DISPLAY CASE SPECIFICATIONS FOR TEMPORARY EXHIBITIONS AT THE METROPOLITAN MUSEUM OF ART

This document, ***Display Case Specifications for Temporary Exhibitions,*** was created and is used by the Metropolitan Museum of Art (The Met). It was first published online in JAIC as Supplemental Online Material 2 associated with the article referenced below. This version has been updated since publication.

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Stephens, C.H, de Lapérouse, J.-F., Breitung, E.M., 2024. Temporary and Permanent Display Case Guidelines Developed Through Interdepartmental Collaborations at The Metropolitan Museum of Art. In *Journal of the American Institute for Conservation* 65(2):1-9. DOI:10.1080/01971360.2024.2337983

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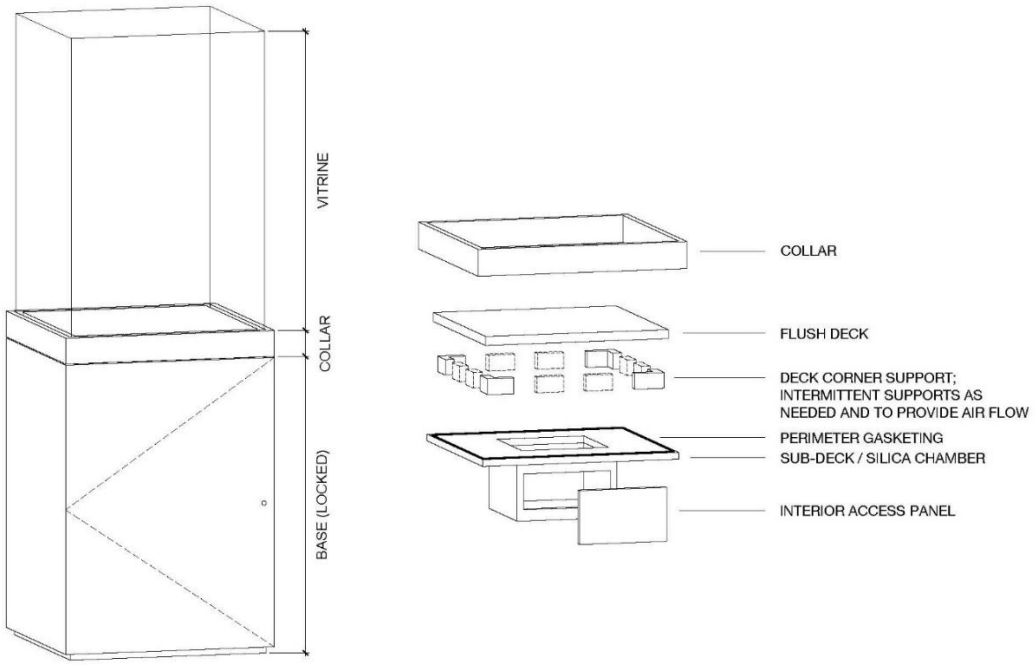
Maintained by the Metropolitan Museum of Art, Department of Scientific Research,
Eric Breitung, Research Scientist.

- These specifications apply to the design and construction of display cases meant only for use in exhibitions scheduled for up to 6 months.
- The document contains schematic and technical drawings of a free-standing case, preferred materials for construction, and design requirements.
- Adhering to the specifications provides clean, air-tight, and secure containers for artwork.

Schematic Design Diagram of Free-Standing Display Case*



*See Appendix for technical drawings of free-standing case and silica compartment.

Glossary of Terms

- **Access panel** – located on the base/pedestal, a locked door that allows access to the sub-deck.
- **Art envelope** – The air space in contact with the artwork. For sealed cases with silica compartments such as the one drawn above, the art envelope includes the bonnet and silica compartment and includes all materials used to produce those components, such as gaskets, fabric, paint, and adhesive. It may also contain blocks, removable deck, gaskets, back panel, backing board, and sub-deck.
- **Back panel/Backing board** – Not shown in the above diagram, this is a vertical panel that goes at the back of a case. Art can be hung from it.
- **Base** – The lower support that is beneath the bonnet and contains or hides the silica compartment.
- **Block** – used to place art at different heights within a case.
- **Bonnet or Vitrine** – Five-sided glass or acrylic lid that encapsulates the artwork.
- **Gasket** – Pliant, elastic material used to seal movable components such as the lower edge of the bonnet and silica compartment's interior access panel.
- **Label wedge** – Angled form for mounting art label/description.
- **Light attic** – Area above the bonnet and outside of the art envelope that houses light fixtures.
- **Pedestal** – Subset of casework comprised of a base but no bonnet.
- **Collar** – Removable strip that hides components of casework. In the above drawing the collar hides the gasket and deck support.
- **Display deck** – Removable and visible display surface at lower edge of bonnet.
- **Silica gel compartment/sub-deck** – Area/box typically beneath the removable deck or behind a back panel to contain silica gel or other absorbing agents that create a microclimate within the art envelope:
    - **The Met requires a silica gel compartment in free-standing cases and all other potentially reusable casework** (e.g., wall cases)
    - The sub-deck should be readily accessible from the side of the case to allow silica gel or other absorbents to be easily inserted or replaced without removing the bonnet as, due to security reasons, bonnets are not allowed to be removed without a registrar or courier present.
    - The volume of the silica gel compartment must be at least 1.5% of the internal volume of the case. For example, if the internal dimensions of a case are 6ft x 6ft x 10ft or 360ft^3, the silica gel compartment would measure at least 5.4ft^3.
    - A 3-inch air gap must be designed above the silica gel to facilitate air flow. Assume silica sachets will occupy 2 vertical inches, so the internal height of the silica compartment minimum is 5 inches.
    - An air gap or path of at least 3/8" is required between the silica compartment and upper display area that runs at least 90% of the outer perimeter of the display deck.
    - It is essential that the silica gel compartment be accessible without opening the vitrine of a display case or moving the installed art.

Recommended Materials for Constructing a Temporary Exhibition Case

To streamline temporary case construction, design specifications and a short list of tested and acceptable materials are outlined herein. If the exhibition requires casework that departs from these specifications, you must contact Scientific Research to initiate materials testing and communicate the results to the exhibition conservator early in the design process for approval.

If the design cannot be built with the listed materials, contact the Department of Scientific Research (DSR) for viable alternatives. If sufficient quantities of the listed materials are unavailable during the procurement process, it is critical that tested alternatives are pursued. Tested alternatives are available in the Met's display guidelines for loans, found on the Registrar's intranet page. Where tested materials are also not available, DSR will test proposed sourced materials to determine whether they should be used in and update the Met's internal database and specification documents.

Outside the art envelope: Casework

Casework is defined here as the supporting structure for the art envelope and includes free-standing pedestals, tables, platforms, label wedges as well as wall-mounted and wall-embedded structures. Any structure supporting art that will not be covered by a bonnet also falls into this category. All such supports should be made from non-volatile or low VOC materials since the gallery space is part of the exhibition environment. Examples of non-volatile materials include metal, stone, and ceramic. Low VOC materials include exterior grade plywood fabricated with Type 1 adhesive (ANSI/HPVA HP-1-1994 Type I), i.e., MDO, HDO, Medex®, and Medite® II. If solid wood is needed, cured and aged wood is preferred to freshly cut, and ash is preferred to oak. In almost all cases, it will be necessary to isolate the art from the surface of the casework using Mylar®.

All cases, pedestals, and platforms that have the potential for being reused must be constructed so that ALL internal spaces are accessible for cleaning between shows. This reduces the potential for insect and pest infestation.

Inside the art envelope

The following materials are **not** permitted for use within the art envelope:

- **Wood or wood-based products**, such as medium density overlay (MDO), Medex®, masonite, plywood, medium density fiberboard (MDF), particle board, pressboard, or chip board.
- All poly vinyl chloride (PVC) boards including Celtec®, Sintra®, Forex®, and Komatex®
- Wool, silk, leather, or jute
- Rubber-based adhesives
- Oil-based paints
- Acetoxy-cured silicones

Below are the materials prioritized for use within the art envelope.

FABRICS

It is necessary to Oddy test any fabric desired for use within the interior case environment as different colors from the same fabric line may test differently.

- For Creation Baumann (CB) brand cotton fabrics, request that fabrics be "pre-washed with detergent" by CB before purchase (chemicals found in unwashed fabrics can lead to failure of the Oddy test).
  - CB fabrics have recently tested between T and U reinforcing the need and requirement to test all fabrics prior to use.
- Flame retardant fabrics may not come in direct contact with art and require testing.

Product Name or Specifications	Manufacturer or Supplier	Last Oddy Tested	Oddy Rating
Unisono or Ultra lines of fabrics, any color - request washing *with* detergent when ordering	Creation Baumann USA Inc.	2016-2022 2022-2023	P-T T-U*
Designtex Gamut, post-consumer polyester	Designtex	2021-2023	P-T

*Unsuitable fabrics are not acceptable for use. Testing is required to select the most appropriate fabric.

ADHESIVES

Material Class	Product Name or Specifications	Manufacturer or Supplier	Last Oddy Tested	Oddy Result
Glues	White Gorilla Glue®	Gorilla Glue Company	March 2020	T
	Heavy Duty Construction Adhesive	Gorilla Glue Company	March 2020	T
	Super 77 multipurpose spray adhesive, 2 day dry	3M	February 2020	T*
	TS40 silane modified polymer	Merbenit	July 2018	P
	PL Premium polyurethane construction adhesive; "PL3X"	Loctite	December 2017	P
	3M: 3M™ Hot Melt Adhesive 3779Q	3M	October 2020	T

*Produced tarnish on silver coupons. Not recommended for use near silver collections due to recent issues with T-rated materials tarnishing silver in display cases.

Material Class	Product Name or Specifications	Manufacturer or Supplier	Last Oddy Tested	Oddy Result
Pressure Sensitive Adhesives	9731 double sided silicone adhesive	3M	January 2019	T
	VHB 4952 Acrylic foam tape	3M	September 2021	T
	889 preservation double sided tape	3M	October 2018	T
	Scotch ATG Gold adhesive transfer tape 908	3M	November 2019	T
	9731 high performance tape (double coated)	3M	January 2019	T

BONNETS, DECKS, BACKING BOARDS, and BLOCKS

Product Name or Specifications	Manufacturer or Supplier	Last Oddy Tested	Oddy Result
Any structural, laminated, or safety glass			
ASTARIGLAS® GP cast acrylic sheets 100% virgin PMMA	AstariGlas	May 2018	P
OPTIX Crystal clear, extruded PMMA	Plaskolite	May 2018	P
High density polyethylene (HDPE) board	AIN Plastics (supplier)	August 2016	P
Obomodulan® 500 (red)	OBO-Werke/McCausey Lumber	September 2021	P
Marine grade HDPE polymer sheet	King Starboard	July 2018	P

PAINTS

- Allow all coatings and paint to dry for *three weeks* prior to enclosing the art envelope.

Product Name or Specifications	Manufacturer or Supplier	Last Oddy Tested	Oddy Result
Regal Select® flat or eggshell paint	Benjamin Moore	May 2017	T

GASKETS

- Gaskets can be secured mechanically or with an approved, double-sided tape.

Product Name or Specification	Manufacturer or Supplier	Last Oddy Tested	Oddy Result
gray SPG silicone foam with silicone PSA backing adhesive	Netherland Rubber Co.	November 2020	T
Viton® 75A (A-500) tube-shaped gasket, white or black	Rainbow Rubber Extrusions, Inc.	April 2019	P

CAULKS

- Do not use acetoxy cured silicones inside or outside of casework. Neutral-cure silicones, specifically alkoxy-cured silicones are preferred.

Product Name or Specifications	Manufacturer or Supplier	Last Oddy Tested	Oddy Result
Gray 7091 neutral cure one-part silicone adhesive; 7-day cure	Dow Corning	November 2017	P
Black 7091 neutral cure one-part silicone sealant; 7-day cure	Dow Corning	August 2021	P

FURTHER CONSIDERATIONS:

MOUNTS, MOLDED SUPPORTS, AND PADDING

- Mounts should be fabricated in consultation with the Conservation Preparators in the Objects Conservation Department.

INTEGRATED LIGHTING

All cases are to be lit from outside of the art envelope.

Free-standing cases rarely require integrated lighting, and embedded wall cases more often require integrated lighting. If a case is to be built with integrated lighting, a special meeting must be called to verify its use. Include the lighting design team and Scientific Research Department in this meeting.

The energy/heat associated with museum lighting systems must be segregated from the interior of the envelope. Light attics embedded in walls require an opening across their top surface to allow the heat associated with light elements or fiber optic illuminators to dissipate away from the interior. If the light attic is enclosed or illuminators or power supplies are to be placed below the deck, those spaces must be outfitted with adequate means of air circulation – cross ventilation, chimney effects, or integrated fans.

SECURITY DEVICES

Security devices are required for all casework. For security reasons, the required number and type are not disclosed in this document. When designing a case or vitrine, contact the Security Office to ensure the proper number and type are included.

The Met utilizes a variety of security devices listed below:

1. [list of security devices removed]

If alarms are installed during the installation process, please coordinate with Buildings to schedule the proper time to enter and exit the exhibition space.

If there are questions about the security devices or how they work, please get in contact with the Security Office.

Resources and further information regarding material selection for building casework for temporary exhibitions

The approved and prioritized materials listed in this document are distilled from years of material testing and a practical understanding of use and availability. The vast majority of the materials tested at the Museum have proved inappropriate for adaptation or difficult to use or source. When considering materials either not listed in the recommendations above or are new to the market, consider going first to the Met's display case guidelines for loans (Registrar's intranet page), then their expanded list of tested materials on the Scientific Research Department's intranet page, and then to the American Institute for the Conservation of Historic and Artistic works (AIC) Oddy test Wiki site to see if that specific material or a similar one has been tested by another organization.

DSR's list of tested materials along with the AIC Wiki site are good starting points to get a sense of what types of materials might pass or fail the Oddy test. There are also a few basic concepts that may help in selecting potential materials for testing: pure materials are often better than mixtures, i.e., simpler is often better. Unfortunately, most of the laminates and composites with visual and/or functional appeal were created for the consumer market and not for the specific needs of preserving art. The more complex the material, the more likely it is that the material will off-gas multiple components that can react with each other or something else in the case.

It is difficult to predict what materials are safe for use solely by reading a material safety data sheet (MSDS) or knowing the main ingredients, nonetheless, the MSDS, if available, should be submitted to DSR along with the samples to be tested. When MSDS's indicate the presence of health hazards, amines, halogens (chloride, chlorine, bromine, etc.), formaldehyde, aldehydes, and acids, it often means that the material will be unsuitable for use within the Museum. Other examples of common bad actors are recycled materials, those containing bamboo or wood, laminates, and composite materials.

The AIC site, linked below, is recommended as a further resource for possible material choices not listed in this document. However, *it should be noted that the AIC's database is not a pre-approved list of materials,* and, therefore, DSR must be consulted before using materials selected from it.

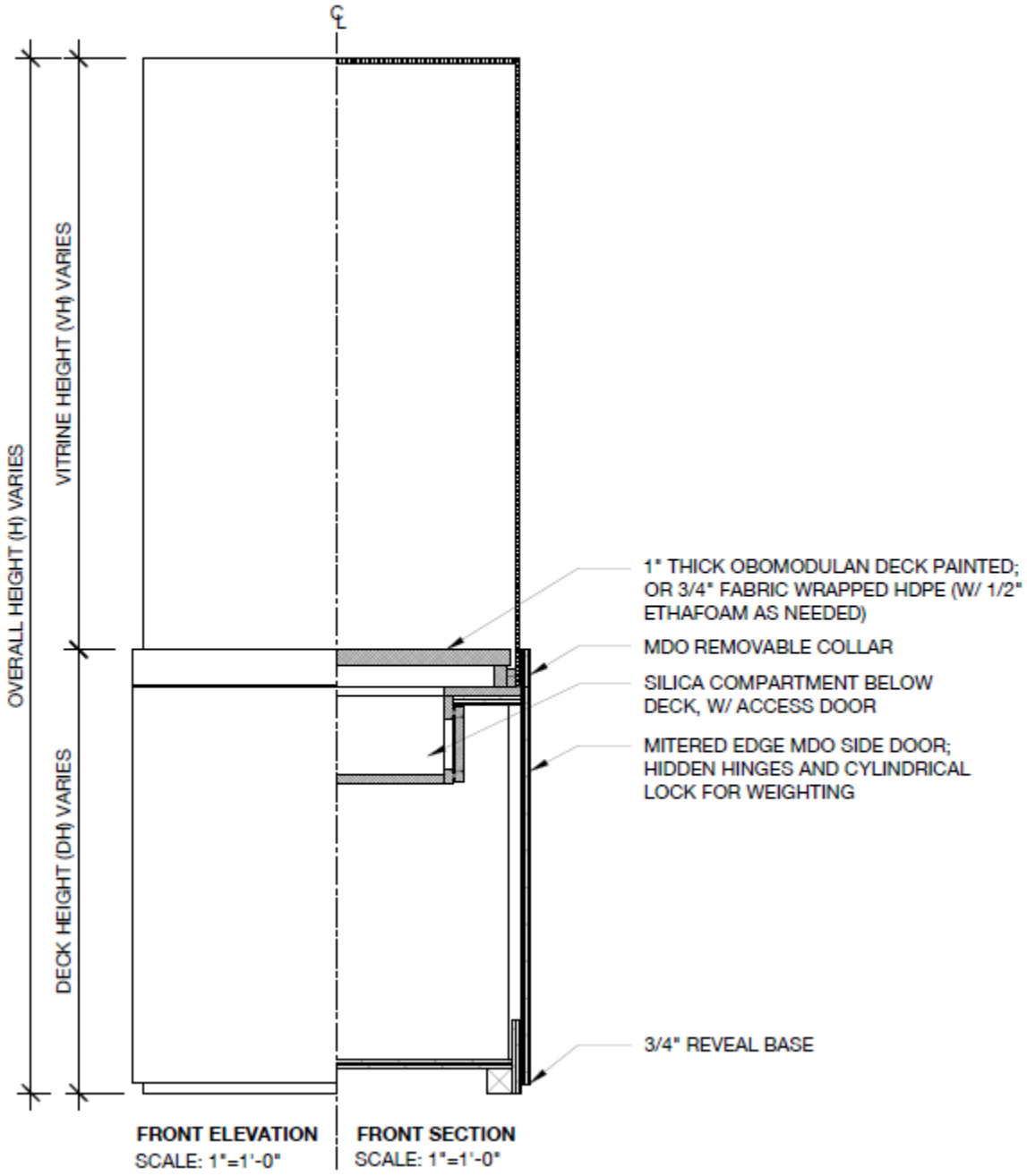
https://www.conservation-wiki.com/wiki/Materials_Testing_Results

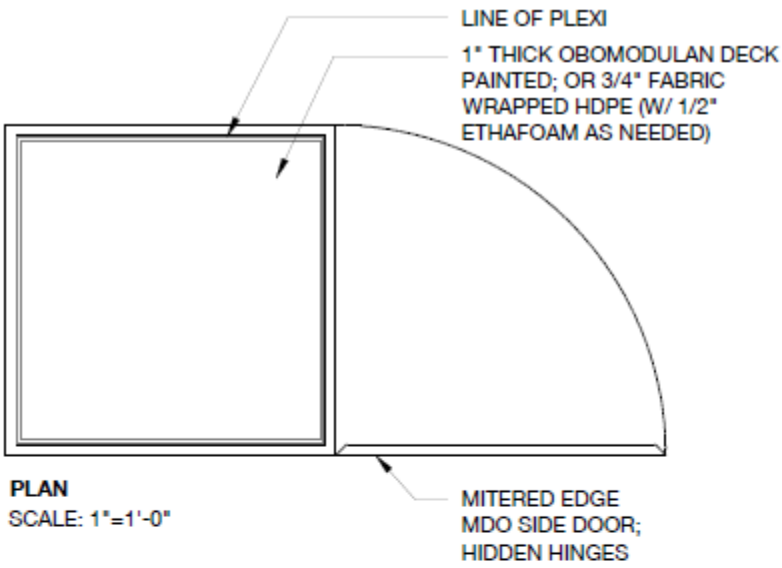
An extensive list of Met tested materials can be found here and includes materials that have been tested that are not suitable for use in the art envelope:

https://metropolitan.sharepoint.com/sites/ScientificResearch/Shared%20Documents/Forms/AllItems.aspx?id=%2Fsites%2FScientificResearch%2FShared%20Documents%2FOddy%20Test%20Results&viewid=7bca9a19%2D6f89%2D4f7e%2D97d8%2D577f90cdd17d

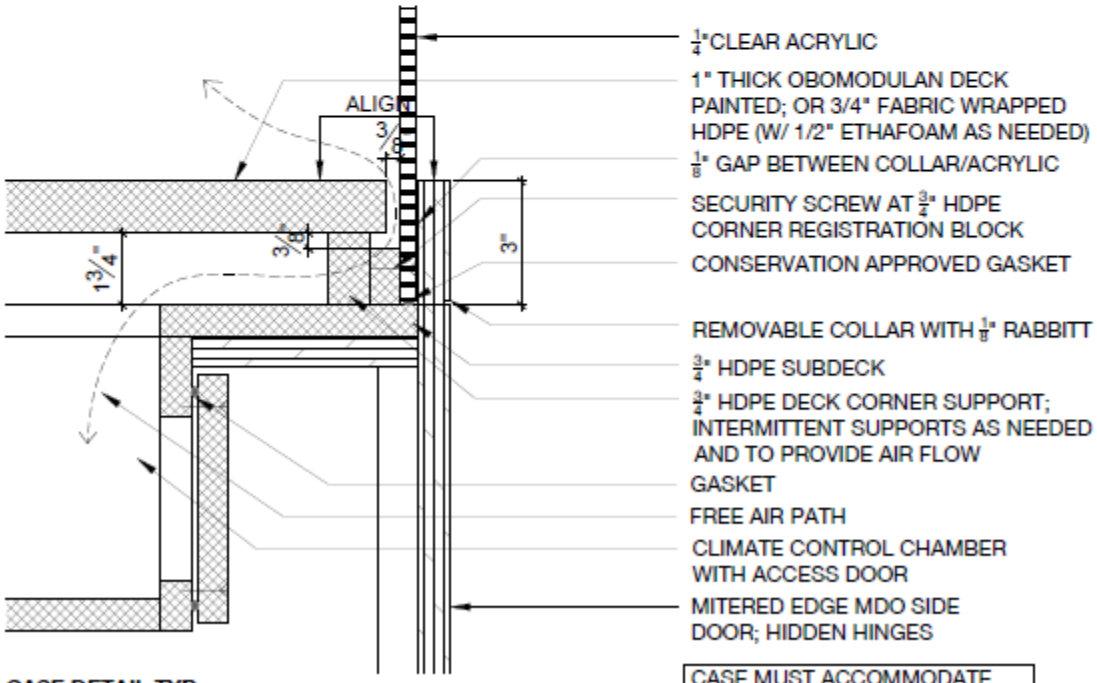
The Met's loan display guidelines can be found on the Registrar's intranet page:
https://metropolitan.sharepoint.com/sites/RegistrarsOffice77/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2FRegistrarsOffice77%2FShared%20Documents%2FMuseum%20Loans&FolderCTID=0x012000F307C028F1DC642911DAE59B02FA4A8

Appendix: Technical Drawings of free-standing case with silica compartment





PLAN
SCALE: 1"=1'-0"



CASE DETAIL TYP.
SCALE: 3"=1'-0"

CASE MUST ACCOMMODATE SECURITY PLUNGER OR ROLLER