COLUMN LAYOUT

All columns at the perimeter of a building should be oriented with their flanges facing outward to facilitate the attachment of cladding to the structural frame of the building. Elsewhere, columns should be oriented with their webs parallel to the short axis of a building whenever possible. This permits the maximum contribution from the columns to the stability of the building in the direction in which the building is most susceptible to lateral forces.

Columns above and below each other at the perimeter of a multistory building are also often aligned on their outer faces. Despite the misalignment of column centers that occurs as the column size reduces on upper floors, this arrangement is desirable for the consistent curtain-wall fastening detail that it produces.

See pages 98–99 for additional information on the sizing of column bays.

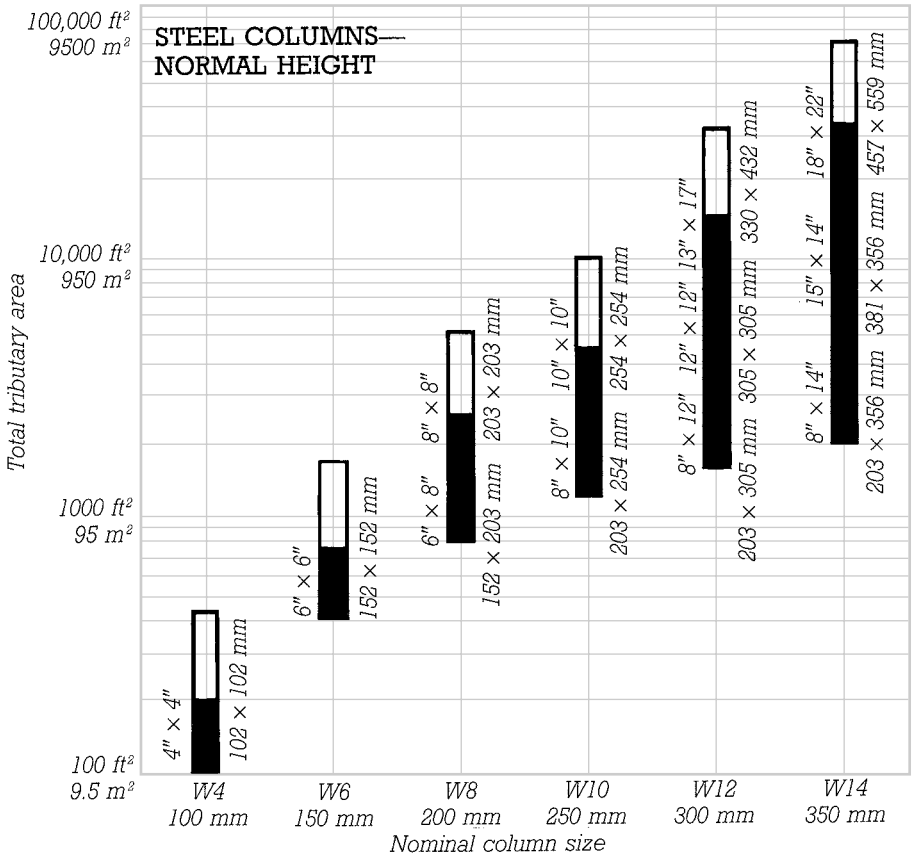
FINAL DIMENSIONS OF STEEL COLUMNS

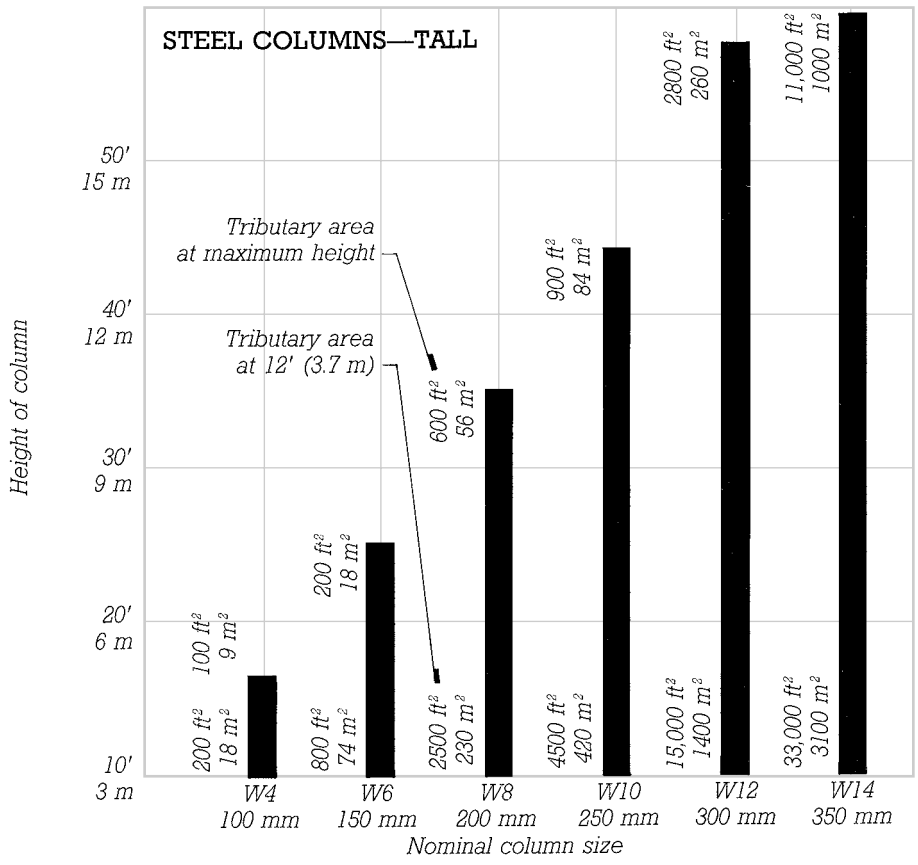
The finish dimension of a steel column must be increased from the actual size of the section to account for applied fireproofing, protective cover or other finishes, and the added depth of connecting plates and protruding bolt heads where column sections are joined. The total finish dimension may range from 2 to 8 in. (50 to 200 mm) greater than the actual column size.

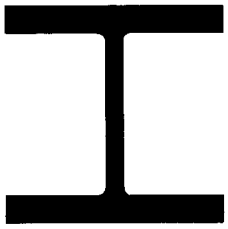
FIRE-RESISTANCE RATINGS FOR STEEL COLUMNS

Exposed steel columns may be used in Unprotected Noncombustible construction. Fire-resistance ratings of up to 4 hours are easily achieved with applied fireproofing.

STEEL COLUMNS







The top chart is for steel wide flange section columns up to 12 ft (3.7 m) tall between floors.

- For normal loads, read high in the solid areas. For heavy loads, read lower in the solid areas. For light loads, read in the open areas.
- Approximate actual column sizes are shown to the sides of the bars.
- For high-strength (50 ksi or 345 MPa) steel columns, sizes W8 or larger, increase the indicated tributary area by 30%.
- For columns that are at the perimeter of a building, or that are part of a rigid frame system, select one nominal column size larger than shown by this chart.
- W14 sections are the largest standard rolled sizes commonly used as columns. Larger built-up sections capable of carrying greater loads may be shop-fabricated.
- *Total tributary area* is the total area of roofs and floors supported by the column.

The bottom chart shows the maximum height permitted for each nominal column size. The tributary areas for average loads, at the maximum height and at 12 ft (3.7 m), are shown next to the bars. (The area that can be supported decreases with increasing column height). For intermediate heights, the tributary area may be interpolated between these two values.

- Maximum column height must be decreased for columns that are part of a rigid frame system.
- Column height may be increased with the use of intermediate bracing or with rigid end connections that restrain buckling.

STRUCTURAL STEEL TUBING

Standard shapes for structural steel tubing include square tubes, rectangular tubes, and round pipes. Compared to wide flange sections or other shapes of similar size, tubes and pipes are more resistant to buckling forces, making them good choices for columns and compressive struts in all types of steel systems. They are employed as columns in long-span steel structures for their greater efficiency, and because they are available in lighter weights than other standard shapes, they are frequently used in one- or two-story steel structures as well. Tube and pipe sections are popular choices for use in the fabrication of steel trusses and space frames, and their high torsional resistance makes them excellent choices for single post supports such as for signs or platforms.

The simple profiles and clean appearance of steel tubes and pipes also make them popular for use where the steel may remain visible in the finished structure, or for structures exposed to the weather where the absence of moisture- and dirt-trapping profiles and ease of maintenance are desirable characteristics.

SIZES FOR STEEL TUBES AND PIPES

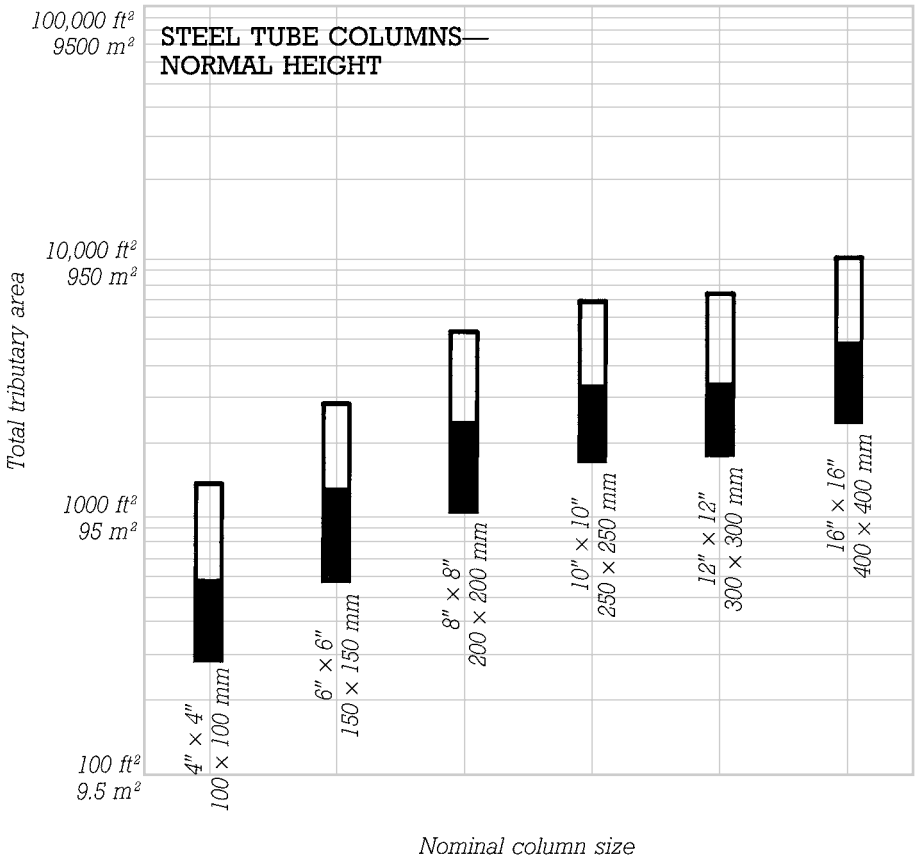
Tubes and pipes are generally available in whole-inch (25-mm) sizes up to 6 or 8 in. (152 or 203 mm). Greater sizes are available in even-inch (51-mm) increments.

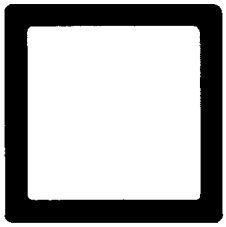
Shape	Width of Tube or Diameter of Pipe	Thickness of Wall
Square tubes	3" × 3"–16" × 16" (76 × 76 mm–406 × 406 mm)	0.188"–0.625" (5–16 mm)
Rectangular tubes	3" × 2"–16" × 12" (76 × 51 mm–406 × 305 mm)	0.188–0.625" (5–16 mm)
Pipes	3"–12" (76–305 mm)	0.216"–0.875" (5–22 mm)

FINISH DIMENSIONS OF STEEL COLUMNS

The finish dimension of a steel column must be increased from the actual size of the section to account for applied fireproofing, protective cover or other finishes, and the added depth of connecting plates and protruding bolt heads where column sections are joined. The total finish dimension may range from 2 to 8 in. (50 to 200 mm) greater than the actual column size.

STEEL TUBE COLUMNS





This chart is for square tube steel columns up to 12 ft (3.7 m) tall between floors.

- For normal loads, read high in the solid areas. For heavy loads, read lower in the solid areas. For light loads, read in the open areas.
- For columns at the perimeter of a building, or that are part of a rigid frame system, select one nominal column size larger than shown by this chart, or consider rectangular tubes larger in one axis only.
- Actual column size is equal to the nominal size.
- *Total tributary area* is the total area of roofs and floors supported by the column.
- Tributary area will be less for taller columns.

FIRE-RESISTANCE RATINGS FOR STEEL TUBE AND PIPE COLUMNS

Exposed steel columns or other framing elements may be used in Unprotected Noncombustible construction. Fire-resistance ratings of up to 4 hours are easily achieved with applied fireproofing.