How-To Guide For Selecting Your Rooftop Mounted Mechanical Equipment Screening

How to select your rooftop mounted mechanical equipment screening or enclosure. A user's guide for assisting you in your selection of materials, products, and design.

This guide is intended to provide a simple step-by-step decision-making process in helping you decide when you may need rooftop mechanical equipment screening. If your situation warrants rooftop mounted architectural screening, this guide will assist you in design and selection of quality materials. PalmSHIELD has worked with architects, engineers, designers, and contractors for over twenty years assisting in designs of rooftop equipment screening. Through the years, we have learned a great deal from these professionals regarding the best designs, material choices, and how to complement building aesthetics.

Any device in support of heating, cooling, waste management, water supply, electricity, or the like can be considered mechanical equipment. This could include chillers, condensers, HVAC, compressors, compactors, breakers, meters, generators, containers, and the like. With this equipment being located on a rooftop, it is at greater risk of wind damage and is often in the direct line of sight of pedestrians.

Rooftop mechanical equipment screening will require a building permit and will typically require community design approval to ensure it matches the building envelope and surrounding area. Please refer to your city planning department and local building inspector to obtain the necessary approval process requirements. A building permit is often used alongside a set of design drawings prepared by an architect. These drawings should be in line with the community's appearance standards and guidelines for rooftop mechanical equipment screening. The guidelines set forth by the community should address material selection that is in accordance with the design of the community and surrounding buildings as well as public view considerations. Many communities have strict guidelines regarding rooftop equipment screening and architectural screening. Often, these community guidelines will use a "line-of-sight" approach in regards to location, height, and coverage of screening. This guide and assistance should not overrule community standards.

For a rooftop mounted mechanical equipment screen, designers should give consideration to the following:

- Building envelope material usage, scale, and color: The rooftop equipment screening should be compatible with the existing building envelope in color, style, and structure. Example: If roof lines are vertical, consider using vertical slats or vertical louvers.

- Line of sight: When designing a rooftop mounted equipment screen, consider the screening from all possible vantage points of the equipment. If the building in question is taller than its immediate surroundings, the rooftop equipment may not need screening as the equipment is not visible from any vantage point. Though, in this situation, wind load on the equipment should be considered as the equipment may need protection. If the building is near an elevated building or road, a designer may consider a rooftop equipment screen featuring a roof or overhang. Please consult your local code on this matter.
- The mechanical equipment being screened: When designing rooftop mechanical equipment screening, the equipment itself and its use should be considered. It may not be possible or practical to screen all rooftop equipment due to space, height, and ventilation requirements. With that in mind, the equipment itself may need to be painted to adhere to local appearance standards. Some stacks have a required height to achieve recommended ventilation. In this case, the stacks can be framed in materials matching the building envelope.
- Structural considerations: Many rooftop mechanical equipment screens are not necessarily engineered or designed to be self-supporting or attached to a rooftop. Wind load should be calculated by a structural engineer in your jurisdiction using the project's site conditions. PalmSHIELD recommends you utilize screening that is engineered with UBC and IBC does. A structural engineer can provide a set of stamped drawings, performance data, and calculations regarding wind load.
- Visibility or lack thereof: PalmSHIELD's rooftop mechanical equipment screening can be modified to select the amount of visibility you desire or that local codes require. Our most common rooftop mechanical equipment screen design, louvered panels, can offer 100% or 80% direct visual screening when looking straight on. Our other panel infills can be modified as well to create more or less visibility.
- Degree of openness: The visibility and direct visual screening referenced above has a direct effect on the degree of openness. The degree of openness is the open area between planks, louvers, holes, etc. over a specific range. The openness or free area determines the amount of air that can travel between infill elements. Often, the rooftop mechanical equipment will have a recommended amount of free area. The community guidelines may also require a certain amount of air-flow.
- Infill design and selection: PalmSHIELD offers a variety of infill options for rooftop mechanical equipment screening that will match any community appearance standards, building envelopes, visibility requirements, and degree of openness requirements. All of PalmSHIELD's rooftop mechanical screening features a picture frame design surrounding the selected infill. The most common rooftop screening designs include:
    - Louvers: PalmSHIELD's louvers can be customized to add or subtract visibility and airflow. PalmSHIELD offers horizontal, diagonal, or vertical louvered infills. Our most common horizontal louvered option features 100% direct visual screening and 64% openness.
    - Slats: A popular option for rooftop mechanical equipment screening are slats. The popularity is due to the amount of customization. We offer aluminum, composite, or vinyl slats to match any building profile and the openness can be

customized to your liking. These tubular or solid infills can be positioned horizontally, diagonally, or vertically. A shadow box pattern can also be utilized to create near 100% direct visual screening while retaining a high degree of openness.

- Perforated screening: Perforated metal sheets in a wide variety of stylistic patterns and hole sizes. Perforations include circles, squares, stars, hexagons, or custom designs.
- Other: Please see our products page for a full line of fully framed product offerings that can be utilized for rooftop mechanical equipment screening.

Upon evaluation of your mechanical equipment screen needs using the information listed above, designers will next consider the material selection and products for their rooftop mechanical equipment screening. Below are 5 common options for rooftop mounted mechanical equipment enclosures and screens.

1). Structural Steel Framework

Structural steel is the most common material used for large commercial buildings and therefore it is often matched with a structural steel mechanical equipment screen placed on the roof. This style of mechanical equipment screening is often in the structural steel contractor's scope of work and is usually welded and installed in the early stages of construction. These rooftop mechanical equipment screens are often integrated into the framework of the building and typically extends below the rooftop materials to connect with structural steel within the building. Because a structural steel rooftop screen is part of the building framework, it cannot be used in a retrofit or building addition. Often, a rooftop mechanical equipment screen is added during a retrofit or building addition because it was not originally considered.

Advantages:

- Structural steel equipment screens are very strong as they are welded to integral framework.
- Structural steel rooftop equipment screening can be created to cover tall and wide areas due to the rigidity and strength of the structural steel.

Disadvantages:

- This style of rooftop mounted screening is prone to water damage. The square steel tube members extend down beyond the roofing. Creating watertight seals around all square tubes is difficult.
- Furthermore, any water that may enter into the steel tubing could also enter the building as the tubing offers a direct line into the building framework. Any screws, pin holes, fasteners, and poor welds can allow water to infiltrate the building.

- Because structural steel is prone to rust, it is recommended to be hot dip galvanized. Hot dip galvanizing can be very expensive.
- A rusting structural steel mechanical equipment screen can stain the roof and may not adhere to community appearance guidelines. Not to mention it could fail over years of rusting.
- Once a structural steel rooftop mechanical equipment screen is built using integral building framework, it can be very expensive to move. Whereas a mechanical attached system can be easily moved and reinstalled.
- If a new tenant or building renovation requires more screening, or a change in rooftop layout, the existing rooftop screening will become a tremendous issue.
- Because a structural steel rooftop mechanical equipment screen is welded on site by the structural steel contractor, the coatings and product itself is not covered by a manufacturer's warranty.

2). Steel Stud Framework

Rooftop mounted screening with a steel stud frame are popular on retrofit applications. Usually, they are installed by some mix of carpenters, drywall installers, sheet metal contractors, and roofers. This option is not engineered by a manufacturer, does not come with a manufacturer's warranty, and is not typically within the scope of a single trade.

Advantages:

- A steel stud framework is hot dip galvanized and will last long outside.
- Installation is simple as it can be field cut, field assembled, and field installed. However, field welding on a rooftop is not recommended due to possible fires and holes in a rooftop.

Disadvantages:

- Attachment to the rooftop is difficult. Usually, it would be mounted to wooden sleepers. The wooden sleepers are bolted to the structure below the rooftop membrane.
- Adding these wooden sleepers to a sloped rooftop can disrupt the flow of water and drainage. The build up of debris and water can cause failure of the roof.
- It is very difficult to keep this method completely watertight when mounting the rooftop equipment screening.

3). Wooden Rooftop Screens

A wooden or “stick-built” rooftop mechanical equipment screen is a non-engineered system that utilizes wooden supports, posts, infill, etc. Often, a lattice effect is used to retain airflow while providing some visual screening. This option is not recommended due to the lack of protection from elements upon an exposed rooftop. Wood framework is not a long-term solution and the lack of engineering and pliability of the material can cause the system to fail under minimal wind loads. Unfortunately, wood is still often used due to its availability and low cost. Though it has become a habit for contractors to save costs and build their own wooden rooftop screen, we would not recommend it for any rooftop application.

Advantages:

- Wood framework is easy to field assemble and cheap.
- Wood may match the building envelope and aesthetics better than other materials. If the building envelope and surrounding area feature wood heavily, consider an engineered metal system that features composite or vinyl panel infills that mimic the texture and color of wood.

Disadvantages:

- Beyond the disadvantages listed above, wood can bow, sag, warp, and requires constant maintenance.
- Rooftop attachment can be difficult and, like the steel stud framework, will utilize wood sleepers which cannot guarantee a water tight installation.

4). Mechanical Equipment Mounted Screening

This option features a rooftop mechanical equipment screen that is mounted directly to the rooftop mechanical equipment. The screening panels can be fastened directly to the mechanical equipment via an equipment exoskeleton and trussing system provided by the mechanical equipment manufacturers. Many mechanical equipment manufacturers offer this trussing system as an add-on to their typical products. Or, the equipment manufacturer may have attachment points on the screening itself that have been engineered to be load bearing.

This is an excellent option for any of PalmSHIELD’s fully framed equipment screening panels. Simply provide the attachment points needed for PalmSHIELD’s panels and PalmSHIELD will fabricate a truss system for quick and easy attachment.

Advantages:

- The installation process is quite easy, especially when utilizing PalmSHIELD’s rooftop mechanical equipment screen panels.
- This option does not require penetration of the roof membrane by the rooftop screening. This removes the chance of leakage caused by the rooftop screening.

- Mechanical equipment mounted rooftop screening meets most municipality codes and guidelines.

Disadvantages:

- If the mechanical equipment manufacturer does not offer a surrounding trussing system, exoskeleton, or mounting points, this option may not be possible.
- Though mounting to a mechanical equipment screen is an engineered option, wind loading should still be considered. When extending the screening above the equipment itself, there will be added wind load to the framework. Since the framework is attached directly to the equipment, there can be sever wind loads on the equipment being screened. The equipment itself and its attachments are not always engineered to survive wind loads beyond what the equipment experiences on its own. Please refer to a registered structural engineer in your jurisdiction to ensure proper wind loading.
- The mechanical equipment may not have sufficient access with mechanical equipment mounted screening. Consider utilizing one of PalmSHIELD's heavy duty gate options to ensure access to the mechanical equipment units.

5). PalmSHIELD Industrial Rooftop Screening

PalmSHIELD's fully framed product options that offer a variety of airflow, visibility, and aesthetic options are an increasingly popular choice among designers for an engineered rooftop mechanical equipment screening solution. PalmSHIELD's panels are fully framed in aluminum and can attach via the structural steel option, the mechanical equipment mounting option, or via our propriety rooftop mounting support system. We can provide just our panels to attach to the rooftop your way, we can provide our exclusive rooftop mounting framework, or we can work with you to design a panel that will mount directly to your mechanical equipment at its attachment points.

PalmSHIELD's rooftop mounting support system features watertight equipment rails that are mounted to the rooftop. Our framework and kickers mount directly to the rails resulting in an engineered system with wind load resistance that one-off or stick-built rooftop screening can not match. This is an economic option that allows for a variety of custom designs and layouts.

If you would like to attach to the equipment or equipment framework, PalmSHIELD offers a cantilevered trussing system the will attach to the equipment and our support posts. We provide all necessary brackets and hardware for this connection and this can be custom fabricated to your needs.

PalmSHIELD's rooftop mechanical equipment screening is extremely robust to account for high wind loads across a rooftop. We take the protection of mechanical equipment very seriously as the loss of mechanical equipment can be detrimental to a building's use.

Advantages:

- The flexibility of PalmSHIELD's rooftop mechanical equipment screening is unmatched due to the ability to be installed in a variety of different ways. We customize every project to your needs and application.
- PalmSHIELD's rooftop mechanical equipment screening is a robust, engineered option that will present an extremely long-term solution compared to stick-built options.
- All of PalmSHIELD's fully framed panel options are available for rooftop installation, meaning you can match any number of building aesthetics and ensure you are matching community appearance standards. Our wide variety of openness options will also allow you to control airflow to mechanical equipment and the visibility of rooftop mechanical equipment.
- PalmSHIELD's rooftop mounted mechanical equipment screening can be used on sloped roofs which is not an option offered by many manufacturers.
- PalmSHIELD is the only rooftop mechanical screening manufacturers that provides a structural, picture frame design for its panels. It is one of the few rooftop mechanical equipment screening manufacturers to offer gates for rooftop applications.
- PalmSHIELD's rooftop mounting support system is water tight to avoid leakage and future costly damage.
- PalmSHIELD's rooftop mounting rails are economic compared to other methods of rooftop attachment.
- No matter which application you select for PalmSHIELD's rooftop mechanical equipment screening panels, we will ensure that the installation is simple and easy.

Disadvantages:

- If you are looking for a non-engineered, "one-off" or "stick-built" system, PalmSHIELD's rooftop mechanical equipment screening may not be the best option. PalmSHIELD's products are not a short-term solution as our system is built for the long haul.
- Contractors and designers are used to field assembling one off systems on a rooftop and believe this is the simplest way to create a rooftop screen. PalmSHIELD offers CAD drawings, site specific shop drawings, step-by-step installation guides, and expert analysis at every step of the way to assist contractors and designers.
- Compared to a non-engineered one-off or stick-built rooftop equipment screen, PalmSHIELD does not offer the most price competitive option. However, compared to like-kind mechanical equipment screening manufacturers, PalmSHIELD does offer the most price competitive options. Also, you must consider the engineering, ease of installation, shop drawings, and longevity of our product when considering the cost. These costs are not always included in non-engineered systems. The long-term cost of a rusting framework, leaking roof, or damaged mechanical equipment is well beyond the cost of PalmSHIELD's rooftop mounted mechanical equipment screening.

Once you have determined height, location, material selection, style selection, and type of product, the design will need to be finalized based on the configuration and needs of the mechanical equipment. This layout takes into account line of sight and multiple other critical design factors for the rooftop mechanical equipment screening.

- Amount of clearance for the mechanical equipment: Many mechanical equipment manufacturers will have recommendations stating the amount of area around the mechanical equipment that will need to remain unobstructed by material. They will also typically state the amount of airflow the equipment requires for proper function. Please consult the manufacturer recommendations, maintenance documents and local codes for the requirements.
- Access to mechanical equipment: Local codes will often require a specific amount of access for mechanical equipment. A gate, door, or access area is typically required on the control side of the rooftop mechanical equipment enclosure. These gates will nearly always open outwards.
- Continuous versus individual screens. Sometimes local coding will require a continuous screen rather than multiple individual screens. Consult your local code requirements.
- Openings: Designers should consider any and all vents, ducts, piping, wiring, etc. that will need direct access to the mechanical equipment and design the rooftop screening to go around these areas. The locations of these variables will need to be communicated to the rooftop mechanical screening provider for accurate fabrication.
- Existing Parapet walls: Designers should consider existing parapet walls around the building as this may limit the amount of screening needed to create 100% direct visual screening. Designers should consider all lines of sight and consult local equipment enclosure coding.

After reviewing all items listed above in our guide for selecting your rooftop mechanical equipment enclosure and screening, you are finally ready to contact your rooftop equipment screen manufacturer! Based on the information above, you should have a good idea of the layout, design, and styles needed for your rooftop application. Please provide this information to your selected manufacturer for proper pricing. If you are not sure on any of the above, allow a reputable rooftop screening manufacturer the opportunity to assist you in your selections. You can expect a reputable manufacturer to provide you with a full set of elevation views, fabrication drawings, product details, and engineering specific to your project. You can use these drawings in support of your submission to community planning authorities.

We hope our guide to selecting your rooftop mechanical equipment screening has been of assistance. If you would like further support regarding product selection and design, please visit www.palmshieldlouvers.com and contact us for assistance.