

# NATIONAL ARCHIVES OF TRINIDAD AND TOBAGO

## Storage and Vault Guidance



## **Introduction:**

Records must remain accessible and secure during every stage of the life cycle. This guide states the minimum requirements for the storage of records and the conditions under which they should be kept. They should be housed in facilities that would ensure they remain safe from deterioration, damage or loss. This is made possible by the construction of an appropriate facility, which is either free standing or an isolated room within organizations' building.

## **Building Construction:**

Shelving: Consideration should be given to the shelving and storage cabinets within the vault. Also, future growth of a collection for the next 15 to 20 years is an important consideration. Shelving can either static or mobile. Static or fix shelving is less expensive but requires a larger floor area than mobile shelving.



Mobile shelving. Photo Source: <http://www.officeanything.com> Fixed Shelving. Photo Source: <http://www.ezrshelving.com>

## **Shelving Material**

Recommended: Steel or anodized aluminum

Shelving should be made of a metal material; the finish should be smooth, nonabrasive and resistant to chipping. Do not consider shelving with wooden decking, which is inappropriate for records storage. Wooden or particle board decking can emit gases over time due to the natural decomposition of the wood. Gases can aid in the degradation of paper stored in boxes on the shelves. And in the case of fire, any wooden parts of the shelving may aid in the destruction of records. Since paper is heavy, it will often cause wooden shelving to buckle over time. Wood also tends to hold moisture, and when wet, such shelving can deteriorate rapidly.

## **Shelving Height**

Varies with needs and height of room

The appropriate height for shelving will depend on your records storage needs and the size of your records storage facility. Standard heights of shelving range from 5 to 10 feet, with an extra 3 or 4 inches added to allow for space to keep the bottom shelf off the floor. Shelving 6 or 7 feet high is the most common. Always allow for at least 1 foot between the cartons on the top shelves and lighting fixtures or ductwork. Sprinkler heads should be at least ½ feet above the cartons to allow the sprinklers to distribute water evenly.

## **Shelving Gauge**

Recommended: Based on weight of records

Heavy-duty steel shelving of 18-gauge or lower is generally recommended for records storage. The smaller the gauge number, the stronger the shelving; thus 16-gauge or 12-gauge steel shelving is also appropriate. Shelving higher than 18-gauge is weaker and may not be appropriate for records storage. Paper is heavy and, over time, may cause this weaker shelving to buckle under the weight.

## **Shelving Dimensions**

Recommended: 42" wide X 16" or 32" deep or 40" X 16" deep

Generally shelving 42 inches wide, this allows for a row of three cartons or boxes (12" wide x 15" long x 10" high). Depth can vary, depending on the dimensions available and storage needs. Shelves 16" or 32" deep are preferable. For the best use of space in a records center or storage room, purchase shelving that is 32 inches deep, which allows for boxes two-deep on each shelf. If efficient use of space is not a concern, 16"-deep shelving will hold a row of boxes one-deep. Shelving of other depths is suitable for records storage, but is not as preferable.

Shelving should run parallel to the direction of airflow and perpendicular to ceiling light fixtures, if possible. Leave a few inches of free space between the shelving unit and the wall to allow for circulation. Bottom shelves should be approximately 4 to 6 inches from the floor to allow for airflow and for protection against flooding. For easy retrieval of records, your shelving arrangement should allow for aisles approximately 36 inches wide. Records or archival materials should never be housed directly beneath overhead water pipes. If your storage area has water pipes, design it so that the pipes parallel the aisles and do not hang above any of your shelving units.

## **Temperature and Humidity**

Records of enduring will age ahead of time if good climate and storage are not provided. All heat accelerates the chemical reactions that cause paper to deteriorate the lower the temperature, the longer paper will last. Whereas temperature set points may vary between 0°F and 70°F. Moisture accelerates the chemical reactions that cause paper to deteriorate, keep the Relative Humidity (RH) as low as possible, but above 30% .



Thermohygrometer, Wall Mount used to measure temperature and RH (Photo source: <http://www.gaylord.com> )

SITUATION	TEMPERATURE	RELATIVE HUMIDITY
Combined stack and user areas	70 °F maximum*	30-50% RH**
Stacks where people are excluded except for access and retrieval	65 °F maximum*	30-50% RH**
Optimum preservation stacks	35-65°F***	30-50% RH**
Maximum daily fluctuation	± 2°F	± 3% RH
Maximum monthly drift	3°F	3%

Environmental Guidelines for the Storage of Paper Records

\* These values assume that 70°F is about the minimum comfort temperature for reading and 65°F the minimum for light physical activity. Each institution can make its own choice.

\*\* A specific value of relative humidity within this range should be maintained ±3%, depending on the climatic conditions in the local geographic area, or facility limitations.

\*\*\* A specific temperature within this range should be maintained ±2°F. The specific temperature chosen depends on how much an organization is willing to invest in order to achieve a given life expectancy for its records.

**Design of Vault**

In a fire-resistive building, the vault may be of either the ground-supported or structure-supported type. In a non fire-resistive building the vault shall be of the ground-supported type. Walls of the building shall not be used as walls of the vault.

- The vault shall be located in a normally dry place, preferably accessible to the section of the building where the records are used.
- (c) Standard record vaults shall not exceed fifteen thousand cubic feet in volume, and the interior height shall not exceed ten feet.

- (d) A vault shall be of such design and construction as to insure that the structure will withstand satisfactorily all of the conditions which a severe fire may impose on it. Plans and specifications shall be prepared and construction supervised by a registered engineer or architect.

#### **Foundation:**

- Structure-supported vaults. The supporting structure shall be of adequate strength to carry the entire load of the vault and its contents. There shall be no combustible material in any portion of the supporting members of the structure. Structural members of the building which support the vault shall have all steelwork protected by at least four inches of fireproofing concrete.
- Ground-supported vaults. Foundations for ground-supported vaults shall be reinforced concrete adequate for the entire load of the vault structure and contents. Supporting structural members shall have all steelwork protected by at least four inches of fireproofing concrete.

#### **Floor:**

- Structure-supported vaults. The floor of the fire-resistive building may serve for the floor of the vault, if it is of noncombustible construction throughout and complies with the following requirements:
  - (1) The floor of the vault shall be reinforced concrete not less than six inches thick; if exposed to undue fire hazard from outside the vault, it shall have a thickness equivalent to that required for the walls.
  - (2) The floor of the vault shall not be pierced for any purpose.
  - (3) No wood or other combustible material shall be used for flooring surfacing.
- Ground-supported vaults. Where the floor of the vault rests on grade, or on compacted gravel fill, the minimum thickness shall be that required to support the load. In non fire-resistive buildings the floor of the vault shall be independent of the floor construction of the rest of the building.

#### **Walls**

- Construction.
  - (1) Walls shall be reinforced concrete, or brickwork with vertical as well as horizontal joints filled with mortar; or, in a fire-resistive building, a framework of heat-protected steel or reinforced concrete with panels of reinforced concrete or brickwork. Reinforcement for concrete shall consist of steel rods at least one-half inch in diameter spaced six inches on center and running at right angles in both directions. Rods shall be securely wired at intersections not over twelve inches apart in both directions and be installed centrally in the wall or panel.

(2) Where a structural steel frame is used the steel shall be protected with at least four inches of concrete, brickwork or its equivalent. Brick protection if used shall be filled solidly to the steel with concrete. (

3) The walls of a structure-supported vault shall follow the panels of the building wherever possible and shall extend from floor to ceiling of the building in each story where a vault is located. If vaults are located on more than one floor of a building, they should preferably be placed one above the other in the several stories.

(4) No combustible material shall be used for trim or partitions.

- Thickness. Walls for four-hour vaults shall be not less than eight inches thick if of reinforced concrete or twelve inches if of brick; walls for six-hour vaults, not less than ten inches thick if of reinforced concrete or twelve inches if of brick. A Class 350 rating is the requirement for protecting paper documents. Above 350°F (176.7°C) paper is distorted by the heat and information is lost. A Class 350-4 Hour vault must keep the temperature below 350°F. for at least four hours, with temperatures up to 2,000°F. (1093.3°C) outside the vault. Heavier walls may be required to take care of unusual structural conditions, loads or local hazards.
- Openings in walls.
  - (1) Interior walls of vaults, that is, those walls which are entirely within the building, shall be unpierced except for protected openings which are required for essential facilities specifically mentioned in this standard. Door openings shall be protected with vault doors.
  - (2) Exterior walls of vaults, that is, those which are exterior walls of the building, shall be unpierced except by exhaust vents essential for proper ventilation. Such openings shall be protected with approved dampers or with approved fire doors suitable for openings in exterior walls.
- There shall be no openings from vaults into elevator, stairway, conveyor or other shafts.

## **Roof**

- **Structure-supported** vaults. In structure-supported vaults, the roof or floor of the fire-resistive building may serve for the roof of the vault, if it is of noncombustible construction throughout and complies with the following requirements:
  - (1) The roof of the vault shall be of reinforced concrete or reinforced concrete or protected steel supports.
  - (2) The roof of the vault shall be at least six inches thick; if it is subject to unusual impact or exposed to undue fire hazard from outside the vault, it shall have a thickness equivalent to that required for the walls.
  - (3) All interior structural steel shall be protected with at least two inches of fireproofing.
  - (4) Roofs of vaults shall not be pierced for any purpose.

- **Ground-supported** vaults. In ground-supported vaults, the requirements in subdivisions (1) to (4), shall apply. In addition, in a non fire-resistive building, the roofs of vaults shall be entirely independent of the wall, floor, ceiling, columns, piers or roof construction of the building.

#### Vault doors

- **Classification.** Each door opening in the vault shall be provided with a vault door unit bearing a rating, in hours of fire-resistance, comparable to the classification of the walls of the vault. Ordinary fire doors such as hollow metal, tinclad, sheet metal or metalclad types, steel plate types and file room doors are not acceptable as vault doors.
- **Installation.** Installation of the vault door unit shall be made in conformity with instructions supplied by the manufacturer and shall be entrusted only to those experienced in such installation work.
- **Escape Device.** The door-locking mechanism shall be of a type enabling a person accidentally locked inside the vault to open the door from the inside.

#### Services to vault

- **Lighting.**
  - (1) Lighting shall be electric, with all interior wiring in conduit and installed. Conduit if exposed shall preferably be located on the ceiling; where it is carried through the wall of the vault the hole shall be made as small as possible and the space around the conduit shall be completely filled with cement grouting. Floors and roofs shall not be pierced for conduit. Generally accepted recommendations limited visible light levels for light-sensitive materials, including paper, to 55 lux (5 footcandles), and for less sensitive materials to a maximum of 165 lux (15 footcandles). Filters made of special plastics also help control UV radiation. Ultraviolet-filtering plastic films or UV-filtering Plexiglas can be used for windows to lower the amount of UV radiation passing through them. These filters, however, do not provide 100% protection against light damage. Drapes, shades, blinds, or shutters that completely block the light are preferable. Fluorescent tubes should be covered with ultraviolet-filtering sleeves in areas where collections are exposed to light. An alternative is the use of special low-UV fluorescent tubes.
  - (2) The wiring shall provide as many fixed lamps as needed for adequate illumination, and may provide a reasonable number of convenience outlets. There shall be no pendant or extension cord within the vault.
  - (3) Wiring shall be so arranged that both wires of the circuit are disconnected when the lights are out. Main switches shall be outside the vault and provided with a pilot light.

- **Ventilation.** Ventilation of the interior should preferably be through door openings. Where it is imperative that a ventilating system be provided, it should be recognized that the presence of this system adds to the possibility of entrance of fire or damaging heat from outside. The following safeguards shall be taken:
  - (1) All air conditioning apparatus, fans, filters, etc., shall be located outside the vault.
  - (2) Each duct shall be provided with an adjustable fire damper equipped with approved automatic means for closing it and shutting down fans in the event of fire outside or inside the vault.
  - (3) Ducts shall be located so as to avoid the possibility of records coming in contact with them.
  - (4) Where a duct is carried through the wall, its installation shall be such that it will not impair the ability of the vault to protect its contents. The floors and roofs of vaults shall not be pierced for ducts.

***Facilities:***

- The building in which records are stored must have adequate drainage systems to prevent flooding. If a leak or flood occurs, the drainage system for the building must be able to dispose of the water without causing damage to the records.



## **Glossary**

### **Access**

The right, opportunity or means of finding, using, or retrieving information.

### **Ground-supported vault**

Means one which is supported by the ground up and which is structurally independent of the building in which it is located.

### **Humidity**

The concentration of moisture in the atmosphere. See also relative humidity.

### **Fire-resistive building**

Means a building whose structural members are of noncombustible material throughout and which can withstand a fire completely consuming combustible contents, trim and floor surfacing on any floor without collapse.

### **Non-fire-resistive building**

Means a building whose structural members, including floors and roof, cannot withstand a fire completely consuming combustible contents, trim and floor surfacing without collapse.

### **Recordkeeping**

The creation and maintenance of complete, accurate and reliable evidence of business transactions in the form of recorded information.

### **Relative humidity**

The ratio, expressed as a percentage, of the amount of water vapour present in the atmosphere to the amount required to saturate it at the same temperature. In a closed environment, relative humidity varies inversely with temperature.

### **Structure-supported vault**

Means one which is supported by the framework of a fire-resistive building and which may be situated independently on any floor of such building

### **Storage**

The function of storing records for future retrieval and use.

### **Storage area**

For the purposes of this standard, a storage area is an area designated for storage of records. It may be a free-standing building, a sole-purpose room within a building, or a designated area within a larger storage space.

**Vault**

Means a completely fire-resistive enclosure so equipped, maintained and supervised as to minimize the possibility of origin of fire within and to prevent entrance of fire from without.

## **SOURCES**

Archival and Special Collections Facilities: Guidelines for Archivists, Librarians, Architects, and Engineers  
By Michele F. Pacifico and Thomas P. Wilsted.

Archival Storage Standards  
By National Archives and Records Administration

Recommendations for Shelving for Inactive Records Storage  
by Nancy Graham Moreland

Regulations of Connecticut State Agencies ,Standard for Fire-Resistive Vaults and Safes  
By Connecticut State Library

Storage Standard  
By National Archives of New Zealand