Physical and structural properties.

Steel framing is engineered to take advantage of the physical properties of formed steel to provide strength where needed and as needed in the construction of buildings. This section provides the basic information needed by architects and engineers to make sure the member called for in the plans will meet the criteria required by the structure.

ClarkWestern has prepared this catalog with the utmost diligence and care for accuracy and conformance to applicable industry standards. ClarkWestern intends this information to be accurate, informative and helpful as a selection guide for choosing ClarkWestern framing products. However, this information is only to be used for guidance and is not intended to replace the design, drawings, specifications and decisions of a registered or professional architect or engineer. ClarkWestern shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for loss caused by product application for other than its intended use. ClarkWestern's liability is expressly limited to materials replacement only for defective products. Claims shall be deemed waived unless they are made in writing to ClarkWestern within 30 days of the date a problem was or reasonably should have been discovered. ClarkWestern reserves the right to modify or change any information in this literature without notification.

Symbols and terms.

The following tables are provided to help architects and engineers design structures that withstand various forces. Those forces include vertical loads such as weight from over head, lateral loads such as wind, other applied pressure or a combination of those. Such natural forces can result in deflection and/or twisting of cold-formed steel framing materials.

Key among these tables are the physical and structural properties tables in this next section. The tables provide typical data required to make determinations about the suitability of materials for certain intended purposes. The nature of those data are identified by commonly used engineering symbols and terms. This legend will help you to understand the symbols and terms used here.

Ix = $in.^4$: Moment of inertia about the X-X axis, used for DEFLECTION
Sx = $in.^3$: Section modulus about the X-X axis, used for STRESS & LOADS
Rx = in.: Radius of gyration about the X-X axis
Iy = $in.^4$: Moment of inertia about the Y-Y axis
Ry = in.: Radius of gyration about the Y-Y axis, used for AXIAL LOADS

Wind load (lbs./sq. ft.): Forces produced by wind, either direct wind (positive pressure), a vacuum (negative pressure) or those generated by wind whipping around the corners of a building. These forces are usually calculated according to the prevailing building code. Wind forces are referred to as transverse loads, are perpendicular to the wall and cause the wall to deflect.

Axial load (lbs.): A vertical force produced by overhead loads such as floors and roof. Floors and roofs contain both dead loads and live loads, which combine to make up most of the vertical loading.

Header: A joist or beam that spans two or more studs, accepts overhead loads from floors and roof and distributes the overhead load to the studs.

Deflection: The amount of movement of a system, usually greatest at the mid point, caused by transverse loading.

L/120: Length (height) of stud, in inches, divided by 120 (short interior wall studs)
L/240: Length (height) of stud, in inches, divided by 240 (interior wall studs, exterior siding or EIFS)
L/360: Length (height) of stud, in inches, divided by 360 (exterior stucco)
L/600: Length (height) of stud, in inches, divided by 600 (exterior brick)
L/720: Length (height) of stud, in inches, divided by 720 (exterior brick)

Limited deflection: A design criteria which specifies the maximum allowable deflection for a system (L/240, L/360, L/600, etc.). Deflection modification factor = IBC 2000 and IBC 2003 table 1604.3, note f. Allows wind load to be multiplied by 0.7 for checking "component and cladding" deflection limits.

Physical properties table notes

1. Effective properties incorporate the strength increase from the cold work of forming as applicable per NASPEC A7.2.
2. Effective properties are based on punched sections.
3. For those steels with both 33 and 50 ksi listings, if the design is based upon 50 ksi, the 50 ksi steel needs to be specified by the end user at the time of quote and order.
4. The inside corner bend radii are based upon the standards set by SSMA for a given gauge or design thickness.
5. Where noted with a superscript "5", web height to thickness ratio exceeds 200. Web stiffeners are required at all support points and concentrated loads.
6. Where no effective properties are listed, width-to-thickness ratio limits per NASPEC B1 are exceeded. Only gross properties are available.
7. Tabulated gross properties are based on the full-unreduced cross sections of the studs, away from the web punchouts.
8. For deflection calculations, use the effective moment of inertia. Reference the NAS Commentary section C1.
9. Overall depth for track sections are equal to the nominal depth plus 2 times the design thickness plus the inside bend radius.
10. Hems on nonstructural track sections [25 ga. or –18 mils] ignored for purposes of section properties.
11. The standard protective coating for structural framing members is a G-60 coating or equivalent. The standard protective coating for nonstructural framing members is a G-40 coating or equivalent. Reference ASTM A1003 table 1.
12. Nonstructural framing is not permitted in load bearing [i.e. axial load greater than 100 lb/ft 200 lb/stud.] or exterior applications [i.e. lateral (or wind loads) more than 10 PSF. Reference ASTM C 645 section 3.2.2.

**Some building codes (e.g.: Florida Building Code) do not allow such an increase in strength, in this case please call our technical services for section properties w/o this increase.