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AKDUCT® AND AKDUCT® PREMIER

CSI Section:
23 31 00 HVAC Ducts and Casings

1.0 RECOGNITION

AQC Industries AKDUCT® and AKDUCT® Premier recognized in this report has been evaluated for HVAC Duct (IRC only), HVAC underground air duct, resistance to ground water entry, back-filling requirements, surface burning characteristics and R-value equivalence. The following code editions are recognized:

- 2015, 2012 and 2009 Uniform Mechanical Code® (UMC)
- 2015, 2012 and 2009 International Residential Code® (IRC)
- 2015, 2012 and 2009 International Mechanical Code® (IMC)
- 2015 and 2012 International Energy Conservation Code® (IECC)
- 2016 and 2013 California Residential Code, 2016 and 2013 California Mechanical Code, 2016 and 2013 California Energy Code – attached supplement

2.0 LIMITATIONS

The AKDUCT® and AKDUCT® Premier comply with the codes listed in Section 1.0 of this report, subject to the following limitations:

2.1. AKDUCT® Duct and Fittings designs shall be limited to systems with a maximum air temperature of 150°F (66°C) at the discharge of the unit entering the duct system.

2.2 The size of the duct shall be in accordance with IMC Section 603.2, IRC Section M1601.1 or UMC Section 601.2, as applicable.

2.3 AKDUCT® Duct and Fittings may be installed underground or embedded within concrete slabs.

2.4 AKDUCT® Premier Duct and Fittings may be installed as part of an aboveground duct system only under the International Residential Code (as set forth in Section 4.3 of this report.

2.5 AKDUCT® Duct and Fittings shall slope to allow drainage to a point provided with access if installation is more than specified in Sections 2.3 and 3.2.4 of this report.

2.6 Concrete structural designs with an embedded air duct design are beyond the scope of this evaluation report.

2.7 Underground air duct pipes located in flood hazard areas shall be designed and installed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation, in accordance with IMC Section 603.13, IRC Section M1601.3.8, Section 603.6 of the 2015 and 2012 UMC or Section 604.6 of the 2009 UMC, as applicable.

2.8 The duct may be installed at a depth of 4 feet (1219 mm) or more below Base Flood Elevation (BFE), a depth at which it shall slope to serve as a cleanout based on testing per LC1014 Section 4.3.2.

2.9 AKDUCT® Duct and Fittings are produced under a quality control program with inspections by IAPMO R&T.

2.10 AKDUCT® Duct and Fittings shall be balanced in accordance with Section 314.0 of the 2015 UMC and Section 317.0 of the 2012 UMC.

3.0 PRODUCT USE

3.1 General: AKDUCT® and AKDUCT® Premier are recognized for installations above or below ground as noted in Table 1 of this report.

TABLE 1—AKDUCT® AND AKDUCT® PREMIER INSTALLATION LOCATIONS

Code	Recognized Installation Locations		Notes
	Underground AKDUCT®	Above Ground AKDUCT® Premier	
UMC	X	-	Section 3.1.1 of this report.
IRC	X	X	Section M1601.1.1 of the IRC.
IMC	X	-	LC 1014
CMC	X	-	Section 2.3 of this report.

3.1.1 UMC: AKDUCT® Duct and Fittings are recognized for underground use in accordance with, Section 302 of the 2015 UMC, Section 103 of the 2012 UMC, Section 105 of

the 2009 UMC and Section 602.1 of the 2015, 2012 and 2009 UMC as follows: Section 602.1 of the 2015, 2012 and 2009 UMC references the SMACNA "*HVAC Duct Construction Standards Metal and Flexible*." ANSI/SMACNA 006-2006. The commentary section of Chapter 10-2 ANSI/SMACNA 006 recognizes the use of plastic materials for underground air duct. Additional acceptance parameters were satisfied based on testing according to the documents noted in Section 6.0 of this report.

3.1.2 IMC / IRC: AKDUCT® Duct and Fittings are recognized for underground use in accordance with Section 603.8 of the IMC and Section M1601.1.2 of the IRC.

3.1.3 IRC (only): AKDUCT® Premier Duct and Fittings are for above ground use in accordance with Section M1601.1.1 of the IRC.

3.2 Installation

3.2.1 Installation General: AKDUCT® and AKDUCT® Premier Duct and Fittings shall comply with the manufacturer's published installation instructions, this report and the applicable code. In the event of a discrepancy between this report and the installation instructions, the more restrictive assumes governance.

3.2.2 Non-Flanged Sealing Method: Two sections of pipe (or pipe and fitting) shall be placed end to end. The adhesive backing shall be peeled off of a gasket and the gasket is wrapped around the duct. The gasket shall overlap approximately $^1/_4$ inch (6 mm). A clamp shall be placed around the gasket, with the clamp and gasket lined up. The clamp shall be tightened to 25 to 30 pounds then the screw gun/drill is set to match. Clamp ends do not have to meet each other to be airtight.

The temperature shall be between 32°F (0°C) and 120°F (49°C) when installing the clamp and gasket. When above 90°F (32°C), $6^3/_4$-inch (172 mm) x $^1/_4$-inch (6.4 mm) self-tapping sheet metal screws shall be used on each side of the clamp to stop slippage from heat.

3.2.3 Flanged Sealing Method: Two beads of AKDUCT AIRTITE® sealant shall be applied to each flanged end and around the bolt holes. Two sections of pipe (or pipe and fitting) shall be placed end to end. The bolts, nuts and washer shall be installed through the predrilled template holes. Torque setting when ratcheting bolts shall be set between 25 to 30 lbs (111 to 133 N). Bolts shall be tightened until they are flush. The nut and bolt require sealant to cover both ends.

3.2.4 Underground Systems: Installation of AKDUCT® does not require special bedding. Direct burial may be done with onsite compaction fill such as sand, pea gravel, light aggregate or material taken from the trench. The backfill material shall be spread evenly around the duct, making sure there are no gaps. The manufacturer recommends the use of plate tamping equipment. The tamped fill holds the duct in place; thus, no concrete is required to fill in around the duct. AKDUCT® (HDPE) is resistant to any minerals or salt that may be in the backfilled soil. The manufacturer indicates that AKDUCT® normally does not "float" as long as it is backfilled to within 2 inches (50.8 mm) of the top of the duct. The concrete slab is then poured so that all "tie-down" work is eliminated. In case of open site construction and associated rain, the duct system shall be filled with water to about half of the depth of the pipe. After concrete is poured, the water shall be removed at the collection points and the interior of the duct shall be wiped dry with a clean rag.

When backfilling or grading, heavy loads shall not occur directly on the duct, and heavy equipment shall not be run over the duct. The loading of the duct from wet concrete and/or soil above the duct shall be limited so as not to produce deflections greater than 15 percent of the original duct diameter as set forth in Table 1 of this report.

When installing 48 inches (1219 mm) or further below the BFE, the duct shall be installed so as to slope back to a 4-inch (102 mm) x 12-inch (305 mm) or larger register box, a size that is generally considered adequate to serve as a clean out.

The underground ducts shall be placed in or beneath concrete floors or in areas free from vehicle traffic.

4.0 PRODUCT DESCRIPTION

4.1 General: Both AKDUCT® and AKDUCT® Premier and their associated fittings are manufactured from High Density Polyethylene (HDPE), circular in cross section, with the average wall thickness for each diameter as noted in Table 2 of this report. System components are detailed in Table 3 of this report.

4.1.1 AKDUCT® and AKDUCT® Premier Duct and Fittings are designed for use in systems with a maximum rated positive pressure equivalent of 10-inch water column and a maximum rated negative pressure of 2-inch water column.

4.2 AKDUCT® Duct and Fittings: AKDUCT® Duct and Fittings are used to form an underground air duct and fitting system for use in forced-air heating and cooling systems in accordance with Section 302 of the 2015 UMC, 203 of the 2012 UMC, Section 105 of the 2009 UMC 602.1 of the UMC, Section 603.8 of the IMC and IRC Section M1601.1.2 of the IRC, as applicable.

4.3 AKDUCT® Premier Duct and Fittings: AKDUCT® Premier Duct and Fittings are recognized for use in an above ground air duct and fitting system in buildings constructed according to the requirements of IRC Section M1601.1.1.

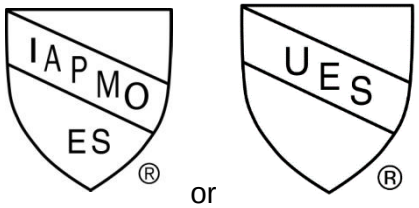
4.3.1 Surface Burning Characteristics: When tested in accordance with UL 723 (ASTM E84), AKDUCT® Premier exhibited a flame spread index of 200 or less in accordance with Section M1601.1.1 of the IRC.

4.4 Flood Plain Elevation: AKDUCT® Duct and Fittings and AKDUCT® Premier Duct and Fittings are recognized for installation at a maximum of 4 feet below the BFE. This recognition is based on successful testing in accordance with Section 4.3.2 of LC1014 at 8 feet (2440 mm) water column pressure (submerged 8 feet (2440 mm) with the test duration extended from the required 24 hours to 7 days with no leakage.

4.5 R-Value Equivalence: When tested in accordance with NSF Protocol P374, AKDUCT® and AKDUCT® Premier, at nominal 10-inch diameters, exhibited thermal performance equivalent to PVC Duct with an external R-10 value insulation in accordance with Section R403.2.1 of the 2012 IECC and LC1014.

5.0 IDENTIFICATION

A label shall be affixed on at least one of the following: product, packaging, installation instructions or descriptive literature. The label shall include the company name or trademark, model number, and the IAPMO Uniform ES Mark of Conformity the name of the inspection agency (when applicable) and the Evaluation Report Number (ER-261) to identify the products recognized in this report. A die-stamp label may also substitute for the label. Either Mark of Conformity may be used as shown below:



or

IAPMO UES ER-261

6.0 SUBSTANTIATING DATA

Data and test reports submitted for this report are from laboratories recognized as being in compliance with ISO/IEC 17025 and are in accordance with ASTM D2412, LC1014 and UL 723**.**

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on AQC Industries AKDUCT® and AKDUCT® Premier to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification.

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For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

TABLE 2— AKDUCT® AND AKDUCT® PREMIER DUCT DIAMETERS, AVERAGE WALL THICKNESS AND LOAD AT 15% DEFLECTON

DUCT DIAMETER (Inches)	AVERAGE WALL THICKNESS (Inches)	LOAD at 15% DEFLECTION AS TESTED (lbs/lineal ft)
6	0.429	205
8	0.507	353
10	0.416	102
12	0.575	117
14	0.700	135
16	0.472	189
18	0.692	208
20	0.460	433
24	0.770	390
30	0.693	300
36	0.850	383
48	0.750	258

For SI: 1 inch=25.4 mm, 1 lb/ft =14.59 N/m.
Load results are based on ASTM 2412 testing without safety factors yielding a 15% deflection based on inside diameter.

TABLE 3— AKDUCT® and AKDUCT® Premier SYSTEM COMPONENTS

ITEM	DESCRIPTION	SIZE(Inches)
ACCESSORIES:20-0027	Foam Trench Block	
ACCESSORIES:20-0030	Damper	
ACCESSORIES:20-0050	Boot Extension	4"x 12"-16"
ACCESSORIES:20-0100A	Air Test Kit	13"
ACCESSORIES:20-0101A	Air Test Kit	8"
ACCESSORIES:20-0200	Boot Reducer	4"x 12" to 2-1/4"x 12"
ACCESSORIES:20-0300	Bolt with 1 nut & 2 washers (pkg of 12)	2-1/2" x 1/4"
ACCESSORIES:20-0711	Airtite Sealant	
BLUE:03-0090	Rubber Gasket for 3"HV	
BLUE:03-2510	Pipe	3"x 8’
BLUE:03-2511	End Cap	3"
BLUE:03-2530	90 Degree Elbow(Long Sweep)	3"
BLUE:03-2531	90 Degree Elbow(Short Sweep)	3"
BLUE:03-2532	45 Degree Elbow	3"
BLUE:03-2533	22.5 Degree Elbow	3"
BLUE:03-2534	Sound Attenuator	3"
BLUE:03-2535	Sound Attenuator Replacement Cartridge	3"

TABLE 3 (CONTINUED)

BLUE:03-2590	Saddle Take Off	3"
BLUE:06-2501	Offset Footer Boot	6"
BLUE:06-2502	90 Degree Boot (4 x 12)	6"
BLUE:06-2510	Pipe	6"x 8'
BLUE:06-2511	End Cap	6"
BLUE:06-2530	90/45 degree Elbow	6"
BLUE:06-2531	22.5 degree Elbow	6"
BLUE:06-2532	15 degree Elbow	6"
BLUE:06-2533	11.25 degree Elbow	6"
BLUE:06-2560	Plenum Adapter with Screws	6"
BLUE:06-2570	Center Saddle-4"x 12" Boot with screws	6"
BLUE:08-2502	90 Degree Boot (4 x 12)	8"
BLUE:08-2510	Pipe	8"x 8’
BLUE:08-2511	End Cap	8"
BLUE:08-2520	Tee	8"
BLUE:08-2525	Tee Reducer	8"x 8"x 8"-6"
BLUE:08-2530	90/45 Elbow	8"
BLUE:08-2531	22.5 degree Elbow	8"
BLUE:08-2532	15 degree Elbow	8"
BLUE:08-2533	11.25 degree Elbow	8"
BLUE:08-2540	Reducer	8"x 6"
BLUE:08-2560	Plenum Adapter with Screws	8"
BLUE:08-2565	Plenum Adapter with 12"piece&End Cap	8"
BLUE:08-2570	Center Saddle-4"x12"Boot with screws	8"
BLUE:10-2510	Pipe	10"x 8'
BLUE:10-2511	End Cap	10"
BLUE:10-2515	Inline Boot (4 x 12)	10"
BLUE:10-2520	Tee	10"
BLUE:10-2530	90/45 degree Elbow	10"
BLUE:10-2531	22.5 degree Elbow	10"
BLUE:10-2532	15 degree Elbow	10"
BLUE:10-2533	11.25 degree Elbow	10"
BLUE:10-2540	Round Reducer	10"x 8"
BLUE:10-2545	Round Reducer	10"x 8"x 6"
BLUE:10-2550	Offset Saddle-4"x 12"Boot with screws Fits 10" pipe	10”
BLUE:10-2560	Plenum Adapter with Screws	10"
BLUE:10-2570	Center Saddle-4 x 12 boot with screws	10"
BLUE:10-2578	Saddle Reducer (with screws) Fits 10"&12"Pipe	10”- 8” x 6”
BLUE:12-2510	Pipe	12"x 8'

TABLE 3 (CONTINUED)

BLUE:12-2511	End Cap	12"
BLUE:12-2520	Tee	12"
BLUE:12-2530	90/45 Degree Elbow	12"
BLUE:12-2531	22.5 degree Elbow	12"
BLUE:12-2532	15 degree Elbow	12"
BLUE:12-2533	11.25 degree Elbow	12"
BLUE:12-2540	Reducer	12"x 10"
BLUE:12-2547	Reducer	12"x10"x 8"x 6"
BLUE:12-2550	Offset Saddle-4 x 12 boot with screws Fits 12", 14",16"&18"Pipe	12”
BLUE:12-2551	Offset Saddle-4"x 24"Boot with screws	12"
BLUE:12-2560	Plenum Adapter with Screws	12"
BLUE:14-2510	Pipe	14"x 8'
BLUE:14-2511	End Cap	14"
BLUE:14-2530	90/45 Degree Elbow	14"
BLUE:14-2531	22.5 degree Elbow	14"
BLUE:14-2532	15 degree Elbow	14"
BLUE:14-2533	11.25 degree Elbow	14"
BLUE:14-2560	Plenum Adapter with Screws	14"
BLUE:14-2575	Wye	14"
BLUE:14-2577	Saddle Reducer-Fits 14", 16" & 18"Pipe	14"x 12"
BLUE:16-2510	Pipe	16"x 8'
BLUE:16-2511	End Cap	16"
BLUE:16-2530	90/45 Degree Elbow	16"
BLUE:16-2531	22.5 degree Elbow	16"
BLUE:16-2532	15 degree Elbow	16"
BLUE:16-2533	11.25 degree Elbow	16"
BLUE:16-2540	Reducer	16"x 14"
BLUE:16-2547	Reducer	16"x 14"x 12"x 10"
BLUE:16-2560	Plenum Adapter with Screws	16"
BLUE:16-2575	Wye	16"
BLUE:16-2577	Saddle Reducer-Round-Fits 16"&18"Pipe	16"x 14"
BLUE:16-3510F	Pipe with Flange	16"x 8'
BLUE:18-2510	Pipe	18"x 8'
BLUE:18-2511	End Cap	18"
BLUE:18-2530	90/45 Degree Elbow	18”
BLUE:18-2531	22.5 degree Elbow	18”
BLUE:18-2532	15 degree Elbow	18”
BLUE:18-2533	11.25 degree Elbow	18”

TABLE 3 (CONTINUED)

BLUE:18-2540	Eccentric Reducer	18"x 16"x14"x 12"
BLUE:18-2560	Plenum Adapter with Screws	18"
BLUE:18-2577	Saddle Reducer-Round	18"x 16"
BLUE:18-3510F	Pipe with Flange	18"x 8'
BLUE:18-3541F	Eccentric Reducer with Flange	18"x 16"
BLUE:20-0010	Plenum	20"x 24"x 36"
BLUE:20-0015	Plenum	25"x 30"x 48"
BLUE:20-0050	Boot Extension	4x12-16"
BLUE:20-0060	Universal Linear Diffuser Adapter	
BLUE:20-0061	Linear Diffuser 49"x 7"x 8"O.D.	48"
BLUE:20-0062	Linear Diffused 37"x 7"x 8"O.D.	36"
BLUE:20-0063	Linear Diffuser 25"x 7"x 8"O.D.	24"
BLUE:20-3510F	Pipe with Flange	20"x 8'
BLUE:20-3530F	90/45 Degree Elbow with Flange	20"
BLUE:20-3531F	22.5 degree Elbow	20"
BLUE:20-3532F	15 degree Elbow	20"
BLUE:20-3533F	11.25 degree Elbow	20"
BLUE:20-3541F	Eccentric Reducer with Flange	20"x 18"
BLUE:20-3542F	Eccentric Reducer	20"x 18"x 16"
BLUE:20-3575F	Tee/Wye	20"
BLUE:24-3510F	Pipe with Flange	24"x 8’
BLUE:24-3530F	90/45 Degree Elbow with Flange	24"
BLUE:24-3531F	22.5 degree Elbow	24"
BLUE:24-3532F	15 degree Elbow	24"
BLUE:24-3533F	11.25 degree Elbow	24"
BLUE:24-3541F	Eccentric Reducer with Flange	24"x 20"
BLUE:24-3575F	Tee/Wye	24"
BLUE:24-3542F	Eccentric Reducer with Flange	24"x 20"x 18"
BLUE:24-3543F	Eccentric Reducer with Flange	24"x 20"x 18"x 16"
BLUE:30-3510F	Pipe with Flange	30"x 8'
BLUE:30-3530F	90/45 Degree Elbow with Flange	30"
BLUE:30-3531F	22.5 degree Elbow	30"
BLUE:30-3532F	15 degree Elbow	30"
BLUE:30-3533F	11.25 degree Elbow	30"
BLUE:30-3575F	Tee/Wye	30"
BLUE:30-3542F	Eccentric Reducer	30"x 24"
BLUE:36-3510F	Pipe with Flange	36"x 8’
BLUE:36-3530F	90/45 Degree Elbow with Flange	36"
BLUE:36-3531F	22.5 degree Elbow	36"

TABLE 3 (CONTINUED)

BLUE:36-3532F	15 degree Elbow	36"
BLUE:36-3533F	11.25 degree Elbow	36"
BLUE:36-3575F	Tee/Wye	36"
BLUE:36-3543F	Eccentric Reducer	36"x 30"x 24"
BLUE:48-3510F	Pipe with Flange	48"x 6’
BLUE:48-3530F	90/45 Degree Elbow with Flange	48"
BLUE:48-3531F	22.5 degree Elbow	48"
BLUE:48-3532F	15 degree Elbow	48"
BLUE:48-3533F	11.25 degree Elbow	48"
BLUE:48-3534F	7.5 degree Elbow	48"
BLUE:48-3575F	Tee/Wye	48"
CLAMPS:03-0080	Stainless Steel Clamp	3"
CLAMPS:06-0080	Clamps &Gasket Set	6"
CLAMPS:08-0080	Clamps &Gasket Set	8"
CLAMPS:10-0080	Clamps &Gasket Set	10"
CLAMPS:12-0081	Clamps &Gasket Set	12"
CLAMPS:14-0081	Clamps &Gasket Set	14"
CLAMPS:16-0081	Clamps &Gasket Set	16"
CLAMPS:16-0100	Steel Clamp	16"
CLAMPS:16-0912	wide W6403 Gasket	12"
CLAMPS:18-0081	Clamps &Gasket Set	18"
CLAMPS:18-0100	SS Clamp	18"
CLAMPS:18-0912	wide W6403 Gasket	12"
CLAMPS:20-0081	Clamps &Gasket Set	20"
CLAMPS:24-0081	Clamps &Gasket Set	24"
CLAMPS:30-0081	Clamps &Gasket Set	30"
CLAMPS:36-0081	Clamps &Gasket Set	36"
CLAMPS:48-0081	Clamps &Gasket Set	48"

For SI: 1 inch=25.4 mm

CALIFORNIA SUPPLEMENT

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AKDUCT® AND AKDUCT® PREMIER

CSI Section: 23 31 00 HVAC Ducts and Casings

1.0 RECOGNITION

The AQC Industries AKDUCT® as evaluated in IAPMO UES Evaluation Report ER-261 is a satisfactory alternative for use in buildings constructed under the following codes and regulations:

- 2016 and 2013 California Residential Code (CRC)
- 2016 and 2013 California Energy Code (CEC)
- 2016 and 2013 California Mechanical Code® (CMC)

2.0 LIMITATIONS

The AQC Industries and AKDUCT® Premier comply with the codes listed in Section 1.0 of this California Supplement, subject to the following limitations:

2.1 AKDUCT® Duct and Fittings installations shall slope to allow drainage to a point provided with access, if installation is more than 48 inches (1219 mm) or further below the Base Flood Elevation (BFE). When necessary, the duct shall have a minimum slope of ⅛ inch per foot to allow drainage to a point provided with access, including back to a 4-inch x 12-inch or larger register box, a size that is generally considered adequate to serve as a clean out.

2.2 Use of the AQC Industries AKDUCT® Duct and Fittings recognized in this report for underground use in accordance with Sections 1.8.1, 602.1 and 1701 of the CMC as follows: Section 602.1 of the 2016 CMC references the SMACNA "*HVAC Duct Construction Standards Metal and Flexible*." ANSI/SMACNA 006-2006 is the same document as SMACNA "*HVAC Duct Construction Standards Metal and Flexible*." In the commentary section of Chapter 10-2 ANSI/SMACNA 006 recognizes the use of plastic materials for underground air duct.

2.3 The size of the duct shall be in accordance with 2016 CMC Section 601.2, as applicable.

2.4 Underground air duct pipes located in flood hazard areas, the ducts shall be designed and installed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation, in accordance with Section 603.9 of the 2016 CMC.

2.5 Flood Plain Elevation: AKDUCT® Duct and Fittings designs are not intended for installation where exposure to ground water or runoff is anticipated, without additional sufficient drain tiles, sumps and pumping systems to be installed to avoid ductwork exposure to hydrostatic pressure.