

## Simplified Guide to Buying Steel

Buying steel is easy and you'll get a decent price by going to the right vendor. Hardware and big box stores have limited materials at exorbitant prices. Online stores are often very pricey. The key is to find a local steel distributor that sells to the public (most do).

Industrial consumers of steel purchase large quantities at once and the typical home hobbyist purchase is small so it's important to be efficient with the vendor's time. Confirm methods of payment in advance; some do not accept credit cards.

Hot-rolled steel (typically made to the A36 specification) is perfect for most practice purposes. Solid pieces come in 20-foot 'sticks', pipe is in 21-foot 'joints', and square/rectangular tube are 24-foot sticks.

Cold rolled steels have tight dimensions, sharp corners, come in 12' lengths, and cost a lot more. Some have higher levels of carbon that can make welding more difficult.

Most yards only sell whole lengths though they will cut it into multiple pieces for easy transport. If you need it cut, indicate that with the initial order. Torching it into shorter pieces with low precision is least expensive so be certain to mention that precision is not required if it isn't. Based on your available equipment, it can be convenient to have exact lengths cut for your project; specify the cut method (saw or flame, for instance) and a tolerance (length to the 1/8" +/- 1/16" is reasonable for most projects). Such cutting may require a lead time of several days.

Hot-rolled solids come as flats (F), square bar, round bar, angle iron (L), Standard beams (S), Wide-flange beams (W), channel iron (C), and tees (ST and WT).

Sizes for flats, bars, and angle iron are given in inches; for example, F3x1/4", 3/4" square bar, L2x2x3/16" (2" angle iron, 3/16" thick). Unequal leg angle is available in some combinations such as L3x2x1/4.

Beams (and their derivative tees and channels) are specified as the approximate height in inches and the weight per foot; S4x7.7 will be about 4" tall and weigh 7.7 lbs/foot while W6x9 will be about 6" tall and weigh 9 lbs/foot. S beams have a sloping inside flange like the bottom of railroad track while W beams have very square/parallel flanges. Channel are all derived from S-shaped beams and are sized by height and weight-per-foot, i.e. C12x20.7 are 12" tall and weigh 20.7 lb/ft. Tees are simply I-beams cut in half and are available from S and W shapes; i.e. ST2x4.75 is just an S4x9.5 slit in half; WT4x5 is half an W8x10. W and WT will typically be made to A572, not A36.

Pipe is specified by a nominal inside diameter (ID) and wall schedule. The inside diameter will be approximately the nominal diameter for "standard" wall. For instance 3" Standard (Schedule 40) pipe has an ID of 3.068" and an outside diameter (OD) of 3.5". For a pipe size, the OD is always the same; various wall thicknesses change the ID. 3" Schedule 40 has a 0.216" wall, 3" schedule 80 (extra strong) has a wall thickness of 0.3" and 3" XXS (double-extra strong) has a wall thickness of 0.6". Each diameter has its own wall thicknesses, for instance, 1" XXS has a wall thickness of 0.358". Of course, weight per foot varies considerably with wall thickness.

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Square/rectangular tube (HSS = Hollow Structural Section) is an efficient material with flat sides and good bending strength with minimal weight. This material is produced under standard A500 or A513 (not A36). Sizes are specified by the outside dimensions and wall thickness (sheet gauge for thin walls and inches for others). For carbon steel, sheet gauge is a number that represent thickness; the larger the number the thinner the material. 26 gauge is 0.0179", 16 gauge is 0.0598" (about 1/16"), 14 gauge is 0.0747", 12 gauge is 0.1046", 11 gauge is 0.1196" (about 1/8"), and 7 gauge is 0.1793" (about 3/16"). Each size tube only comes in certain wall thicknesses. HSS1x16gauge (1" square with 1/16" wall) is handy as is HSS2x11gauge (2" square with 1/8" wall); a heavier example would be HSS4x2x0.250 that is 4x2" with 1/4" wall.

There are several thousand shapes in the entire catalog so distributors won't have every option on hand though most will have the many of the small shapes; expect to compromise for availability at times. There are online tables of shapes to aid in making selections.