

MARCH 2024
GUIDE IN ENGLISH

ALIER

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GUIDE FOR
THE STORAGE
& HANDLING
OF PAPER REELS

01

INTRODUCTION

02

PURPOSE OF THE REPORT

03

HANDLING OF PAPER REELS
3.1 HANDLING EQUIPMENT

04

STORAGE OF PAPER REELS
4.1 ABOVE-FLOOR STORAGE OF
UNPALLETIZED REELS
4.2 GENERAL INSTRUCTIONS
4.3 VERTICAL STACKING
4.4 ENVIRONMENTAL CONDITIONS
4.5 PRECAUTIONS

05

DISPOSAL FOR CONSUMPTION

06

REFERENCES



The activities related to the transportation and consumption of paper reels involve a significant movement of these, which requires the use of various work equipment, such as forklifts, pallet trucks and others, to carry out loading/unloading, transportation, storage and stacking of these materials.

Improper storage of these reels can **alter the technical characteristics of the paper**.

Currently, regarding storage and stacking, there is a lack of specific regulatory criteria in terms of

spaces, heights and environmental conditions in warehouses of the paper industry. This has led many companies to develop their own criteria for these activities.

On the other hand, although there are regulations related to the use and maintenance of equipment and machinery necessary for these storage activities, **compliance with a series of regulatory requirements is required, such as training, use of protective means and circulation criteria, in addition to reviews and maintenance.**

Consequently, given the absence of standardized criteria to define storage and stacking, as well as the need for standards and instructions in companies on the use of equipment, machinery and environmental conditions of the warehouse, ALIER has considered it necessary to develop criteria that guide its clients. in the safe management of activities and tasks associated with the storage of paper reels.

For the preparation of this Manual, the recommendations of ASPAPEL (Spanish Association of Pulp, Paper and Cardboard Manufacturers) have been followed.

PURPOSE OF THE REPORT



The purpose of this Manual is to establish a series of general criteria for the **handling, storage and stacking of paper reels in the storage facilities of factories** that use paper as raw material. These criteria are designed to facilitate the development of specific standards adapted to the particular circumstances of each company.

It is essential to keep in mind that each company, depending on its specific characteristics and the risk assessments associated with storage activities, must define its own storage management standards. Therefore, the criteria in this Manual should not be directly applied without first considering the particularities of the facilities and the corresponding risk assessments.

03

HANDLING OF PAPER REELS

Every roll of paper must be handled for use, either at the time of unloading from transport, for storage if necessary, or for disposal on the production line.

As a general rule, they should be handled one at a time. Always take the reel in the center, preventing the clamp from touching the edges.

Forklift clamps must be kept vertical during transport. The clamps must not be rotated while the truck is in motion. The reel must not be released until it has rested on the ground or on another reel.

One reel should not be used to push another, and unpalletized reels should not be transported unless clamped.

Unpalletized reels will be transported in a vertical position as long as their height allows a complete view of the front field. If the height of the reel or reels obstructs the forklift operator's vision, they will be transported in reverse. They should never be transported in a horizontal position, since in the event of a fall, for example

due to a hydraulic system failure, the reel could roll.

When handling reels 2 m wide or more, they will be taken from the center.

When holding a reel with the clamp, the clamp will not be rotated at the same time as the reel is lowered.



HANDLING OF PAPER REELS

The blades of the grippers must be large enough to embrace most of the reel without protruding from it (approximately 25 cm wide x 100 cm high for reels 1.9 meters in diameter and 1.2 meters wide) and have the correct texture to be able to grip the reel well without generating marks on it.



The appropriate working pressure of the clamps will depend on the weight of the reels, but it is considered that, for reels weighing between 2,000 kg and 3,000 kg, a pressure of 180 bar should be used in the clamps. Too much pressure could deform the inner mandrell of the reel, while too little pressure could cause the reel to slip and fall.

3.3 HANDLING EQUIPMENT

Reel handling must be carried out using the appropriate equipment for this task. The ideal equipment should have grippers large enough to embrace the entire reel, so that the axes of the gripper blades coincide with the diagonal of the reel.

STORAGE OF PAPER REELS

For the storage of reels, especially in the absence of an automated warehouse, we will follow a series of general criteria. These include: the larger the reel diameter, the higher the stacking height; The smaller the reel width, the lower the stacking height. An approximate maximum height of 7.50 meters is established, leaving an adequate free distance between the top of the stack of reels and the ceiling of the warehouse, or failing that, that which is determined by the capacity of the available stacking equipment.

4.1 ON-FLOOR STORAGE OF UNPALLETIZED REELS

The storage of reels on the floor in indoor facilities will be carried out in accordance with the following indications:

GENERAL INDICATIONS

The arrangement of the reel stacks and the separations indicated by the competent

authority of each country will be marked in accordance with the criteria of minimum health and safety signaling provisions. In situations where safety may be compromised by the movement of forklifts at intersections, the ends of the piles can be arranged in a chamfer shape and curved mirrors can be placed to improve visibility.

In addition, a minimum separation will be established between the reels and the walls to guarantee safety.

The pedestrian corridors to access the warehouses will be marked and adequately delimited.

VERTICAL STACKING

Non-palletized reels will be stacked vertically in all cases. In vertical stacking, specifically of the "island" type (where the stacks consist of a single element at the base, allowing a small separation between adjacent stacks to avoid damaging the reels with forklift clamps), the following storage guidelines will be followed:



STORAGE OF PAPER REELS

The height of the stack will be determined based on the diameter and width of the reel, guaranteeing its stability and avoiding displacement. In this sense, the general rule will be followed that, the larger the diameter of the reel, the greater the stacking height, and the smaller the width, the lower the height, without ever exceeding the maximum height of 7.50 meters, or the maximum capacity of the stacking equipment. stacked if lower. For reels with diameters between 60 and 90 cm, the maximum stacking height will be reduced to a maximum of 5.0 meters. Reels with diameters of 40 to 60 cm will not be stacked more than two high, while reels with diameters less than 40 cm will not be stacked at all.

Both the weight of the reel and the structural resistance of the soil and the reels themselves must be taken into account.

When stacking different types of reels, always place the smaller diameter reels on top of the larger diameter reels to maintain stability.

The stacking areas will be delimited and clearly

marked on the ground to avoid confusion.

The personnel in charge of handling and storing the finished product will proceed to place it in the warehouse organized in homogeneous batches.

HORIZONTAL OR ROLLING STACKING

The practice of storing reels in a horizontal position is discouraged, since due to their weight, they could deform in the part that is in contact with the ground. If storage in this position is necessary, it is recommended to avoid stacking the reels and keep them in this position for as little time as possible.



STORAGE OF PAPER REELS

4.2 ENVIRONMENTAL CONDITIONS

Paper is a hygroscopic material, meaning it can absorb or release moisture from the environment. Some of the most important properties of paper can vary depending on its moisture content. Humidity in an environment is measured as relative humidity, which is influenced in part by the temperature of the environment.

For these reasons, it is crucial to know both the humidity and temperature of the environment where the paper is stored. Some of the key properties of paper that are affected by relative humidity include its own moisture content, its tensile strength, its tear resistance,

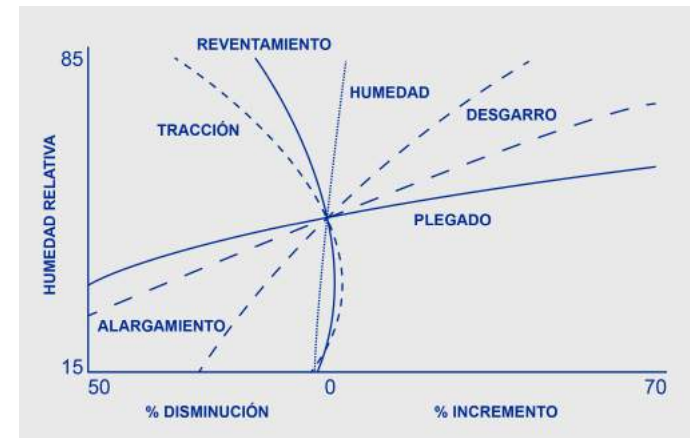
its elongation, among others.

It has been observed that these properties remain constant when the relative humidity of the environment is 50%. Therefore, maintaining a relative humidity level of 50% in the paper storage environment may be optimal to preserve its properties.

Therefore, it is recommended that paper reels be stored in environmental conditions that maintain a relative humidity of 50%, to ensure that their main mechanical properties do not suffer variations. The ideal storage conditions are the following:

TEMPERATURE 20°C - 24°C
RELATIVE HUMIDITY 45% - 55%

Additionally, it is important to note that exposure to sunlight can affect the quality of the paper. Sunlight can trigger reactions in some molecules in the paper, such as lignin or dyes, resulting in changes in the color of the paper. Therefore, it is recommended to avoid storing paper reels in places where they may be exposed to direct sunlight.



STORAGE OF PAPER REELS

4.3 PRECAUTIONS

To protect the paper reels from physical damage on the end, ALIER places a cardboard protection. During stacking of the reels, the protected end cap will be placed at the bottom of the reel, in contact with the ground.

To prevent possible paper alterations due to humidity, ALIER wraps its paper reels with plastic, which extends around the circumference and the outer sides of the reels, areas most prone to be damaged by humidity. This surrounding plastic is responsible for preventing moisture leakage from the paper.

If the reels are stored in areas exposed to light, as long as the paper side is on the outside of the roll, it is recommended to remove the first layer of paper if it presents color alterations due to exposure to light.



DISPOSAL FOR CONSUMPTION

Alier recommends, whenever possible, to avoid placing the reels in a rolled position before feeding them to the production line. If avoidance isn't feasible, it's recommended to keep the duration the reel remains rolled as brief as possible. As a general rule, for the consumption of paper reels using unwinding equipment that uses spindles to hold them, it is important to take into account the following considerations to avoid damaging the reels during the process:

- If skids are used to move the reels, it is essential to ensure that these elements are well greased and in good condition for proper operation.
- Before inserting the spindles, the reel must be correctly centered with respect to the machine. If exact centering is not possible, it must be ensured that the reel can move freely during the spindle insertion process.

- If feasible, it is recommended to raise the reel before inserting the spindles to facilitate the process.
- The spindles used must be conical and have a mechanical stop to prevent them from penetrating too far into the reel mandrel.



Safety Manual in the handling and storage of raw materials and finished products in the paper industry. ASPAPEL

THANK YOU.

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