

Shipping Container Modifications

Examples and Explanations



DOORS • WINDOWS
CLIMATE CONTROL
CLEAR SPANS • LIGHTING
POWER • PLUMBING
WALL PANELING
INTERIOR WALLS
FLOORING • STAIRS
PAINT • CHASSIS



INTRODUCTION

As you're designing your shipping container structure, you may run into an idea that makes you stop and wonder, "Can I even do that?" We created this guide to answer common questions about shipping container modifications. We'll cover:

- Modifications that require cutting and framing.
- Joining shipping containers.
- Stacking containers for multiple story structures.
- Climate control options.
- Outfitting containers with electrical power.
- Outfitting containers with plumbing.
- Options for exterior paint.
- Installing flooring over original container floors.
- Interior framing and wall paneling.
- Added furnishing and features.
- Trailers for frequent relocation.



If you have any questions or need assistance along the way, we're here to help. Just give us a call at

877-704-0177



CUTTING AND FRAMING

Shipping containers are certainly strong, but maintaining their structural integrity when adding cut-outs calls for thoughtful modifications.

Imagine a can of soda. It's sturdy when intact, but if you cut out a side you can easily crush it.

When we add doors and windows to shipping containers, we frame the openings with steel tubing. We often create custom openings for equipment enclosures.

For large openings, we may even add beams for structural reinforcement. Removing an entire wall is possible but will inevitably call for columns and reinforced framing.



Large openings must be framed and reinforced to protect structural integrity.





CLEAR SPANS

Shipping containers can be arranged side by side to create large spacious rooms called “clear-spans.” As you can see in the image of the two-container wide office below, interior columns maintain the structural integrity of the building.



CLOSING THE SEAM IN A CLEAR SPAN

The long silver plate along the floor, called a threshold, seals the seam between the two containers. Once the modules are arranged at the final site, the threshold must be installed and sealed with bolts and caulking.

The process usually takes around an hour and only requires a drill and caulking gun. Falcon includes the threshold plates and bolts with the structure.

There is a similar process for the the roof. Flashing must be bolted to the seam on the roof and sealed with caulk.



Above: Interior threshold to interior floor



Above: Ridge cap that covers the seam between container roofs drilled into place



Above: Caulking seals the seam between roof top ridge caps

STACKING CONTAINERS

Shipping containers were designed to be stacked nine high in ports and on container ships. Shipping container buildings can certainly be stacked into multiple stories. For example, Fortress Obetz (top and bottom left), a shipping container stadium, stacked containers three levels high.

When containers must hold the weight of multiple stories, it's important to determine how modifications on lower levels will impact structural integrity. We consult with structural engineers on multi-story structures to ensure the building design is safe.



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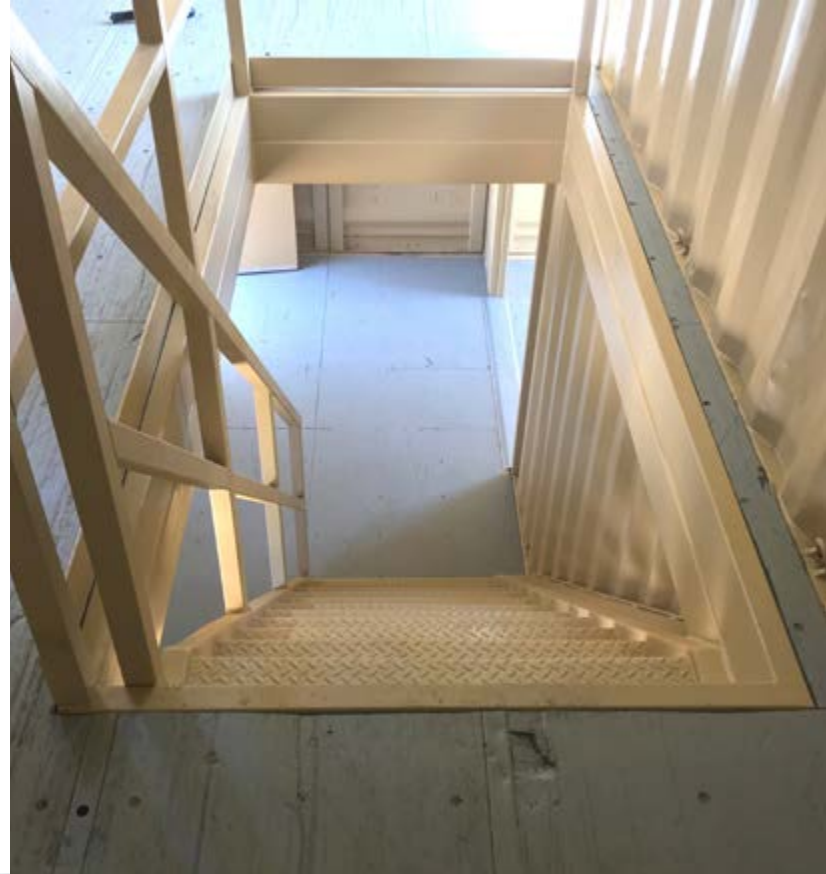
Fortress Obetz used shipping containers stacked three levels high to form its stadium.



STAIRS

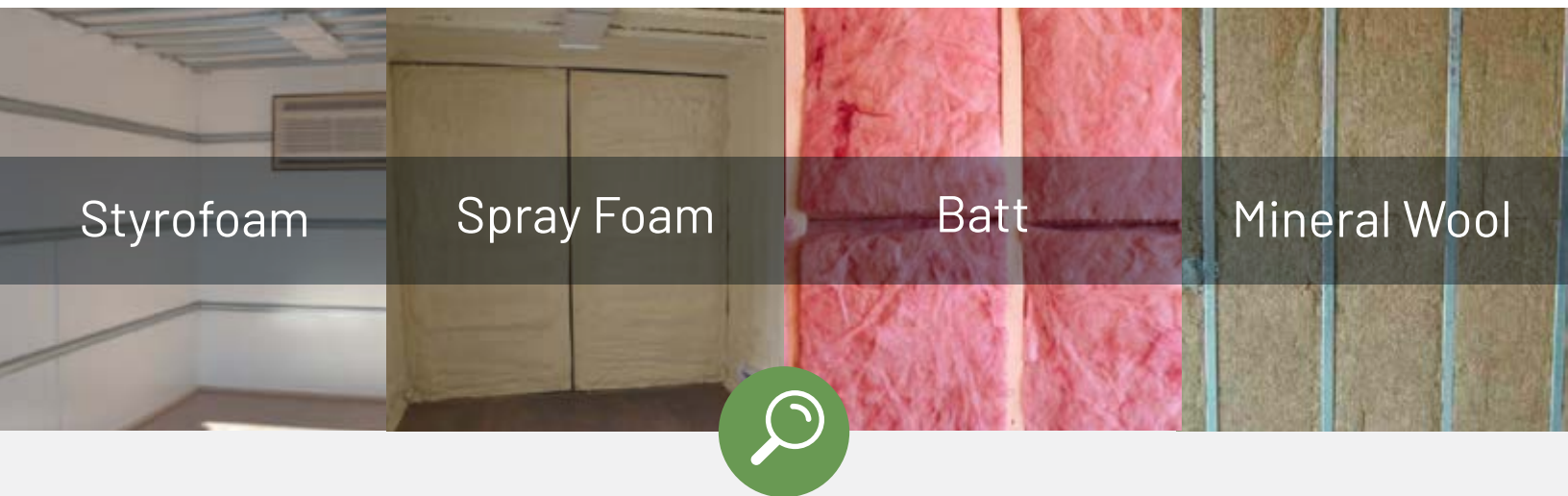
Stairs can be installed on the interior and exterior of multi-level container buildings.

Mobile single container buildings, such as ground level offices, do not need stairs to be OSHA compliant.



INSULATION

The amount of insulation your structure requires depends on the climate of your job site and the modified container's function. You'll definitely need insulation if you will either be living or working in the container or plan to store temperature-sensitive assets. Our three most popular insulation options include: Styrofoam, rolled batt, and spray foam.



| | Ideal Use | Examples | R-Value | Installation | Key Benefits |
|---------------------|--|---|----------------------------|--|--|
| Styrofoam | Climate-controlled storage for assets that do not produce heat | File rooms, storerooms, pantries | 4 (per inch of thickness) | Fast and easy; Requires no framing | Highly cost-effective |
| Spray Foam | Enclosures for heat-producing equipment | Server rooms, mobile water treatment plants | 6 (per inch of thickness) | Calls for specialty equipment; Requires no framing | Water-resistant; Hard finish; High R-value |
| Batt | Living and work spaces | Mobile offices, locker rooms | 13 (3.5 in); 19 (6 in) | Fast and easy; Requires framing | Cost-effective; High R-value |
| Mineral Wool | When fire risk is a concern or when housing loud equipment | Offices on ships, generator enclosures | 13 on walls; 26 on ceiling | Fast and easy; Requires framing | Sound attenuation; Fire resistance; High R-value |



CLIMATE CONTROL SYSTEMS

Passive Vents

Your ventilation needs will depend on what you plan to store. All shipping containers come with small vents to equalize air pressure while traveling overseas, but these vents don't create enough air flow to prevent mold or rust during long term storage.

Pairs of passive vents installed in the shipping container walls can promote basic air flow without a power connection.

PTAC Units

You've probably seen packaged terminal air conditioner (PTAC) units in hotel rooms. We recommend them for storage, work spaces, and living spaces for a couple of reasons.

First, they have the perfect amount of cooling power (15 K) to keep employees comfortable in a single unit office. Second, their size hasn't changed for decades. Installing a climate control system in a shipping container means cutting and framing an equivalent sized hole in the steel walls. Should the PTAC malfunction, it can be easily replaced.



Through-the-Wall Units

We also offer through-the-wall units (12 K) when wall space or power is limited (often with solar). Through-the-wall units can also be plugged into 110V outlets.



Industrial HVAC Units

If you're protecting industrial equipment that emits heat or absolutely must stay within a set temperature range—for example, servers or water treatment equipment—we recommend a more robust wall-mounted HVAC unit. Heavy-duty HVAC systems are also ideal for larger shipping container buildings.

Heating

While the climate control options discussed above have basic heating systems, they're not very energy efficient when heating rather than cooling. If you're taking your container somewhere with below freezing temperatures, installing baseboard heaters is the best solution.



POWER

First and foremost, call an electrician to connect your container to power. While connecting to power is simple, missteps are extremely hazardous.

Our container structures are designed to take 220 V power. Connecting to 208 V is acceptable, but 110 V is unadvisable. If you plan to connect the container to a generator, we recommend a 220 V generator with at least 20 Amps on one circuit; this translates into a 45 kw generator.

We also strongly recommend grounding the container as a safety measure. You can install a grounding rod next to the container, directly screwing the rod into a corner casting or anchor plate. Any connected generators should be grounded as well.



Connecting any structure to power can be dangerous. Hire an electrician for your own safety.



SOLAR PANELS

Exclusively powering a container structure with solar power is possible but can be expensive. To ensure there is power at all times, you would need to purchase a large battery array and carefully monitor electricity usage.

For perspective, a single container office could be charged by rooftop panels in the right weather conditions. However, a long stretch of overcast weather could deplete battery reserves. We recommend pairing solar power with a backup grid connection.



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Going off the grid is possible, but expensive. Staying connected to the grid and using solar as your majority energy source is a practical alternative.





KITCHENETTES AND BATHROOMS

Kitchenettes

Kitchenettes for living units include a mini fridge, sink, oven, microwave, and cabinets. Plumbing connections are similar to the ones you'd find on an RV. The standard 2" plumbing ports can be connected to a sewer line or tank system.

Bathrooms

Half bathrooms are commonly added to offices and full baths to living units. We've also created restroom buildings and locker rooms with showers. Customers may choose from Falcon's standard fixtures or ship us their preferred finishes for installation.

Please note that installing plumbing and vanity require certain considerations. Consult with us to ensure this solution will work for you.



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PAINT

A hard, shiny alkyd enamel paint works best for most container uses. The alkyd enamel is so smooth that additional paint layers will peel off unless you sand the surface.

If you plan to add a mural to the container, a matte acrylic paint base is the best option. Industrial applications may call for specialized polyurethane paints.

Choose alkyd enamel paint for a hard shiny finish and acrylic paint for murals.



FLOORING

Keeping the original marine grade plywood flooring is always an option. However, adding an additional covering will make the interior more aesthetically pleasing and easier to clean. Here are some popular flooring options.



Coin Vinyl

Coin vinyl is easy to clean, easy to install, and relatively inexpensive.



Vinyl Plank

Vinyl plank imitates hardwood floors. In addition to being easy to install, vinyl plank makes offices and living spaces look polished and homey.



Welded Steel or Aluminum

Welded steel or aluminum floors are usually chosen for industrial applications. We offer flat sheets and treaded texture. Drainage can also be installed for easy clean up.



Epoxy Coating

An epoxy coating can go over any type of flooring to add a water-proof seal with non-slip texture. The coating is usually blueish-grey with a matte sheen. Customers usually request epoxy to go over the original plywood floors or welded steel for industrial applications.

What about carpet and hardwood?

Carpet and hardwood are possible, but containers pose some extra considerations. Because the floor is partly steel, nailing in hard wood floors and stapling down carpet proves tricky. A floating hardwood floor system or carpet tiles are potential work arounds. If you are set on carpet or hardwood, we recommend consulting a contractor to install your chosen flooring on site.



WALLS

Sanded Wood Paneling

Sanded wood paneling is a great option for office and living spaces that will be relocated throughout their use. The cabinet grade wood has a tight grain and smooth finish, so the walls appear smooth once painted. Trim strips cover the seams between two adjacent panels. Sanded wood paneling is also flexible enough to weather regular relocations without damage, making it ideal for field offices and mobile workforce housing.

Dry Wall

Drywall makes containers look very similar to typical brick and mortar buildings on the inside. The seams between the panels will be invisible once finished and painted. If the shipping container will be part of a permanent building, drywall can be installed off-site by the manufacturer or on-site by a local contractor.

Drywall may not be the best option for containers that will be regularly relocated. Consult with us to determine if drywall will work for your project.





Plywood

Plywood interiors are less expensive than sanded paneling, but the texture is more pronounced. You can see knots and ripples in the grain even after the plywood is painted. Plywood paneling is usually chosen for workshops and climate-controlled tool sheds, where it's acceptable for the interior to look less polished.

PolyVinyl Chloride (PVC)

PVC wall paneling is durable and easy to clean. The moisture and chemical resistance makes it a great application for bathrooms, locker rooms, and spaces requiring hygiene. Hidden fasteners secure the lightweight and hollow vinyl panels in place for a clean look.



Perforated Steel

Industrial equipment can be loud, so a growing number of customers are installing sound deadening insulation covered by perforated steel to create a quiet space for labs and offices.



Aluminum or Steel Sheets

If you absolutely can't risk pests invading your container structure and people be spending long periods of time in the container, steel or aluminum walls paired with spray foam insulation may be an appropriate solution. Metal walls have also helped customers clear customs when moving their container structures overseas.

You will see the seams between the metal panels, but the interior can be very sleek for the right application. For example, Black Swan Racing embraced the industrial look of aluminum walls, and the results were perfect for their mobile car garage (left).

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Aluminum or steel sheets are the best option for keeping pests away from sensitive equipment.

ADDITIONAL FINISH OUTS

Shelving

We can secure shelving to the container walls to help create an organized space. Standard solutions come with five, 1.5 feet deep shelves.



Counter and Desk Space

Counter and desk space can be installed along the walls of the containers. For containers that will be frequently relocated, we recommend laminate desks. Permanent offices may opt for granite work surfaces.

Lockers and Cabinets

Lockers and cabinets can be secured to the walls of the container.





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Shipping container structures require specialty trailers designed to handle the heavy load.

TRAILERS

Shipping containers require custom chassis that can handle the weight of a steel box. While we offer chassis for containers that will be regularly relocated, we'd like to note that containers are considerably heavier than travel trailers.

Many people imagine towing a shipping container around the country as a tiny home with a pick-up truck, but the additional weight and unideal aerodynamics make towing containers something better suited to a semi-truck than a Ford F150.





Have questions or need additional resources? [Let's talk.](#)

While the majority of our clients' container applications fall into one of our standard product categories, we regularly complete custom container modification requests too. If you're not finding the tools or insight you need here, contact us. We can walk you through the process and share additional resources to help transform your vision from concept into reality.

ABOUT FALCON STRUCTURES

When we repurpose steel shipping containers, we're not just leveraging a stronger, more readily available building material; we're creating long-lived business assets. Whether your business plans to quickly deploy a field camp or assemble a multi-story apartment complex, Falcon Structures can provide code-compliant modules for your project. Countless industries now rely on our modified containers to create modular container buildings with superior quality. Founded in 2003, Falcon Structures is based in Austin, Texas.

[Contact Falcon Structures](#) today for information on modified, steel shipping containers for your next project.



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