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A BRIEF GUIDE TO HANDLING ART

77 Introduction: How to Use This Guide

79 Art Handling Skills and Tools

- 80 • Characteristics of a Good Art Handler
 - 80 • General Skills
 - 81 • Skills That Complement Art Handling Work
 - 82 • Basic Art Handling Tools
 - 83 • Basic Skills in Art Handling and Preparing Spaces to Display Artwork
 - 84 • Common Packing and Crate-Building Tools
 - 86 • Skills Needed to Pack and Crate Artwork
 - 87 • Skills Needed to Safely Transport Art
 - 87 • Other Related Skills
 - 88 • Common Moving Tools
-

89 Art Handling Guidelines

- 90 • General Notes on Art Handling
 - 93 • Handling 2D Objects
 - 96 • Handling 3D Objects
 - 98 • Moving and Packing Objects
 - 101 • Summary
-

102 Things to Remember When Handling Art: Tips from the Pros

112 Common Art Handling Equipment

115 Common Hardware

118 Materials Index

133 Technical Resources

INTRODUCTION: HOW TO USE THIS GUIDE

Robert Espinoza, Jose Hernandez, Rô/Si Vô, Jasmine Tibayan, Evelyn Bird, Cecilia Sweet-Coll, Desirée Monique Thurber, and Goziè Ojini at The Broad (photograph by George Luna-Peña).



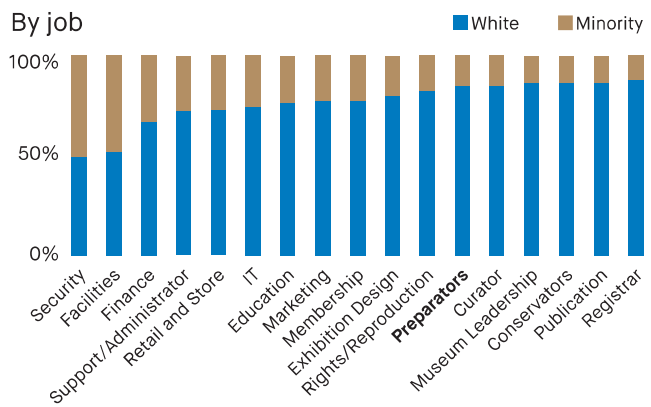
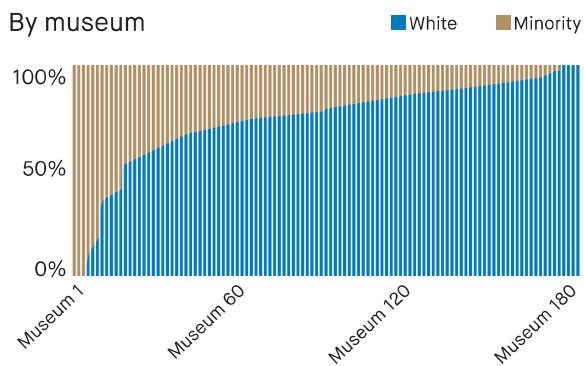
Who has access to art handling work? How do people get these kinds of jobs? What are the barriers to working in this field? We asked ourselves these questions in putting together this guide because we know that the inner workings of museums can be opaque and mysterious—for instance, the titles that museum professionals hold (curator, registrar, preparator, exhibition technician, collections manager) are not common outside museums.

This guide aims to crack open the door and give a peek into the world of art handling. It contains a lot of helpful information about what it takes to be an art handler, including the qualities that make a good art handler, the skills that art handlers need, and the kinds of common materials and types of equipment used to do this type of work.

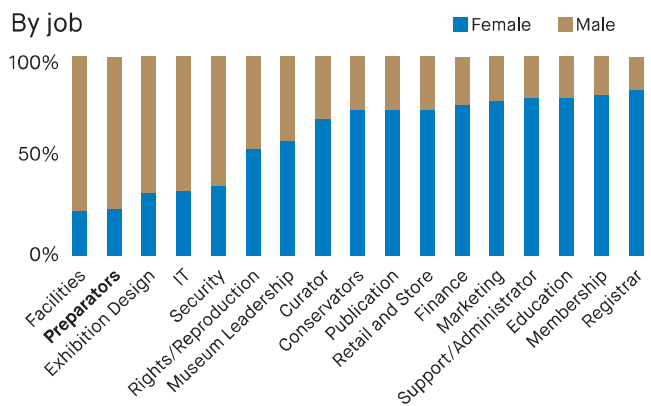
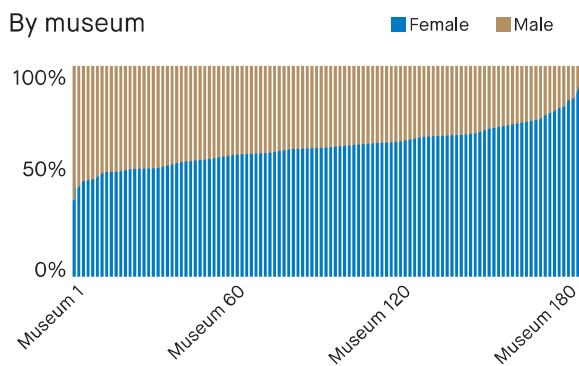
There is a need for more diversity, equity, accessibility, and inclusion in museums and the art world in general, and art handling teams are no exception. The Andrew W. Mellon Foundation's 2015 *Art Museum Staff Demographic Survey* found that about 85 percent of art handlers are white, and more than 75 percent are men.²⁶ Art handlers don't just work in museums; they also hold positions at galleries and art handling companies. In recognition of this, the DAP ensured that museums, art handling companies, university and nonprofit galleries, and fabrication companies were represented as partners and sites. This also gave graduates a wide variety of employment options. Research shows that teams in which individuals hail from diverse

²⁶ Roger Schonfeld, Mariët Westermann, and Liam Sweeney, *The Andrew W. Mellon Foundation Art Museum Staff Demographic Survey* (New York: The Andrew W. Mellon Foundation, July 28, 2015), 8, 11.

White (Non-Hispanic) and Underrepresented Minority



Gender



SOURCE: Adapted from Roger Schonfeld, Mariët Westermann, and Liam Sweeney, *The Andrew W. Mellon Foundation Art Museum Staff Demographic Survey* (New York: The Andrew W. Mellon Foundation, July 28, 2015), 8, 11.

backgrounds and perspectives are more productive, more creative, and better able to solve problems.²⁷

In addition to discussing art handling work, this section includes standards to best protect works of art. Museums collect all types of objects made of all kinds of materials, which makes it difficult for any manual to cover all the ways to handle every type of work. Artworks can be everything from insects to stone sculptures, etchings to animatronic figures, and tanks of toxic liquids to common household items.

This guide should be seen as a companion and introduction to the DAP Training Materials, which contain more detailed information and step-by-step instructions. The materials include all the online learning modules, and they will continue to evolve as we receive feedback from future cohorts of apprentices and partner organizations. There are also many additional resources about caring for museum objects; we included a list at the end of this section for reference. You can create a complete training

manual by printing this section and all the training modules and assembling them into a single binder, book, or PDF.



This guide is a companion to and introduction for the DAP Training Materials, which can be found at www.thebroad.org/dap/toolbox.

Neither this brief guide nor the toolbox as a whole addresses the identification, handling, or repatriation of sacred or ceremonial items or human remains. We defer to subject-matter experts on these issues. Resources about this topic can be found in Section 4 on page 141.

We hope this guide can take the mystery out of museum work for those who are interested in it—whether it be a high school graduate who knows their career path; someone working at a small museum or gallery who wears many hats, including that of a preparator; or a seasoned carpenter who wants to expand their skill set.

²⁷ David Rock and Heidi Grant, "Why Diverse Teams Are Smarter," *Harvard Business Review*, November 4, 2016.

ART HANDLING SKILLS AND TOOLS

*Alicia Teele installing a painting for
Outliers and American Vanguard Art at
the Los Angeles County Museum of Art
(photograph by Julia Latané).*



An art handler is someone who works directly with art or cultural objects in museums, galleries, or art shipping companies. This person packs and unpacks art; installs and de-installs artwork in galleries, museums, or private homes; and moves art to and from different locations (e.g., from a warehouse to another location across town by truck, across the country to a private residence or museum by cargo vehicle, from a museum gallery through hallways to a conservation lab or storage space by dolly). An art handler's duties and skills are wide-ranging and depend on the size of the organization they work for, the types of objects the organization holds, and how the responsibilities are assigned to staff at the organization.

Art handlers can have many different titles, including exhibition technician, production assistant, collections manager, conservation technician, or preparator. The responsibilities of an art handler may include loading or driving trucks, building crates or display furniture for galleries, installing audio and video equipment, choosing and aiming lights at objects, building and creating gallery environments, or making mounts to hold art objects in a specific way or to keep them safe in the event of an earthquake.

Characteristics of a Good Art Handler

A good art handler

- has good common sense;
- is careful;
- is handy and understands space;
- is curious;
- likes solving problems; and
- likes working around art and cultural objects.



Lance Bad Heart Bull at the Los Angeles County Museum of Art (photograph by Kya Williamson).

General Skills

An art handler should

- have good hand-eye coordination, manual dexterity, and spatial reasoning;
- be self-motivated, reliable, and focused;
- be able to follow instructions and plan ahead;
- have basic math skills;
- be able to communicate clearly;
- work well with others; and
- be able to perform physical tasks, including bending, kneeling, pulling, pushing, walking, standing for long periods of time, and lifting 50 pounds or more.

Skills That Complement Art Handling Work

These talents may translate well to art handling:

- Arts and crafts
- Automotive bodywork/mechanic
- Carpentry
- Construction (hanging and taping drywall, tiling, roofing)
- Cosmetology or hair styling
- Electrician
- Equipment technician
- Factory experience
- Food handling or preparation
- Housekeeping
- Jewelry making
- Landscaping or gardening
- Maintenance work
- Painting
- Plumbing
- Sewing
- Tattoo artist
- Theater stagehand or set builder
- Waiting tables
- Welding

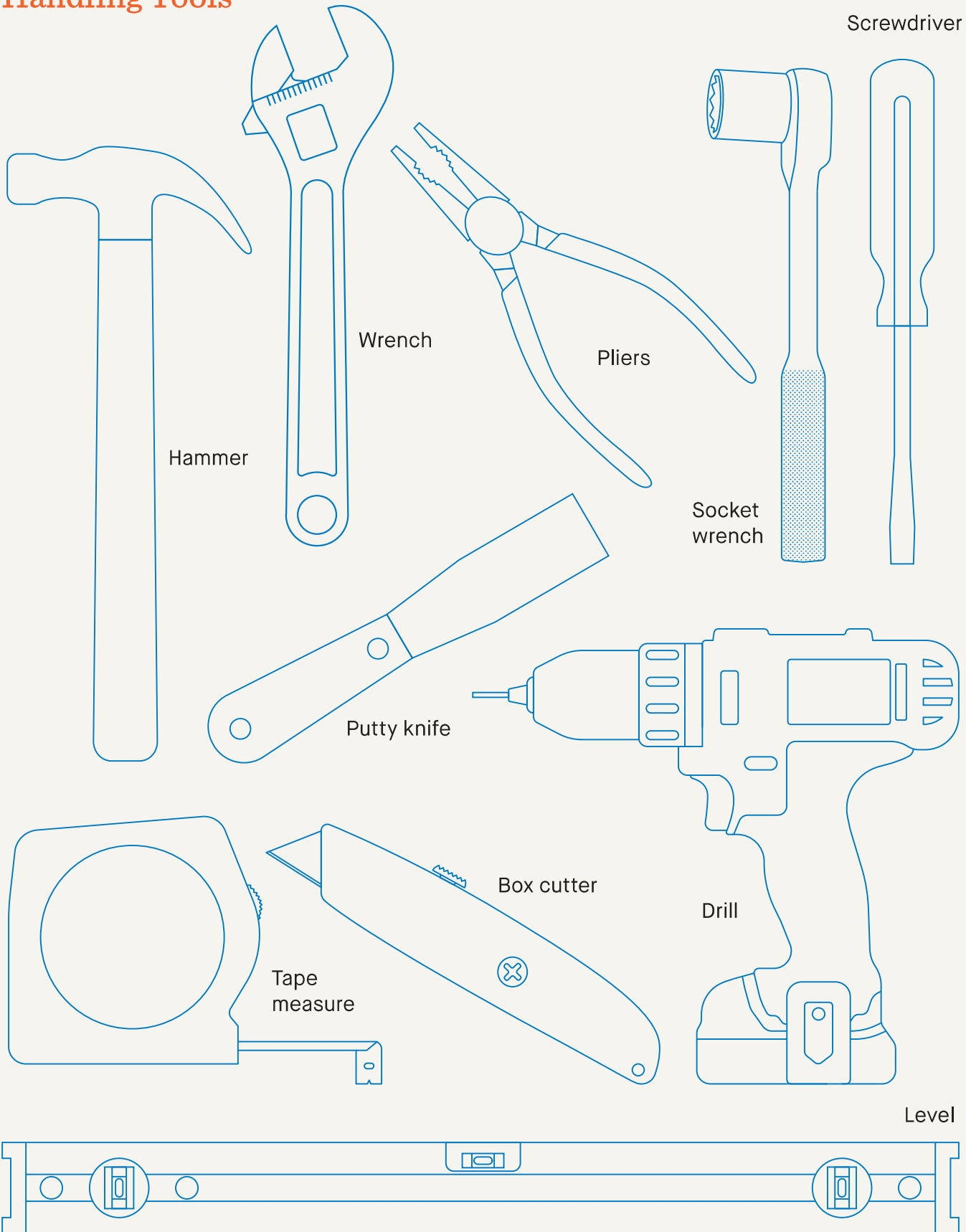


Evelynn Bird at the Academy Museum of Motion Pictures (photograph by Kya Williamson).

Basic Art Handling Tools

Illustrations are not to scale.

Screwdriver



Basic Skills in Art Handling and Preparing Spaces to Display Artwork

The following lists of skills are not exhaustive, and art handlers don't have to possess each and every one of them. They're good to have, but each handler will bring their own talents to the table in their work.

You should be able to

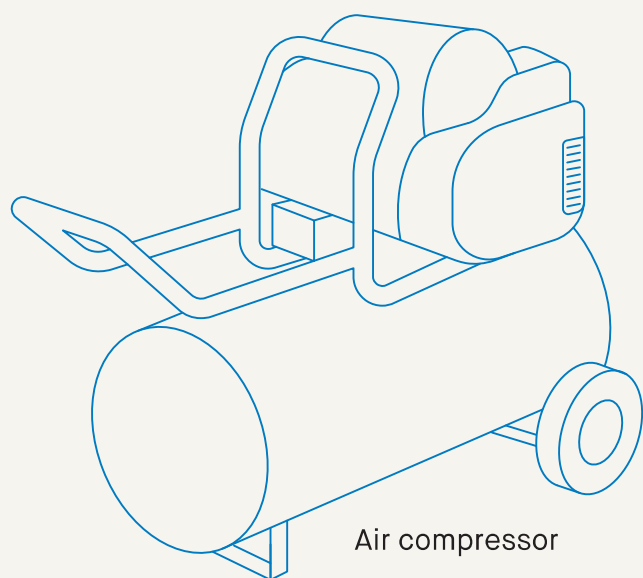
- use tools, including hammers, levels, drills, screwdrivers, sockets, pliers, wrenches, box cutters, and putty knives;
- read and use a tape measure;
- lift heavy objects. Art handlers are often required to have the ability to lift 50 pounds or more;
- handle 2D objects, such as works on paper or paintings;
- handle 3D objects, such as sculptures, furniture, musical instruments, and other objects;
- handle delicate or fragile objects;
- stack framed works safely;
- identify proper installation/hanging hardware;
- understand the differences between installation/hanging hardware; and
- hang art on a wall.



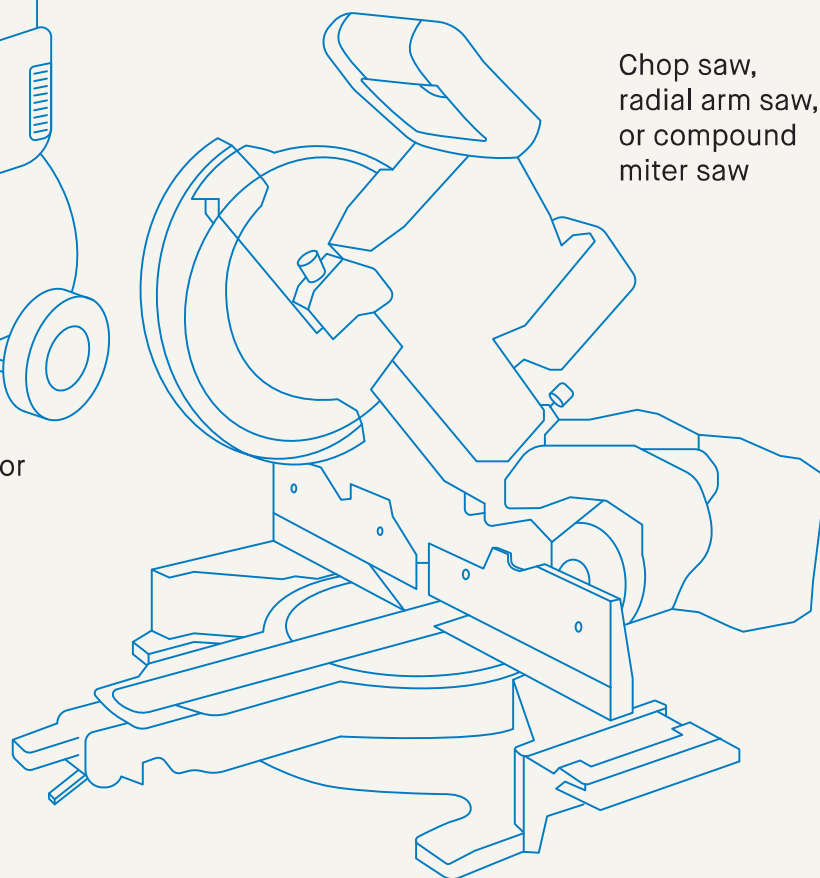
Desirée Monique Thurber at Building Bridges Art Exchange (photograph by Kya Williamson).

Common Packing and Crate-Building Tools

(in addition to the basic art handling tools
illustrated on page 82)



Air compressor



Chop saw,
radial arm saw,
or compound
miter saw

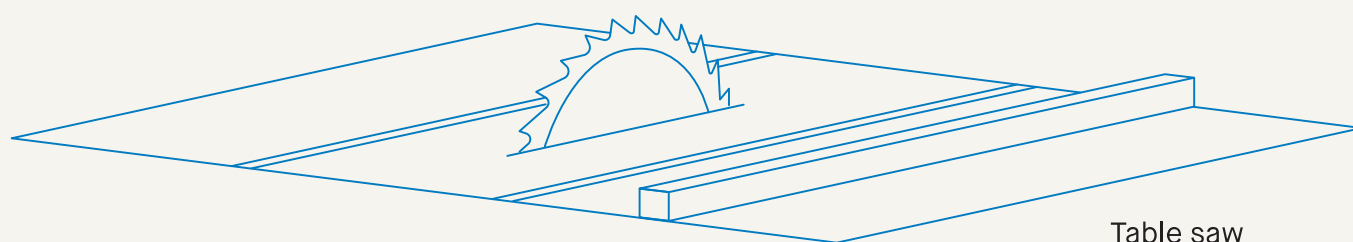
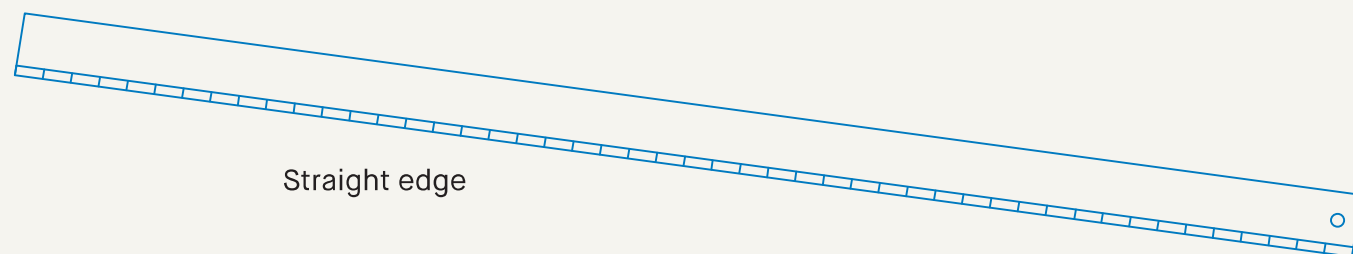
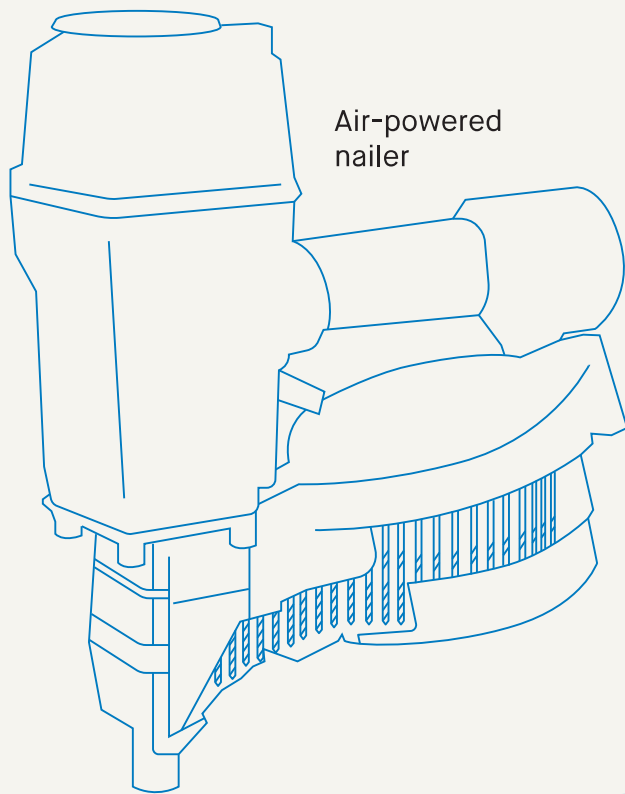


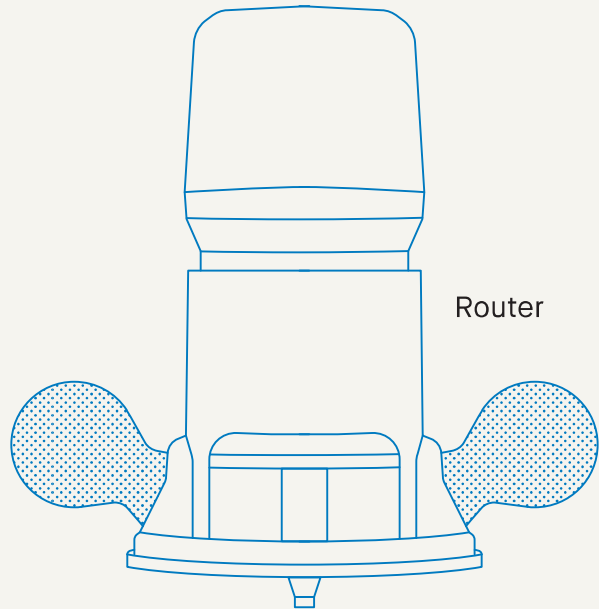
Table saw



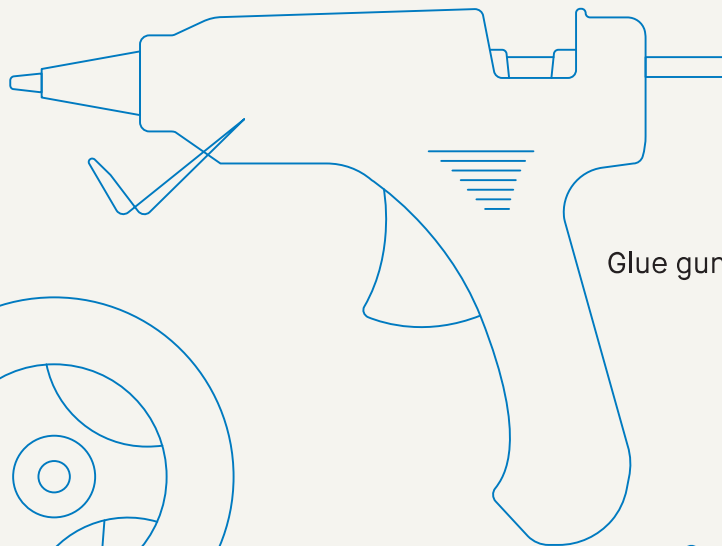
Straight edge



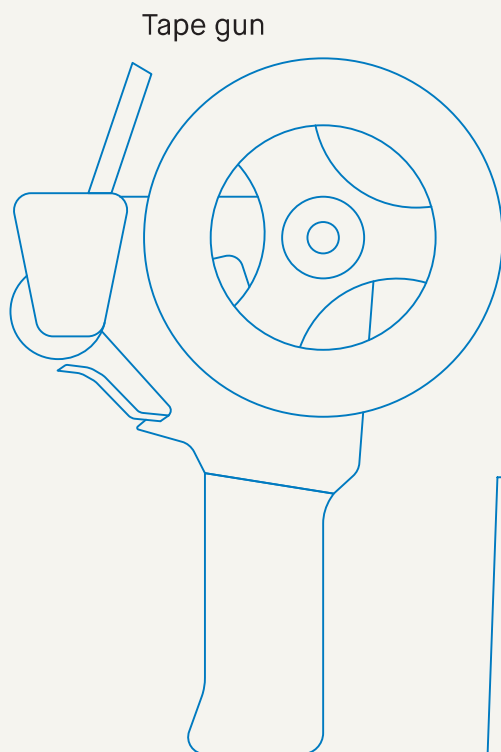
Air-powered
nailer



Router



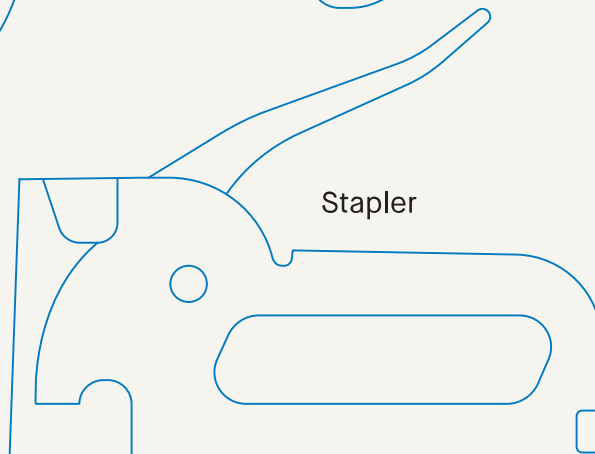
Glue gun



Tape gun



Foam
knife

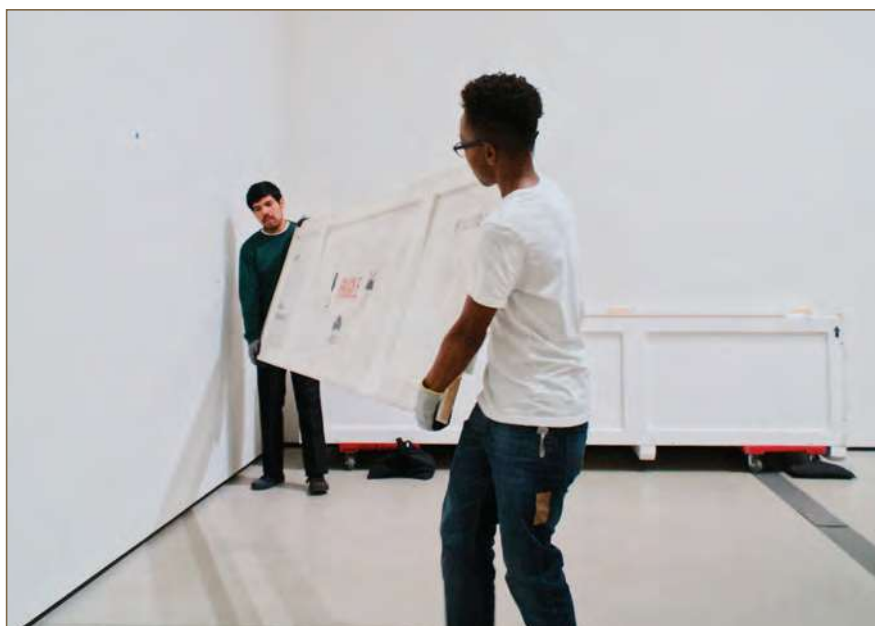


Stapler

Skills Needed to Pack and Crate Artwork

You should be able to

- use common packing and crate-building tools, such as table saws, radial arm saws or chop saws, routers, air compressors, nailers, staplers, glue guns, box cutters, straight edges, foam knives, tape guns, and tape measures;
- determine proper packing types and methods;
- know the differences among packing materials and when each is appropriate to use (see materials list on pages 118–32);
- handle crates, pack, and unpack objects;
- make cardboard slip cases for 2D works;
- cavity-pack objects;
- design and build crates; and
- add hardware to artwork and crates.



Eduardo Camacho and Nya Abudu opening a crate at The Broad (photograph by Kya Williamson).

Skills Needed to Safely Transport Art

You should be able to

- use moving tools, such as a Johnson bar (J bar), pallet jack, four-wheeled dollies, object carts, painting carts, A-frame carts, and flatbed carts;
- use safe lifting techniques;
- tie knots and use straps to secure loads to a cart or in a truck; and
- secure crates and packed artworks into trucks or storage spaces.

Other Related Skills

Art handler responsibilities may also include the following:

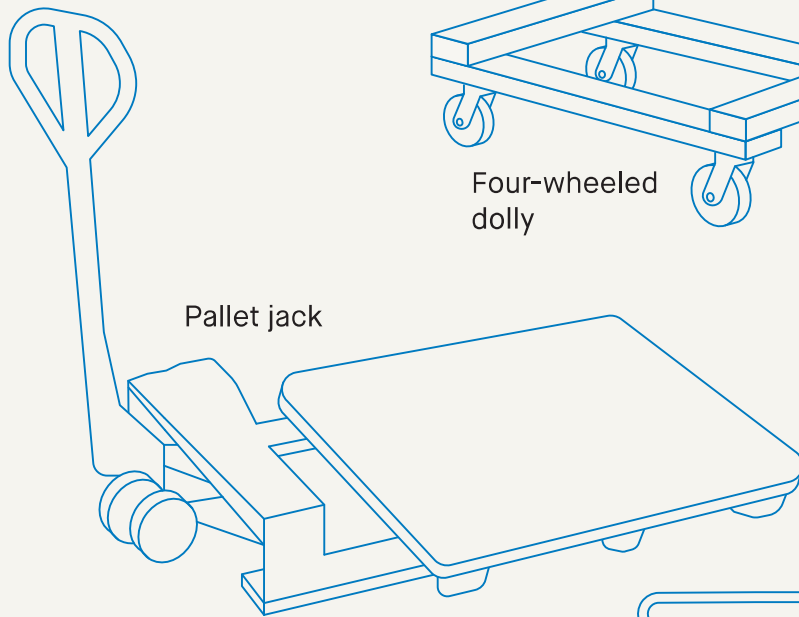
- Determine lighting needs, install and aim light fixtures.
- Do rough framing, drywall hanging and taping, painting walls, and scenic painting.
- Install audio-visual equipment.
- Make mounts, including weld, braze, shape metal, Plexiglas, or other materials to safely display art objects.
- Fabricate and install pedestals, platforms, showcases, and other exhibition furniture.
- Use computer skills for exhibition design, crate design, graphic design, and communication.
- Print and mount labels, text panels, and graphics, install wall and case labels and vinyl wall text or graphics.
- Understand environmental factors that can cause damage to objects or works, such as light, temperature, humidity, and pests.
- Mat and frame works on paper.
- Dress mannequins and handle costumes and textiles.
- Do preventive maintenance like dust and clean artwork.



Goziè Ojini at The Broad (photograph by George Luna-Peña).

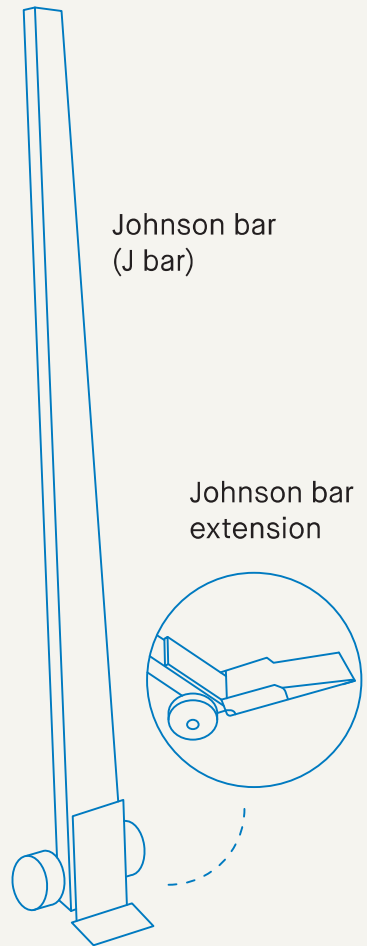
Common Moving Tools

Illustrations are not to scale.



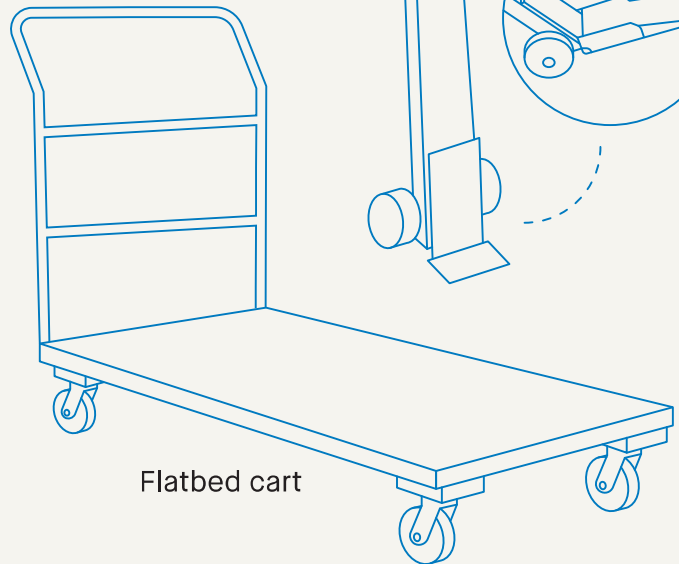
Four-wheeled dolly

Pallet jack

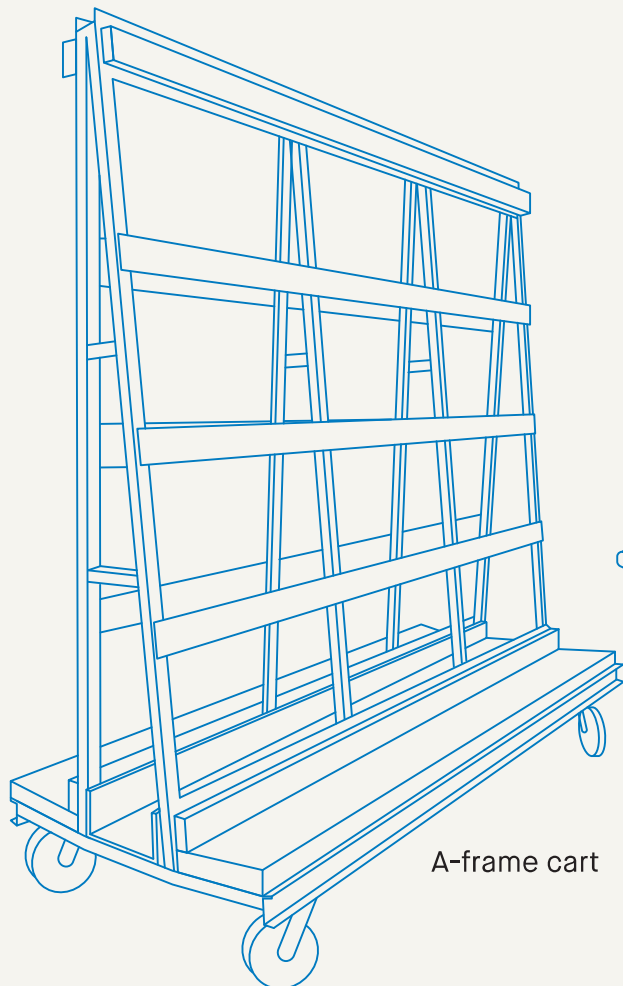


Johnson bar (J bar)

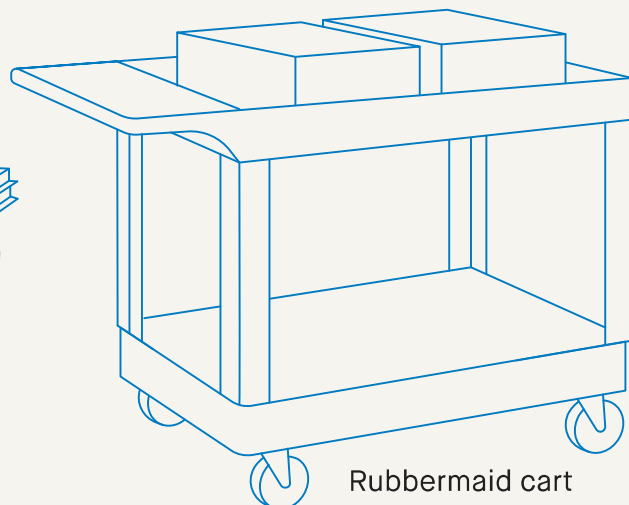
Johnson bar extension



Flatbed cart



A-frame cart



Rubbermaid cart

ART HANDLING GUIDELINES

Goziè Ojini, Vanessa Garcia, and Tina Matthews install a Jasper Johns work on paper at The Broad. Artwork: Usuyuki, 1995. © Jasper Johns / Licensed by VAGA at Artists Rights Society (ARS), NY (photograph by Kya Williamson).



The golden rule is to never handle art objects unless you absolutely have to. The biggest chance of damage to art objects is while handling or moving them. These tips aim to reduce the risk of damage to objects when they do need to be handled.

We use the terms *art*, *artwork*, *object*, and *cultural object*, but they all roughly mean the same thing in the context of this document. We sometimes use *object* to refer to 3D objects, as opposed to *flatwork*, which we use to refer to 2D objects.

Our primary goal is to preserve cultural objects for the future. It is an honor to work with these objects, each of which has been made by and in many cases used by a person or people. We encourage mindfulness and respect for the makers when approaching or handling objects.



More detailed information and step-by-step instructions can be found in the DAP Training Modules at www.thebroad.org/dap/toolbox.

General Notes on Art Handling

- Safety—yours, those around you, and the artwork being handled—is first and foremost.
- Approach the objects you're handling with calm and respect. Many of these items are irreplaceable.
- Don't handle art if you are sick, tired, or injured.
- Do not eat, drink, smoke, or chew gum around artwork.
- Use pencils, not pens or markers, around unpacked artworks.



Annamarie León preparing for a project at the USC Fisher Museum of Art (photograph by Kya Williamson).

- Wear comfortable, sturdy shoes and clothes and remove dangling jewelry, watches, keys, badges, and other things that could scratch or dent artwork while handling. Do not wear hats with brims, or, if you do, turn the brim to the back.
- Check pockets for pencils or pens that can fall out onto artwork when you lean over.
- Be prepared for the job at hand, think it through from beginning to end, and have everything you need ready (gloves, tools, hardware, carts, padded blocks, bags, dust masks, acid-free tissue, blankets, Ethafoam, etc.).

- Plan a move from the beginning to the end, give clear instructions to the crew, and follow the plan. Be sure the crew understands all instructions before making a move.
- Before you pick up an object, know where you are going to put it down. Be sure that the space is ready for the artwork and that the necessary blocks, blankets, and other materials to receive it are in place.
- Before moving artwork, check the dimensions of your path of travel and make sure it is clear.
- Move objects on a cart or on dollies when possible to minimize the risk of dropping. Keep large and heavy objects as close to the floor as possible during movement.



Alicia Teele and Lance Bad Heart Bull at Artex (photograph by George Luna-Peña).

- Inspect the object before handling. If an object appears too fragile to safely move or if there is any doubt about handling, transporting, or installing an artwork, ask for help or more information before handling.
- Note what materials the object is made from. Some materials (such as lead) are inherently toxic, and some objects (such as textiles and animal specimens) may have been treated with toxic pesticides or preservatives. Ask about and learn how to protect yourself from toxins that may be present.

-
- Loose, fragile, or moving parts are often designed to be separated from an object and should be removed, packed, and transported separately. Tie these components down with cotton twill tape or Teflon tape, if necessary.
-

- Some objects have special handling instructions; follow them and ask questions as needed.
-

- Know who is in charge. A team lead should be designated to communicate the plan, talk about ideas, and answer and address questions and concerns. The lead may be chosen formally or informally.
-

- Don't rush when you are working around art. Move slowly and carefully when carrying works of art.
-

- Don't make sudden or unnecessary movements around works of art. Be aware of what is behind and around you and be aware of the movements of others.
-



Arturo Guzman, Annamarie León, Tina Matthews, Jenalee Harmon, Elizabeth Hanson, and Alee Peoples at The Broad. Artwork: Julie Mehretu, Cairo, 2013 © Julie Mehretu (photograph by George Luna-Peña).

-
- Keep work areas clean and organized. Keep tools and hardware off the floor and put things away when you are finished using them. Clean work areas, with fewer trip hazards and less clutter, make it easier to find things when you need them and create a safer workspace.



Vanessa Garcia at the Autry Museum of the American West during the installation of the Masters of the American West exhibit (photograph by Kya Williamson).

-
- When working with art, pay attention to what you are doing. Do not make irrelevant comments or conversation during a move. Do not check your phone while handling or stabilizing artwork.
-

- Handle artwork with clean gloves or clean hands. After handling crates or tools, change gloves before handling artworks.
-



Rô/Si Vô at the Los Angeles County Museum of Art (photograph by Kya Williamson).

- Don't judge the value of an object. Treat every work of art as if it was the most important item in the collection.

- Handle only one art object at a time, no matter how small.

- Always use both hands when carrying artworks.

- Stop and report any damages or suspected damages to a supervisor immediately.

- If an object is damaged while handling or moving, continue to provide support for cracked or weakened parts, if possible or necessary. Do not move objects or broken pieces unless required to prevent further damage. Additional damage frequently occurs from well-meaning attempts to clean up after an accident. It is important not to test-fit broken elements, because rubbing them together along the breaks will make later repair more difficult. Never discard even the smallest fragment after an accident.

- When using a ladder or stepladder, have another person on the ground to take the object from the person on the ladder, or hand the object to the person on the ladder. Make sure the ladder is secure.

- When handling art with another person, mirror each other's positions to make movement more unified.



Michael Price, Cedric Adams, and Lance Bad Heart Bull at the Los Angeles County Museum of Art (photograph by Giorgio Carlevaro).

Handling 2D Objects

This section covers objects that are generally flat, such as paintings, photographs, prints, and other works on paper. The golden rule is to never handle art objects unless you absolutely have to. The biggest chance of damage to art objects is while handling or moving them.



For more information, see “DAP Training Module 3: 2D Art Handling Principles” and “DAP Module 7: Installation of 2D Artworks” at www.thebroad.org/dap/toolbox.

- Review the general notes at the beginning of this section.
- Handle artwork with clean gloves or clean hands. After handling crates or tools, change gloves before handling artworks.
- Handle only one art object at a time, no matter how small.
- Always use both hands when carrying artworks.
- Stop and report any damages or possible damages to a supervisor immediately.
- Generally, at minimum, two people should handle a 2D work if it is bigger than 3 ft x 3 ft, no matter how little it weighs.
- Don't pick up a framed work by the top rail. Don't lift framed work by the hanging hardware or hanging wire on the back of a frame.
- Don't pivot a 2D piece over on its corner. To change the orientation of a piece, lay it flat and then lift it into the desired orientation.

- If a painting or framed photograph is small enough to be carried by one person, it should be carried by the sides or with one hand supporting the side and one supporting the bottom.



Eduardo Camacho at the Vincent Price Art Museum (photograph by George Luna-Peña).

- Carry the work with the front surface facing you, so that the surface of the work is protected by the front of your body at all times.



Cecilia Sweet-Coll at the Museum of Latin American Art (photograph by Kya Williamson).

- When moving paintings, don't put your fingers between the stretcher bars and the back of the canvas. Avoid grabbing the wood stretcher in a way that forces your knuckles against the back of the canvas. Your fingers should not touch the front or back of the painting or wrap around the stretcher bar.



Juan Rojas and Annamarie León at the USC Fisher Museum of Art. Artwork: Eduardo Leyva Herrera, Heroé nacional, 2017. © Eduardo Leyva Herrera, Collection of the USC Fisher Museum of Art, Los Angeles (photograph by George Luna-Peña).

- Carry unframed paintings by grasping only the inner and outer edges of the stretcher bar, not the broader sides parallel to the canvas. When handling unframed paintings, be careful of painted edges and the sides of the painting.



DAP trainers Jack Williams and Ernesto Ceja at Crozier Fine Arts (photograph by George Luna-Peña).

- Unframed paintings require special attention because they are more exposed than framed paintings in several ways. Most of the rules listed earlier apply but with added details.



Jasmine Tibayan and Jennifer Gutowski at The Broad. Artwork: Glenn Ligon, Remember the Revolution #1, 2004 © Glenn Ligon; courtesy of the artist, Hauser & Wirth, New York, Regen Projects, Los Angeles, Thomas Dane, London, and Chantal Crousel, Paris (photograph by Kya Williamson).

- When handling framed works, be mindful of where you grab the frame. Avoid ornate details on a frame and avoid touching gilded areas with bare hands.



Jasmine Tibayan at the Los Angeles County Museum of Art (photograph by Julia Latané).

- Stretcher bars and frames may not be sturdy enough to carry the weight of the art they hold. They may be damaged or loose and may separate from the top of the artwork.



Nya Abudu, Vanessa Garcia, and Lillian Wimberly at Crozier Fine Arts (photograph by George Luna-Peña).

- Use arrows pointing upward and standard language, such as “Must Ride Upright” or “Must Ride Flat,” on soft packs to indicate the correct riding orientation.



Los Angeles County Museum of Art (photograph by Jordan Mesavage).

- Never drag covering (plastic, Tyvek, Dartek, etc.) across the face of an object when unpacking or uncrating.



Jasmine Tibayan, Nya Abudu, and Jennifer Gutowski at The Broad. Artwork: Christopher Wool, Untitled, 1991 © Christopher Wool (photograph by George Luna-Peña).

Handling 3D Objects

The biggest chance of damage to art objects is while handling or moving them. Never handle art objects unless you absolutely have to. This section addresses handling practices for 3D objects, which can be made of many different materials, including stone, glass, wood, metals, leather and other organic materials, or plastics.



DAP apprentice Rô/Si Vō assists Carlos Diaz, the Armory's former special projects and facilities assistant, with the installation of Tanya Aguiñiga: *Borderlands Within/La Frontera Adentro* at Armory Center for the Arts (photograph by Kya Williamson).



For more detailed information, see “DAP Training Module 4: 3D Art Handling Principles” at www.thebroad.org/dap/toolbox.

- Review the general notes at the beginning of this section.
- Handle artwork with clean gloves or clean hands. After handling crates or tools, change gloves before handling artworks.

- Handle only one art object at a time, no matter how small.



Goziè Ojini handles a small object at the California African American Museum (photograph by Kya Williamson).

- Always use both hands when carrying artworks.



Lillian Wimberly at the Los Angeles County Museum of Art (photograph by George Luna-Peña).

- Stop and report any damages or possible damages to a supervisor immediately.
- Don't pick up objects by their handles or projections—for example, don't pick up a teacup by its handle.



Andrea Perez-Martinez avoids the projections while holding a 3D object at the Los Angeles County Museum of Art (photograph by George Luna-Peña).

- Don't drag works of art across the floor, table, or any surface.

- Be sure you have the right number of people and the right type of equipment to handle large or heavy things. Too many hands are as dangerous to people and artwork as too few.



David Foster, Jasmine Tibayan, Kathryn Pinto, Julia Latané, Jordan Mesavage, Michael Price, and Tom Duffy de-installing Frank Stella's K56 (large version) at the Los Angeles County Museum of Art. Artwork: Frank Stella, K56 (large version), 2013. © 2021 Frank Stella / Artists Rights Society (ARS), New York (photograph by Errin Copple).

- Don't set objects directly on the floor or a table. You can scratch or abrade surfaces of objects or the floor by doing so. Use clean packing blankets, wood blocks, or Ethafoam blocks to pad the floor and use clean plastic, tissue, Ethafoam, or blankets to pad a table.



David Foster and Annamarie León at the Los Angeles County Museum of Art. Artwork: Judy Chicago, Pastel Domes #1, 1968 © 2021 Judy Chicago / Artists Rights Society (ARS), New York (photograph by Julia Latané).

Moving and Packing Objects

This section deals with packing and moving or transporting artwork. Once again, never handle art objects unless you absolutely have to.



Anna Nelson making a slip case for a framed artwork (photograph by George Luna-Peña).



For more information, see "DAP Training Module 5: Packing Methods and Materials" and "DAP Module 6: Transportation Methods" at www.thebroad.org/dap/toolbox.

- Review the general notes at the beginning of this section.
- Handle artwork with clean gloves or clean hands. After handling crates or tools, change gloves before handling artworks.



Nya Abudu and Jack Baker at the California African American Museum (photograph by Kya Williamson).

- Handle only one art object at a time, no matter how small.

- Always use both hands when carrying artworks.
- Stop and report any damages or possible damages to a supervisor immediately.
- Transport objects on a cart or with dollies when possible to minimize the risk of dropping. Keep large and heavy objects as close to the floor as possible during movement.



Nya Abudu at The Broad. Artwork: Andreas Gursky, F1 Boxenstopp III, 2007 © Andreas Gursky / Courtesy Sprüth Magers / Artists Rights Society (ARS), New York (photograph by George Luna-Peña).

- Don't move objects of different sizes, weights, or materials together without enough space and the appropriate barriers between them. Make sure objects are balanced and stable in the position you have placed them. Safely pad or secure if necessary. Don't overload carts.



Jasmine Tibayan and Jennifer Gutowski securing an artwork to an A-frame cart at The Broad (photograph by Kya Williamson).



Mark Wamaling talks about cart-stacking strategies with DAP apprentices during training weeks at Crozier Fine Arts (photograph by George Luna-Peña).

- Shock and vibration can harm art objects. Be aware of vibration during transportation, packing, and unpacking.

- Move carts slowly when crossing thresholds. Use shock-absorbing pads, like foam, blankets, or Sorbothane, on carts and pallet jacks for fragile works.



Gerardo "Shorty" Arciniega, David Foster, David Parker, and Annamarie León at the Los Angeles County Museum of Art (photograph by Julia Latané).

- Don't use impact drivers to open or close crates that contain artwork. Beware of using impact drivers or other tools that cause shock or vibration near artwork, especially on the same wall or on the other side of a wall where artwork is installed.



Nya Abudu opens a crate at the California African American Museum (photograph by Kya Williamson).

- Avoid moving or lifting objects over other artworks. For salon walls or grouped objects on a wall, start installing at the top, and work your way down, if possible.



Michael Price and Daniel Wheeler installing a salon wall for Yoshitomo Nara at the Los Angeles County Museum of Art.

- When unpacking objects, don't discard the packing materials. Damages caused by shipping are not always visible immediately. Inspect the packing material for fragments and accessories. Take note of the packing methods and materials and retain the old packing material in the crate or box to make repacking easier.



Jose Hernandez unpacks an object at the Vincent Price Art Museum (photograph by Kya Williamson).

- Try to keep artworks upright—the way they are displayed—because they were designed to carry their own weight in this default position. However, if an artwork is top heavy, lay it in a more stable position, if possible.



Jennifer Gutowski, Tom Duffy, and Vanessa Garcia pack a crate at The Broad (photograph by George Luna-Peña).



Vanessa Garcia closing a crate at The Broad (photograph by George Luna-Peña).

Summary

The golden rule is to never handle art objects unless you absolutely have to. The biggest chance of damage to art objects is while handling or moving them.



Lance Bad Heart Bull at the USC Fisher Museum of Art (photograph by George Luna-Peña).

- Because every artwork or cultural object is unique, art handlers are often required to use their judgment and experience in making decisions.
- Share ideas and discuss problems among coworkers to get to the best solution.
- Be careful and mindful and plan ahead.
- Mistakes will happen. It's important to learn from them and move on.

Again, we encourage mindfulness and respect for the makers and the objects we handle. Our care of cultural objects ensures the stories of our peoples live into the future.



Create a complete DAP Training Manual by printing or assembling this section and all the training modules found at www.thebroad.org/dap/toolbox into a single binder, book, or PDF.

THINGS TO REMEMBER WHEN HANDLING ART: TIPS FROM THE PROS

DAP graduates, mentors, advisers, and friends share tips from their years of experience handling artwork.



Nya Abudu holds a crate at the California African American Museum (photograph by Kya Williamson).

“ I would say that, for me, the most important thing to remember when handling art is that you have to **learn from your mistakes and learn from others**. I have personally learned the most from making mistakes and even seeing some mistakes that others have made and incorporated that into my knowledge. Making mistakes doesn’t ever feel good, but I think that, in the end, it helped with my confidence as an art handler. ”

Nya Abudu, Assistant Preparator, The Broad;
former apprentice, The Broad



Gerardo "Shorty" Arciniega directs a forklift driver at the Los Angeles County Museum of Art (photograph courtesy of the Los Angeles County Museum of Art).

“ One important thing to remember when you are lifting an object or a crate— **always mirror your partner so no one will get hurt.** ”

Gerardo "Shorty" Arciniega, Senior Art Preparator,
Los Angeles County Museum of Art; DAP mentor



Lance Bad Heart Bull at the Los Angeles County Museum of Art (photograph by Kya Williamson).

“ The most important thing I remember is to **be totally present in the moment when I am moving the piece**. Think about everything before and after but not during. Find out everything and work through as many processes I can remember in my head before moving. Clarify with everyone, then be quiet and let the leader lead or, if I am leading, then be loud and concise about directions. **Remember to communicate through each process**. And then after the piece is moved successfully, I think about the history of the piece, how many have touched the piece, etc., and revel in the uniqueness of what just happened secretly. ”

Lance Bad Heart Bull, Art Handler, Academy Museum of Motion Pictures; former apprentice, The Broad



Evelynn Bird assists on a mural restoration project with the Los Angeles County Department of Arts and Culture (photograph by Kya Williamson).

“ I feel as if the most important aspect when handling any artwork or object is that you **consider the history and cultural significance** the item may hold. I always try to approach each and every object with respect and care. The time and care I spend with an object is incredibly important to my learning as an art handler and as someone passionate about the expansive connection in which art brings people together. ”

Evelynn Bird, Conservation Technician, RLA Conservation of Art and Architecture; former Preparator, Autry Museum of the American West; former apprentice, The Broad



Eduardo Camacho at the Vincent Price Art Museum (photograph by George Luna-Peña).

“ I think it’s important to remember to **respect the object you’re handling**. Oftentimes, we work with objects that have survived thousands of years, objects that were once sacred or cherished. They’ve survived wars, looting, natural disasters, only to end up in your hands. I believe these objects carry a lot of spiritual energy, and we must treat them as such, which is why best practices are so important for the preservation of them. ”

Eduardo Camacho, Art Preparator, Los Angeles County Museum of Art; former apprentice, The Broad



Tom Duffy and Andrea Perez-Martinez at Crozier Fine Arts (photograph by George Luna-Peña).

“ **A little communication goes a long way**. If you are working with others, suggest your plan. Talk about how you intend to lift and move the object (and to what location you are headed) so that your peers can mirror and anticipate these actions. This also inspires confidence with the client and/or museum personnel who have contracted the work. If others then offer an equally safe and efficient method, adopt their strategy and learn from it. ”

Tom Duffy, Senior Art Preparator, Los Angeles County Museum of Art; DAP mentor



Robert Espinoza and Anna Nelson at The Broad (photograph by George Luna-Peña).

“ **When moving art, never be over-confident**, and let your coworkers know when and how you will be moving the art. ”

Robert Espinoza, Principal, Lignum Studios;
DAP mentor and trainer



Vanessa Garcia assists an artist installation at the L.A. Art Fair (photograph by George Luna-Peña).

“ **Have a plan before you act.** Know where you’re moving the artwork to, check that the path to the destination is clear, and confirm that your entire team is on the same page. ”

Vanessa Garcia, Assistant Preparator, The Broad;
former apprentice, The Broad



Jennifer Gutowski and Annamarie León at The Broad (photograph by George Luna-Peña).

“ **Communication is key!** Communicate with the registrar and with your teammates. Find out from the registrar how the piece is to be handled if you are not sure and then coordinate the movements with your teammate if the move requires more than one person. ”

Jennifer Gutowski, Lead Preparator, The Broad;
DAP mentor



Julia Latané at the Los Angeles County Museum of Art
(photograph by James Graham).

“ I often remind folks that the word *prepare* is in our job title . . . a well-planned and choreographed movement—where each prep understands and executes their role in collaboration with their teammates—inspires confidence in all our colleagues. ”

Julia Latané, Head of Art Preparation and Installation, Los Angeles County Museum of Art; DAP author and adviser



Annamarie León at The Broad (photograph by George Luna-Peña).

“ Every person you work with will have something to teach you—whether or not they realize it—so long as you are observant and patient. And given how much of this work occurs in teams, it helps to keep this in mind. ”

Annamarie León, Fine Art Packer, Artech; former apprentice, The Broad



Jordan Mesavage at the Los Angeles County Museum of Art (photograph by Julia Latané).

“ **Calm is contagious.** Stay focused and calm in any situation, and others will join. ”

Jordan Mesavage, Art Preparation and Installation Lead, Special Projects, Los Angeles County Museum of Art; DAP mentor



Kevin Marshall gives a behind-the-scenes tour at the J. Paul Getty Museum (photograph by George Luna-Peña).

“ Be prepared mentally as well as have technical skills and knowledge of the objects you are handling. I call this the five Cs, a mental checklist in the process for handling objects:

- **Common Sense**

If it seems like a bad idea, it probably is.

- **Communication**

It is important to communicate, since confusion can add unnecessary risk.

- **Cooperation**

Teamwork will minimize potential risks, another set of eyes and hands can be useful.

- **Coordination**

Planning the move. Who, what, when, where, how.

- **Control**

One person directs the operation. ”

Kevin Marshall, Head of Preparations, J. Paul Getty Museum



Goziè Ojini at the California African American Museum (photograph by Kya Williamson).

“ **Work ethic is everything.** Treat the small tedious work with as much attention and care as you would the larger more important work. ”

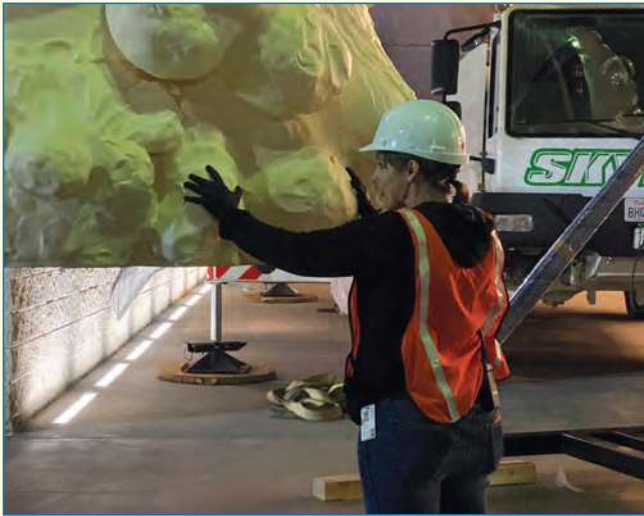
Goziè Ojini, Conservation Technician, RLA Conservation of Art and Architecture; former Preparator, Hauser & Wirth; former apprentice, The Broad



Andrea Perez-Martinez at Cinnabar (photograph by Kya Williamson).

“ The most important thing to remember when art handling is to remind my colleagues and my team that I am hard of hearing. Disclosing my disability can make others uncomfortable, but I have realized that, by doing so, I am **modeling clear communication and personal boundaries as an art handler.** It is empowering to take up space in this way because it encourages others to verbalize their needs and physical limits on the job. For me, this means repetition or rephrasing of instructions, having a visual map or plan for a specific piece of artwork, maybe even asking another art handler to switch tasks due to a physical limitation. Collective access to communication allows me and all art handlers to safely handle artwork and successfully complete our jobs. ”

Andrea Perez-Martinez, former apprentice, The Broad



Kathryn Pinto at the Los Angeles County Museum of Art
(photograph by Elspeth Patient).

“ I don’t like to use the word ‘easy.’ There are varying degrees of difficulty in art handling as in many things, but **the easy projects are a chance to rehearse best practices for the harder projects.** ‘It’s a good drill,’ as my fire-fighter friend would say if you ask him why the fire department rescues dogs from the L.A. River in a rainstorm. The swift water boat teams and helicopters are already deployed: It’s a good drill for rescuing humans.

Every move, no matter how low the stakes, is a valuable opportunity to practice the techniques that are needed for difficult and demanding projects. ”

Kathryn Pinto, Senior Art Preparator, Los Angeles County Museum of Art; Preparator, The Broad and the Autry Museum of the American West; DAP mentor



Kristin Strid at the Los Angeles County Museum of Art
(photograph courtesy of the Los Angeles County Museum of Art).

“ **Breathe.** ”

Kristin Strid, Head of Collections Management, Los Angeles County Museum of Art; DAP mentor



Alicia Teele at The Broad (photograph by George Luna-Peña).

“ There is a sacred nature to art handling. No matter what the object is, you are the steward of cultural treasure. **I maintain a consistent respect for everything left in my care.** ”

Alicia Teele, Art Preparator, Los Angeles County Museum of Art; former apprentice, The Broad



Jasmine Tibayan and Anne Mersmann at The Broad. Artwork: Mark Bradford, *Deep Blue*, 2018. © Mark Bradford; Courtesy of the artist, and Hauser & Wirth, Los Angeles; and Glenn Ligon, *White #5*, 1993. © Glenn Ligon; Courtesy of the artist, Hauser & Wirth, New York, Regen Projects, Los Angeles, Thomas Dane, London, and Chantal Crousel, Paris (photograph by Kya Williamson).

“ **Spatial awareness is an essential skill** for every art handler to have in their mental toolbox.

- Clear the art path and prepare the destination so that you can move safely from point A to point B.
- Communicate—especially if something disrupts your movement or feels uncomfortable.
- Stand clear if you are not handling art or in a designated support role so that others may move freely.

You minimize potential risks when you are thoughtful about how your body moves in relation to others and the objects being handled. ”

Jasmine Tibayan, Art Preparator, Los Angeles County Museum of Art; former apprentice, The Broad



Lillian Wimberly, Nya Abudu, and Mark Wamaling during DAP training weeks (photograph by George Luna-Peña).

“ **Art handling is more than a set of rules of what to do or not do.** It also involves understanding the mediums and structures that make up art and artifacts [and the] dynamics of contact for support as well as the materials and equipment used for handling and packing. ”

Mark Wamaling, Chair, Preparation, Art Handling, Collections Care Information Network; DAP adviser



Lillian Wimberly at the Los Angeles County Museum of Art (photograph by Kya Williamson).

“ Always keep yourself and the art safe. **Know your limits, don't let others define them for you.** Make a plan and anticipate any potential issues. ”

Lillian Wimberly, Preparator, J. Paul Getty Museum; former apprentice, The Broad

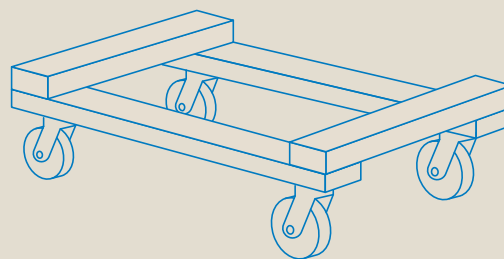
COMMON ART HANDLING EQUIPMENT

This section covers commonly used equipment for moving or lifting art and objects and organizing tools. We often look to other industries for specialized equipment depending on the size, weight, and material of an object. For example, equipment designed for moving glass or stone can be useful. Many companies, museums, and galleries build or customize their own carts to use for moving tools or artwork.

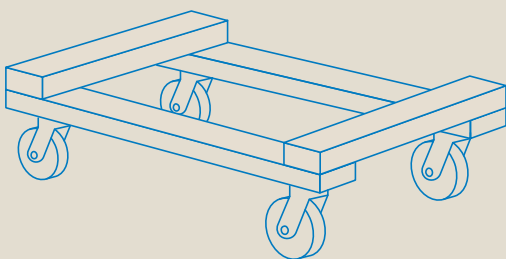
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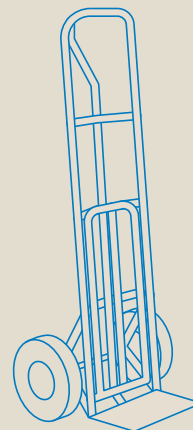
A-frame cart: This cart is often used to transport paintings, framed works, or flat objects.



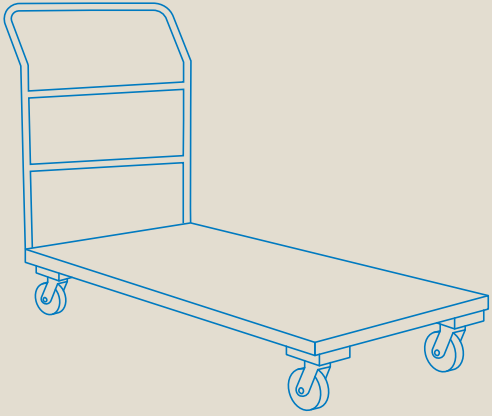
Dolly (four-wheel): These are often used to move crates and exhibition casework. Four-wheel dollies have four swiveling wheels, whereas directional dollies have two fixed wheels and two swiveling wheels.



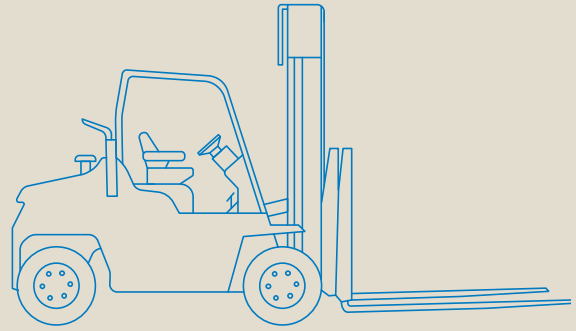
Dolly (directional): Directional dollies are often used to move tall and skinny or skinny and heavy crates to keep the dolly from kicking out to one side. They are sometimes called mirror dollies because they are often used to move crates containing glass or stone slabs.



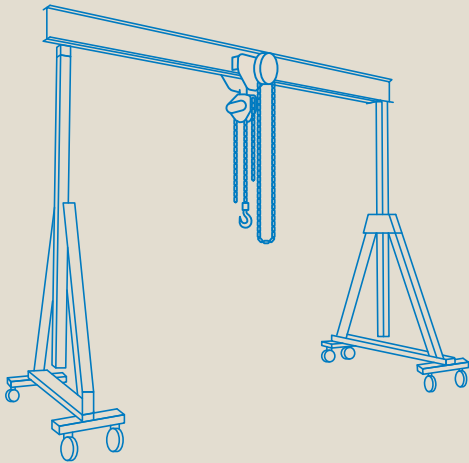
Dolly (upright): Upright dollies are used to move smaller boxes and can be used as a lever to lift the end of a larger crate.



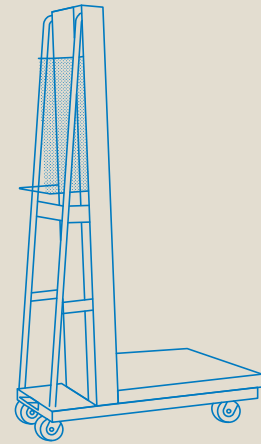
Flat cart: Flat carts can be used to transport a wide range of items, such as mannequin stands, sculptural objects, or boxes.



Forklift: Forklifts can be used to move very heavy objects, and to lift things up to high storage shelves.



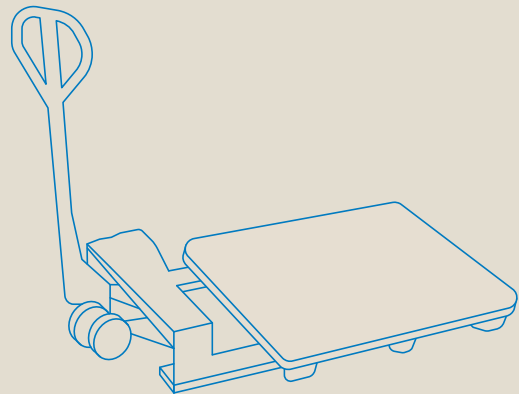
Gantry: A gantry is a type of crane used for lifting heavy things from above.



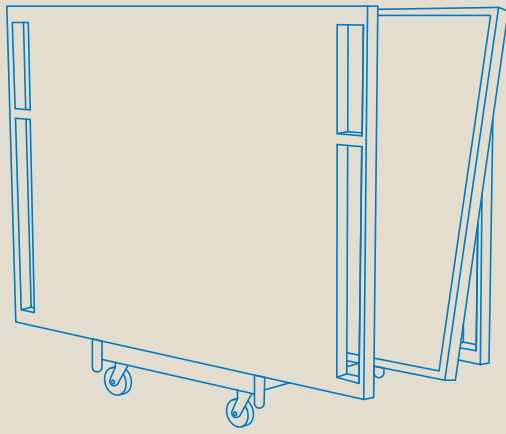
Hydraulic lift: There are many types of manual lifts, including hydraulic and winch operated, that are used to lift heavy things.



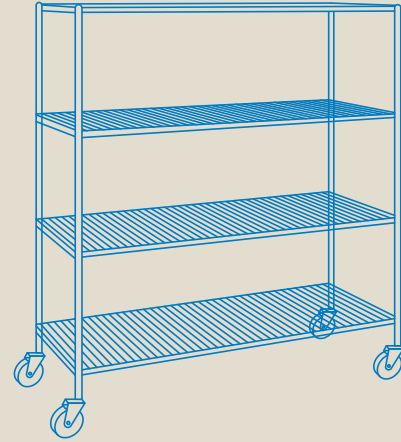
Johnson bar (or J bar): The J bar is a lever used to lift the end of a heavy crate to place a four-wheeled dolly or something else under it.



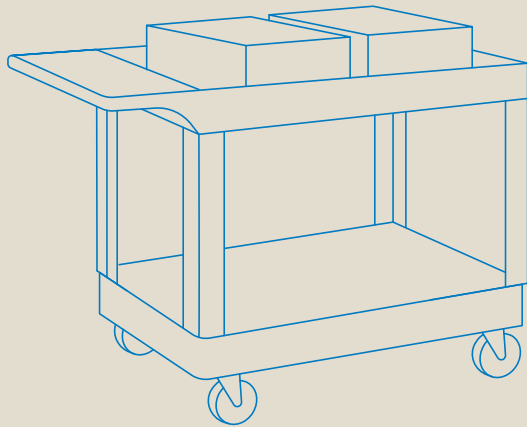
Pallet jack: Used to move pallets and crates.



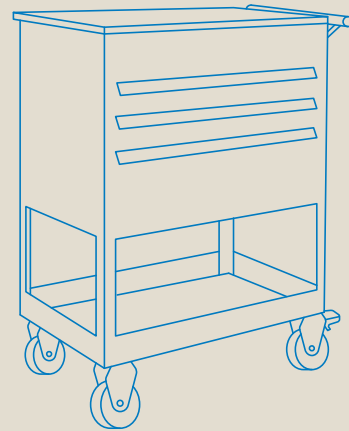
Panel cart: There are many styles of panel carts used for flatworks and panels.



Rolling shelving and pastry/metro carts: For moving and storing smaller 3D works.



Rubbermaid cart: Versatile carts for moving tools or small to midsized artworks.



Tool cart: Houses and organizes hand tools and supplies.

COMMON HARDWARE

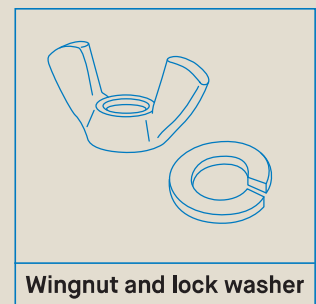
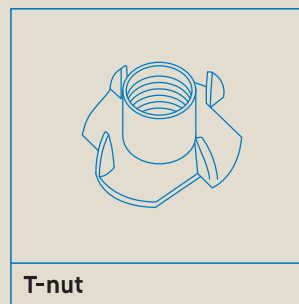
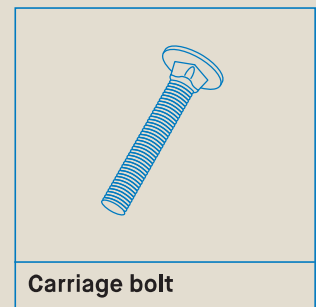
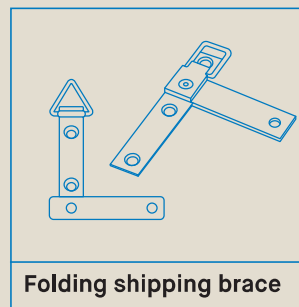
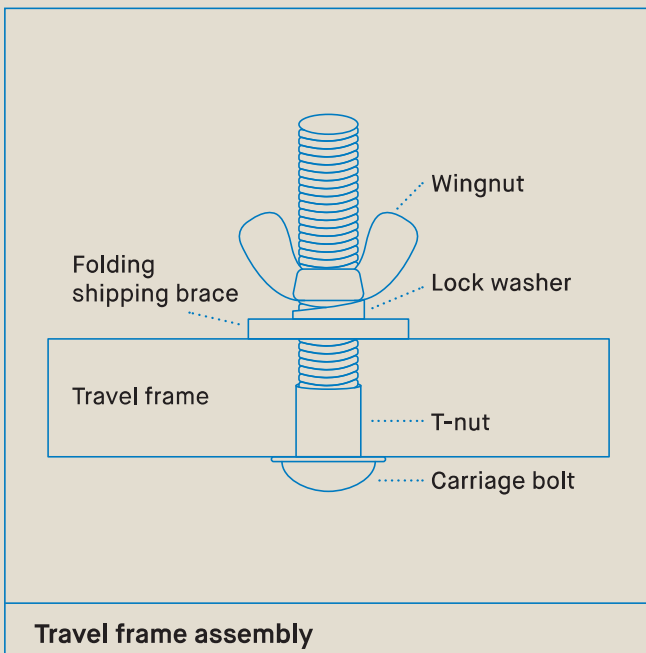
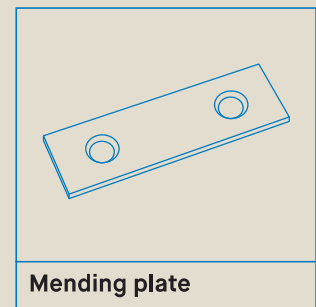
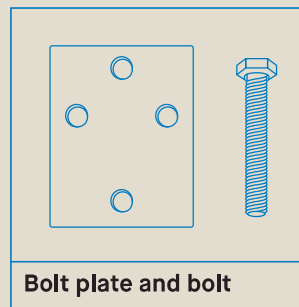
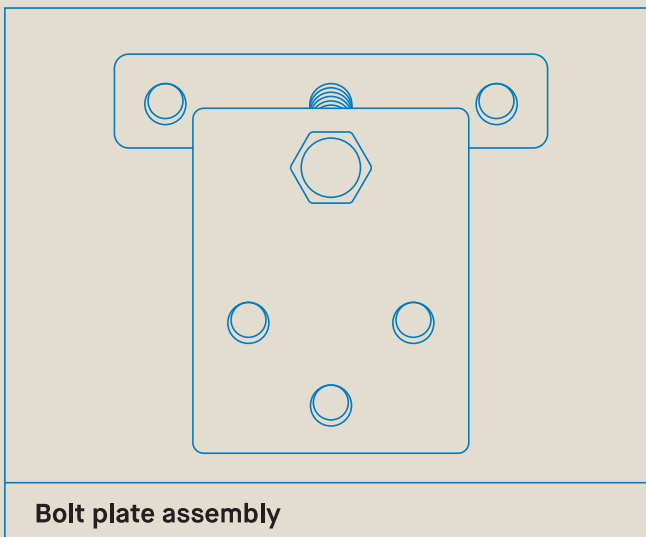
This section covers commonly used specialty hardware for packing and installing art. We also use general purpose hardware like staples, brads, nails, screws, nuts and bolts, and all types of anchors for wood, drywall, and concrete. Many art handlers also make custom hardware and mounts.



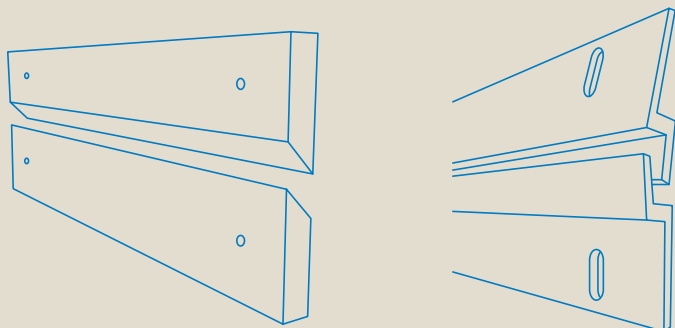
For more information on these items, see "DAP Training Module 7: Installation of 2D Artworks" and "DAP Training Module 5: Packing Methods and Materials" at www.thebroad.org/dap/toolbox.

Hardware for packing

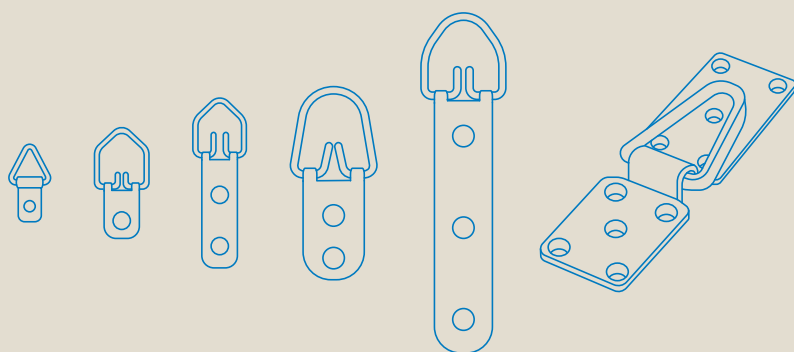
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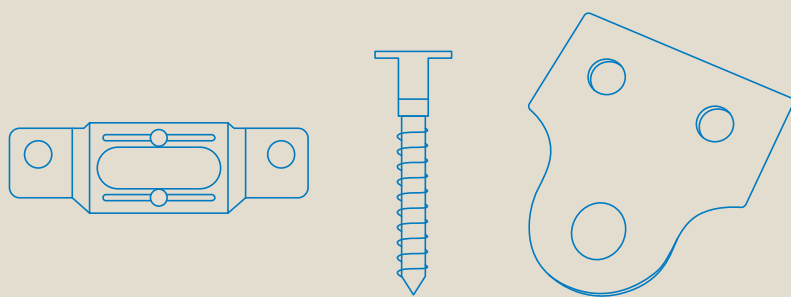
Hardware for installing



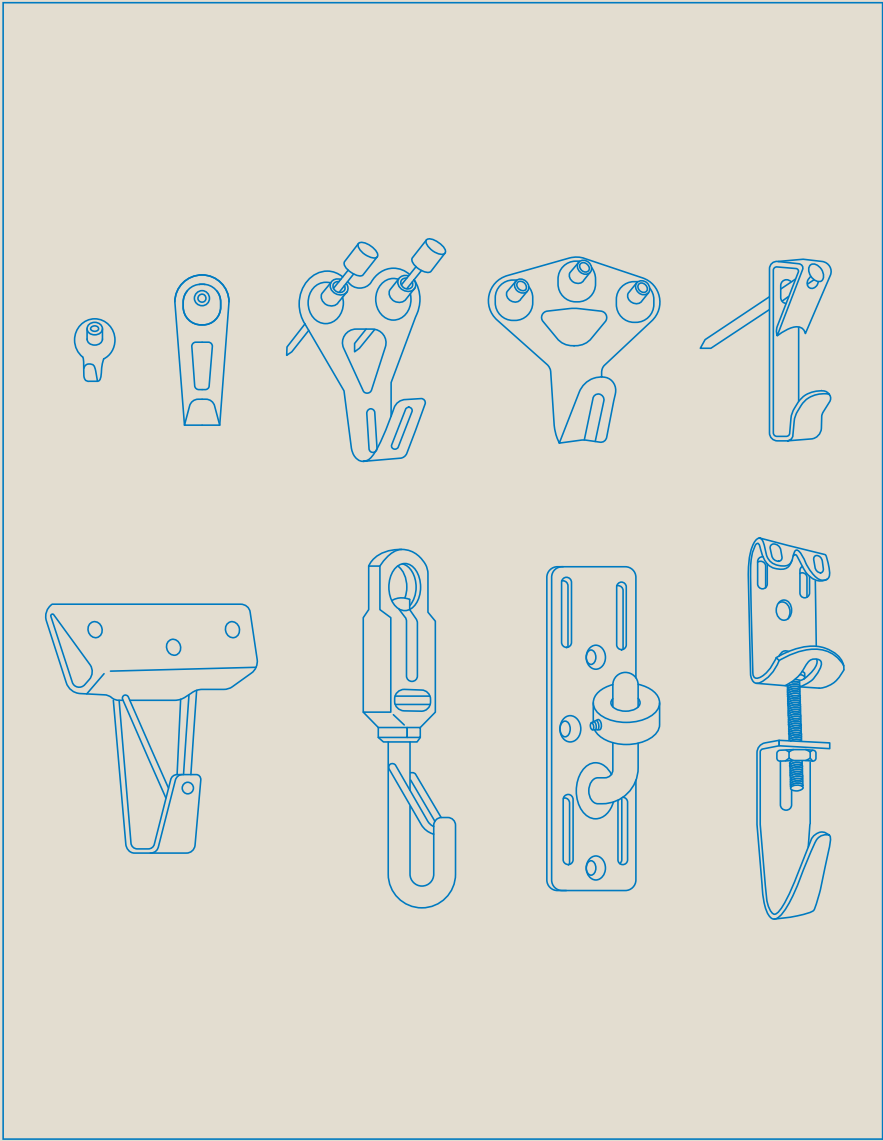
Cleats: Both wooden French cleats and aluminum Z-bars or cleats are designed for one part to attach to the back of the artwork and the other part to attach to the wall. The two parts interlock to hang the artwork on the wall. These are great for heavier works and for spreading the weight across many points.



D-rings: These go on the back of 2D artworks for hanging onto hooks on the wall.

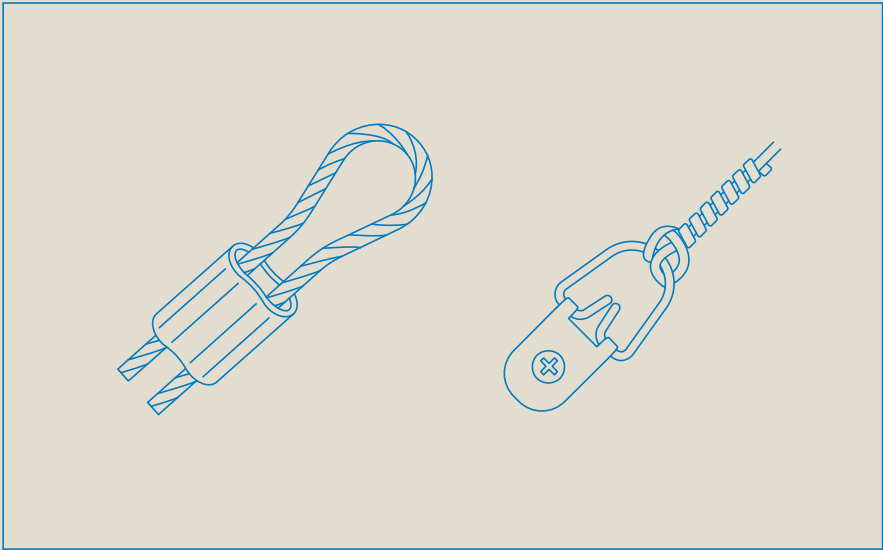


Security hardware: Used to secure 2D artworks to the wall to protect against theft and earthquakes.



Florets and wall hooks:

For hanging 2D works on the wall. These come in a variety of styles. Check how much weight each type can safely hold for each application.



Wire and cable: We generally try to hang 2D works with D-rings or cleats, though picture wire is still used by some. Aircraft cable can be used to “leash” works to the wall to hang things from ceilings or as tension cable to stabilize or suspend things or create barriers.

MATERIALS INDEX

As important as it is to use the appropriate materials for the job at hand, it is also important to consider the environmental impacts of these materials. Although the items highlighted in this section are necessary for art handling, art handlers can be thoughtful about how they use them. Seek out natural and nontoxic materials if they are available and suitable for the situation. Reduce the amount of trash that goes to the landfill by cleaning and reusing materials when feasible. And finally, source recycled and recyclable alternatives.



For more on sustainability in museums, see the link on page 141 in Section 4.

This section provides information about materials commonly used to wrap, pack, and protect art and artifacts derived from PACCIN, a network of professionals working in collections care. Visit www.paccin.org for more detailed information.



For more information on materials, see “DAP Training Module 5: Packing Methods and Materials” at www.thebroad.org/dap/toolbox.

Our goal is to provide you with information on how the materials can be used and how they react, both positively and negatively. Although there may be times when you may have to use a material because it is the only one available to get the job done—despite it not being the ideal option—you need to know the limits of that material.



Abaca Tissue

paccin.org/content.php?64-Abaca-Tissue

Alternate Names

Sometimes called “tengujo” and “kozo” for abaca rolls

Characteristics

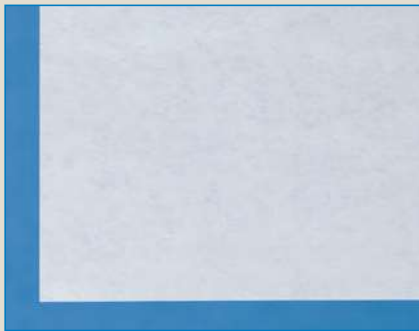
An unbuffered, long-fibered tissue made from abaca (manila hemp) fibers. Resembles Japanese mulberry papers (typically used for paper conservation) in structure, strength, and appearance. Semitransparent and exceptionally soft, with pH values of 6.8 to 7.2. Since it is unbuffered, a drop in pH may occur under normal atmospheric conditions. Expensive.

Forms/Sizes

Precut sheets typically 24” x 36”; rolls 36” to 65” wide. Weights range from 9 gsm to over 21 gsm.

Applications

Recommended for storing protein-based materials (fur, leather, silk, wool) and other materials sensitive to alkali. Used to cushion very delicate materials and on intricate objects where the material must conform minutely to complex forms. Ideal for padding out silk and other fragile textiles. Also used for hinging in framing and as a protective covering for works of art on paper and photography.



Acid-Free Tissue—Unbuffered

paccin.org/content.php?102-Acid-Free-Tissue-Unbuffered

Characteristics

Acid-free tissues do not contain lignin and are made from high-quality pulp. Unbuffered tissue is used with protein-based materials (wool, silk, leather, fur) and other materials sensitive to alkali (silver, color photos). Buffered tissues have a component added to push the pH to neutral or alkaline range, which can help scavenge acidic pollutants. Choose unbuffered when content is mixed or unknown or if its somewhat softer qualities are preferred. Its hygroscopic qualities can help stabilize relative humidity within a closed envelope.

Forms/Sizes

Machine-made rolls 30–60" wide; precut sheets up to 30" x 40". Weights range from 9 to 18 lb.

Applications

When crumpled, it can provide a "pillow" or "cloud" on which to lay an object, but it does compress. Its softness makes it excellent for building up layers on objects to protect smaller areas or to build out protrusions. It is often used as a contact material with metals since they can be subject to condensation during severe temperature change. Its ability to buffer humidity change makes it useful when packing objects for low temperature IPM treatments.



Backer Rod

paccin.org/content.php?128-Backer-Rod

Alternate Names

Extruded Polyethylene foam rod

Characteristics

This common construction material is a chemically stable foam with a smooth "skin." It is relatively nonabrasive and is considered safe under most circumstances for direct contact with objects. It consistently passes oddy testing and can be used in long-term storage situations.

Forms/Sizes

Circular diameters range from 3/8" to 2" diameter; triangular versions 3/4" to 2" diameter; trapezoidal versions 3/4" to 5" diameter. For all forms, available lengths vary with diameter.

Applications

The most common use is to place rod in the folds of textiles and garments that cannot be stored flat to prevent creasing. It replaces the rolled-up tubes of tissue traditionally used in this function. Can also be heat sealed into rings to support pots or other delicate objects. The tri-rod version is used as cut-to-size wedges in storage mounts. The original triangular shape is equilateral and is extruded to produce a smooth "skin" on all three surfaces. There have been availability issues with this type. Larger tri-rod can be cut in half to create two wedge shapes with a 90-degree surface, which may be better for some objects. Trapezoidal forms have cut foam surfaces, which can be abrasive to objects when in direct contact.



Batting

paccin.org/content.php?65-Batting

Alternate Names

Pellon

Characteristics

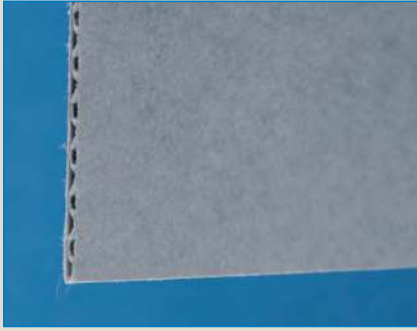
An extremely soft nonwoven padding material; non-museum use is for quilted blankets, clothing, and quilts. Normally made from cotton or polyester. Cotton as an organic is hygroscopic and can therefore provide some rH buffering but is more attractive to insects. Polyester is more durable and has more of a cushioning "memory," where cotton will tend to flatten out over time.

Forms/Sizes

Roll lengths vary—widths typically 40" or 45" up to 90". Thickness (referred to as "loft") ranges from .007" to 1". Can easily be stacked to achieve more substantial thicknesses.

Applications

The most common type used for packing and many storage applications is polyester. Often used as additional cushioning in foam cavities, as loose fill inside Fome-Cor® or corrugated plastic boxes, or incorporated into padded textile hangers or stockinette tubes. Batting fibers can easily snag on small object parts—Tyvek or other barriers serve to prevent this. Versions that allow you to separate layers allow for greater flexibility in use. Polyfil is a nonlayered form of polyester batting that can help conform to more extreme surfaces. If used in storage applications be sure that it has been tested for long-term stability.



Blueboard

paccin.org/content.php?66-Blueboard

Characteristics

Common term for acid-free, lignin-free buffered corrugated cardboard, typically light blue, gray in color but may also be white or light tan. Available in single- and double-wall thicknesses and some variation of fluting sizes and patterns. Has good hygroscopic and buffering properties. pH ranges from 7.5 to as high as 9.5. Check manufacturer's specs. Very expensive.

Forms/Sizes

Available precut as small as 8" x 10" up to 55" x 120" sheets. 40" x 60" and up requires trucking, which adds considerably to expense. Thicknesses: single-wall E-flute $\frac{1}{16}$ ", single-wall B-flute $\frac{1}{8}$ ", double-wall BB-flute $\frac{1}{4}$ ".

Applications

Used for some shipping and many storage purposes. Blueboard is a versatile box-making material and is also used as craft inserts, dividers, backings and supports, and to line drawers and shelves. Like all corrugated products, it is stronger in one direction, which can be mitigated by cross-laminating sheets or taken into consideration of forming boxes or inserts.



Bubble Wrap®

paccin.org/content.php?68-Bubble-Wrap

Characteristics

Polyethylene, polyvinylidene chloride, or polyvinyl chloride films sandwiched to create compartments of various sizes into which air is injected. Inexpensive and tear resistant, but bubbles will deflate and plastic may degrade in a fairly short time. Some versions—Aircap® and Polycap® have an additional layer of nylon designed to prolong the life of the bubble. Available in versions that stick to themselves and where flat film layers sandwich compartments on both sides.

Forms/Sizes

Rolls up to 72" wide. Bubble sizes $\frac{1}{4}$ " to 2" diameter; typically $\frac{3}{16}$ ", $\frac{5}{16}$ " and $\frac{1}{2}$ ". Perforations optional (e.g., every 12").

Applications

A traditional soft packing material often used to pack paintings or in conjunction with tissue to pack 3D objects. Gauge bubble size to object weight and size. Objects wrapped with bubbles faced in can be left with distinctive surface marks echoing the bubble pattern, especially if no interim layer is used. Bubbles faced out are more prone to breakage. Used appropriately, it is a valuable short-term material. Used inappropriately, it can create the illusion of protection. Bubbles have a tendency to break exactly where protection is required (corners/projections). This can be mitigated by using two layers face to face. Use better grades to extend life.



Cardboard

paccin.org/content.php?69-Cardboard

Characteristics

Comes in many forms: corrugated, flat, rolled, single wall, double wall, triple wall, and boxes. Most cardboard is corrugated layers with a paper lining on at least one side. Wall refers to the number of layers of corrugation. Test refers to the amount of pressure per square inch that the material will withstand without puncturing. (The most common is 200 or 275 test.) It is a paper product and has a high acid content. It is excellent for using as a protective barrier for objects. It can be cut or scored with a knife to create almost any shape; it absorbs moisture and can be coated to minimize absorption. It is very strong and fairly inexpensive and can be bought in ready-made cartons that are excellent for packing objects when filled with a cushioning material. Some cardboard, such as mat board, is not corrugated.

**Cellulose Wadding**

paccin.org/content.php?70-Cellulose-Wadding

Alternate Names

Formerly Kimpak

Characteristics

A nonarchival packaging product made of layers of soft tissue like paper; sometimes having a kraft paper backing. Has good cushioning qualities, especially when used in layers. Hygroscopic qualities can help buffer rH changes. Inexpensive. Can be recycled with other paper products.

Forms/Sizes

Rolls 12 to 60"; thicknesses 1/8 to 1/4".

Application

Often used to wrap furniture, where it easily wraps around chair legs and arms. Provides cushioning while still leaving objects easy to handle. An old-fashioned material that still has its place—lately used in combination with stretch wrap.

**Corrugated Plastic (Coroplast®, Corulite)**

paccin.org/content.php?71-Corrugated-Plastic-%28Coroplast-Corulite%29

Alternate Names

Cor-X®, PolyFlute®, Corulite®

Characteristics

A tough, rigid, inert, and chemically stable corrugated plastic made from a copolymer of polypropylene and polyethylene. Resistant to water, oils, and solvents. Can be die cut, sawn, scored, folded, drilled, stapled, spot/heat welded, glued, or fixed with nails or screws. Unlike blueboard, it will not provide hygroscopic buffering.

Forms/Sizes

Commonly available in 30" x 40", 40" x 60" and 48" x 96" sheets; 3 mm, 4 mm, 6 mm, and 10 mm thicknesses. In museum applications, either translucent "natural" color or white is typically used. In thinner thicknesses, it can be die cut to make folding tab boxes and trays. Also available in a variety of prefabricated storage boxes. Custom sizes (longer) available by special order.

Application

Often used in storage applications as an alternative to acid-free corrugated cardboard (blueboard). Can be formed into boxes suitable for storage and transit. It is an excellent backing material for paintings and framed works on paper, providing a valuable alternative to conventional Fome-Cor or blueboard. Due to its water- and puncture-resistant qualities, it is also used to cover open spaces for frames and hybrid crates in transit.

**Dartek®**

paccin.org/content.php?72-Dartek

Characteristics

A Dupont product cast nylon film with 'Saran-wrap'-like feel and clarity. Softer and more pliable than Mylar or glassine and tear-resistant, with good release properties. Maintains characteristics across a wide temperature range. Capable of absorbing up to 10 percent of its weight in moisture. C-917 type has no plasticizers, additives, or surface coatings. More expensive than glassine, which it typically replaces in packing applications.

Forms/Sizes

Rolls 10" to 88" wide. Available in gauges from .0075" (.19 mil) to .075" (1.9 mil).

Application

Dartek® is a replacement for glassine when wrapping paintings that are susceptible to tackiness and abrasion. Works best as an object wrap in situations where moisture and heat can be avoided because it can stick to objects under certain conditions. Adheres to other surfaces with hot melt or double-sided tape or to itself or other plastics using a heated spatula or tacking iron. It is water clear instead of slightly milky like low-density polyethylene. It can make a good storage dustcover where light sensitivity is not an issue.



Ethafoam™ Polyethylene Foam

paccin.org/content.php?266-Ethafoam

Material Name

Polyethylene foam

Brand Name

Ethafoam

Nicknames

White plank, etha, ethylene, PE foam

Description

Ethafoam is the brand name of polyethylene foam plank manufactured by Sealed Air Corporation (formally by Dow Chemical Company). It is a durable, flexible, closed-cell foam with excellent memory when used in an appropriate coverage and density for the load. It is watertight and impervious to most chemicals. It performs consistently through a wide range of temperatures. It is easily cut with knives, hot knives, band saws, powered foam rubber cutters, and table saws. Ethafoam adheres to itself and other polyethylene-based materials with heat-welding or to most other surfaces with industrial-grade hot glue. The natural color of polyethylene foam is brilliant, sparkling white with a slight translucence in thin areas, but black and blue are also available in a limited range of sizes. Ethafoam is not cross-linked, so it is easily recyclable.

Sheets and planks have a skin on each of the large faces. The skin is an unbroken surface but has a bubbly texture with approximately 1 mm relief, and, despite the absence of additives, the foam feels waxy to the touch. The edges of the planks expose open cells where they have been broken. Individual cells range between 1 mm and 2 mm diameter at medium density. Plank edges and other cut surfaces create a rougher texture than that of the closed skin. Both surfaces are generally considered too abrasive for making direct contact with sensitive surfaces and require the mediation of a smoother material between the Ethafoam and the object, such as Tyvek Softwrap, Volara, or poly-sheeting, for example. This mediation can be achieved either by lining the foam or wrapping the object.

Ethafoam 220 appears very similar to PolyPlank EXT220 and PolyPlank LAM220, another brand name of polyethylene foam, but the two PE foams are manufactured with slightly different methods and chemical compositions. PolyPlank has a larger cell structure on average, and the broken cell walls of cut surfaces feel rougher. It offers less resistance to compression and puncturing than Ethafoam of the same weight. PolyPlank LAM offers two more light-density options than Ethafoam; 0.9 pcf and 1.2 pcf.

2" material is relatively expensive per square foot but less so than 2" polyurethane ester foam. The latter is also typically applied in greater quantity per container, thus magnifying the price difference.

Applications

Ethafoam is typically used in art handling as a versatile and chemically stable shock absorbing and vibration-dampening material applied in small amounts relative to the size of an object. In other words, multiple pads, strips, or blocks are more common than continuous contact over broad areas.

It is more firm than open-cell foams of equivalent pcf densities, such as polyurethanes. In fact, 220 is not soft enough to be highly recommended for cavity-packing lightweight objects or, as noted above, full-contact cushioning over broad surfaces. However, it carves well with sharp knives for precise contouring of cushioning pads. 220 is stiff enough to employ as yokes for large rolling tubes or guillotines for moderately sized sculptures. Heavier objects can be secured with pads and wood bracing and with the further option of greater foam densities. 900 is typically reserved for support underneath objects weighing several hundred pounds or more or in storage and mount-making applications, where its rigidity makes it work almost like wood.

It will also provide some thermal insulation when applied as lining for a container, and the closed-cell structure makes it waterproof.

Common Fabrication Tools

Knife (deli knife, extendable box cutter, specialty foam knife)

Foam rubber cutter (electric): For best results, mount cutter under saw table with an adjustable fence.

Hot knife

Band Saw: For best results, use a scalloped or straight blade.

Table saw: For best results, clean table saw blade frequently.

Heat gun

Glue gun: Suitable with hot-melt or low-melt glue sticks

**Felt**

paccin.org/content.php?74-Felt-Polyester-or-Acrylic

Characteristics

Soft, fibrous material traditionally used as a contact material for delicate surfaces. Most colors are not colorfast and should be washed before using. Can be used as a liner for foam padding.

Cotton felt absorbs liquids and humidity.

**Foam Board, Fome-Cor®**

paccin.org/content.php?75-Foam-Board-Fomecor

Alternate Names

Foamboard, Foam core, Pacon®

Characteristics

A closed-cell foam between two skins of paper available in both archival and nonarchival grades. Nonarchival is most readily available. It is quite rigid but can be cut with a knife. Not recyclable. Fome-Cor brand (International Paper Co.) has an acid-free polystyrene core, but paper (wood fiber) may become acidic over time.

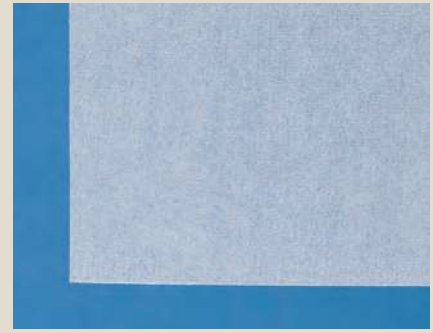
An "archival" version with buffered paper is only available in the 3/16" thickness.

Forms/Sizes

Comes in white, black, and colors. Thicknesses range from 1/16" up to 1". Precut 8 1/2" x 11" up to 48" x 96" sheets. Also comes pre-primed with adhesive.

Application

The 3/16" size is commonly used as a backing board for paintings and maybe incorporated into framing packages for works on paper (normally separated by a vapor barrier). The 1/2" thickness is frequently used as a material for tray-pack style crate interiors or to fabricate lightweight inner boxes for both 2D and 3D objects. Sometimes used to provide a support in storage where extra rigidity is required. Product grade needs to be carefully chosen to suit the application.

**Glassine**

paccin.org/content.php?78-Glassine

Characteristics

Glassine used in museums is acid-free, unbuffered, and made from selected chemical pulp. After pulping and drying, sheets are pressed through rollers so that paper fibers flatten out in the same direction—called calendering. To maximize smoothness and thinness, glassine is calendered several times, or supercalendered. Even if pH neutral, it is not always lignin free and is therefore ultimately unstable. It has a definite shelf life of three to five years.

Forms/Sizes

Precut sheets 8 x 10" to 36" x 48"; rolls 36"–60" wide premade envelopes.

Application

Used primarily for interleaving between prints, drawings, and pastels. Also used to make temporary envelopes for shipping unframed matted or unmatted works on paper to stiffen them for oversized photo corners or to tape directly to board "sandwiches" or trays. Traditionally used as an inner wrapping for paintings. Wrinkling and creases can be abrasive in some applications (ornate frames for example), therefore wrapping must be done carefully, and reuse of wrapping material is not advised. Not recommended for long-term storage. Not recommended for direct contact with unframed paintings on canvas or photographs.



Hollytex

paccin.org/content.php?79-Hollytex

Characteristics

A spunbonded polyester fabric that is lightweight yet strong, lint-free with no pigments or binders. It has a very calendered smooth surface. It has the appearance of thin tissue but is more durable. It is typically used as a release and interleaving paper rather than as a packing material.



Loose Fill (Extruded Polystyrene Chips, Peanuts, or Pelspan®)

paccin.org/content.php?80-Loose-Fill-%28Extruded-Polystyrene-Chips-Peanuts-or-Pelspan-%29

Characteristics

Extruded polystyrene chips or "peanuts" or "Pelspan®" are available in different shapes, some of which are designed to mesh together to enhance their stability. More commonly, it is used loosely in a container and packed around an object. When used this way, it needs to be packed tightly around the object, and the container should be shaken to get the fill to mesh correctly, because objects tend to shift to the bottom of the container.

A more accepted method in the museum community is to place peanuts very loosely in thin polyethylene bags to allow the bags to conform to the shape of the object and prevent objects from settling through to the bottom of the container (high-density polyethylene especially works well for this application).

While it gives overall support, there is a limit to how much weight it can support. It is very unsound environmentally and is not biodegradable. This negative aspect can be minimized through reuse, but when used, lose their tendency to scatter—and in doing so, attract dirt make a less than optimal packing material. When repacking, you may be faced with the temptation to sweep it up, dirt and all.

Vegetable starch peanuts with names like "ECO-Fill" are a biodegradable answer to polystyrene peanuts. They are made of vegetable starches and water and can actually be eaten. They are water soluble and work the same as the peanuts for filling voids, giving overall support. This is a material has been discussed as a replacement for normal polystyrene.

Considerations to weigh in the decision-making process include the issue that, in storage situations, are basically a food can attract insects. Others have expressed concerns that, when used in contact with objects, the packing material if exposed to water can become goo that can damage objects more than the water itself.



Marvelseal®

paccin.org/content.php?81-Marvelseal

Alternate Names

Foil or wrap

Characteristics

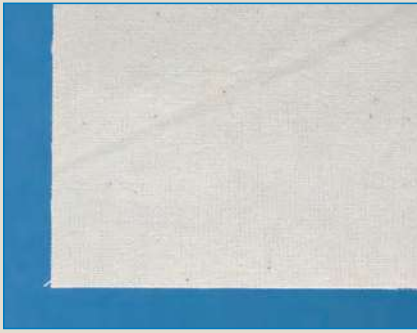
Barrier film made of a layer of aluminum foil sandwiched between layers of transparent nylon and heat-sealable polyethylene (360 type). Resists the passage of vapors, gasses, and pollutants. Alternate varieties of Marvelseal® combine aluminum and polyethylene layers with polypropylene (470 type).

Forms/Sizes

48" rolls up to 200 yards long, 5 mil thick.

Applications

Excellent for lining transport crates to minimize off-gassing of wood products, especially when objects will be stored in them for long periods of time. 360 type easily welds to itself and other hard surfaces like plywood by the application of heat. Custom bags can also be made to completely encapsulate an object for humidity-controlled storage or shipping or to create a sealed framing package. Sometimes used in combination with Aclar® for anoxic pest treatment. Commonly used as a barrier between display-case materials and the object environment and to seal wood products used in storage settings.

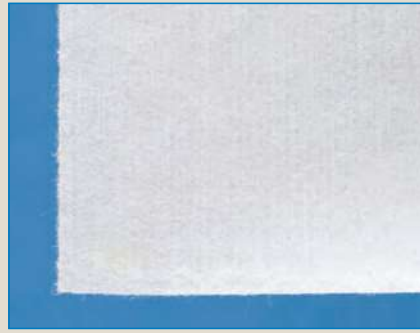


Muslin (Cotton Fabric)

paccin.org/content.php?82-Muslin-%28Cotton-fabric%29

Characteristics

Soft cotton cloth often used in storage applications, especially with textiles. Usually used in unbleached form. It is recommended that it be washed to remove any sizing applied during manufacturing.



Nomex®

paccin.org/content.php?83-Nomex

Alternate Names

Nomex® Softwrap

Characteristics

A DuPont product made from aramid (aromatic polyamide) fibers developed for fire/electrical insulation applications. Unique ability to stretch in one direction, preventing bunching and folding of loose material within a cavity. Permeable to air and water, non-dusting, chemically inert, and flame resistant; also resists mold and mildew. Comes in paper/fabric, fiber, and felt forms, from very soft and fibrous to more rigid. Spunwoven version typically used for museum applications.

Forms/Sizes

39" rolls typical. Thicknesses from 3 mil to 30 mil.

Applications

Excellent for lining cavities cut from polyester foam or Ethafoam®. For use with objects that have smooth surfaces that are not likely to snag or catch on its fibers. Can be sewn and bonded with hot melt adhesives without melting.



Packing Blanket

paccin.org/content.php?84-Packing-Blanket

Alternate Names

Furniture pad, moving blanket

Characteristics

Most packing pads or blankets are cloth with cotton-batten filling and quilted stitching. They are thick and durable and offer heavy-duty protection when used as soft packing for furniture and sculpture.

Forms/Sizes

Most common size is 72" x 80". Available in different grades, usually measured by weight per dozen. Lighter weight, inexpensive blankets are multicolored and are made of recycled fabric. Higher-quality blankets usually have solid colors on at least one side. A less-expensive version is made with nonwoven synthetic material in both 72" x 80" and 54" x 72" sizes.

Applications

This material is commonly used (and reused) by commercial movers for many purposes. In the art and museum world, it is often used to soft-wrap sculpture and furniture. In this application, often another material (Tyvek soft wrap, tissue, etc.) is used between the object and the blanket itself. This is especially true if blankets are not segregated (often by color) by use (for example, for art contact versus general use). To secure the blankets, commercial movers sometimes use oversized rubber bands. Art services providers often use stretch wrap.

This moving tool is essential for use in a truck, where it effectively dampens vibration when placed underneath cartons and soft-packed paintings. It is also used when cargo is strapped to the side of a truck.

In a museum setting, it is often used to pad equipment used to lift or transport artwork or as a protective layer used when rigging sculpture.

A novel way to use this material is in the form of custom-made covers. For case-work, vitrines, or anything that is handled frequently and vulnerable to abrasions, dents, and dings, consider having covers sewn to fit them.



Poly Sheeting—High Density Polyethylene (HDPE)

paccin.org/content.php?108-Poly-Sheeting-High-Density-Polyethylene-%28HDPE%29

Alternate Names
Painters' plastic

Characteristics
Polyethylene sheeting with a denser structure than the type commonly used to wrap paintings. The same material used to make Tyvek®, its greater density allows for superior protection with a much thinner film; 0.23 mil–0.35 mil is typical, depending on form purchased. The manufacturing process tends to reduce the need for plasticizers and slip agents. More heat-resistant than low-density polyethylene. Thinner versions behave like a very supple nonabrasive form of tissue but without hygroscopic properties.

Forms/Sizes
Easy to purchase as "food grade" bags as thin as 0.23 mil in smaller sizes from a plastics distributor or in rolls up to 12" x 400' in 0.31 mil thickness as painters plastic at home-improvement centers and painting supply stores. The Husky brand has been the most widely used version, consistently passing oddy tests.

Applications
Can be used in much the same way as low-density polyethylene. Thinner, smoother, and less rigid than tissue, it is perfect as a protective barrier for delicate objects. Will conform readily to complex shapes without build up of bulky folds. Also a superior, inexpensive, and lightweight dust cover. Lack of additives means it can be handled for long periods of time without leaving a residue or film on hands or objects. Because it is so thin, it can be used to supplement preexisting packing solutions. When used in two layers, it provides a "slip sheet" effect, where one layer stays with the object and the other with cushioning material that virtually eliminates risks of abrasion to fragile surfaces. Like most synthetic materials, however, there can be a risk of static charge with movement, so it may not be appropriate for use with some friable materials.

Poly Sheeting—Low Density Polyethylene (LDPE)
paccin.org/content.php?85-Poly-Sheeting-Low-Density-Polyethylene-%28LDPE%29

Alternate Names
Visqueen

Characteristics
Chemically inert, pH neutral, and water repellent, especially if seams are sealed. It is nonabrasive if clean. Some manufacturers use talc or other release agents, which creates a residue or oily film. Especially true of material with recycled content. "Virgin" grade is nonrecycled, and "UDSA" grade has been determined safe for storing food. Less expensive than Marvelseal® but less effective as a barrier to gaseous pollutants.

Forms/Sizes
Rolls in a wide variety of widths and lengths; 3 mil or 4 mil thickness typically used, up to 6 mil for heavy objects or those exposed to more stress. Also available in various widths of tubing.

Applications
Commonly used to wrap paintings for softpacking and to wrap inner boxes and travel frames to create a sub-environment within crates. Virgin grade preferable, especially when an additional barrier layer (glassine, Dartek® etc.) is not used. Also used as a moisture barrier lining for crates and as protective sheeting in storage.

Polyethylene Foams
paccin.org/content.php?268-Polyethalene-Foams

Polyethylene is a durable, chemically stable, closed-cell foam with a wide variety of shock-absorbing, vibration-dampening, and insulation properties, depending on the product specifications. PE foams cut, carve, and bond easily, with only the heaviest densities requiring power saws to cut. They will not off-gas and are widely considered viable interior materials for long-term storage containers. PE foams are recyclable.

Crosslinked PE foam is a high-density polyethylene with cross-linked bonds in the polymer structure, changing the thermoplastic into an elastomer. Crosslinked PE foams share the qualities listed above but have ultra-fine cells for soft, skin-like surfaces suitable for direct contact with most stable object surfaces. Unlike non-crosslinked PE foams, they are not recyclable.

See the brands below for product lines and specifications.

Polyethylene Foams (non-crosslinked)
Planks:
Ethafoam™ polyethylene foam
PolyPlank® polyethylene foam
Polyfoam

Rolled sheeting:
Astro-Foam

Crosslinked Polyolefin-Based Polyethylene Foams
Planks:
MicroCell® crosslinked polyolefin foam
Volara® crosslinked polyethylene foam (laminated)
Plastizote

Rolled sheeting:
Volara® crosslinked polyethylene foam



PolyPlank® Polyethylene Foam

paccin.org/content.php?267-PolyPlank

Material Name

Polyethylene foam

Brand Name

PolyPlank

Nicknames

Ethafoam (PolyPlank and other Pregis foam products are often called "ethafoam" by museum professionals, fine art service providers, conservation materials suppliers, and industrial foam suppliers because of their similarity and a long association of PE foam with the Ethafoam brand)

White foam, etha, ethylene, and PE foam

SenFlex. This is another mislabel. Some industrial foam suppliers refer to the light-density PolyPlank LAM090 as "Senflex"—a nonrecyclable polyolefin-based polyethylene of the same density from Sentinel Products Corp—or "Synflex," which is either a pharmaceutical-quality liquid glucosamine or a thermoplastic tube used in hoses and wire casings, depending on the context. LAM090 is a nice soft material to work with, particularly for cavity packing, but it is good to be aware of what you are getting.

Description

PolyPlank is the brand name of polyethylene foam plank manufactured by Pregis Corporation. It is a durable, flexible, closed-cell foam with excellent memory when used in an appropriate coverage and density for the load. It is water-resistant and impervious to most chemicals. It performs consistently through a wide range of temperatures. It is easily cut with knives, hot knives, band saws, powered foam rubber cutters, and table saws. PolyPlank adheres to itself and other polyethylene-based materials with heat-welding or to most other surfaces with industrial-grade hot glue. The natural color of polyethylene is bright white with a soft translucence throughout. PolyPlank is not cross-linked, so it is easily recyclable.

Sheets and planks have a thin skin of 6 lb. foam on one face. The skin is an unbroken surface but has a bubbly texture with approximately 1 mm relief, and, despite the absence of additives, the foam feels waxy to the touch. The edges of the planks expose open cells where they have been broken. Individual cells range between 1 mm and 3 mm diameter at medium density. Plank edges and other cut surfaces have a rougher texture than that of the closed skin. Both surfaces are generally considered too abrasive for making direct contact with sensitive surfaces and require the mediation of a smoother material between the PolyPlank and the object, such as Tyvek Softwrap, Volara, or poly-sheeting, for example. This mediation can be achieved either by lining the foam or wrapping the object.

PolyPlank EXT220 and PolyPlank LAM220 appear very similar to Ethafoam 220, another brand name of polyethylene foam, but the two PE foams are manufactured with slightly different methods and chemical compositions. Medium-density PolyPlank has a larger cell structure on average, and the broken cell walls of cut surfaces feel rougher. It offers somewhat less resistance to compression and puncturing than Ethafoam of the same weight. PolyPlank LAM boasts two more light-density options than Ethafoam; 0.9 pcf and 1.2 pcf. The PolyPlank LAM090 (0.9 pcf density) is often distributed in the light gray tint pictured above, and sometimes mislabeled "SenFlex" by industrial foam suppliers.

2" material is relatively expensive per square foot but less so than 2" polyurethane ester foam. The latter is also typically applied in greater quantity per container, thus magnifying the price difference.

Applications

PolyPlank is typically used in art handling as a versatile and chemically stable shock-absorbing and vibration-dampening material applied in small amounts relative to the size of an object. In other words, multiple pads, strips, or blocks are more common than continuous contact over broad areas.

It is more firm than open-cell foams of equivalent pcf densities, such as polyurethanes. EXT220 and LAM220, for example, are not soft enough to be highly recommended for cavity packing lightweight objects or, as noted above, full-contact cushioning over broad surfaces. However, LAM090 (0.9 pcf) is in fact soft enough to serve a cost-effective and chemically stable alternative to polyurethanes for cavity packing or contact with large surface areas. The equivalent standard product line of Ethafoam brand PE foam, by contrast, only goes as soft as 1.5 pcf.

The medium densities of PolyPlank carves well with sharp knives for precise contouring of cushioning pads. 220 is stiff enough to employ as yokes for medium-large diameter rolling tubes or guillotines for moderately sized sculptures. Heavier objects can be secured with pads and wood bracing and with the further option of greater foam densities. EXT900 is typically reserved for support underneath objects weighing several hundred pounds or more.

It will also provide some thermal insulation when applied as lining for a container.

Common Fabrication Tools

Knife (deli knife, extendable box cutter, specialty foam knife)

Foam rubber cutter (electric): For best results, mount cutter under saw table with an adjustable fence.

Hot knife

Band saw: For best results, use a scalloped or straight blade.

Table saw: For best results, clean table saw blade frequently.

Heat gun

Glue gun: Suitable with hot-melt or low-melt glue sticks.

See more at <http://www.paccin.org/content.php?267-PolyPlank>.



**Polypropylene Foam Wrap
(Astro-Foam®, Micro-Foam®)**

paccin.org/content.php?89
-Polypropylene-Foam-Wrap-%28Astro-Foam-Micro-Foam-%29

Characteristics

This material is similar to polyethylene (Ethafoam), but it is slightly less dense and has a higher gloss. A recycled product is available. It is chemically inert and nonabrasive. Thicker versions comprise thinner layers of the material that are held together with little heat-welded dots.

Forms/Sizes

It comes in thin rolls, 1/16" to 1/2" thick.

Applications

Commonly used to wrap furniture or large items with complex forms.

Held in place with packing tape or stretch wrap.



Polystyrene, Extruded (XPS)

paccin.org/content.php?92-Polystyrene
-(Styrofoam-)

Alternate Names

EPS: This name is commonly used for both expanded and extruded styrofoams, so it can be vague. Some users and vendors have taken to using "XPS" for extruded and "EPS" for expanded.

Rigid styrofoam
Rigid EPS

Characteristics

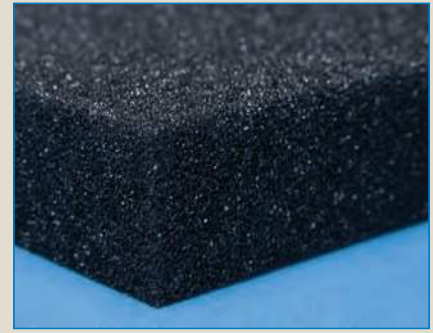
XPS is a stiff foam board usually blue, pink, or green in color, depending on the manufacturer. It has a consistent texture, which differentiates it from expanded (EPS) "bead board" styrofoams that crush more easily and produce small pellets that can damage some artwork, especially when trapped between canvas and stretcher. It is a less expensive form of thermal insulation than polyurethane ester. Almost all polystyrene is now CFC-free.

Forms/Sizes

It is commonly available in two forms 2' x 8' planks—these sheets may be the only version available in some areas. The second, more-desirable form is in 4' x 8' sheets. Most common thicknesses are 2" or 1".

Applications

Used as thermal insulation in crates, usually in combination with Ethafoam (for cushioning), when it is important that all materials are chemically stable. XPS has a thermal rating of R-5 per inch thickness.



Polyurethane Ester Foam

paccin.org/content.php?279
-Polyurethane-Ester

Material Name

Polyester-based urethane polymer

Brand Name

N/A; polyurethanes are produced by multiple manufacturers

Nicknames

Polyurethane ester, polyester urethane foam, polyurethane polyester foam, ester-based polyurethane, esterfoam, ester museum foam, charcoal foam

Description

Polyurethane ester foam is an open-cell foam with excellent memory and very soft compression characteristics. It has a fairly high tensile strength for a polyurethane but not compared with standard polyethylenes. It can be torn by hand, for example, but most people would need to start a tear at a sharp corner where the material is thin. It can be punctured with a blunt object like a pen with only moderate pressure. Its open-cell structure also makes it permeable to air and water.

Ester has a uniform texture and density throughout, with no skin on either face. Sheet dimensions tend to be pretty consistent but can vary in thickness by a fraction of an inch. Its natural color is charcoal gray with a textured appearance—almost sparkling in strong light.

Ester carves complex contours easily with a sharp knife, but it is soft enough to stretch under the blade and cause faceting and flashing in cut edges. In contrast, ester machines very well with the right power tools. Reciprocating foam rubber cutters work especially well to produce smooth-edged blocks and strips.

Ester's gritty surface texture and chemical instability require the use of one or more intervening materials between the foam and any art object. Intervening material can be applied by lining the foam where it will make contact, wrapping the object, enclosing the object in a structural inner package, or any combination of the above.

Applications

Because of off-gassing, ester foam is recommended only for short periods of time. It is generally considered safe enough for transporting most objects between venues, including international shipments. However, it is not recommended for use in storage or any other long-term application.

Ester foam is most often used as one or two layers of interior protection inside shipping crates and boxes. It is an excellent thermal insulation material and, in many cases, an equally effective cushioning material for shock absorption and vibration dampening. It is typically used by itself in that combination, rather than mixed with another type of foam. In other words, crates with ester insulation and ester cushion pads are much more common than crates with extruded polystyrene insulation and ester cushion pads.

One reason for this is that a 2" layer of ester thermal insulation will compress a small amount, adding a second phase of firmer cushioning to the inner layer of smaller ester cushion pads. This introduces two levels of cushioning; the primary pads in contact with the package and the more firm support of the insulation lining the crate walls. Because even broad planes of ester will provide cushioned support for certain objects, like paintings of moderate weight riding upright, sometimes ester insulation is used without the addition of small cushion pads. In such cases, an extra layer is typically added to the bottom lining under the riding edge of the object. 4" is a common minimum for the total thickness of ester foam under objects.

Another reason ester is usually used with itself is that it bonds well with itself when a full-coverage adhesive is used, such as spray glue. Another factor still might be the notion that once ester is chosen for either the insulation or the cushioning, it may as well be chosen for the other, because either way the issue of ester's off-gassing has been introduced to the crate.

Ester cushions need a larger surface area to match the support of closed-cell foams with equivalent density, which means more material is used. Ester is also

typically more expensive per square foot than equivalent options in polystyrenes and polyethylenes. These two factors make it a relatively expensive option for crate insulation and cushioning among the common materials.

Cavity Packing

Ester's relatively low surface tension makes it an excellent material for fine contouring in response to the shapes of delicate objects. It is very useful for cavity packing, where custom, form-fitting holes are carved into deep blocks of laminated foam, usually for small objects. Custom cavities carved by hand will not be aesthetically appealing, providing further incentive to line them with a thin protective material like Tyvek Softwrap. For a more economical and chemically stable alternative in cavity packing, consider a very soft polyethylene, such as PolyPlank LAM090.

Quick Tip: Have you ever needed to get a large area of wet wood glue off a piece of wood before it dries? Consider a block of ester dunked in water. Wring it about 75% out, leaving some water in the foam. The texture of ester is rough enough to scour the thickening glue off. If it gets gummed up, dunk and wring again. Once dry, the wood piece may want a quick pass with a sander if the surface will be exposed in the finished product.

Ether Versus Ester

Ester is very similar in manufacture and appearance to polyurethane ether foam, another urethane polymer, and the lack of brand names combined with casual labeling can complicate the identification of polyurethane foam offered by some regional foam suppliers.

Ether was developed about a decade after ester to provide a softer and more-flexible cushioning, a better reaction to wet environments, and somewhat lower manufacturing costs. It has a slightly larger cell structure than ester and is less resistant to punctures or tears. Despite the larger cells, however, ether looks and feels smoother, with a more uniform surface texture. In contrast, ester tends to look more textured, with a little sparkle, and feel rougher, stiffer, and more dense to the touch.

The newer foam's qualities listed above can make it sound like a superior urethane for art handling and industrial applications, but it is not generally approved in this context. 2 pcf ether tends to be soft to a fault, providing insufficient support in some cases. It is also significantly less durable than ester under repeated use and much less chemically stable.

Although ether and ester can come in two distinct gray colors, the materials also can be found with virtually identical charcoal colors. In such cases, it takes an experienced eye—and sometimes a pinch—to spot the difference.

For more information on the differences and backgrounds of ester and ether, visit <http://www.thefoamfactory.com/blog/index.php/ether-and-ester-based-polyurethane-foam-characteristics-differences-and-uses>. More technical information is available online in a 1971 U.S. Department of Energy report prepared by J. P. Madden, G. K. Baker, and C. H. Smith, "A Study of Polyether-Polyol- and Polyester-Polyol-Based Rigid Urethane Foam Systems."

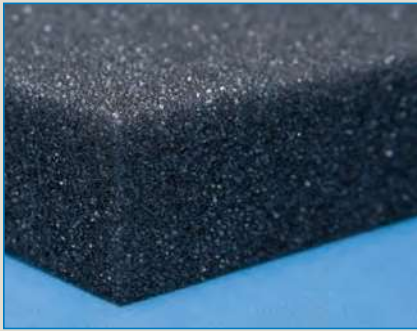
Common Fabrication Tools

Knife (deli knife, extendable box cutter, specialty foam knife)

Foam rubber cutter (electric): For best results, mount cutter under saw table with an adjustable fence.

Glue gun: Limited facility with hot glue, because of the fragile matrix in small areas. Large globs of glue are typically needed to form an effective grip rather than long beads.

Spray glue: Nontoxic, water-based spray glues, such as Simalfa, are highly effective adhesives for ester.



Polyurethane Ether Foam

paccin.org/content.php?277
-Polyurethane-Ether

Material Name

Polyether-based urethane polymer

Brand Name

N/A: Polyurethanes are produced by multiple manufacturers.

Nicknames

Flexible urethane foam
Polyether urethane foam
Polyurethane polyether foam
Ether-based polyurethane
Etherfoam
Ether
Mattress foam

Description

Polyurethane ether foam is an open-cell foam with exceedingly soft compression characteristics and a relatively low tensile strength. Its open-cell structure makes it permeable to air and water. Ether is the urethane polymer typically used in household and automotive furniture cushions; usually in a cream, light yellow, or amber color.

Ether foam is not chemically stable, and the by-products of its deterioration can be hazardous to some museum objects—especially if exposed for a significant period of time. Among the effects of deterioration are discoloration, powdering, changes in compression qualities and chemical off-gassing.

Applications

Ether is generally not recommended for use in the context of art handling/preventative conservation. Though readily available among foam suppliers, ether's unstable nature makes it a risky material to use in an enclosed container, or long-term in any environment. Its relatively low surface tension can also call into question its suitability as a cushioning material in many cases, depending on the static load. For a more accepted form of polyurethane in the art handling field, see polyurethane ester foam.

Ether Versus Ester

Go to Polyurethane Ester Foam description (page 128) for explanation.

Possible Fabrication Tools

Knife (deli knife, extendable box cutter, specialty foam knife)

Foam rubber cutter (electric): For best results, mount cutter under saw table with an adjustable fence.

Glue gun: Limited facility with hot glue, because of very fragile cell walls breaking down. Large globs of glue are needed to form an effective grip rather than long beads.

Spray glue



Stretch Wrap—LLDPE

(Linear Low Density Polyethylene)

paccin.org/content.php?98-Stretch
-Wrap-LLDPE-%28Linear-Low-Density
-Polyethylene%29

Alternate names

Bundling film

Characteristics

LLDPE has higher tensile strength, higher impact, and puncture resistance than LDPE. It is very flexible and elongates under stress. Good resistance to chemicals and ultraviolet radiation. Common brands have passed oddity tests for contact with objects but are commonly used with some kind of barrier material.

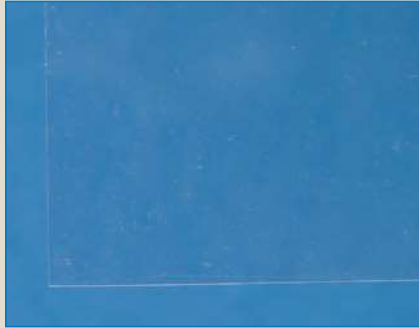
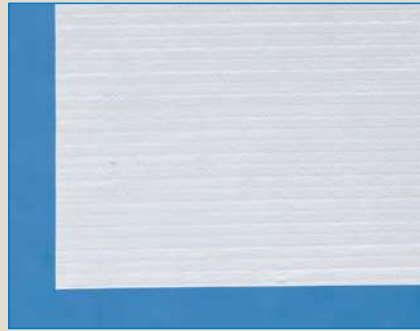
Product is commonly misnamed "shrink-wrap," which is activated by heat to shrink-fit what it contains. It is usually a form of PVC (polyvinyl chloride)—normally unsuitable for use around art.

Forms/Sizes

Widths from 2" to 30" can be used with or without a variety of handles; thicknesses range from 60 to 120 gauge (80 gauge is most common).

Applications

Initially used by shippers to stabilize loose boxes on pallets. Adapted by fine art packers to secure moving blankets to large objects and furniture. Smaller widths used successfully to secure delicate objects inside of inner boxes. Increasingly used to add extra layers of protection to crates. Each layer of stretch adds an additional layer of "springiness." When used thoughtfully, this allows for precise levels of restraint for even the lightest, most delicate objects. Used less carefully, it can snap legs on chairs from accumulated force.



Silicone Release Paper/Mylar

paccin.org/content.php?99-Silicone-Release-Paper-Mylar

Characteristics

A coated paper or polyester product. It has a very slick surface and is very hard. Not much will stick to it, thus in packing it may be used when contact with "tacky" materials cannot be avoided.

Applications

Although this product will not stick to most materials, it also is fairly rigid, so it cannot conform to complex shapes.

By definition, materials that are tacky are soft. Although this release material may not stick to the surface of an object, it may alter the appearance of its surface by making it flatter and "shiny" in texture.

Soft Tyvek®

paccin.org/content.php?100-Soft-Tyvek

Alternate Names

Tyvek® Softwrap™

Characteristics

Spunbonded high-density polyethylene (HDPE/olefin) fibers manufactured by DuPont to form a nonwoven fabric. Type 14 styles are thinner and more pliable than Type 10 styles ("crate liner") but are also lightweight, chemically stable, nonabrasive, tear resistant, and water resistant, while remaining vapor permeable—it "breathes." "Type 16" styles have perforations for extra breathability but are less of a barrier. All are non-dusting, resist mold/mildew, and pH neutral.

Forms/Sizes

Rolls 30" and 60" wide and 10 to 100 yards long. Typical thicknesses 1422A, 1443R (6.6 mil) and 14 M (7.6 mil).

Applications

Often used to cover foam pads or line cavities in contour-cut foam or as a primary wrapping material. It is also used as a light-blocking dust cover and can be sewn or heat-welded to create form-fitting covers. Also used to make filled bags or snakes to conform to and stabilize objects while being moved.

Teflon®

(PTFE—Polytetrafluorethylene)

paccin.org/content.php?101-Teflon-%28PTFE-Polytetrafluorethylene%29

Alternate Names

Plasti thread, relic wrap®

Characteristics

A synthetic fluoropolymer made by DuPont. Teflon® is chemically inert, nontoxic, and nonabsorbent. It is extremely stretchable in all directions and can easily conform to the shape of an object and/or cavity. However, it is extremely thin and can tear if used with objects that are too sharp, heavy, or when stretched too far.

Forms/Sizes

12" rolls; thicknesses—up to 3 mil

Applications

Mostly used with light objects with extremely fragile surfaces—for example, used in conjunction with polyester batting to conform to complex shapes and help mitigate vibration. An excellent nonabrasive lining for cavities or covering for cushioned surfaces. Because the film is thin and pliable, it conforms without adding bulk. Use two layers at a time to gain strength without compromising desirable properties. It can be used to stabilize objects by "tying" objects in place. Can be adhered to surfaces with low-melt adhesive.



Tyvek®

paccin.org/content.php?104-Tyvek

Alternate Names

Crate liner, Tyvek® Hardwrap™

Characteristics

Spunbonded from filaments of 100 percent high-density polyethylene (olefin) by DuPont. It is chemically stable, mold and mildew resistant, lint-free, and acid-free and has a smooth surface. Resistant to wetting (billed as "waterproof"), but it allows transmission of moisture and vapor. Relatively inexpensive. Type 10a styles are stiffer than garment-weight "soft" (Type 14) or perforated (Type 16) styles.

Forms/Sizes

Rolls 36" to 60" wide and up to 100 yards long. Thicknesses: 1025 type is 6.6 mil, 1020 type is 7.3 to 7.6 mil. Comes in various sizes as premade folders, media sleeves, envelopes, and expansion envelopes.

Applications

A high-strength barrier and wrapping material. Also used as a handling support for textiles and to make nonabrasive, tear-resistant envelopes and media sleeves. Because it is vapor-permeable, use as a barrier to block off-gassing from plywood and/or glue, especially in storage situations, may not be the best choice.

Volara® Crosslinked Polyethylene Foam

paccin.org/content.php?275-Volara-Crosslinked-Polyethylene-Foam

Material Name

Crosslinked polyolefin-based polyethylene foam

Brand Name

Volara

Nicknames

Volara Type A, or Volara-A

XLPE foam

X-linked PE foam

Equivalent products outside the United States: Alveolit (European Union), Softion (Japan and Australia)

Description

Volara is the brand name of a polyolefin-based polyethylene foam from Sekisui Voltec LLC. It is irradiation crosslinked, producing a closed-cell foam with virtually microscopic cells. It has an extremely soft texture throughout, including that of cut surfaces where the tiny cells are presumably broken. Its other desirable qualities include chemical stability, consistent thickness/texture/density, high tensile strength, low water absorption and vapor transmission, workability, and aesthetic appeal, all serving to make it a highly versatile material.

The surface tension of 2 pcf Volara when pressed with a finger is not unlike that of larger-celled foams with lower densities, such as 0.9 pcf polyethylene. It is very easily cut with a knife, but the blade must be quite sharp to avoid thin bits of "flashing" along the exit edges of the cut. A single slice with the blade will produce a smoother cut than a sawing motion, which can produce a somewhat shredded or faceted appearance. The natural color is a creamy, antique white, or ivory. One or both faces of 1/8" Volara in particular can sometimes have a subtle sheen, which will wrinkle softly on the inside of a tight curve. It also displays a random network of faint lines, increasing its passing resemblance to human skin. Being crosslinked, Volara is not recyclable.

Applications

Volara is most commonly used as a surface material added to thicker foam cushions. Its silky/rubbery texture, pliability, and softness at 2 pcf makes it a useful primary contact material for many unwrapped objects, whether the cushion is a flat surface or a contoured shape. It is also a handy material for shimming inexact foam contours for a better fit. Volara can be used alone when rigid support, such as wood or foam-board bracing, is desired close to the object. Then the main shock-absorption material can surround the exterior of the rigid securing structure. Likewise, Volara can sometimes be used as a vibration-dampening gasket between two hard surfaces, such as a cabinet and its hinged door, or a large object and the structural load spreader beneath it. Finally, Volara is often used as an effective liner for storage shelving and drawers. It has been known to compress and even stick slightly to the bottoms of glass objects left in place over a long period of time.

Volara bonds well with itself and with non-crosslinked PE foams, like Ethafoam and PolyPlank, by heat-welding. With practice, large flat surfaces can be heat-welded without overheating the larger-cell PE foam, which can melt under a heat gun and produce dips in the plane. The thinner forms of Volara are pliable enough to heat-weld onto convoluted surfaces, including custom cavities carved into other PE foams. Volara bonds well with hot glue, but care must be taken to ensure that beads of glue do not show through the thin material. Volara also bonds very well with 0.003" double-sided PVC film tape. This tape is useful for attaching Volara to hard, flat materials like foam boards or MDO, where beads of hot glue are more likely to partially dry before lamination and show ridges.

On the downside, Volara is easily soiled with dust and dirt, and once smudged, it is pretty much impossible to clean. When removing the material from a shop to use on-site, wrapping it in poly or transporting it in a plastic bag is recommended.

For more information, visit <http://www.paccin.org/content.php?275-Volara-Crosslinked-Polyethylene-Foam>.

TECHNICAL RESOURCES

As stated at the beginning of this brief guide, this document is a primer to art handling work. Refer to the DAP Training Materials for more details and step-by-step instructions. Here's a list of more resources, if you'd like to dig deeper.

This list of resources was shared with us by Elizabeth Mauro Art Installation, LLC, Seattle, Washington, and supplemented by Kevin Marshall, Head of Preparations, J. Paul Getty Museum.

Publications

- *Art in Transit: Handbook for Packing and Transporting Paintings* (Mervin Richard, Marion F. Mecklenburg, and Ross M. Merrill, editors)
- *The Art of Showing Art* (James K. Reeve)
- *Bob's Rigging and Crane Handbook* (Pellow Engineering Services, Inc.)
- *The Care and Handling of Art Objects* (Marjorie Shelley)
- *reCollections: Caring for Collections Across Australia: Handling, Transportation, Storage and Display* (Heritage Collection Council)
- *Caring for Your Art* (Jill Snyder and Maria Reidelbach)
- *Caring for Your Family Treasures* (Jane S. Long and Richard W. Long)
- *Collection Care* (Brent A. Powell)
- *The Effective Management of Volunteer Programs* (Marlene Wilson)
- *The Ethics of Collecting Cultural Property: Whose Culture? Whose Property?* (Phyllis Mauch Messenger, editor)
- *Exhibitions: Concept, Planning and Design* (Tom Klobe)
- *Exhibit Labels* (Beverly Serrell)
- *From Here to There: Museum Standards for Object Handling* (Dixie Neilson, video)
- *The Klutz Book of Knots: How to Tie the World's 24 Most Useful Hitches, Ties, Wrap, and Knots: A Step-by-Step Manual* (John Cassidy)
- *A Legal Primer on Managing Museum Collections* (Marie C. Malaro and Ildiko Pogancy DeAngelis)
- *Light for Art's Sake: Lighting for Artworks and Museum Displays* (Christopher Cuttle)
- *Lighting: Basic Concepts* (Warren G. Julian)
- *The Lighting Handbook: Reference and Application* (David DiLaura)
- *The Manual of Museum Exhibitions* (Barry Lord and Gail Dexter Lord)
- *Mount-Making for Museum Objects* (Robert L. Barclay, André Bergeron, and Carole Dignard)
- *Museum Exhibition* (David Dean)
- *The New Museum Registration Methods* (Rebecca Buck and Jean Allman Gilmore)
- *Registrars on Record: Essays on Museum Collections Management* (Mary Case, editor)
- *Tools of the Trade: A Listing of Materials and Equipment for Managing Museum Collections* (National Park Service, Park Museum Management Program, Park Cultural Resources Programs)
- *Way to Go! Crating Artwork for Travel* (Stephen A. Horne)
- *Museum Lighting, A Guide for Conservators and Curators* (David Saunders)
- *When Galleries Shake: Earthquake Damage Mitigation for Museum Collections* (Jerry Podany)
- *Advances in the Protection of Museum Collections from Earthquake Damage: Papers from a Symposium Held at the J. Paul Getty Museum at the Villa on May 3-4, 2006* (Jerry Podany, editor)

Websites and Organizations

To learn more outside the workplace, there are numerous resources available on the subjects of art handling, storage, display, mount making, transportation, lighting, conservation, registration, workplace safety, and emergency response.

	Conferences	Forum for discussion with peers	Networking/socials	Training via workshops/classes	Videos/webinars	Website resources
American Alliance of Museums (AAM) aam-us.org	●	●	●		●	●
American Institute for Conservation Wiki (AIC WIKI) conservation-wiki.com						●
Australian Institute for the Conservation of Cultural Material (AICCM) aiccm.org.au	●		●	●		●
Association of Registrars and Collections Specialists (ARCS) arcsinfo.org	●	●	●	●	●	●
Canadian Conservation Institute (CCI) canada.ca/en/conservation-institute.html	●		●	●	●	
The Center for Collections Care (CCW) beloit.edu/ccw				●		
Conservation OnLine (CoOL) cool.conservation-us.org						●
Connecting to Collections Care (C2C) connectingtocollections.org		●			●	●
The Diversity Apprenticeship Program (DAP) thebroad.org/dap				●		●
J. Paul Getty Museum, Complete Guide to Adult Audience Interpretive Materials: Gallery Texts And Graphics getty.edu/education/museum_educators/downloads/aaim_completetguide.pdf						●
International Convention of Exhibition and Fine Art Transporters icefat.org	●					●
International Preservation Studies Center preservationcenter.org				●		
Level It: Women's Art Handler Network level-it.squarespace.com			●	●		
Minnesota Historical Society, Conservation mnhs.org/preserve/conservation						●
Mounts and Mountmaking Wiki conservation-wiki.com/wiki/Mountmaking						●
Museum Study museumstudy.com				●		
National Park Service Museum Handbook nps.gov/museum/publications/handbook.html						●
Node Center nodecenter.net				●	●	
Northeast Document Conservation Center nedcc.org				●	●	●
Northern States Conservation Center collectioncare.org/course-list				●	●	●
Occupational Health and Safety Administration osha.gov					●	
PACCIN (Preparation, Art Handling, and Collections Care Information Network) paccin.org	●	●	●	●	●	●
Smithsonian Museum Conservation Institute si.edu/mci				●	●	●
Washington Museum Association washingtonmuseumassociation.org	●		●			●
Western Museums Association westmuse.org	●				●	●
Woodworking for Mere Mortals woodworkingformeremortals.com					●	