Effects Moisture & Humidity Have on Paper Tubes & Cores

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Overview

Paper products are essential in our every day lives. It's all around us. Paper is the most widely used packaging material across the world and plays a major role in different applications.

Many of us live in a state that gets to experience all four seasons. While most of us enjoy the summer months, some of those days can reach high humidity levels, causing temperatures to be hotter than normal. Then, you have the dreary winter months that tend to be very dry and blustery cold. Not only does humidity and moisture have an impact on us as people, but it also has an effect on fibrous paper products as well, such as paper tubes and cores.

Understanding how paper interacts with the environment is critical to ensuring its appearance and performance stay intact.

Dry Conditions

Paper products that are conditioned in dry environments will release moisture to the atmosphere in a low relative humidity. Mainly during winter months will you notice that paper tubes and cores will shrink/warp quicker. Keep in mind, paper tubes and cores will always take on a bit of moisture as the cellulose fibers are held together through hydrogen bonding. As the temperature in the air decreases, it loses its ability to retain as much moisture.

There is a lot to take into consideration when it comes to dry conditions. Heavier walls tend to shrink on the outside diameter (O.D.), the width of paper can affect the length, and the lighter the tubes (less paper plies), the less you will notice the shrinkage. On average, a winding product has six-thousandths per inch of shrinkage and a recut product will have three-thousandths per inch of shrinkage.

In severely cold weather, when plant heating systems are running for prolonged periods of time, it is likely that the humidity within plants become very low. These are the same conditions in a person's home which causes dry air, sinus problems, doors drying out, static electricity, etc. These low R.H. conditions usually cause paper cores to shrink in size due to the evaporation of moisture from the cores.

Humidity

As the temperature in the air increase, so does its ability to retain moisture. When humidity levels increase, the fibers in the paper draw in moisture very quickly. This results in the paper tubes and cores expanding.

High humidity environments are most commonly effected regions that have a lot of rain which results in high humidity during the summer months. During summertime conditions, paper cores manufacturing in high humidity (i.e. 90% R.H.) can shrink drastically if an end-user puts them into an air conditioned room with extremely low humidity.

During the manufacturing process of paper tubes and cores, tubes come off the winders with 12% moisture and dry at 8% with silicate glue and when using P.V.A. glue, the tubes come off the winders at 8.5-9% moisture and dry at 6%. There will be less shrinkage and warping when P.V.A. glue is used.

Packaging techniques may play a role as well. When products are received snake-laced on pallets, tied in bundles, or on racks, the outside perimeter cores are likely to be more affected by drastic humidity and temperature changes, causing inconsistency between different cores. If the product is stretch wrapped for shipment, it can cause higher moisture levels unless the wrapping is removed immediately upon receipt.

Storage

Proper storage of paper tubes and cores is very important when it comes to humidity and moisture. To retain normal dimensions, paper tubes and cores should be used and stored at ideal conditions of 73ºF and 50% relative humidity (R.H.). Relative humidity is a measure of the amount of water in the air, at a specific air temperature, expressed by a percentage of the maximum amount of water the air can hold at that temperature. Humidity can weaken the paper tubes and cores which will then cause them to fail. When using paper products right away, less moisture will affect the product.

If the product has been stretch wrapped upon arrival, remove it once received and expect changes to occur once removed. Paper tubes and cores should not be stored near any type of heating or cooling unit, in an air stream of heated or cooled air, or in the path of a humidifying stream of air. Again, keep in mind that where you store the inventory, will have an affect on the tubes. Be sure to store the products where they can't be crushed or bent.

Conclusion

As you have read, understanding how moisture and humidity affects paper tubes and cores is very important for end-users as they are looking for the products to have the best appearance and performance. Paper products will have optimum performance by controlling the relative humidity (R.H.) levels and temperature in the processing and storage environments. It is important to know what your acceptable tolerances are on length, I.D. and O.D. when ordering paper tubes and cores. All of Yazoo's products are custom manufactured, made to fit your specifications.

To learn more about our manufacturing process, our friendly and knowledgeable customer service representatives are available to assist you Monday through Friday, between the hours of 8am and 5pm EST. **Give us a call today to receive a quote or to place an order - 800.242.5216**