



## The Resilience of Steel Windows and Doors

Few athletes succeed at bringing together the ideals of superior strength, graceful form, and lasting endurance. In construction, often the strongest materials are the most bulky and inflexible. Yet, window and door frames made of solid, hot-rolled steel have proven to be the most resilient while offering the versatility to achieve the most graceful and distinctive appearance.

Steel windows and doors, with their striking aesthetic appeal, are by far the most resilient option. Indeed, it is the strength of solid, hot-rolled steel that enables the graceful, slender sightlines, larger lites of glass, design flexibility, and weather and impact resistance that gives steel windows and doors their remarkable combination of both strength and visual appeal.

### The Resilience of Steel

What gives steel its exceptional strength? Windows and doors made from solid steel purpose-made sections are stronger than products composed of other materials. For example, steel is three times stronger than aluminum. Steel is inherently more elastic, allowing it to dynamically bend and rebound, and providing significantly higher yield strength which is defined as the maximum stress that can be applied before an object begins to change shape permanently.



The manufacturing process also contributes to durability. Solid hot-rolled steel windows and doors are manufactured from thick gauge steel; the thicker material promotes a more resilient

product. Hardware fastened to steel windows and doors will not pull out. Ventilators will not rack with age.

The intrinsic properties of solid steel provide optimal thermal performance. The raw material conducts heat and cold at one-fifth the rate of aluminum substrates. The minimal frame dimensions of steel windows and doors further lessen thermal transfer by reducing surface exposure.

Steel windows and doors also have many options for high-performance finishes that protect the steel substrate and provide a more resilient finish for a longer life cycle. Modern technology with metal pretreatment processes to hot-dip galvanize the frames, as well as electrocoat (e-coat) primer, powder coatings, and urethane enamels and other top coats, enable manufacturers to produce windows and doors that last longer and require less maintenance than alternatives such as wood and aluminum.

But this unmatched resilience is only one driver in the increasing adoption of steel. The strength of steel also affords additional benefits that are highly valued in commercial and residential markets, including the unique and distinctive aesthetic possibilities.

### **Unique and Distinctive Look of Steel**

No other quality is more readily associated with steel windows and doors than their narrow sightlines, a distinctive look that cannot be duplicated in aluminum, wood, or vinyl alternatives. For centuries, architects have incorporated this attribute into countless architectural styles in municipal buildings, museums, churches, private homes, commercial buildings, schools and universities, transportation terminals, manufacturing facilities, hospitals, and retail stores.



The narrow framing not only gives architects many design options for achieving graceful and classic looks, but it also has the functional benefit of allowing larger lites of glass, thereby letting more daylight into occupied spaces.

Building codes contain increasingly stringent standards to increase daylight in occupied spaces in order to conserve energy used for artificial lighting and to make the spaces more pleasant, healthful and productive. The larger lites of glass allow for more open, expansive views. Steel windows and doors are also becoming more popular for interior glass

partitions, reflecting contemporary architectural designs that favor less framing, more open views, and better lighting.

In renovation projects, steel is often selected to replace wood windows to maximize glazing area, in addition to providing extended durability. Retrofit and historic replication projects benefit from over a century of manufacturing and technical advancements, such as insulated and low-E glass, integral groove weatherstripping, coupled with slim, historically accurate sightlines of steel window frames.

The strength of solid hot-rolled steel gives architects design flexibility. The greater structural integrity not only enables thinner frames and larger glass lites, but it also allows substantially larger openings and complicated, customized shaping of the frame profiles. Another benefit of steel windows and doors is the ability to accept any style and type of hardware, to serve a functional purpose or to achieve an aesthetic look.

### **Unmatched Resilience and Visual Appeal**

Solid, hot-rolled steel window and door frames, offering versatile design options and aesthetically pleasing capabilities, have proven to be the most resilient option for construction applications. Their superior strength, impressive longevity and exquisite composition make them an unmatched option in the residential and commercial construction industries.

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### **About the Steel Window Institute (SWI):**

The members of SWI are leading manufacturers of windows and doors made from hot-rolled purpose-made steel sections and such related products as casings, trim, mechanical operators, screens, and moldings that are manufactured and sold by members of the industry for use with steel windows and doors. SWI members lead the way for steel windows and doors with testing requirements such as air-water-structural and impact. Proprietary specifications produced by each SWI member are available from individual members upon request.

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