

**PMMI B155-TR2.3-2011**

**ANSI Technical Report for packaging machinery  
prepared by Packaging Machinery Manufacturers Institute**

**STORAGE AND HANDLING OF CORRUGATED  
PACKAGING MATERIALS**

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## **0 Forward**

The Packaging Machinery Manufacturers Institute (PMMI) is a “standards developing organization” (SDO) accredited by the American National Standards Institute (ANSI). This Technical Report has been approved by the B155 TR2 accredited standards committee of PMMI. This document is registered as a Technical Report according to the Procedures for the Registration of Technical Reports with ANSI. This document is not an American National Standard and the material contained herein is not normative in nature. Comments on the content of this document should be sent to Director of Technical Services, Packaging Machinery Manufacturers Institute, 11911 Freedom Drive, Suite 600, Reston, VA 20190-5629, USA.

This voluntary guideline was originally released August 1973. A revised version was released May 1976. The document was revised again in 1996.

This Technical Report was promulgated by the Packaging Machinery Manufacturers Institute (PMMI) in collaboration with the Fibre Box Association (FBA) as a Technical Report to establish guidelines for the storage and handling of corrugated containers. These guidelines are entirely voluntary and are not intended to preclude or prevent improvement in storage and handling practices.

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# 1 Scope

## 1.1 Purpose

Corrugated board packaging is shipped to the user in knocked-down or flat form so that it requires a minimum amount of storage area. Banding, bundle twine, strapping, shrink/stretch film or other methods may be used to unitize and stabilize the load, which may be delivered on slip sheets or pallets.

If a unitization method is likely to adversely affect the run-ability of the corrugated board, the user should specify to the packaging container manufacturer the particular method of unitizing to be used.

Corrugated board packaging can be damaged by its storage environment or by handling practices. Once damaged the packaging may not perform its intended function.

## 1.2 Scope

These are recommended practices for the storage and handling of corrugated board packaging, including knocked-down (KD) containers, scored and slotted sheets, and inner packaging pieces.

These guidelines, when followed, provide a reasonable expectation that the packaging:

- Is usable and can fulfill its intended function.
- Will erect easily by hand or will run on automatic forming, filling and closing machinery for which it was designed.
- When erected/formed and filled, the container should stack squarely during palletization.

# 2 Informative References

The Fibre Box Handbook (Corrugated industry reference) contains provisions or guidelines which constitute additional resources available to the user of this technical report. This document contains recommendations the user of this technical report should be aware of regarding the application of this technical report. All technical reports/documents are subject to revision, and parties to agreements based on this Technical Report are encouraged to use the most recent edition of the document.

# 3 Storage Practices

Recommended storage conditions are 40 to 100 degrees Fahrenheit (4 to 38 degrees Celsius) and relative humidity of 30% to 70%.

## 3.1 High Humidity

High humidity (greater than 70%) or direct contact with water may adversely affect the performance of the corrugated board and may:

- Degrade the corrugated board to the extent that the container may not stand up to the rigors of automatic or semi-automatic case erection, filling and sealing, causing container failure and/or equipment jams.
- Degrade the corrugated board to the extent that the filled container may fail during storage and distribution.
- Soften or dissolve the adhesive leading, in extreme cases, to delamination.
- Increase the coefficient of friction of the linerboard, causing packaging to stick in automatic equipment or on conveyors.
- Alter the dimensions, resulting in equipment jams.
- Cause warp.

## 3.2 Low Humidity

Extremely low humidity (less than 30%), can reduce the moisture content of the corrugated board and may alter the dimensions and/or make the corrugated board and/or its corrugating adhesive brittle.

### 3.3 Temperature

Low (less than 40 degrees Fahrenheit [4 Celsius]) or high (greater than 100 degrees Fahrenheit [38 degrees Celsius]) temperature can alter the physical characteristics and adversely affect the run-ability of the corrugated board packaging.

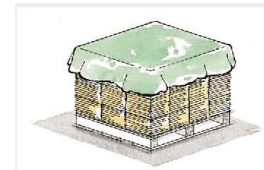
### 3.4 Combined effects of humidity and temperatures

Combinations of humidity and temperature outside the recommended ranges can adversely affect the run-ability and physical performance of the corrugated board packaging.

### 3.5 Best practice

To avoid adverse effects caused by moisture and temperature extremes and fluctuations, the following practices are recommended:

- Use flat dunnage or other material to protect the top and bottom of the unitized corrugated board packaging.
- Corrugated board packaging should not be stored directly on the floor.
- Store corrugated board packaging inside, away from sources of moisture.
- Keep corrugated board packaging away from outside doorways that remain open or that might be opened frequently.
- When it is not possible to store corrugated board packaging under recommended storage conditions, bring the corrugated board packaging to the packing line for a period of time to ensure that all corrugated board packaging reach recommended conditions before being used. In some cases this may take 24 hours or more. If both the storage area and the packing area are subject to extreme conditions, it may be necessary to condition corrugated board packaging in a third area to assure proper operation of the packing line.
- Follow the practice of “first in, first out,” using the oldest inventory first.
- Containers are best run on automated machinery within 3 to 6 months from manufacture.



### 3.6 Functional life

Experience has shown that unused corrugated containers will perform their intended containment and stacking functions for at least 12 months from date of manufacturer, when stored under recommended conditions.

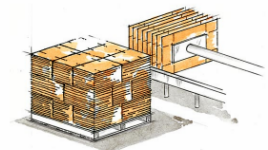
## 4 Handling Practice

The flute structure in corrugated board provides stacking strength and a cushion for the packaged product. Any damage to the flute structure prior to use either from crushing, puncture or tears reduces the packaging's effectiveness and its ability to run on automated machinery.

Torn, bent or scuffed edges can affect the corrugated board packaging's proper erection or performance on automatic packaging machinery.

To avoid physical damage to the corrugated board packaging, the following practices are recommended:

- Corrugated board packaging should be stored horizontal (flat), in a knocked-down form, from the time it is received until it is used or fed into the automatic machinery magazine.
- Corrugated board packaging should be stored on clean, flat surfaces. When pallets are used, all deck boards should be in place and undamaged in order to distribute the weight evenly.
- Leave the banding, bundle twine or other unitizing material in place until the corrugated board packaging is ready for use.
- Avoid placing any uneven weight on stored corrugated board packaging.



- Do not walk or stand on units or bundles of corrugated board packaging.
- Always lift and set down corrugated board packaging carefully when it must be moved. Do not use the unitizing/bundling material for lifting, carrying or otherwise transporting the stacks of corrugated board packaging.
- To avoid damage to edges and corners do not drop unitized loads into place, or drop or throw bundles or individual corrugated board packaging pieces. Do not drag corrugated board packaging or strike it against a hard surface.

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## **5 Inquiries**

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