and cooling systems are manufactured by Unico, Inc. in Arnold, Missouri, under a quality control program with annual surveillance inspections by ICC-ES.

**TABLE 1—UNICO DUCT EQUIVALENT (CALCULATED) R-VALUES^{1,2}
COMPARISON TO CONVENTIONAL 6-INCH DUCT AT 140°F ATTIC TEMPERATURE**

Unico Part Number	Type Core	Duct Diameter (inches)	10 ft Duct Length	15 ft Duct Length	20 ft Duct Length	25 ft Duct Length	30 ft Duct Length
UPC-25	Aluminum	2	4.8	4.2	3.8	3.4	3.1
UPC-25-R4	Aluminum	2	6.2	5.4	4.9	4.4	3.9
UPC-25-R6	Aluminum	2	8.9	7.6	6.8	6.1	5.4
UPC-25-R8	Aluminum	2	11.3	9.6	8.5	7.6	6.7
UPC-26C	Mylar Spiral	2	4.8	4.2	3.8	3.4	3.1
UPC-26C-R4	Mylar Spiral	2	6.2	5.4	4.9	4.4	3.9
UPC-26C-R6	Mylar Spiral	2	8.9	7.6	6.8	6.1	5.4
UPC-26C-R8	Mylar Spiral	2	11.3	9.6	8.5	7.6	6.7
UPC-26D	Mylar Spiral	2	4.8	4.2	3.8	3.4	3.1
UPC-26D-R4	Mylar Spiral	2	6.2	5.4	4.9	4.4	3.9
UPC-225	Aluminum	2.5	6.5	5.6	5.0	4.6	4.2
UPC-225-R4	Aluminum	2.5	8.6	7.4	6.5	5.9	5.4
UPC-225-R6	Aluminum	2.5	12.8	10.8	9.4	8.5	7.8
UPC-225-R8	Aluminum	2.5	16.9	14	12.2	10.9	9.9
UPC-226C	Mylar Spiral	2.5	6.5	5.6	5.0	4.6	4.2
UPC-226C-R4	Mylar Spiral	2.5	8.6	7.4	6.5	5.9	5.4
UPC-226C-R6	Mylar Spiral	2.5	12.8	10.8	9.4	8.5	7.8
UPC-226C-R8	Mylar Spiral	2.5	16.9	14	12.2	10.9	9.9
UPC-226D	Mylar Spiral	2.5	6.5	5.6	5.0	4.6	4.2
UPC-226D-R4	Mylar Spiral	2.5	8.6	7.4	6.5	5.9	5.4

¹R-values shown are for 6-inch duct yielding the same percentage heat gains as Unico ducts for the given lengths.

²Calculations based on the following coil temperature drops: 6-inch duct at 17°F and Unico ducts at 25°F.

**TABLE 2—UNICO DUCT EQUIVALENT (CALCULATED) R-VALUES^{1,2}
COMPARISON TO CONVENTIONAL 6-INCH DUCT AT 120°F ATTIC TEMPERATURE**

Unico Part Number	Type Core	Duct Diameter (inches)	10 ft Duct Length	15 ft Duct Length	20 ft Duct Length	25 ft Duct Length	30 ft Duct Length
UPC-25	Aluminum	2	4.7	4.0	3.7	3.3	3.0
UPC-25-R4	Aluminum	2	6.0	5.2	4.7	4.2	3.8
UPC-25-R6	Aluminum	2	8.5	7.3	6.5	5.8	5.2
UPC-25-R8	Aluminum	2	10.8	9.2	8.1	7.3	6.4
UPC-26C	Mylar Spiral	2	4.7	4.0	3.7	3.3	3.0
UPC-26C-R4	Mylar Spiral	2	6.0	5.2	4.7	4.2	3.8
UPC-26C-R6	Mylar Spiral	2	8.5	7.3	6.5	5.8	5.2
UPC-26C-R8	Mylar Spiral	2	10.8	9.2	8.1	7.3	6.4
UPC-26D	Mylar Spiral	2	4.7	4.0	3.7	3.3	3.0
UPC-26D-R4	Mylar Spiral	2	6.0	5.2	4.7	4.2	3.8
UPC-225	Aluminum	2.5	6.3	5.4	4.7	4.4	4.1
UPC-225-R4	Aluminum	2.5	8.3	7.1	6.3	5.7	5.2
UPC-225-R6	Aluminum	2.5	12.3	10.3	9.0	8.1	7.4
UPC-225-R8	Aluminum	2.5	16.1	13.4	11.7	10.4	9.5
UPC-226C	Mylar Spiral	2.5	6.3	5.4	4.7	4.4	4.1
UPC-226C-R4	Mylar Spiral	2.5	8.3	7.1	6.3	5.7	5.2
UPC-226C-R6	Mylar Spiral	2.5	12.3	10.3	9.0	8.1	7.4
UPC-226C-R8	Mylar Spiral	2.5	16.1	13.4	11.7	10.4	9.5

UPC-226D	Mylar Spiral	2	4.7	4.0	3.7	3.3	3.0
UPC-226D-R4	Mylar Spiral	2	6.0	5.2	4.7	4.2	3.8

¹R-values shown are for 6-inch duct yielding the same percentage heat gains as Unico ducts for the given lengths.

²Calculations based on the following coil temperature drops: 6-inch duct at 17°F and Unico ducts at 25°F.