

NYLON SOLUTIONS

Films Handling Guide for the Converting Industry

Packaging

Nylon products should remain wrapped in protective metallized overwrap when they are not in use.

Nylon is hygroscopic, meaning that it will absorb moisture from the air. To protect the film until use, AdvanSix uses special cores and a double layer of metallized overwrap to keep moisture from entering into the product. This overwrap significantly slows the transfer of moisture, but it does not prevent it. Damage to the packaging from shipping or handling can allow the film to be exposed to excessive moisture.

Temperature and Humidity

It is important to store film away from temperature and humidity extremes.

High temperature (especially combined with high humidity) can make film rubbery and prone to stretching. Low temperature (especially in low humidity) can make the film brittle. Even at room temperature, high humidity can cause problems.

The other important factor is time. It is extremely important to stage film for a minimum of 24 hours prior to running in an area that is maintained at 65°F - 85°F. This allows hot film to cool and cold film to warm, and ensures greater run consistency in converting operations.

The greatest effects of humidity can be observed on the ends of rolls that have been left unwrapped in a humid place. The ends will be swelled to a larger diameter than the center of the roll. This phenomenon is responsible for baggy edges. To minimize these effects, rolls should not

be unwrapped until immediately prior to use and should be rewrapped in an equivalent barrier material after use. These precautions are not as critical in humidity-controlled environments.

Nylon films also tend to exhibit memory. The inherent properties of nylon coupled with high film tensions and/or high oven temperatures can lead to problems in printing and laminating.

Staging and Handling

Rolls of nylon film should be unwrapped and mounted immediately prior to use.

Nylon will start to absorb moisture through the ends of the roll as soon as it is unwrapped. A roll that has been unwrapped for a significant amount of time in a humid environment prior to use will exhibit baggy edges. The degree of bagginess will vary according to time, temperature and humidity.

Rolls should be handled with straps or slings. Do not use chains. If a carpet pole is used, make sure that the pole extends at least 2/3 of the way through the core. Bent cores can result from picking up a roll from the very end with a carpet pole.

Similarly, rolls should not be handled or moved by driving a fork into the core. Bent cores and core damage can occur. The edges of the roll must be protected during handling. Nicks and dings can cause film tears. Biaxially-oriented nylon is notch sensitive. Bent cores will cause constantly-changing web tensions. Core damage can cause core chucks to slip and cause inconsistent tension control.

Web Tension

Brake tensions should be as low as possible while controlling film to run flat.

While high tension can flatten baggy edges, it also increases the potential for film to tear and can affect repeat tolerance. Correctly adjusted bow rollers can be effective in flattening film while maintaining lower tensions. Upwind tensions (especially starting tension) should be low. High wind tension and taper can cause radial compression in the roll and result in transverse (cross web) corrugation. To build harder rolls, increase down pressure at the lay on roll.

Corona Treatment

Surface energy should be checked prior to use in order to achieve optimal results in printing and laminating.

Nylon has a naturally high surface energy. Untreated films typically exhibit dyne levels approaching 50. Corona-treated films typically exhibit treat levels in the mid 50s to low 60s depending on the age of the film and its storage conditions. The customer should specify corona treatment if the higher level is desired.

The surface treatment will dissipate as a function of time and storage conditions. It is recommended that the converter check the surface energy prior to use and retreat accordingly in order to achieve optimal results in printing and laminating. Film that is properly stored and protected can retain its surface treatment for up to three months. Films that are older than this or that have not been protected in storage should be checked, as retreatment may be necessary. Note that overtreatment can result in poor ink wetout and low bond strengths. Generally, it is recommended that film be retreated at 1 to 2 W.min/ft².

Static Electricity

It is important to dissipate static charge for safety and performance.

All films generate static electricity as they pass through the converting processes. This problem is more noticeable on days when the humidity is low. It is important to dissipate the static charge for safety reasons, as well as to prevent the web from attracting dust, dirt and other contaminants. Static dissipation can be achieved through the use of ion generators, graphite brushes and copper tinsel.

Printing

Nylon film requires specific conditions for successful printing.

Nylon does not process the same as PET or OPP, as it requires lower tensions. For example, 60ga biaxially-oriented nylon film typically runs well at 0.5 PLI. Excessive web exit temperatures can dry the film and affect its dimensional stability, thus distorting the printed image. Typical web exit temperatures range from 140°F - 160°F. Generally, polyamide and urethane-based ink systems will work with nylon films. Rewrap the printed roll in barrier film. Contact your ink supplier for specific recommendations.

Adhesive Lamination

Nylon film requires specific conditions for successful adhesive lamination.

Observe the same temperature and tension constraints as in printing. Note that excessive temperature in the laminating nips can cause differential shrinkage between the nylon and second webs. Usually, this manifests as curl in the lamination. In extreme cases, transverse tunneling and delamination can occur. As with other films in your operations, contact your adhesive supplier for recommendations specific to your application.

Extrusion Lamination

Contact your supplier for a specific recommendation.

Typically, most problems seen in this process stem from excessive tension. Occasionally, low line speeds and heavy coating or tie layers can cause shrinkage or neck in. If it is required for improved bond strengths, a primer such as Mica 131x may be used. Contact your supplier for a specific recommendation.

Troubleshooting

Contact AdvanSix for help in addressing specific problems.

Film stretch at startup may be due to an aggressive acceleration ramp, and is affected by inertia in the system. Undriven rolls and idler rolls will increase drag. Bad and sticky bearings also can be contributors. Tracking issues and uneven edge-to-edge tension may be attributed to any or all of the following:

- Misaligned rolls and/or unwinds
- Bad bearings in rollers

- Bent rollers
- Buildup on rolls
- Spreader rolls that feed in one direction

Film tear problems can be caused by:

- Damaged ends on the roll
- Excessive or uneven tension
- Line speed variation (surging)
- Burrs or buildup on rollers or other contact surfaces

Varying tension can be attributed to one or more of the following:

- Damaged cores
- Line speed variations
- Air pressure variation (to the brakes)
- Mechanical issues with the brakes (cracked pads, glazed or bent rotors, etc.)
- Buildup on rollers
- Bent rollers
- Bent core in the film

Note: This guide is intended to provide general information only. As such, AdvanSix assumes no liability for the interpretation or use of information presented herein. For recommendations specific to your applications, please contact the appropriate supplier(s).

Contact AdvanSix

To learn more about the benefits of Capran® films and OxyShield® films, visit [AdvanSix.com/NylonSolutions](https://www.advan-six.com/NylonSolutions) or call: **1-844-890-8949** (toll free, U.S./Can.) **+1-973-526-1800** (international)

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