

**Aging has no effect on cable ties, except for aesthetic. Natural nylon ties tend to yellow with age, but the effectiveness of the tie is unaffected by the change in coloration. (If this is a concern, you could use a colored cable tie.)**

**For indoor use under a controlled environment, perfect conditions for a cable tie are 70° F, and 50% RH. You could expect a very long life. A cable tie will remain supple as a result of the stable temperature and RH in the indoor environment.**

**Most brittleness problems with cable ties are caused by temperature extremes with very low humidity. When cable ties exit the mold, they are in a dry and brittle state. In order to give ties flexibility and suppleness, moisture is added by placing water in a sealed bag with the ties. Nylon 66 is hydroscopic, i.e. it has the ability to absorb moisture, up to 8% by weight. Good cable tie practice is to add 2-3%.**

**Just as nylon 66 absorbs moisture, under cold and dry conditions the moisture seeks to migrate from the strap. Sealed plastic bags are used to retard this process, but the bags are not a vapor barrier. Eventually, under these conditions, the tie will return to its “as molded” (i.e. brittle) state. This is true of all nylon 66 ties produced by the various cable tie manufacturers.**

**Virtually all brittleness problems occur in outdoor applications in very cold weather, or where cable ties have been stored for long periods in an unheated warehouse. The tie breaks as it is being flexed. Once ties are placed around a wire or cable, they are virtually immune to brittleness.**

**Suggestions for engineering standard would be:**

**Cable ties should be stored in the manufacturer’s original packaging until ready for use.**

**Cable ties should not be stored in an unheated warehouse.**

**Cable ties inventory should be rotated frequently.**

**Cable ties should be used within one year of purchase.**

**Partial Cable tie bags should be closed or sealed if at all possible.**

**Cable ties should not be over tensioned when installed. (Over-tensioning actually weakens the tie).**

**If you have any further questions, please call at 800-621-5837**

## THE EFFECTS OF MOISTURE ON NYLON 66 CABLE TIES

Nylon is a hygroscopic material, and as such is affected by variations in moisture levels. For peak performance and for the as designed and tested conditions nylon should be stored at a controlled 73° F and at 50% Relative Humidity. This storage results in a moisture conditioning of the nylon of 2.5%. While one realizes the realistic limitation of these conditions, nevertheless these are the optimum as designed and tested conditions.

Nylon can vary from 0% moisture to a fully absorbed moisture maximum condition of about 8%. The process of absorption is reversible and nylon will desorb depending on the environmental conditions. This factor makes packaging and handling prior to installation most important.

When dry, nylon is stiff and brittle, and when moist it is pliable and tough. We like to say that moisture is what gives nylon cable ties their toughness.

Most nylon cable tie brittleness problems come about from exposure to dry conditions and as a result the moisture in the tie is fully desorbed. This is accentuated in hot arid and dry cold climates. January and February are the months when most brittleness problems occur in the domestic United States. Nylon is also notch sensitive and dryness amplifies this sensitivity. Cable tie design by necessity has several areas where this notch sensitivity can be found.

Ties undergo significant stress during installation. Dry ties will exhibit several failure modes. The most common failures under dry desorbed conditions are the pawl breaking out of the head and/or the strap snapping.

In addition, any color or UV inhibitors added to the natural nylon resin will compound the problem of brittleness caused by dryness.

Dry ties can be returned to fully functional and specification condition by storage under proper conditions. The ties can be soaked in hot water to rapidly return them to a pliable tough tie.

Improperly designed or molded cable ties will normally not return to serviceable condition by simply remoisturizing the ties.

For a more analytical approach to this and other characteristics of nylon a review of DuPont's nylon resin design guide is recommended.