

ENVIRONMENTAL CONSIDERATIONS:

Exposure to Moisture

The nature of Nylon

Nylon is a hygroscopic material with stresses induced during the molding process. A majority of cable ties manufactured today are made from various grades of Nylon 66. Nylon 66 is referred to as being a hygroscopic material because it absorbs water and/or loses water depending on the environment it is in. A hygroscopic material has the ability to attract and hold water molecules from the surrounding environment.

Cable ties are typically molded. The molding process dries out the material and causes some degree of molded-in stress. To reduce the molded-in stress of cable ties, manufacturers add 2% to 3% of their weight in water to a sealed bag. This process is known as conditioning, which requires about 30 days for the cable ties to uniformly absorb the water.

Mechanical advantages of moisture in cable ties

There are mechanical advantages with water molecules (moisture) present in cable ties made from these types of materials. The act of inserting a cable tie strap into the head locking mechanism requires some flexibility in the locking mechanism. The moisture conditioning process helps to keep the locking mechanism flexible during installation and provides more impact resistance.

Packaging cable ties with moisture

To keep cable ties flexible for installation, they are typically sealed in plastic bags to retain the moisture during storage for later use. Manufacturers recommend storing cable ties in a sealed plastic bag, out of sunlight, at 23°C (73°F) and 50% RH. The sealed plastic bags help retain a reasonable amount of moisture in the cable ties to withstand the stresses of installation. Cable tie manufacturers take into consideration material and thickness when selecting their packaging to ensure it will prevent the moisture from escaping. Typically an LDPE (Low Density Polyethylene) bag is used for this purpose.

During storage

A sealed bag of cable ties in most warehouse environments should maintain its moisture level for a period of one year. If long-term storage beyond 1 year occurs, and the storage environment is very dry, reconditioning the product will increase its flexibility. It is



recommended that stock is rotated “first in, first out” to maintain the most recent product in inventory. An opened bag of properly processed cable ties should remain flexible in a dry environment for approximately 3 to 5 days, depending on the size and type of cable tie and the level of relative humidity.

Moisture effects after installation

After the cable tie has been properly installed in the application environment, the cable tie will absorb and/or desorb moisture due to environmental changes. This is the hygroscopic behavior of nylon and the effect of water as a plasticizer. An increase in moisture will lower the cable tie’s loop tensile strength. A decrease in moisture will increase the tensile strength. This type of reaction is normal for most applications. Moisture levels do not affect the longevity of cable ties.

Moisture also alters the impact resistance of cable ties. As moisture is absorbed into the parts, the impact resistance is increased (cable ties become more flexible). On the other hand, as parts dry out and the impact resistance is reduced (cable ties become less flexible).

In a normal assembly operation, the maximum stress a cable tie will undergo during installation is when the cable tie is tensioned and cutoff. After surviving the installation process, the remainder of the service life of a cable tie is far less stressful and should be problem free for the life of the installation with regard to moisture changes.

Conditioning practices followed in UL 62275

UL 62275 establishes stabilization times based on cable tie strap thickness. The intent is to achieve equilibrium of moisture content before and after further conditioning and testing of cable ties.

For additional NEMA Cable Tie application guides, go to:

www.nema.org/Products/Pages/Cable-Ties.aspx



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