

SUGGESTED PRACTICES

for Museum Exhibit Case Construction and Alarming Design

as adopted by

**The Cultural Properties
Council**

of
ASIS International



**The Museum Association
Security Committee**

of the
American Association of Museums



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SUGGESTED PRACTICES
for
Museum Exhibit Case Construction
and Alarming Design

The Cultural Properties Council of ASIS International has adopted “Suggested Practices for Museum Exhibit Case Construction and Alarming Design,” as described in this document. “Suggested Practices” are not standards, and this document does not attempt to establish a standard. While industry standards might be recommended in this document, the use of the term does not imply that museums that do not adopt the recommendations are in any way negligent or in noncompliance.

Not all aspects of all recommendations within this document will apply to all museums; however, most will or can be closely adapted by any museum institution identifying itself as a museum or gallery. Smaller museums in particular may find it difficult to comply with the recommendations herein. The Council recognizes that museums are diverse in nature and there will be those for which these practices do not apply.

While the practices may apply to historic houses or sites, libraries, and other cultural properties, they were not specifically developed for these applications unless they function as “museums” rather than simply architectural sites.

Although the recommendations as adopted are voluntary, they represent the composite opinion of the leading experts in the field of museum security as being appropriate for most, if not all, institutions. In fact, there should be few exceptions. We are hopeful that Suggested Practices could be developed for these specific applications in the future. It is also our hope that, in time, Suggested Practices will be used by accreditation personnel as guidelines for evaluating the security of an institution.

The risk to any institution collection item is the result of a combination of several factors. The value, perceived or actual, of a collection item can vary greatly from item to item and is one of those factors that must be identified by the institution in order to establish the risk to any particular collection item. A complete threat and risk analysis (TRA) is recommended. For the purposes of this document, the value and impact of loss or damage can be quantified by one or several factors including, but not limited to:

- Intrinsic value
- Cultural value
- Research value
- Reputation of the institution
- Mission of the institution

The mitigation measures appropriate for reducing risk for any particular collection item should also vary and be in proportion to the perceived or actual value of the item.

Typically, objects in cases and displayed on platforms can be expected to fall into one of several risk categories, where the risk level can be expected to be established by the museum's collection and security staff (in the absence of a TRA). Following are sample definitions of levels of risk, not necessarily all-inclusive or definitive. Each institution must make determinations of levels or risk that are suitable. Objects on loan may carry conditions that require a level of protection above that which the museum would normally establish.

Low Risk

Items are not considered to be of great value or are of such material or composition that damage or theft would be impractical. Other items might fill their void if lost.

Security is provided in terms of physical construction and locks, railings, and/or barriers, if necessary, to keep the public at a safe distance.

Medium Risk

Items are of greater value (than Low Risk items) or are fragile and subject to damage.

Alarm contacts may be added to detect case opening or removal of vitrine top. Light attics are alarmed if they provide access into the area where objects are displayed. Platform displayed objects may be designed to permit use of curtain-type motion detectors with or without local sounders. Video recording should occur if equipment is in place at the facility.

High Risk

Objects are of high intrinsic value, are cultural icons, or are irreplaceable.

In addition to electronic protection, shock sensors should be provided to detect attempts at forcible entry. A higher level of case construction and locking would be sought. Locks would be rekeyed for each exhibit change to ensure key accountability. Video surveillance and recording would be in place.

Extremely High Risk

Display is a newsworthy event and every practical means should be employed to protect the object on a 24-hour basis. Objects are of high intrinsic value, are cultural icons, or are irreplaceable.

Protection is supplemented by the presence of security force personnel during public hours and either electronic space/area supplemental electronic measures after hours or 24-hour security officer coverage. Video surveillance and recording is in operation continuously.

Construction Materials for Cases

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It is important to realize some materials used in the construction/fabrication of display cases and supports are a potential source of damage to artifacts. Damage can be caused by volatile emission or migration of a material component. Typical visual evidence of these reactions are

- accretions: corrosion on metals or efflorescence on shells
- discoloration: stains on paper, discoloration of textiles
- tackiness: plasticizer on photographs
- dust: from degradation of polyurethane foam

Physical considerations must be taken into account. Poor weight distribution can cause distortion and cracking. Hard abrasive materials can leave marks on the artifact surface during shock or vibration.

There are several databases, reference articles, and publications available for research of these materials. One such information resource is the Canadian Conservation Institute Web page located at www.cci-icc.gc.ca/index-eng.aspx

The remainder of this document is presented to guide museum staff, exhibit case designers, and fabricators in the construction and alarming of new exhibit cases or rehabilitation of existing exhibit cases. Ideally, it is advantageous to install alarm devices and locks at the time of fabrication.

Glazing Materials

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For Items of

Low or Medium Risk

Acrylic glass or Plexiglas at least 3/8-inch thin (10mm) may be used in case construction. Designers are encouraged to increase the thickness of the material as the surface expanse increases. Plexiglass is not shatter resistant. Other choices that offer shatter resistance are available for a higher price.

For Items of

High or Extremely High Risk

Polycarbonate or laminated glass should be specified, but designers may consider a higher level of protection, such as bullet-resistance, if it is appropriate to the anticipated threat. Security laminates can also be applied to existing display cases, where the interior of the case is accessible for application of the product. It would be a very cost-effective retrofit for cases with glass or Plexiglas panels. Following a minimum of training, any case constructor would be able to apply the laminate correctly. Laminate is available in multiple levels of protection, which allows the institution to elect the level of protection to be applied.

- A.** The joining of vitrine tops to bases should be accomplished in a manner whereby the retaining screws are not visible and subject to removal. The preferred method is to secure the vitrine top from within the base, where an access door provides access to the screws. The preferred method of securing the molding is with recessed screws that are puttied over and painted. With the methods described above, there is no need for security screws.
- B.** Security screws are preferred as they require a removal tool not commonly found in hardware stores. Cases constructed under contract should be delivered with two security screw removal tools. Case bodies considered to be high security type (i.e., containing alarm devices) should not be constructed of material less than $\frac{3}{4}$ -inch (19mm) in thickness.
- C.** Where many high value objects are displayed in wood cases, it is recommended that 9-gauge expanded metal be sandwiched between two sheets of $\frac{3}{4}$ -inch (19mm) case material to provide additional physical security.
- D.** A vitrine-type case receiving alarm devices may require an access door that is large enough to allow an alarm technician to service and test wire connections at a terminal strip, and to service/adjust shock sensors, should they be installed. The preferred access door mounting method is the use of concealed hinges and a lock with captive key (i.e., a key that cannot be removed unless the lock is locked). If access is through a light attic, other alarm requirements apply and are outlined below. Vitrine tops should receive plunger-type alarm switches on two opposite sides (which will be wired together as one alarm zone). It is difficult to predict which type of alarm contact would best fit a particular application before a design is in hand.
- E.** Vitrine tops extending more than 24 inches (60cm) in any one direction should receive four alarm switches—one on each of the four sides—to protect against forcing a corner up to fish an object from the case.

F. A plunger-type alarm switch is typically placed between the base and the Plexiglas or glass top. One such switch is the type that has an adjustable 6-32 thread screw that provides fine adjustment between the base and top. This screw can be replaced with a longer screw if needed. The switch is a normally closed switch.

G. Plunger alarm switches need to “open” electrically as soon as the vitrine top is raised but is still within its “groove” in the base. Careful attention should be paid to the smoothness and size of the hole through which the plunger passes to avoid splinters and rough edges from interfering with the switch’s operation.

H. Alarmed vitrine cases should be protected with both alarm switches and a shock sensor. These shock sensors are screwed to the front of the inside of the case as close to the juncture of the base and removable top as possible. Cases with vitrine tops longer than 30 inches in any direction should be provided with two shock sensors, one at the inside front and one at a side. Two sensors provide greater sensitivity with less chance for nuisance alarms. In order to accommodate sensitivity adjustment to the shock sensors at time of initial testing and during the life of the exhibit, the sensors must be accessible at all times to permit an alarm technician to reach into the case to adjust the device.

I. All security devices that are used to protect display cases shall be wired to an electronically supervised (e.g., resistive) circuit, where any attempt to substitute, cut, short, or otherwise tamper with the circuit, will be detected by the monitoring system.

- A.** Cases with removable front Plexiglas/glass panels require alarm contacts on the left and right ends of the panels. If the panel can be pried open more than ½-inch at any location, additional alarm contacts will be required to detect this. Case design will dictate whether alarm plunger switches or magnetic contacts are more effective or more aesthetically pleasing. Generally speaking, plunger-type alarm switches are preferred over magnetic switches because they will provide an alarm indication before the glass is moved far enough to reach inside a case to access an object. Also, plunger and lever type switches are harder to defeat than a simple magnetic contact.

For Items of High or Extremely High Risk

Magnetic contacts can be of the “biased” type, where any attempt to substitute the magnet to defeat the contact will create an alarm condition. Shock sensors should be installed within the display case in these types of cases to ensure proper operation.

- B.** Placement of switches or magnetic contacts along the top of the Plexiglas or glass often minimizes their presence.

- C.** Where glass is used and mounted frameless, the magnets associated with magnetic switches should be attached to the glass with epoxy. The use of double-sided tape is not recommended for any installation.

- D.** Magnetic contacts and the shock sensor casing can be painted.

- E.** Motion detectors may be placed inside large cases. The plastic lens over the sensing element must not be painted.

- A.** Although usually not utilized / preferred by exhibition designers, sometimes it is necessary to include an access door on cases. Cases with hinged doors require alarm contacts on the operable side. Doors that can be pried open more than half an inch require alarm points at the top and bottom (wired together as one alarm zone). Either an alarm switch or magnetic contact may be suitable, depending on aesthetics.
- B.** If there are multiple access doors to valuable artifacts, each door shall be alarmed. Hinged doors that are alarmed can not have any loose fit or movement. Looseness causes intermittent alarms and adversely impacts the ability of a shock sensor to sense a strike on the case. If loose door fit is not anticipated during design yet appears at the time of final assembly, additional door locks or concealed protected door pins should be added at the time of installation.
- C.** A hinged access door, concealing alarm equipment connection points, requires a substantial lock that will resist tampering efforts. These doors require a magnetic alarm contact.
- D.** An access door without hinges that conceals alarm equipment/wiring must be securely fastened to prevent attempts to pry it open. These doors require magnetic alarm contacts on opposite sides of the door panel. This door should be wired as a separate alarm zone.

- A.** Display cases with a light attic on top and alarm devices installed requires the light attic door(s) to be of substantial construction. Metal is preferred over wood. However, if wood is used, it should be a minimum of ½-inch (13mm) with ¾-inch (19mm) support framing on the protected side to aid in reinforcement and to deter prying up the door with hand tools. Exposed hinges should have non-removable pins.
- B.** Cases with light attics and light diffuser panels should have the diffuser panels secured in place with continuous metal angle brackets fastened from above with security screws. For cases containing high value objects the diffuser panels should be provided with a laminated glass or metallic mesh barrier between it and the object below. The glass or mesh barrier should be securely affixed to the case structure to prevent easy lift-out.
- C.** Should alarms be installed, the location of the alarm wiring terminal strip is to be at one end of the light attic (near the case front or side) where a technician can service it. Should electronic shock sensors be included, it may be desirable for them to be serviced from the light attic. Cases with light attics and light diffuser panels should have alarm contacts on all four corners if any corner can be lifted from than ¼-inch (6.5 mm). The light attic door switches should be wired together as a separate alarm point.

Alarm switches and shock sensors protecting cases on stands (or those that are otherwise accessible from under an exhibit case) must be protected against alarm circuit tampering. One practical solution is to provide a screwed-on enclosure to prevent access to the alarm contacts or shock sensors. Such an enclosure should be provided with an alarm tamper switch to detect removal of cover. The wiring must be as protected as the devices. The tamper alarm circuit may be wired in series with the display case alarm circuit(s).

Motion Detectors on Platforms

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A.

Some objects on exhibit platforms can be successfully protected with motion detectors if several limiting factors are kept in mind.

- i. The protection pattern will likely extend many feet beyond the platform unless a wall is erected to block it.
- ii. The protection pattern typically expands with distance from the detector; careful detector placement is necessary to avoid inadvertent alarms.
- iii. The presence of the unit on the platform may be objectionable.

B.

Single curtain motion detectors are typically deployed around these types of exhibits. Motion detector casing can be painted, but the plastic lens over the sensing element must not.

C.

Typically a local sounder may be mounted at the platform location as a deterrent to individuals who may have trespassed into the alarm zone. A timer can be provided to silence the alarm after a preset time. Additional wiring to the security alarm system is recommended.

Situations may arise where exhibit wiring is difficult or impractical to install. In these situations, wireless communication and battery operated sensors provide a flexible solution for case and exhibit security.

A. Wireless alarms require battery powered transmitters installed inside the display case. Because they have to transmit radio signals to another location, they cannot be shielded or mounted in an all-metal enclosure (or within a metal case). Because batteries are used, access to the transmitters and sensors is needed for routine battery replacement. The transmitter must remain accessible at all times to an alarm technician.

B. A decision to use wireless alarms *changes* the selection of shock sensors and motion detectors from those used in wired applications.

For High Security Cases

Wireless alarms are not recommended.

C. Wireless case sensors need to transmit a radio signal to a wireless receiver located within range of the exhibit. The receiver should be in a secure area, with 110 volt power on the building's emergency power circuits.

D. Frequently, a wireless "repeater" is needed between the transmitter and the receiver. The repeater should be in a secure area, with 110 volt power on the building's emergency power circuits.

E.

Radio Frequency Identification (RFID) is fast becoming an important technology that can provide the traditional function of case sensors (i.e., switches and shock sensors) as well as asset protection and tracking through imbedded tags with unique ID numbers. These active RFID systems communicate every few seconds to receivers/sensors that are placed throughout a museum or gallery. Wireless range is typically estimated at 60 to 100 feet (20 to 30 meters), but may travel in open air up to 300 feet (100 meters). Systems available for case protection involve the placement of vibration or tilt sensors inside the case or case door. Pressure plinth devices can also be used under objects that will detect a change in weight as little as one ounce (26 grams).

F.

Many wireless alarm and communication systems (to include RFID) can be connected to non-proprietary security systems, video surveillance systems, and third party alarm software. They are expandable and scalable.

Locking devices typically are installed by the case fabricator and locks should be selected with interchangeable cores, permitting the institution to rekey them before artifacts are placed in the cases. Cut sheets of proposed locks should be submitted for review to ensure that rekeying is possible. For extremely high risk applications, a dual custom lock system may be desirable. The two locks would be keyed differently and keys would reside in two different departments. The preferred lock for access doors and light attics should have a bolt-throw of one inch. For high-risk artifact cases, a high-security restricted keyway lock cylinder is recommended to provide a high level of key security and pick resistance.



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