

New Cable Tie “Type” Classifications

UL 62275 United States
 CSA C22.2 No. 62275 Canada
 NMX-J-623-ANCE Mexico

CABLE TIES FOR ELECTRICAL INSTALLATIONS

Technically Equivalent to IEC 62275

All cable ties are not created equal !!! With an increasing number of global sources for cable ties and their accessories, and the seemingly limitless uses for them, NEMA supports a global approach to the selection and specification of cable ties for electrical installations. That’s why NEMA members invested directly in the development of a new international standard, IEC 62275, *Cable ties for electrical installations*, and that’s why they have supported its adoption throughout North America.

IEC 62275, Edition 1 was published in 2006. North American harmonized standard UL 62275 (U.S.) / CSA C22.2 No. 62275 (Canada) / NMX-J-623-ANCE (Mexico) *Cable ties for electrical installations*, was published February 26, 2010¹.

Products conforming to this new standard will be identified by new “Type” classifications and standard performance ratings declared by the manufacturer and confirmed by the tests in the standard. We’re confident that cable ties produced by NEMA member manufacturers will lead on this new global platform.

The Type Classification of a cable tie and its accessories is declared by the manufacturer and confirmed through performance tests. When the official mark of a third-party certification organization is shown in association with a Type Classification and declared Performance Ratings that mark attests (certifies) to the manufacturer’s declarations.

The standard “Type” Classification is based on the demonstrated ability of the product to retain its mechanical performance both before and after exposure to various application conditions.

Like most fasteners, the principal measure of performance for a cable tie is its mechanical strength. However, unlike many other types of fasteners, cable ties serve a very wide variety of fastening functions in many diverse application environments. Depending on the application of the product, mechanical strength may not always be the most critical performance characteristic.

While the Type classification and performance ratings described in the following sections are addressed in standards for “cable ties for electrical installations” these classifications and ratings are applicable to many non-electrical applications for cable ties and their accessories as well.

The following pages provide details on the new Type classifications and standard performance ratings that will greatly simplify selection and specification of cable ties and their accessories.

¹ Cable tie requirements in current bi-national standard UL 1565 / CSA C22.2 No.18.5, *Positioning Devices*, will be retired in February, 2013.

Standard TYPE Classifications - What are they? Where are they referenced?

Previous standards for cable ties either treated performance of all products the same or they depended upon obscure distinctions that were seldom uniformly understood in the market by specifiers and the ultimate users of the products. The earliest standards considered cable ties in limited applications as components in manufactured equipment, never envisioning the multitude of uses where they are now specified and depended upon often for critical safety purposes. It's little wonder why over time, the value perception of these highly engineered products may have slipped.

The standard Type Classifications in the latest standards are based on the demonstrated ability of the product to retain its declared mechanical performance both before and after exposure to conditions expected in normal use.

The IEC 62275 standard, on which the new North American harmonized standard is based, contains the two basic Type Classifications: **Type 1** and **Type 2**.

UL 62275 and CSA C22.2 No. 62275 contain the same two basic Type 1 and Type 2 Classifications. Additionally, **Type 11** and **Type 21** are introduced in these standards indicating that the product is produced from polymer materials that themselves are subject to separate and ongoing conformity assessment².

Type classifications **Type 2S** and **Type 21S** indicate that cable ties and their fixing devices above specific performance ratings* are generally suitable for support of flexible conduit and cables in building construction in accordance with the requirements in relevant national electrical installation Codes.

Standard Type Classifications – Where Recognized

IEC 62275	UL 62275 / CSA C22.2 No. 62275 (U.S. / Canada)	NMX-J-623-ANCE (Mexico)
Type 1 Type 2	Type 1 Type 11 Type 2 Type 21 Type 2S* Type 21S*	Type 1 Type 2 Type 2S*

*Loop tensile strength classification for cable ties (mechanical strength for fixing devices) at or greater than 220N (23 kg)(50 lbs).

Importantly, the numbers associated with the Type Classifications (1, 2...etc) alone are not intended as a hierarchy for comparison of one product to another. Rather, the Type Classifications and Performance Ratings together provide an objective basis for selecting the right cable tie product for each application, considering the relative importance of specification for the application on the spectrum from light use (convenience) to highly technical.

More about Type 11 and Type 21 Classifications

North American markets have a much longer history with standards for cable ties and their accessories than the rest of the world. In Canada and the United States, the end product standards are complemented by separate standards, third-party certification, and ongoing conformity schemes for polymer materials used to mold or extrude the cable ties and their accessories. When these pre-qualified materials are used in the manufacture of cable ties and their accessories, NEMA cable tie manufacturers are convinced that value is added in the form of increased dependability over the life of the installation when all appropriate performance ratings for the end use application are taken into consideration. At the present time, Mexican standards do not exist for a polymer material certification program and Mexico does not officially recognize the programs in Canada and the U.S. Therefore, Type 11 and Type 21 are not recognized in the NMX-J-623-ANCE standard in Mexico.

² For a description of the Component Plastic Materials Certification Program offered by Underwriter's Laboratories Inc. visit www.UL.com/plastics

Standard TYPE Classifications - What do they mean?

The Type Classification of a cable tie and its accessories is declared by the manufacturer and confirmed through performance tests according to the standard. When the official mark of a third-party certification organization is shown in association with the declared Type Classification and declared Performance Ratings that mark attests (certifies) to the manufacturer’s

declarations.

The test conditions include required exposures for all products based on the specific declared performance ratings (i.e. installation and operating temperatures) and exposures based on optional application declarations by the manufacturer (i.e. Resistant to Ultraviolet light).

Standard TYPE Classifications – Meaning and Where Applicable

<p>TYPE 1 (Nonmetallic and Composite Cable ties)</p>	<p>Retains at least 50 percent of declared loop tensile strength after all test conditions</p>
<p>TYPE 11 (Nonmetallic and Composite Cable ties)</p>	<p>Type 1 with additional pre-qualification to long-term performance characteristics of nonmetallic molding materials.</p>
<p>TYPE 2 (Metallic, Nonmetallic and Composite Cable ties and ALL Cable tie Fixing Devices)</p>	<p>Retains 100 percent declared loop tensile strength, or mechanical strength for fixing device, after all test conditions</p>
<p>TYPE 21 (Nonmetallic and Composite Cable ties and Cable tie Fixing Devices)</p>	<p>Type 2 with additional pre-qualification to long-term performance characteristics of nonmetallic molding materials.</p>
<p>TYPE 2S and TYPE 21S (Metallic (2S only), Nonmetallic and Composite Cable ties and ALL Cable tie Fixing Devices)</p>	<p>Type 2 or Type 21 with additional qualification for suitability to support flexible conduit and cables in building construction in accordance with the requirements in relevant national installation Codes.</p>

The mechanical performance characteristic “loop tensile strength” for cable ties is defined in the next section “Standard Performance Ratings”. This term does not apply to cable tie accessories such as fixing devices.



New Cable Tie “Type” Classifications

Standard Performance Ratings

Like most fasteners, the principal measure of performance for a cable tie is its mechanical strength. However, unlike many other types of fasteners, cable ties serve a very wide variety of fastening functions in many diverse application environments. Depending on the application of the product, mechanical strength may not always be the most critical performance characteristic.

Terms associated with some of the following performance ratings for cable ties may not be fully understood, even though they have been commonly used over the years in manufacturer’s literature and previous standards for cable ties. The meaning of each term or measure of performance is explained in each of the following performance rating categories.

Present standards for cable ties and their accessories address the most common considerations affecting the products in their intended use. Since some performance ratings, most noticeably mechanical properties, can be affected by one or more other influences, such as temperature, time, environmental influences, etc., performance tests either combine these influences in a testing sequence or in separate tests to ensure that each critical condition is evaluated.

Declared Performance Ratings

The standards for cable ties and their accessories define the terms and measure of performance in each Performance Rating Category (Classification). While in some cases, a scale of optional ratings is provided based on historical use, manufacturers have the option to declare the rating of their product from this scale or declare a rating that is either lower than the range provided or higher. This declared value is the basis for how the product is tested to confirm the declared rating.

Performance Rating Categories (Classification)

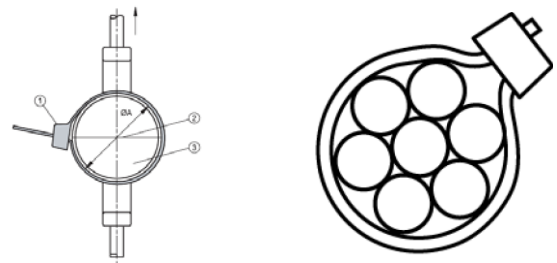
- Mechanical
- Thermal
- Environmental
- Fire Effects

Mechanical Performance Ratings

The mechanical performance rating for cable ties is expressed in terms of “minimum loop tensile strength” defined as:

“Minimum Loop Tensile Strength”
 - a reference mechanical characteristic of a cable tie with its locking mechanism engaged

As addressed in the standard, loop tensile strength does not provide a reliable indication of long-term static load-bearing capabilities. The loop tensile strength test on cable ties exert the force from the inside out more or less equally with an attempt to stress the locking mechanism.



The loop tensile strength tests conducted on **Type 2** and **Type 21** cable ties include a maximum slippage restriction as well as zero allowance for variation from the declared loop tensile strength even after being subjected to conditions representing the declared ratings for thermal and environmental elements representative of anticipated applications. Cable ties constructed completely of metallic materials are also subjected to vibration.



APPLICATION CONSIDERATIONS:

Mechanical Properties

The application guide is intended to describe the mechanical properties most often considered in the design and selection process of cable ties and their accessories. It is not intended to provide the design engineer with a complete and accurate means to verify mechanical characteristics of individual cable tie products. The designer should consult the manufacturer's literature for detailed information on the mechanical properties of individual cable tie products. The designer should also consult the manufacturer's literature for information on the mechanical properties of individual cable tie products. The designer should also consult the manufacturer's literature for information on the mechanical properties of individual cable tie products. The designer should also consult the manufacturer's literature for information on the mechanical properties of individual cable tie products.

Additional information on the range of mechanical considerations for cable ties can be obtained from NEMA [Application Guide #6](#).

Free download at: www.NEMA.org/prod/be/cable-ties

New Cable Tie “Type” Classifications

Thermal Performance Ratings

The temperature, or range of temperatures to which a cable tie and its accessories may be exposed after installation is an important factor to be considered when assessing the right cable tie for a particular application.

The thermal performance ratings declared according to standards UL 62275, CSA C22.2 No.62275, NMX-J-623-ANCE and IEC 62275 include:

- Maximum Operating Temperature for Application
- Minimum Operating Temperature for Application
- Minimum Temperature for Installation



The declared **Maximum Operating Temperature for Application**^{(1) (2)} is the maximum continuous temperature at which a cable tie or its accessory is expected to continuously operate in normal use. This should also be considered the peak operating temperature the product should be exposed to where the temperature of the application environment is subject to change. The table below indicates the most common declared maximum operating temperatures for cable ties and associated fixing devices. Other values may also be declared. The North American harmonized standard specifies that cable ties and their accessories that are completely constructed of metallic materials are rated as follows: Aluminum, 150° C and steel, 300° C.

Maximum Operating Temperature for Application °C	Minimum Operating Temperature for Application °C
50	0
60	- 5
85	- 15
105	- 25
120	- 40
150	- 60

The maximum operating temperature declared by the manufacturer for cable ties and their accessories classified as Type 11, Type 21 or Type 21S is not permitted to exceed that of the polymeric material (RTI-Strength) predetermined under independent testing.

The declared **Minimum Operating Temperature for Application**^{(2) (3)} is the minimum continuous temperature at which a cable tie or its accessory is expected to continuously operate in normal use. This should also be considered the lowest operating temperature the product should be exposed to where the temperature of the application environment is subject to change. The table below indicates the most common declared maximum operating temperatures for cable ties and associated fixing devices. Other values may also be declared.



The declared **Minimum Installation Temperature**⁽⁴⁾ is the minimum temperature at which a cable tie can be assembled during installation. This temperature need only be identified if declared below 0° C.

“Methods of Test for Compliance”

- (1) Aging samples at 15 °C above declared maximum operating temperature for 1000 hours followed by tensile testing according to declared Type classification.
- (2) Cycling samples several times over an extended period from their maximum to their minimum declared temperatures for application. This conditioning is followed by the appropriate tensile testing. The cycles for Types 2, 2S, 21 and 21S are longer in duration and include elements of high humidity exposure.
- (3) Samples are subjected to an impact test after exposure to minimum declared temperature.
- (4) Physical assembly at the declared lowest temperature.



Additional information on temperature considerations for cable ties can be obtained from NEMA [Application Guide #4](#)
Free download at: www.NEMA.org/prod/be/cable-ties

New Cable Tie “Type” Classifications

Fire Effects Performance Ratings

Flammability



In particular, in electrical installations where arcs and sparks might ignite combustible materials, a minimum degree of resistance to flammability for nonmetallic materials is expected. In the UL 62275, CSA C22.2 No. 62275, NMX-J-623-ANCE and IEC 62275 standards the requirements fall under “Contribution to Fire”. IEC 62275 contains classification options “Flame Propagating” and “Non-Flame Propagating”. The harmonized North American standards require all cable ties and their accessories to be classified “Non-flame Propagating”.

In the United States and Canada, nonmetallic and composite cable ties classified as Type 11, Type 21 or Type 21S and accessories classified as Type 21 or Type 21S are constructed from polymer materials having a flammability rating that has been separately determined by independent testing ⁽¹⁾. A minimum flame rating of “HB” is required.

Products of all metallic construction are inherently “Non-Flame Propagating”.

“Methods of Test for Compliance”

Type 1 and Type 2 Products ⁽¹⁾: Needle flame test according to IEC 60695-11-5.

Type 11, Type 21, Type 21S Products: Minimum “HB” according to IEC 60695-11-10, UL 94 or CSA C22.2 No. 0.17.

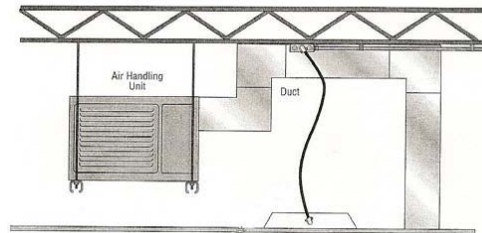
Smoke and Heat Effects



In the United States and Canada, nonmetallic materials installed in areas used for the exchange of environmental air (air-handling plenums) are required to be classified as such. UL 62275 and CSA C22.2 No. 62275 include a Smoke and Heat Release Test which results in a specific minimum index of characteristics. This index is in line with the requirements in national mechanical installation codes.

Standard Heat and Smoke Index

- The peak heat release rate shall be ≤ 100 kW
- The peak normalized optical density shall be ≤ 0.5
- The average normalized optical density shall be ≤ 0.15



APPLICATION ENVIRONMENT
Air-Handling Spaces (Air Plenums)

It is a common practice to install cable ties in air-handling spaces. The primary concern is the fire safety of the cable ties. The cable ties should be made of non-combustible materials and should be able to withstand the high temperatures of a fire. The cable ties should also be able to withstand the mechanical stresses of the fire.



PHYSICAL PROPERTIES
Flammability and Fire Effects

During the physical properties of nonmetallic materials used in modern wiring systems and their accessories, flammability characteristics are extensively measured. The flammability of nonmetallic materials, including those used in cable ties and their associated wiring systems, have been tested, measured and compared to determine safe levels of use. There is a primary consideration in some applications for a better understanding of other fire related effects (e.g., smoke, toxic gases, etc.) associated with the use of these materials.



Flammability

Flammability is defined as the ability of a material to ignite and sustain a flame. It is measured by the peak heat release rate, the peak normalized optical density, and the average normalized optical density. The peak heat release rate is the maximum rate of heat release during a fire. The peak normalized optical density is the maximum optical density of the smoke produced during a fire. The average normalized optical density is the average optical density of the smoke produced during a fire.

Additional information on Flammability and applications in Air-Handling Plenums for cable ties can be obtained from NEMA [Application Guides #1 and #5](#)
Free download at: www.NEMA.org/prod/be/cable-ties

¹ For a description of the Component Plastic Materials Certification Program offered by Underwriter’s Laboratories Inc. visit www.UL.com/plastics

Environmental Performance Ratings

Particular environmental exposures can have an effect on the performance of cable ties in both the short- and long-term. While it is nearly impossible to address all such influences in a standard, UL 62275, CSA C22.2 No. 62275, NMX-J-623-ANCE and IEC 62275 address the following common environmental conditions:

- Resistance to ultraviolet light
- Resistance to corrosion



Resistance to ultraviolet light⁽¹⁾ is an optional declaration and pertains only to cable ties and their accessories constructed from nonmetallic or composite materials. Products identified as “UV Resistant” in addition to their Type classification may also be identified “For outdoor use” or “For indoor or outdoor use”. It is important to recognize that the effects of long-term exposure to ultraviolet radiation from sunlight is not exclusive to outdoor installations.



The declaration for Resistance to Corrosion⁽²⁾ pertains only to metallic cable ties and their accessories or products constructed of composite materials containing metal. This is an optional declaration in IEC 62275 but is required in the harmonized North American standards.



With the exception of Mexico, stainless steel materials having a minimum of 16% chromium content are considered “corrosion resistant”.

“Methods of Test for Compliance”

- (1) Aging samples for 1000 hours in a temperature controlled chamber containing a xenon-arc lamp with intermittent water spray.
- (2) Exposure to neutral salt spray and elevated temperatures. This conditioning is followed by tensile testing according to the declared Type classification.

ULTRAVIOLET RESISTANT
Application Guide No. 2
February, 2009

ULTRAVIOLET RESISTANT
Application Guide No. 3
February, 2009

APPLICATION ENVIRONMENT:
Exposure to Ultra-Violet Light

APPLICATION ENVIRONMENT:
Corrosive Atmosphere

Additional information on exposure to ultraviolet light and corrosive atmospheres for cable ties can be obtained from NEMA [Application Guides #2 and #3](#)
Free download at: www.NEMA.org/prod/be/cable-ties



NOTICE AND DISCLAIMER

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

The National Electrical Manufacturers Association (NEMA) standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While NEMA administers the process and establishes rules to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards and guideline publications.

NEMA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no guaranty or warranty, expressed or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer or seller's products or services by virtue of this standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity, nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.