Aluminum is a Modern Choice for Balconies

What Features of Aluminum Answer Modern Balcony Needs?
Think Beyond the Balcony Box

Balconies are basically boxes, and anything but simplistic. Architects have to think beyond the box. Factors such as safety, look, feel, community, connections, codes and regulations all factor into the design of a balcony. This eBook summarizes some of the highlights to consider when designing a balcony for multifamily properties.

Codes and Regulations

Specific codes and regulations apply to balcony construction. Live loads and deflection play a part in safety and design.

What are live loads?

Live loads take into consideration the number of people, planned objects, or unplanned objects like snow, and how much a structure can hold without structural compromise. This can also apply to balcony railings. Think of live loads as the number of people who can lean against a balcony railing without structural compromise.

What is deflection?

Deflection is the amount of bend in a deck or railing. The amount allowed is both set to code, and against the perception of someone standing on a deck. If the users of the structure are uncomfortable with a bouncing deflecting floor, the structure has “failed” from a serviceability standpoint. Though the balcony structure may be considered safe, ideally, safety shouldn't be a question.

One option of a welded railing to deck will eliminate most railing deflection, like that in prefabricated bolt-on balconies. A thicker aluminum choice versus wood can also serve to eliminate most deck and railing deflections, as well as increase live load amounts. Any balcony rails built beyond the standard 200 lb lateral load will feel more sturdy.

Start thinking about these items for designing the feel of a balcony and deck structure:

- Plan for a greater load to provide a greater level of safety feel
- Review IBC code for balconies
- Understand how design can minimize deflection
- Type of substrate (e.g. wood, steel, aluminum)
- Cantilever versus bolt-on self-supporting balcony design
- Thickness of material
- Attachments of balcony railing to deck (e.g. welds, screws)
Community Concerns

The Challenge

Traditional balconies use a wood cantilever balcony construction method, with a counterbalance of wooden beams built inside floor-ceiling assemblies. This type of wood construction is quite time and material involved. A traditional wooden cantilever method also poses many challenges including fire safety, replacement costs, and unknown load hazards.

The Solution

A bolt-on balcony system increases safety for occupants and firefighters, nearly eliminates replacement costs, and greatly reduces install time. These benefits occur with prefabricated welded aluminum balcony construction that bolts to the outside of the building. Installation of a bolt-on balcony is about 30% faster compared to a wood installation. This aluminum system is also about 110% longer lasting than a wood balcony.

Wood fails over time, and usually it fails without visibility, as it can rot from within. Check out the failed balcony story at Berkeley. Typically, to replace a failing wood balcony, you have to remove floor joists or deconstruct and rebuild the entire balcony, which can be a costly maintenance expense. Change out an aluminum bolt-on balcony if you don't like the color, otherwise set it and forget it. To change the color of an aluminum bolt-on balcony, you just unbolt, re-powder coat, and re-bolt onto the building.

Fire safety is one of the major benefits of aluminum construction versus a traditional wood balcony. Aluminum is non-combustible, and it's good strength to weight ratio allows the balcony to hold greater loads.

Aluminum : A Great Building Material Choice

Aluminum is a modern building material choice for factors such as: LEED certification, longevity, safety, and color options. Aluminum by itself has features of: strength, durability, flexibility, impermeability, down-weighting, corrosion resistance, and recyclability (more info: http://www.aluminum.org/sites/default/files/SustainabilityBrochure_0.pdf), and contributes to more jobs in the United States.

Aluminum is a sustainable metal. The lightweight, strong, and infinitely recyclable nature of aluminum makes it a wise choice for carbon footprint reduction. No other metal can match aluminum's sustainability advantage. Balconies can take advantage of its strength, durability, impermeability, and natural corrosion resistance. Unlike other balcony construction methods, the entire aluminum balcony can be recycled.

Why Aluminum?

- Weather-Proof
- Corrosion Resistant
- High Strength
- LEED Certification
LEED Certification / Environmental Responsibility

Known as an inherent sustainable metal, aluminum is lightweight, strong, and infinitely recyclable, which makes it a wise choice for carbon footprint reduction. No other metal can match aluminum's sustainability advantage (ref: http://www.aluminum.org/sites/default/files/SustainabilityBrochure_0.pdf). Balconies made with aluminum can take advantage of its strength, durability, impermeability, and natural corrosion resistance. Unlike other balcony construction methods, the entire balcony can be recycled.

The use of aluminum can contribute to LEED certification. Here are a couple of resources to better understand how aluminum building products contribute to credits for LEED certification from The Aluminum Association:


Longevity

The building material that lasts longer than any other considerable material for balconies is aluminum. For instance, the use of steel will rust, the use of wood will rot. The only reason for replacing an aluminum balcony may be to change the color. If you want to change a bolt-on aluminum balcony color in the future, just unbolt the balcony, send to powder coater, and re-attach.

Safety

Balconies are one aspect of a building that requires ultimate safety considerations. For ultimate safety consideration of a balcony, the key factors to consider are the material, attachments, and maintenance requirements. This safety aspect is why aluminum is such a key choice. A traditional wooden cantilever balcony has great risk of fire, load, and unseen wood rot hazards. The bolt-on aluminum system is fully exposed with no hidden connections, which adds to the overall increased safety. Consideration of the recent fire tragedy with a wood balcony in Berkeley, CA makes an aluminum balcony a more assuring choice. Often no one can tell without a special test on whether or not a wooden balcony will fail. Bolt-on balconies have plain view bolt connections to the building, which allow for unlimited visual inspection. Additionally, an aluminum balcony formed by welds creates a stronger assembly over other decking and
railing assemblies connected by nuts and bolts. Of course, no balcony system is completely safe over extreme weather, a complete building fire, or occupant negligence, so inspection should be part of periodic building inspections.

Anyone can do a basic visual inspection for ensured and continual safety of a bolt-on balcony. The most difficult challenge of a cantilever balcony is maintaining a weather tight joint where the joists pass through the wall. Joists will move with changes in moisture and temperature, as the result of expansion and contraction. The result is unseen rot and water damage, with a great safety risk. Caulk is often the weather sealant from water damage, and caulk wears quickly in outdoor elements. The repair of an unsafe wooden balcony often requires: rebuild, repair to the inside joists, drywall removal, and interior fixes. These fixes can be lengthy and costly.

Considerations when Choosing Bolt-On Aluminum Balconies

Some of the considerations when choosing bolt-on aluminum balconies include engineering, design, storage space, and size. The knife plates are one of key engineering components of a bolt-on balcony, and require precise measurement and fabrication. Timing is of the essence when calculating for knife plates. Additionally, a change in architectural designs may require redraws by the fabricator to ensure fit, which may delay the project or require additional fees. Currently, computer programs do not easily adjust for changes to the building structure, so an item like a balcony will need to be redrawn to fit any design changes.

Another consideration is storage space. If the aluminum balcony is fully welded and shipped in one piece then the general contractor and fabricator will have to ensure either onsite storage space, or carefully plan sequence of delivery. Conversely, the pre-assembled balcony will save the general contractor and installer time, as they will not have to spend time in a search for railing pieces.

Currently, the size limitations of a self-supporting bolt-on aluminum balcony is a maximum size of 6’ depth x 20’ width; additional modifications can be made to support larger sizes.
Install Speed

The use of aluminum to construct a balcony helps create a bolt-on system to decrease install time. A bolt-on balcony can be attached to a building about four times quicker than building a wooden balcony. Additionally, the bolt-on system is cited as easy to train local installers on how to install. The only requirement which may be different than other systems is the need for a crane operator. The following figure demonstrates the average amount of time to install a traditional wood cantilever balcony versus a standard aluminum bolt-on balcony. A wood cantilever deck takes an average of 40 hours install time per balcony. Conversely, a standard aluminum bolt-on balcony (after install of knife plates) install time can be as little as 24 balconies installed in five (5) hours.
Railing Options

The railing options for aluminum balconies are numerous from cable to the architect’s imagination. Popular railing styles include: mesh panel, cable, picket, glass.

Connection Details

The connection points of a bolt-on aluminum balcony are engineered with an assumption that the wall beneath will provide adequate structural support. The knife plates are the first piece to install onto the building prior to the arrival of the balconies. The best way is to install knife plates first prior to siding and brick applications. Next, the bolt-on aluminum balconies arrive in one welded piece (decking and railings) along with the tie rod/bolt system. This entire process from crane to building is done in about five (5) to ten (10) minutes per balcony.

Infrastructure Preservation

Additionally, the avoidance of cantilever construction allows for the preservation of the infrastructure. A self-supporting balcony preserves the content of the structure by bolting to the outside of the building. This prevents the disruption of the inherent structure, as disruption may create unforeseen challenges.

Color Options

Color serves as a design element, which can help differentiate buildings from other buildings. The use of aluminum and powder coating opens up unlimited color choices. The opportunity to utilize vibrant color
on a balcony fits the trend of using color to differentiate a building from surrounding buildings. A building can become a brand with color. Or, people can use color as a landmark while navigating through a city.

The powder coat process is used to color aluminum balconies. A powder coat color offers many advantages over a traditional paint / wood combination. Sometimes a surprising advantage of powder coating is that there are no solvents or VOCs, so you can be assured of a process without harmful environmental effects. Another advantage is flexibility, so the coating stands a better chance over paint to bend and yield during transport and varying weather conditions. The powder coat withstands the tests of time over paint with very slow fading (if any) and chipping (if any.)

Of course, powder coating has a couple of items to consider such as: using a touch up “powder coat color” paint will face the same conditions as regular paint, so it is advantageous to have designs and fabrication carefully built to spec requirements. A powder coat color still faces the same warranty challenges as paint as the length of a powder coat warranty and their coverage vary greatly depending on the supplier and type of powder coat. To note powder coat is one of the most economical, longest lasting, and most color-durable finishes available on metal. Generally, a powder coater will warranty the immediate cosmetic appearance such as ensuring the paint is bubble free and peeling free upon arrival.

**Best Practices**

Sometimes a balcony is seen as an afterthought, or as a basic generalized component to a design. The availability of numerous design features, and code considerations will help both architect and fabricator if communication begins early in the design process.

**Never Do This**

Never allow hardware replacement for a bolt-on balcony which does not originate from the manufacturer. The hardware used to attach the balcony to the building is engineered for safety, and must always use a specified grade of stainless hardware.

**Lessons Learned**

Today’s design environment is different than that of 30 years ago. The choice in building types varies immensely, and therefore requires engineering per substrate. Allot adequate time for drawing, engineering, and field measuring for bolt-on aluminum balconies as they are customized to the building type.

Midwest Stairs & Iron offers:

- The first aluminum bolt-on balcony to save install time, for increased safety, longevity, and aesthetics
- 10 standard colors, and availability of custom colors
- Each balcony arrives in one fully welded piece (decking and railings) for quicker install
- Joist free look for clean lines as one looks above
- Large widths
Helpful Items for the Architect

A few items from the architect early on in the process are helpful to keep aluminum balconies production moving with the project. Here is a general checklist of considerations:

- Supply architectural drawings, which can be utilized within the fabricators design package (e.g. AutoCAD, Tekla)
- Decide on responsibility to verify knife plate measurements (pros and cons of options)
- Choose color at contract award

Recent Project Examples by Midwest Stairs & Iron

Install Video: (features Trio Apartments) [https://www.youtube.com/watch?v=f5yIK-6tYVE](https://www.youtube.com/watch?v=f5yIK-6tYVE)

**Project:** Trio Apartments, [http://www.newlandmke.com/property/trio/](http://www.newlandmke.com/property/trio/)
**Location:** 124 W Washington Street, Milwaukee, WI 53204
**Features:** Use of two color styles for bolt-on aluminum balconies as a branding element to the building complex.

**Project:** NorthShore 770, [http://northshore770.com/](http://northshore770.com/)
**Location:** 770 Skokie Blvd, Northbrook, IL 60062
**Features:** Bolt-on aluminum balconies with a mesh railing for a luxury apartment complex.

**Project:** The North End, [http://www.thenorthend.com/](http://www.thenorthend.com/)
**Location:** 1551 N Water St, Milwaukee, WI 53202
**Features:** Bolt-on aluminum balconies
Ask Midwest Stairs & Iron about other notable projects across the country...such as a project with 350 balconies, and a project with large widths.

White Powder Coating Aluminum Bolt-On Balconies

Call Midwest Stairs & Iron at 414-483-2890 for a consultation, or visit mwstairs.com.