

**Library of Congress Preservation Directorate**  
**Specification Number 300-323 – 16**  
**Specifications for Flat Boxes for the Storage of Artifacts**

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## **1. Composition and Chemical Requirements**

### **1.1 Fiber**

The stock must be made from rag or other high alpha-cellulose content pulp, minimum of 87%. It must not contain any post consumer waste recycled pulp.

### **1.2 Lignin**

The stock must give a negative reading for lignin as determined by the phloroglucinol test when tested according to TAPPI T 401, Appendix F, and shall have a Kappa number of 5 or less when tested according to TAPPI T 236.

### **1.3 Impurities**

The stock must be free of metal particles, waxes, plasticizers, residual bleach, peroxide, sulfur (which will be less than 0.0008% reducible sulfur as determined by TAPPI T 406), and other components that could lead to the degradation of the box itself, or the artifacts stored therein.

### **1.4 Metallic Impurities**

Iron must not exceed 150 ppm and copper shall not exceed 6 ppm when tested according to TAPPI T 266.

### **1.5 Optical Brighteners**

The stock must be free of optical brightening agents.

### **1.6 pH**

The stock must have a pH value within a range of 8.0 - 9.5 as determined by TAPPI T 509, cold extraction (modified by slurring sample pulp before measurement).

### **1.7 Alkaline Reserve**

The stock must contain an alkaline reserve with a minimum of 2% and a maximum of 5% calculated as CaCO<sub>3</sub> when tested according to TAPPI T 553 (modified by slurring sample pulp before measurement).

## **1.8 Sizing**

Only neutral or alkaline sizing shall be used. No alum rosin or rosin sizing should be used, as determined by TAPPI T 408.

## **2. Physical and Performance Requirements**

### **2.1 Thickness and Basis Weight**

The stock must meet the following minimum requirements for basis weight as determined by TAPPI T 410.

#### **2.1.1 60 pt. Board**

The minimum basis weight should be 800 lbs/ 3,000 ft<sup>2</sup>

### **2.2 Color**

The color of the stock should be tan, unless otherwise specified on the purchase order. The color must not be so dark that it obscures color-dependent test evaluations, e.g., spot stain tests.

### **2.3 Color Bleeding**

The color must show no bleeding when soaked in distilled water for 48 hours while held under suitable weight in contact with white bond paper. The color must not rub off.

### **2.4 Color Retention**

The color of the stock must not change more than 5 points of brightness as measured by directional reflectance at 457 nm (TAPPI T 452), when exposed 24 hours to a Xenon arc lamp in an Atlas Weatherometer under the following conditions: Irradiance Level: 1.0 watts/m<sup>2</sup> at 420 nm. Inner filter: Borosilicate glass. Outer filter: clear soda lime glass. Black panel temperature: 50°C. Wet bulb depression: 8.5°C.

### **2.5 Surfaces**

The surfaces of the stock must be free of fingerprints, dirt, bubbles, knots, shives and other imperfections.

### **2.6 Creases and Folds**

The stock must not fray, crack or split when folded and/or creased.

### **2.7 Stiffness**

The stock must meet the following minimum requirements for stiffness. Test will be conducted according to TAPPI T 489, after conditioning by TAPPI method T 402.

#### **2.7.1 60 pt. Board**

The minimum internal stiffness must be not less than 5,600 Taber units in the machine direction and 2,500 in the cross direction.

## **2.8 Adhesive**

If an adhesive is required, it must not soften or run. The adhesive must not cause the stock to become transparent or alter the color of the stock. The adhesive must not yellow, discolor, or fail (causing delamination) over time. The adhesive should not contain sulfur, iron, copper or other ingredients that may be detrimental to photographic materials. The adhesive should not contain or generate oxidants. Pressure-sensitive or rubber-based adhesives are not acceptable. When used, the adhesive must not extend beyond the joined area.

## **2.9 Durability**

The boxes must be sturdy enough to withstand normal wear and tear during use. The lid must be able to withstand repeated opening and closing without delamination of the plies, fraying along the cut edges, or splitting along the joints.

## **2.10 Metal Edge Stays**

The metal edge stays must be made from a single unit of 0.0088 gauge cold rolled steel coated on the exterior with chrome, lacquer or baked enamel. The metal edge stays must be one inch wide and contain a minimum of eight 4-prong eyelets per 2 inch length. The metal edge stays must be chrome in color or as specified on the purchase order.

# **3. Product Requirements**

## **3.1 Construction**

The boxes must consist of two blanks of 60 pt. board stock constructed as two separate units comprising a base and a detached lid. (Illustration below)

### **3.1.1 Base**

The grain direction of the board stock should run parallel to the long dimension of the box. The four walls of the base should be the same height. There must be no cut-out holes or pulls on the base of the box. Boxes larger than 20 x 24 x 1 1/2 inches must have the two long sides of the base reinforced by folding the side onto itself towards the inside of the box. The folded area should come flush to the edge of the 90 degree corner.

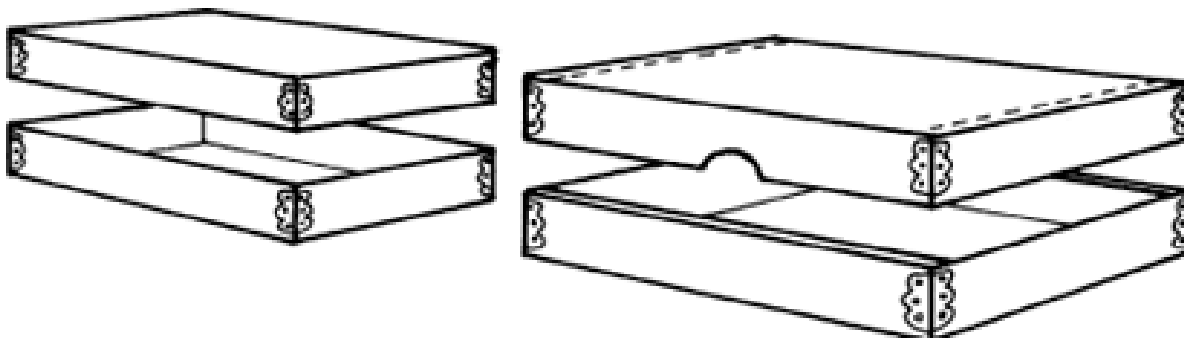
### **3.1.2 Corner Joints**

The corners of the box base and the lid must be joined with continuous metal edge stays. The stays should stop 1/4 inch from the cut edge of the top and the folded crease at the bottom of the corners to avoid the problem of the stays working loose. The prongs of the stays should fully penetrate the box board so that they are visible on the inside, and must be free of sharp raised edges inside and outside.

### **3.1.3 Lid**

The lid must fit securely, but not bind. Boxes larger than 20 x 24 x 1 1/2 inches must have the two short sides of the lid reinforced by folding the side onto itself towards the inside of the box. The folded area should come flush to the edge of the 90 degree corner. Boxes over

2 1/2 inches high or with reinforced sides should have a half-round thumb cut in the middle of the long sides of the lid. The thumb cut should be approximately 2 1/2 inches long and 3/4 inches high, measured from the lower edge of the lid side.



Flat storage boxes for the storage of artifacts

### 3.2 Workmanship

The boxes must have clean cut edges and properly aligned panels with no unnecessary scores or cuts. All dimensions of the box maker's blank must be accurately cut, scored and slotted so that the assembled parts fit closely without binding. The edges must be straight, corner joints must meet exactly, and corners must be squared to 90 degrees.

### 3.3 Dimensions

Dimensions will be specified on the purchase order.

### 3.4 Thickness

The boxes should be constructed of 60 pt. board stock.

### 3.5 Marking

Each box must be marked with the name of the manufacturer, year of manufacture, and the actual pH.

#### 3.5.1 Placement and Size

The identifying information must not be larger than 2 1/2 inches long and 1 1/2 inches high. It should be centered on the bottom of the box, legible from the outside.

#### 3.5.2 Marking Method

The information can be stamped in ink or embossed.

##### 3.5.2.1 Ink Stamping

The stamping must be done on the outside of the box. The ink must not smear, fade, or rub off after drying. The ink must not run, bleed through, or transfer to other materials if it becomes wet. There must be no ink on the interior of the box.

### 3.5.2.2 Embossing

The embossing must be done from the outside of the box. The impression must be legible from the outside only, with no penetration to the interior of the box.

## **4. Packaging and Identification**

### **4.1 Packages**

The items must be packed in standard commercial containers that are constructed to ensure that they arrive at the Library of Congress in dry, undamaged condition. The outside of each container must be identified by type, size and number of items within; manufacturing run or batch number; LC Purchase Order / Contract number and line number.

## **5. Compliance with Specification**

### **5.1 Quality Assurance Testing**

The Library of Congress has the right to perform any of the tests set forth in the specification where such tests are deemed necessary to ensure that supplies conform to prescribed requirements.

### **5.2 Sampling**

To sample for testing, shipments will be sampled according to ANSI/ASQ Z1.4, inspection level S-2, AQL 2.5%.

### **5.3 Methods**

Tests will be conducted in accordance with specified test methods of the American National Standards Institute (ANSI), the American Society for Testing and Materials (ASTM), the Technical Association of the Pulp and Paper Industry (TAPPI), and the International Organization for Standardization (ISO). Publications describing these tests may be ordered directly from the technical associations, their websites, or other on-line standards vendors.

### **5.4 Acceptance**

Materials will be accepted when the Library of Congress has ascertained that the products comply with all parts of the specification. A quick reference table of the physical and chemical requirements and test methods used to ascertain compliance is provided in section 5.5.

**FAILURE TO MEET ANY PART OF THE SPECIFICATION WILL BE CAUSE FOR REJECTION**

## 5.5 Table of Physical and Chemical Requirements and Test Methods

Property	Requirement	Test Method
Lignin	Negative / Kappa 5	TAPPI T 401, Appendix F or TAPPI T 236
Reducible Sulfur	< 0.0008%	TAPPI T 406
Iron	≤ 150 ppm	TAPPI T 266
Copper	≤ 6 ppm	TAPPI T 266
pH	8.0 – 9.5	TAPPI T 509, cold extraction, slurried pulp
Alkaline Reserve	2 – 5%	TAPPI T 553, slurried pulp
Alum Rosin Sizing	Negative	TAPPI T 408
Basis Weight	60 pt: 800 lbs./3,000 ft <sup>2</sup>	TAPPI T 410
Color Bleeding	No bleed in 48 hours	See section 2.3
Color Retention	≤ 5 pts	TAPPI T 452
Stiffness	60 pt: 5600 MD, 2500 CD	TAPPI T 489

## Configuration Management

Date	Revision History
19-Jun-2002	Initial release of document on website, html format.
14-Dec-2009	Revised and reformatted for release as PDF document.
30-Sept-2016	Revised Sections 1.1, 1.2, 2.2, 5.5. Deleted 2.7. Editorial update to footer.