

WHITE PAPER

# Code Adoption

Understanding ever-changing building codes as they are adopted at the state and local level is paramount to building safety.

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# Using Industry Standards to Build Safety and Quality into Materials

## Armacell ArmaFlex Ultra: UL Classified Elastomeric Insulation Products

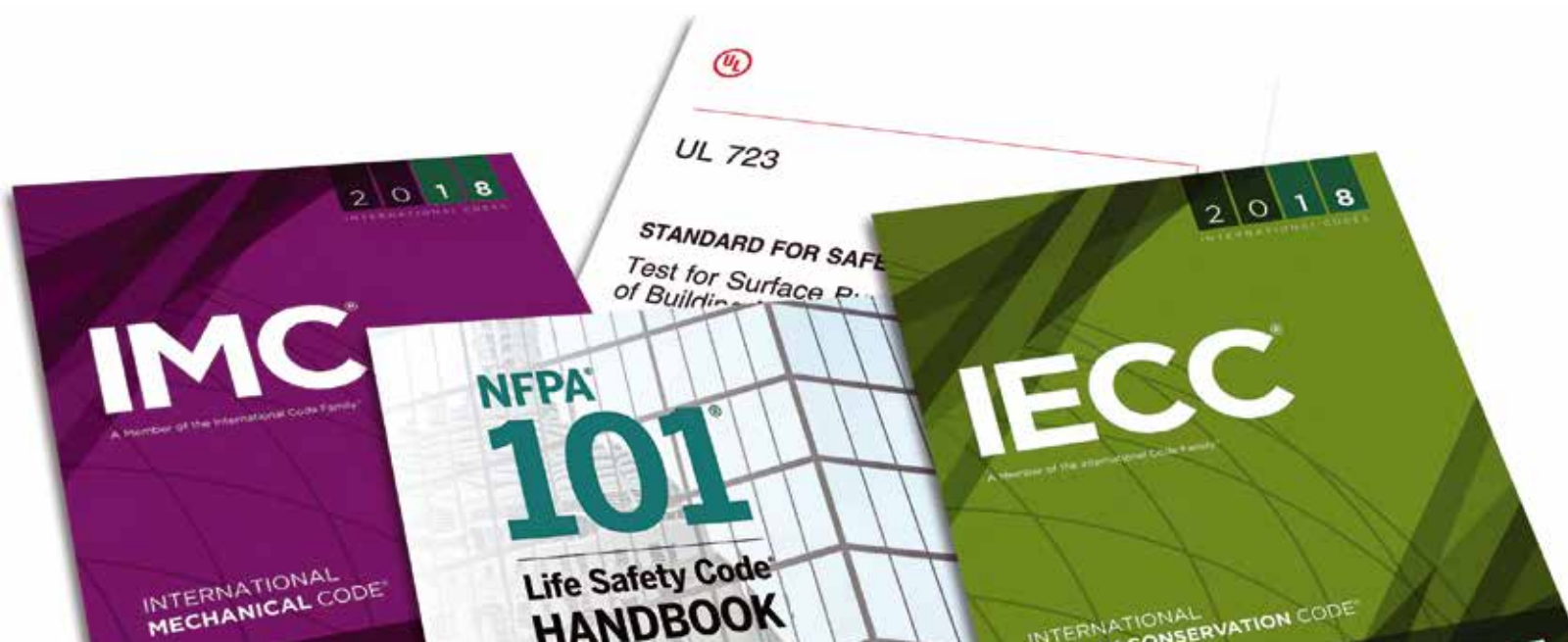
### Background

Safety standards and their related testing procedures are developed for buildings and their associated systems and components to ensure adherence to minimum requirements to reduce risk and injury. There are several organizations, such as The International Code Council (ICC) and ASHRAE, that develop model building codes and performance standards from both expert and public input. Every state then adopts a model code and corresponding standards, with or without amendments, to be enforced through local code enforcement officials. Typically, state adoptions and local enforcement lag behind the model codes releases by 3 – 9 years giving manufacturers, engineers, contractors and oversight agencies time to ensure products, designs, and industry training are properly in place and available.

Within the International Code Council (ICC) model codes, requirements for mechanical insulation products are contained in the International Mechanical Code (IMC) and International Energy

Conservation Code (IECC). Current versions of these codes **require** not only achievement of specific flame and smoke ratings according to ASTM E84 or UL 723 but **also** third-party certification of the ratings by an Occupational Safety and Health Administration (OSHA)-approved Nationally Recognized Test Laboratory (NRTL) that also administers follow-up audits and testing when materials are installed within an air duct or plenum.

Prior to the 2012 versions, the IMC and IECC model codes did not require third-party certification to ASTM E84 or UL 723 for air duct or plenum installations. Therefore, manufacturers of elastomeric insulation have not historically undergone third-party certification. These products were instead tested to ASTM E84 or UL 723 by accredited labs but not certified by an outside agency with follow up testing and audits. At Armacell, we opted to go the extra step and develop new elastomeric products that would stand up to the rigorous testing, auditing, and safety standards of UL, the largest and most recognized third-party safety and certification organization in the world.





**STANDARDS ORGANIZATIONS INCLUDE:**

- Underwriters Laboratory (UL)
- National Fire Protection Agency (NFPA)
- ASTM International
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- American National Standards Institute (ANSI)
- International Organization for Standardization (ISO)

## Standards

Technical standards play an important role in ensuring the safety and intended performance for a wide range of products, materials, systems, and services spanning multiple industries. For tangible products and systems, these published standards outline the testing procedure to determine that the product meets the specifications for intended use and complies with recognized safety requirements.

Regarding mechanical insulation, because it is installed on and in plenums where fire and smoke can spread quickly, flammability and smoke are of particular concern. Therefore, all model codes, municipal laws, and regulations set strict limits on the flammability and smoke potential of these materials and require testing and ratings to either UL 723 or ASTM E84 before they can be installed. Both standards fully define how to test and determine a material's flame spread index and smoke developed index by comparing the burning and smoke characteristics of the product to established standard materials.

The test methods outlined in UL 723 and ASTM E84 use the Steiner Tunnel (shown below) to evaluate the surface burning characteristics of building products – how far and fast flames spread across the surface and how much smoke is produced. The sample (measuring

approximately 20" wide and 24' long) is mounted to the roof of the tunnel and exposed to a gas flame at one end. The distance the flame travels and amount of smoke developed are measured during the 10-minute test. These values are converted to a flame spread index and smoke developed index and reported as a combined rating (e.g., 25/50 = flame spread index of 25 and smoke developed index of 50) with lower values indicating better flame spread and smoke developed performance. Most building material requirements are expressed as a "Class" with flame and smoke indices ranges for each class defined in the standards. Because of the increased fire and smoke risk of materials installed in plenums, they have a more stringent 25/50 requirement that is not listed in the class system.

### Typical Class Ratings

Class	Flame Spread	Smoke Developed
Class A	0-25	0 - 450
Class B	26 - 75	0 - 450
Class C	76 - 200	0 - 450

Flame and smoke classifications listed in ASTM E84 and UL 723.

The mounting of the insulation material influences the results; therefore, the standards specify that insulation products must be mounted according to ASTM E2231, which clearly describes how different types of insulation products must be mounted to obtain valid flame spread and smoke developed indices. At the same time, the installation of the material during the test must be representative of how it will actually be installed. For example, if an insulation product is going to be installed with a facer used as protective covering or vapor retarder, it must be tested with the facer installed as it will be in the building, or if the insulation will be applied in multiple layers to achieve 3" thickness on a duct, the insulation must also be layered during the test.



## Testing Choices

Codes do not always require third-party certification to determine compliance to the relevant safety standard, but as an objective product evaluation, third-party review and testing demonstrate an ongoing commitment to safety and quality. OSHA approves laboratories as NRTL's and publicly maintains the list of approved NRTL's on their website.

According to 29 CFR 1910.7, to become an NRTL, an organization must:

1. Have the appropriate capability to test, evaluate, and approve products to assure their safe use in the workplace;
2. Be completely independent of the manufacturers, vendors, and users of the products for which OSHA requires certification;
3. Have internal programs that ensure proper control of the testing and certification process; and
4. Establish effective reporting and complaint handling procedures



While some NRTL's focus specifically on a limited number of standards, others support a comprehensive list. Intertek Testing Services and UL are the best known of the list, both

**“A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL)  
IS A PRIVATE-SECTOR ORGANIZATION THAT OSHA HAS  
RECOGNIZED AS MEETING THE LEGAL REQUIREMENTS IN 29  
CFR 1910.7 TO PERFORM TESTING AND CERTIFICATION OF  
PRODUCTS USING CONSENSUS-BASED TEST STANDARDS.”**

[https://www.osha.gov/dts/otpca/nrtl/nrtl\\_faq.html](https://www.osha.gov/dts/otpca/nrtl/nrtl_faq.html)

of which cover an extensive list of standards and global locations. UL has also gone further and earned the distinction of being the only organization to develop and maintain widely accepted industry safety standards as well as be an OSHA-approved NRTL, with a global network of UL testing labs.

## Listed and Labeled

According to IMC, a “listed” product included in an NRTL's published product directory indicates that it meets the appropriate designated standards or has been tested and found suitable for a specific purpose. To maintain listed and labeled status, follow-up testing and audits are required to ensure continued compliance with the standards or specified use. When a product is “labeled”, it has the label, symbol, or other identifying mark of the NRTL that has certified the product's compliance with the appropriate standards or performance. The label/listing mark is the most visible and reliable confirmation that the product complies with the applicable standard which will be listed alongside the mark on the product or product packaging. Identifying the applicable standard is important because a product may be listed but to a different standard or requirement than its planned use on a project. If in doubt whether a product is listed for the intended application or standard, one should consult the listing organization's certification directory which, in most cases, can be found on their website.

Under UL, the listed and labeled designation is facilitated by the terms “UL Listed” and “UL Classified.” A UL listed



Examples of certification marks used by the CSA Group Testing and Certification Inc., Underwriters Laboratories Inc., and Intertek Testing Services NA Inc. (ITSNA), respectively

product has been tested under a suite of individual tests that may form a Standard or define a product for use in a specific application. UL Classified products have been evaluated for particular properties, hazards, or use-case, under one test. A UL Classified product enrolled in the UL Follow-up Services Program which also displays the correct UL Classified labeling, is an example of “listed” and “labeled” as defined by IMC.

## Elastomeric Insulation

Elastomeric Insulation is a lightweight product that can be easily manipulated and is typically used in residential, commercial, and industrial settings to save energy and prevent condensation on below ambient piping, ducts, and equipment. It is often used to insulate chillers, chilled water pipes, air handlers, HVAC piping, HVAC ducts, VRV and VRF piping, refrigeration units, and hot and cold water supplies. It typically features high resistance to water absorption and water vapor permeation, which minimizes moisture-related threats (e.g., mold, CUI) and ensures stable thermal performance over the material’s lifetime.

Because elastomeric insulation is used for ducts and pipes, the following codes apply which highlight the requirement for listing and labeling:

### INTERNATIONAL MECHANICAL CODE – DUCT INSULATION

#### IMC 604.3 Coverings and Linings

Coverings and linings, including adhesives where used, shall have a **flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E 84 or UL 723**, using the specimen preparation and mounting procedures of ASTM E 2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C).

**Coverings and linings shall be listed and labeled.**

### INTERNATIONAL MECHANICAL CODE – PIPE INSULATION

#### 1204.1 Insulation characteristics

Pipe insulation installed in buildings shall conform to the requirements of the International Energy Conservation Code; shall be tested in accordance with ASTM E 84 or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231; **and shall have a maximum flame spread**

**index of 25 and a smoke-developed index not exceeding 450.** Insulation installed in an air plenum shall comply with Section 602.2.1.

#### 602.2.1 Materials within plenums

Except as required by Sections 602.2.1.1 through 602.2.1.7, materials within plenums shall be noncombustible or **shall be listed and labeled** as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

### Armacell’s ArmaFlex® Ultra Materials

At Armacell, we develop safe and innovative thermal, acoustic, and mechanical solutions and are a leading provider of engineered foams – including elastomeric. We have an ongoing commitment to safety goals and objectives, going above and beyond existing standards and compliance. As such, we have developed a new innovative flexible, elastomeric insulation product line: ArmaFlex® Ultra. ArmaFlex Ultra uses FlameDefense™ technology and provides a 25/50 flame and smoke rating for plenum applications.



In order to prove our commitment to safety and quality and to adhere to building codes, we submitted these products to UL for UL 723 evaluation where they were tested and proven to have 100% consistent and code-compliant results, earning them the UL Classified mark with a rating of 25/50.

This makes ArmaFlex Ultra the **first** elastomeric insulation in the industry to receive this certification. These third-party certifications demonstrate our commitment to first-class safety and performance of our materials as verified by UL; a safety organization at its core.

**How can you be sure it's classified? The UL Classified mark will be on the carton label and/or printed on every piece of insulation that comes out of the factory.**



ArmaFlex Ultra products are available in tubes, sheets, rolls and tape. The UL flame and smoke classification makes these products compliant to current building code requirements, and they will continue to be audited and tested regularly, assuring you that they will **remain** compliant. Even better, UL's time-tested and industry-proven relationships with regulatory authorities, manufacturers, insurers, retailers, and others in the safety community around the world, means that our materials will be scrutinized to the most current and accepted standards.

### Who is affected and what should be done?

Across the industry, it is important to know what to look for when determining which materials, products, and systems to use to ensure that you are using the highest quality and safest option.

#### Engineers and other Specifiers

As a specifying engineer, you are ultimately responsible for ensuring the products specified and approved for a project are in compliance with the governing building codes or standards. The building codes in a majority of jurisdictions throughout the country now not only require that insulation installed on or in a duct or air plenum must have a maximum flame spread index of 25 and a maximum smoke index of 50 according to UL 723 or ASTM E84, **but also that the insulation be listed with an NRTL who verifies these ratings and performs follow up testing.** Therefore, since ArmaFlex Ultra is the **only** closed-cell, flexible insulation with a 25/50 rating Classified by UL to UL 723, ArmaFlex Ultra can be specified for ducts or pipes in a plenum space or anywhere else where a 25/50 rating is specified.

As such, review your specifications and update **ALL** to specify ArmaFlex Ultra or a flexible, elastomeric insulation with a 25/50 rating certified by an NRTL, such as UL. In addition, verify that the flame and smoke ratings for insulation materials submitted for a project are indeed certified by an NRTL and meet the requirements for the specific application by looking up the product in the NRTL's certification directory.

#### Distributors

Contractors expect distributors to stock products that are compliant to local building codes and regulations. Since the building code in your region likely already requires, or will

in the near future, insulation installed in a plenum to have a 25/50 flame and smoke rating that is tested and certified by an NRTL, be sure to have adequate stock of 25/50 rated products that are listed with an NRTL. For elastomeric insulation, this means ArmaFlex Ultra since it is the first and only flexible insulation with a 25/50 rating Classified by UL to UL 723.

#### Building Owners

As a building owner, you have the obligation to make your building safe in order to protect your investment, yourself, and your tenants. Make it clear to your building engineer, and contractor, that any materials not meeting or exceeding local building codes and safety standards should not be used. You will not likely choose every product that goes into the construction of your building, but having your specifiers fully understand your commitment to using products listed with 3rd party labs for performance in the intended application will facilitate the safety and longevity of your investment.



### Summary

The model building codes from the ICC have long required that all insulation installed on a duct or anywhere within a plenum have a flame spread index of 25 and a smoke developed index of 50 when tested to ASTM E84 or UL 723. Starting in 2012 and continuing through current versions, the ICC model building codes tightened the requirement by adding that the flame and smoke ratings must be listed and labeled with an NRTL. Now that a majority of jurisdictions have adopted the 2012 codes or beyond, it is critical to only specify and install insulation materials on a duct or in a plenum that meet the listing requirement. ArmaFlex Ultra is an elastomeric insulation product consistently achieving a 25/50 rating certified with an NRTL and, as a result, is compliant to the current model building code requirements for insulation on a duct or in a plenum. When you choose ArmaFlex Ultra, be assured that it has been proven safe and compliant by UL, the globally recognized leader in product certification and safety. ■



All data and technical information are based on results achieved under the specific conditions defined according to the testing standards referenced. It is the customer's responsibility to verify if the product is suitable for the intended application. The responsibility for professional and correct installation and compliance with relevant building regulations lies with the customer. Armacell takes every precaution to ensure the accuracy of the data provided in this document and all statements, technical information and recommendations contained within are believed to be correct at the time of publication. By ordering/receiving product you accept the **Armacell General Terms and Conditions of Sale** applicable in the region. Please request a copy if you have not received these.

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## ABOUT ARMACELL

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As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With 3,000 employees and 24 production plants in 16 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.



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