

BUILDING CODES & COMPLIANCE

A Summary of Air Dispersion Systems (Fabric)

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The combination of architectural design, innovative products and improving construction methods add to the complexity of the respective building codes. The mechanical section defines the foundation for proper design and installation of heating, ventilating and air-conditioning (HVAC) systems.

The purpose of this paper is to provide an overview of the mechanical codes that apply to DuctSox products, including the most recent developments.

Through the development process, DuctSox Corporation has worked with building code organizations to develop a clear understanding of our products and their place within the building codes. For the U.S. market, these organizations have included ETL SEMKO, Underwriters Laboratories (US and Canada), ICBO, BOCA, SBCCI, NES and the International Code Council (ICC).

AIR DISPERSION SYSTEM

To better understand the challenge in development, the first step is to clearly understand the product. A “DuctSox” is basically a stem of air outlets that are integral to a fabric tube. The outlets are strategically sized and positioned within the system to best match the requirements of each application. Descriptively, it’s a large diffuser with an integrated ducting system.

Prior to the publishing of the 2012 International Mechanical Code Supplement, fabric air dispersion systems did not hold a specific place in the ICC model Mechanical Code. To best describe the performance of the product, we worked with the code authorities to adopt the best terminology:

- UL recognizing an air dispersion system as traditional diffusers having a metal ductwork component.
- Air-conditioning and Refrigeration Institute (ARI) defines an air dispersion system as a diffuser assembly (ARI 890-2001).
- ASHRAE states, “Air passages of self-contained systems are not recognized as air ducts.”

Given the sources and the clear void for our products, building code authorities have agreed to label our system an “Air Dispersion System.” As defined by the ICC, “Air Dispersion Systems are:

Any diffuser system designed to, both, convey air within a room, space or area and diffuse air into that space while operating under positive pressure. Systems are commonly constructed of, but not limited to, fabric or plastic film.

ICC's reference to Air Dispersion Systems in the 2007 IMC Supplement:

603.17 Air dispersion systems. Air dispersion systems shall:

- 1. Be installed entirely in exposed locations.*
- 2. Be utilized in systems under positive pressure.*
- 3. Not pass through or penetrate fire-resistant-rated construction.*
- 4. Be listed and labeled in compliance with UL 2518.*

CODE COMPLIANCE TESTING

Initially, UL classified Air Dispersion System to the 25/50 flame spread/smoke generation requirements of NFPA 90A, using a test method identified as NFPA 255. Known commonly as the Steiner Tunnel Test, this test method is also referred to as ASTM E-84 or UL 723. Later, UL developed a category that classifies air distribution devices or air dispersion systems (UL category AJIJ).

Seeking a more comprehensive evaluation, we worked with numerous building code organizations. The most stringent was the International Conference of Building Officials Evaluation Service (ICBO-ES) in 2002. ICBO-ES drafted AC167 to define a set of evaluation criteria to review air dispersion systems. AC167 was publicly reviewed through mailings and through the ICBO-ES public hearing process, and ultimately adopted. ICBO has since joined with the other model building codes to form ICC. ICC ES now maintains AC167.

AC167 includes criterion and evaluations contained within UL181, including (Weight and Air Permeability tests are outside of UL181):

<i>Surface Burning Characteristics</i>	Same criteria as outlined earlier, 25/50 flame spread / smoke generated per UL723.
<i>Weight</i>	Weight of fabric is determined using ASTM D 3776-96, Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.
<i>Air Permeability</i>	Sections of fabric are tested using ASTM D 737-96, Test Method for Air Permeability of Textile Fabrics.
<i>Mold Growth & Humidity</i>	Fabric sample is tested in a closed test chamber, subjected to an atmosphere saturated with water vapor, at room temperature, and under dark conditions for 60 days.
<i>Erosion</i>	General measure of durability of product, as tested products are subjected to 2.5x highest design air velocity, or 5,000 feet per minute. Passing samples show a decrease in loss of macroscopic particles throughout the 4 hour test.
<i>Temperature</i>	High Temperature: Product is tested in an oven where internal temperature of the product is maintained at not less than 265 degrees F and the exterior is maintained at not less than 125 degrees F for 60 days.
	Low Temperature: Product is placed in an environment saturated with water vapor and at room temperature for 48 hrs. Product is then placed in a chamber maintained at 0 degrees F. After 24 hrs of exposure, product is visually examined for indications of deterioration.
<i>Pressure</i>	Product Sample is tested to 2.5x highest design static pressure (3.01" wg), which results in pressure testing at 7.525" wg static pressure.

After AC167 was published, UL added a “second level” UL Classification to the AJJJ Section that further evaluates air dispersion systems to ICC-ES AC167.

To better support the growing market need, UL has initiated “Outline of Investigation” 2518 (UL2518). This standard is their adaptation of the AC167 evaluation. UL 2518 is directly referred to in the 2012 version of the International Mechanical Code (IMC).

CONTINUED COMPLIANCE

In addition to having the product pass the required evaluation criteria, compliance to NFPA-90A and ICC-A-167 and UL 2518 also includes unannounced quarterly inspections at each of our production facilities. For NFPA-90A and UL 2518, inspections include review of inventory certification, and pulling random fabric samples to confirm compliance. ICC AC-167 adds a thorough audit of the quality inspection program, review of the inspection reports on weight, permeability, fabric strength and observe testing of random samples.

ONLINE VERIFICATION

While there are growing numbers of providers, to help ensure you are getting a compliant product, Underwriters Laboratories lists companies providing classified products. The most current version of this list can be found at:

*<http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.html>
Search “Category Code” = AJJJ*

What to look for:

- Only UL Classified companies are included.
- UL Classified is generic, covers two classification levels
 - Level 1: Classified to NFPA-90A*
 - Level 2: Classified to ICC AC-167 and UL 2518*
- UL Classification identifies company, not compliant product.
Classified products may be listed upon request of company. To ensure clarity of compliance level, DuctSox Corp. lists all compliance products by classification level.
- UL Classified products must include the UL label and corresponding file number on the product.

To locate your UL regulatory service agent, please go to www.ul.com/auth/regcon.cfm

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