STEELWAY
BUILDING SYSTEMS

Steelway Building Systems'

Product Specification Guide

AN ARDENT COMPANY

SBS Building Specification Guildline
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Product Specification
Guide

STEELWAY BUILDING SYSTEMS

Table of Contents

1.0 General

1.1 Scope

1.1.1 The following Specification Guide will provide the owner or design professional a detailed description of all standard Steelway Building Systems (Steelway) products. This guide is designed to aid the architect or engineer of record in the process of specifying the superior building system solution.

1.1.2 These product specifications are intended for use as an outline of the performance requirements for the various materials used within Steelway's steel building system. They are further intended to ensure that architects, engineers, builders and owners understand the basis for design, manufacture and application of these materials.

1.1.3 Engineering and mechanical properties of materials utilized by Steelway in its product line are provided or referenced within these specifications, as they are industry specification standards, where applicable.

1.1.4 Steelway utilizes those standards, specifications, interpretations and recommendations of professionally recognized groups and agencies, such as CSA, CWB, CISC, MBMA, AISC, AISI, AWS, ASTM, as the basis in establishing its own design, fabrication and quality criteria, standards, practices, methods and tolerances.

1.1.4.1 In all cases unless stipulated otherwise in the contract documents, Steelway's design, fabrication and quality criteria, standards, practices, methods and tolerances will govern the work.

1.1.5 Statements, descriptions, specifications and dimensions contained herein are in effect as of the date of this issue. Steelway reserves the right to make material substitutions and changes in specifications and construction methodology as and when deemed necessary.

1.2 Materials

1.2.1 Standard materials furnished for Steelway's steel building systems will include primary and secondary structural steel framing members, bracing, steel panels for roofing and siding, flashings, fasteners, sealants, accessories and all other miscellaneous component parts required for a complete building (with the exception of insulation, doors, windows, hardware, foundations, anchor rods and other embedded items, which are excluded). Specific items beyond the scope of standard material may also be furnished if called for by contract documents.

1.3 Drawings, Reactions and Calculations

1.3.1 Steelway will provide erection information and drawings as required to assemble all parts, components and accessories furnished by Steelway.

1.3.1.1 Erection drawings will bear the stamp and signature of a professional engineer registered in the province in which the building is to be erected.

1.3.1.2 Steelway documents are in accordance with the CSSBI 30M paragraph 13; erection drawings showing foundation loads, anchor rod setting details, part numbers, connections and assembly details.

1.3.1.3 Drawings will indicate plans and grid lines, structural members and connection details, bearing and anchorage details, roof cladding, wall cladding, framed openings, camber (as required), loads and reaction forces, fasteners and field welds (as required), sealant locations and details.

1.3.1.4 Drawings will indicate shop and erection details including cuts, copes, connections, holes, threaded fasteners, rivets and welds.

1.3.1.5 Erection drawings will indicate related provisions required for mechanical, electrical and other work, when such information can be supplied to Steelway at time of the initial order.

1.3.2 Drawings will include anchor rod setting plans, roof framing plan, wall framing elevations, cross-sections, etc.

1.3.3 Steelway will supply un-factored / basic "service" column reactions for use in designing foundations for the building however, Steelway will not be responsible for the design nor the adequacy of the foundation.

1.3.3.1 It is the responsibility of the foundation designer to use our reported un-factored / basic "service" column reactions in conjunction with the applicable load combinations, codes and standards that correspond to the design of the foundation.

1.3.3.2 Steelway understands that it's common for the foundation designer to reference our maximum factored reactions as an approximate check, however we do not recommend or endorse the use of the maximum reactions for the foundation design as there may be different load combinations exclusive to the foundation that may govern.

1.3.4 If required by the contract documents, Steelway will furnish design calculations for the structural framing and covering panels of the steel building system. At the discretion of Steelway, design calculations may be computer-generated or prepared manually.

1.4. Certification

1.4.1 CSA A660 Certified

1.4.1.1 Steelway will submit, for each project, an A660 Certificate of Design and Manufacturing Conformance stating design criteria used and loads assumed in design. The certificate shall be stamped and signed by a professional engineer registered in the province in which the building is to be erected.

1.4.1.2 CSA A660 certification ensures that the manufacturer (Steelway) has been audited to the following items: (a) Personnel; (b) Design and engineering; (c) Materials control; (d) Fabrication; (e) Warehousing, packaging and shipping; (f) Erection responsibility; and (g) Plant quality program.

1.4.1.3 The issued A660 certificate of design and manufacturing conformance is a confirmation of process and manufacturing quality control and conformance to national building code standards that is rigorously audited through an annual certification process

1.4.1.4 No modifications, substitutions or alterations may be made in the field without prior authorization from Steelway. Any unauthorized modifications, substitutions or alterations made to the construction of the building are not the responsibility of Steelway and are not covered in the CSA A660 certification.

1.4.2 CSA W47.1 Certified

1.4.2.1. As a steel building systems manufacturer, Steelway is certified under CSA W47.1, Division 1 or 2.1, for welded fabrication.

1.5 Building Description

Steelway Buildings are designed to meet the exact requirements of the customer therefore the information listed below must be included in the contract documents, in order to fully specify the building. The Steelway building contract will be the primary contract document used to define an order.

1.5.1 Size (width, length, eave height, bay spacing)

1.5.1.1 The building width will be measured from side wall steel line to the opposite side wall steel line. (The steel for the walls is the exterior face of the wall girts.)

1.5.1.2 The building length will be measured from end wall steel line to the opposite end wall steel line. (Steel line for the walls is the exterior face of the wall girts.)

1.5.1.3 The building eave height will be measured from the underside of the base plate to top of the eave strut. The top of the eave strut is the point of intersection between the side wall steel line and the roof steel line. (Steel line for the roof is the top face of the roof purlins.)

1.5.1.4 The bay spacing will be measured as follows:
1.5.1.4.1 Interior bays: from center-line to center-line of interior frames.
1.5.1.4.2 End bays: from end wall steel line to center-line of first interior frame.
1.5.1.4.3 Bay spacing for interior bays and end bays, specified to nearest 1/16" (1.6 mm).

1.5.2 Roof slope

1.5.2.1 The "roof slope" is the angle of the roof with respect to the horizontal. The most common roof slopes are 0.5/12 and 1/12. However, any practical roof slope is possible.

1.5.3. Primary frame type.

1.5.3.1 Rigid Frame Clear Span:
1.5.3.1.1 Primary frames will be a bolted rigid frame design, clear span type, with a gable or single slope roof and pin base columns**. Columns will be either tapered or straight as specified. Rafters will be variable or parallel depth.

1.5.3.2 Rigid Frame Multi-Span:
1.5.3.2.1 Primary frames will be a bolted rigid frame design, multi-span type (number of spans to be specified), with a gable or single slope roof, pin base side wall columns** and rafter supported at intervals (intervals to be specified) by interior columns, typically HSS tubes. Interior columns may also be fabricated from pipes, built-up plate or hot-rolled members. Interior columns will be recessed 5" below floor, unless noted otherwise. Side wall columns will be either tapered or straight as specified. Rafters will be variable or parallel depth.

1.5.3.3 Lean-to:
1.5.3.3.1 Primary frames will be a post and beam design with high side of frame connected to and supported by the main building. Frame will be a clear span type with single slope roof. Columns and rafters are pinned at both ends. Columns will be straight sections. Rafter will be either a tapered beam or beam with parallel flanges as required by design.

1.5.3.4. Girts for all Primary Frame types will be either by-pass (exterior), inset or flush in relation to the outside face of the frame columns.

*** Column bases for all frame types may be "fixed" or moment resisting if required by design.*

1.5.4 Expandable or non-expandable end walls.

1.5.4.1 Bearing End Frame - Hot Rolled or Built-Up Plate (BFEW):

1.5.4.1.1 This type of end frame will be a post and beam design with rafter pin-connected at corner posts but continuous over, and supported by, end wall posts spaced at intervals along the end wall. Corner posts and end wall posts will be designed as being pinned at both ends. Rafter, corner posts and end wall posts will be either hot-rolled mill sections or welded, "H"- shaped, straight sections. Positive bracing is required for this type of end wall, typically cross- rod bracing.

1.5.4.2 Rigid End Frame (Full Load or FFEW):

1.5.4.2.1 End frames will be a bolted rigid frame design of same type and design as Primary Frames in the building. End posts will be furnished to provide support for girts, if a sheeted end wall is specified. End posts will be either hot-rolled mill sections or welded, "H"-shaped, straight sections. The End Frame is designed for future expansion. (*Future bay space must be specified.)

1.5.4.3 Rigid End Frame (Half Load or NEFF):

1.5.4.3.1 End Frames will be a bolted rigid frame design of same type and design as Primary Frames in the building, but will be designed for only half-bay loading. End posts will be furnished to provide support for girts, if a sheeted end wall is specified. End posts will be either hot-rolled mill sections or welded, "H"-shaped, straight sections.

1.5.4.4 Girts for all End Frame types will be either by-pass (exterior), inset or flush in relation to the outside face of the End Frame posts.

1.5.5 Building location including City, County and Province.

1.5.6 Building Code to be used.

1.5.7 Design Loads.

1.5.7.1 Canadian Projects:

1.5.7.1.1 Roof or Ground Snow Load
1.5.7.1.2 Snow Exposure (Normal Exposure, Exposed Location, North of Tree Line)
1.5.7.1.3 Rain load
1.5.7.1.4 Collateral load
1.5.7.1.5 Wind load
1.5.7.1.6 Seismic values
1.5.7.1.7 Site Class/Soil Type
1.5.7.1.8 Importance Category (Low Occupancy, Normal Occupancy, High Occupancy, Post Disaster)
1.5.7.1.9 Crane data
1.5.7.1.10 Roof Top Unit data
1.5.7.1.11 Mezzanine data

1.5.7.2 American Projects:

1.5.7.2.1 Live load
1.5.7.2.2 Roof or Ground Snow Load
1.5.7.2.3 Snow Exposure (Fully Exposed, Partially Exposed, Sheltered)
1.5.7.2.4 Collateral load
1.5.7.2.5 Wind speed and exposure
1.5.7.2.6 Seismic values

1.5.7.2.7 Site Class/Soil Type
1.5.7.2.8 Occupancy (I – Low Hazard, II – Normal, III – High Occupancy, IV – Essential)
1.5.7.2.9 Thermal Condition (Heated, Unheated, Above Freezing)
1.5.7.2.10 Crane data
1.5.7.2.11 Roof Top Unit data
1.5.7.2.12 Mezzanine data

1.5.8 Information on attached and adjacent structures or future structures and/or expansion.

1.5.9 Serviceability requirements (deflections).

2.0 Design

2.1 General

2.1.1 All structural steel sections and welded plate members shall be designed in accordance with the latest editions of:
2.1.1.1 Canada: CSA Specification for Structural Steel Buildings (S16), CSA Welded steel construction (metal arc welding) (W59) and CSA Specification W47.1-09.
2.1.1.2. America: American Institute of Steel Construction (AISC) "Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design".

2.1.2. All light gauge cold-formed structural members and exterior covering shall be designed in accordance with latest editions of:
2.1.2.1. Canada: CSA S136 "North American Specification for Design of Cold Formed Steel Structural Members".
2.1.2.2. America: American Iron and Steel Institute (AISI) "Specification for the Design of Cold Formed Steel Structural Members."

2.2 Design Loads

2.2.1 Design load requirements will be determined by local conditions, applicable codes, building end use, etc. Magnitude of design loads will be specified by the contract documents. Application of design loads will be in accordance with:
2.2.1.1 Canadian Projects: Applicable National and/or Provincial Building Code, unless specified otherwise.
2.2.1.2 American Projects: Design Practices sections of the Metal Building Manufacturers Association (MBMA) 1996 "Low Rise Building Systems Manual", unless specified otherwise.

2.2.2 Loads to be considered are defined as follows:
2.2.2.1 Dead Load: the weight of the building system materials.
2.2.2.2 Collateral Loads: the weight of additional permanent materials, other than the building system, such as sprinklers, mechanical and/or electrical systems, partitions, and ceilings.
2.2.2.3 Roof Live Loads: loads that are produced 1) during maintenance by workers, equipment and materials and 2) during the life of the structure by movable objects. Live loads do not include snow, wind, seismic or collateral loads.
2.2.2.4 Roof Snow Loads: the vertical load induced by the weight of snow, assumed to act on the horizontal projection of the roof of the structure as specified by the Code and contract documents for building location and relevant parameters.
2.2.2.5 Wind Loads: the load caused by wind blowing from any horizontal direction.
2.2.2.6 Seismic Loads: the lateral load due to the action of an earthquake acting on the structure in any horizontal direction.
2.2.2.7 Auxiliary loads: dynamic live loads such as those induced by cranes and material handling systems.

2.2.2.8 Floor Live Loads: those loads induced on a floor system by the use and occupancy of the building.
2.2.2.9 Unless otherwise specified, load combinations will be those listed in the specified Building Code and/or other relevant standards, such as Design Practices section of the MBMA 1996 "Low Rise Building Systems Manual."

3.0 Structural Framing

3.1 Primary Members

3.1.1 Rigid Frame: A structural frame consisting of members joined to render the frame stable with respect to the design loads, without the need for bracing in its plane.

Rigid Frames are three plate beam sections, forming an 'I' shape consisting of flange plates, web plates, and endplates. Depending on the size and complexity of the building, rigid frame members could consist of multiple flanges and webs of various material sizes.

Rigid frame columns and rafters allow for large open interior spaces without obstruction created by interior columns. These types of frames not only allow for large open spaces, but do so with an efficient and minimum weight of material.

3.1.2 Interior Column: A hot rolled column supporting a rigid frame located between the sidewall columns to provide support to the rigid frame rafter(s).

3.1.3 Endwall Column & Endwall Rafter: A hot rolled structural member located at the endwall of a building supporting the building girts and purlins respectfully. In post and beam endwalls, the endwall columns also support the endwall rafter.

3.1.4 Material:
3.1.4.1 Sheet, plate, strip mill plate, plate coils and flat bar stock used to fabricate welded, structural members will conform to one of the following ASTM specifications as appropriate: CSA G40.20/G40.21, Type W, ASTM A572/A572M, A529/A529M, A1011/A1011M, HSLAS or SS, 50 ksi or 55 ksi (350/345/340 MPa) minimum yield.
3.1.4.2 Members fabricated from hot-rolled structural sections will conform to one of the following ASTM specifications: G40.20/G40.21, Type W, ASTM A992/A992M, A572/A572M, A529/A529M, 50 ksi (350/345 MPa) minimum yield.
3.1.4.3 Members fabricated from other hot-rolled structural sections (S-shapes, channels, angles) will conform to one of the following ASTM specifications: G40.20/G40.21, Type W, ASTM A992/A992M, A572/A572M, A529/A529M, 50 ksi (350/345 MPa) minimum yield.
3.1.4.4 Members fabricated from HSS tube sections will conform to one of the following ASTM specifications of G40.20/G40.21, Class C, 50 ksi (350 MPa) or ASTM A-500, Grade C, 46 ksi (317 MPa).
3.1.4.5 Members fabricated by cold forming process will conform to ASTM specification ASTM A-1011, Grade 55 (380 MPa) or ASTM A-1011-HSLAS, Grade 55 (380 MPa), Class 1.
3.1.4.6 Bolts: ASTM A325M (ASTM A490M when required) complete with nuts and washer, plain. Hot dip galvanized (A325 only), F1136 ZC grade 3 (A490 only) available upon request (extra).
3.1.4.7 Anchor Rods: G40.20/G40.21, ASTM A572/A572M, A529/A529M, 50 ksi (350/345 MPa) minimum yield, plain (no coating). Hot dip galvanized available upon request (extra).

3.1.5 All primary steel framing members will be cleaned to remove loose rust and mill scale, and given one shop coat except where members are zinc coated or zinc-aluminum alloy coated or to be encased in concrete. Shop coat will be formulated to equal or exceed, under laboratory conditions, performance requirements of:

3.1.5.1 Canadian Projects: 2-75 Structural Primer.
3.1.5.2 American Projects: U.S. Federal Specification TTP-636.
3.1.5.3 Shop coat is only intended to provide temporary protection during transportation and erection.
3.1.5.3.1 Shop Primer Paint: Single Coat Grey Primer (Alkyd, Quick Dry Universal Primer) to CISC/CPMA Standard 2-75, 1.5 to 2 mils film thickness. Standard primer not to exceed 90 days exposure to weather. Hot dip galvanized or epoxy paint available upon request (extra). Note: An optional Single Coat White Primer is available at an additional cost.
3.1.5.4 Shop Primer Paint: Single Coat Grey Primer (Alkyd, Quick Dry Universal Primer) to CISC/CPMA Standard 2-75, 1.0 to 1.5 mils film thickness. Standard primer not to exceed 90 days exposure to weather.

3.2 Secondary Members

3.2.1 Purlins and girts shall be roll-formed "Z" or "C" sections of adequate size and thickness as determined by the design criteria.

3.2.2 Strut: A hot rolled brace beam fitted into a framework to resist force in the direction of its length.

3.2.3 Portal Frame: a frame configuration consisting of three hot rolled members designed to brace a building system where cross bracing is not permitted.

3.2.4 Eave Purlins: A unique shaped purlin placed at the low and /or high eave along the sidewall formed by the intersection of the roof and wall steel lines.

3.2.5 Openings: Framework that surrounds an opening in the wall or roof of a building. These openings can be either field located and/or factory located.

3.2.6 Material:
3.2.6.1 Purlins, Girts and Framed Openings: minimum 16 gauge (0.060 inch/1.52 mm); Hot Rolled Sheet Steel conforms to G40.21, ASTM A653/A653M, A1011/A1011M, HSLAS Class 1 or 2, or SS, 55 ksi (380 MPa) minimum yield.
3.2.6.2 Bolts: to SAE J429 Grade 8.2.

3.2.7 Secondary structural steel framing will be cold-formed coil painted with grey powder coat primer.

3.2.7.1 In compliance with the 2001 ASTM Standards for Steel Building Systems, all references in the Product Manual to ASTM A-570 and ASTM A-607 should be regarded as references to ASTM A-1011-SS and ASTM A-1011-HSLAS respectively.

3.2.7.2 Grey Powder Coat Primer (hybrid), 1.5 mils film thickness.

3.3 Bracing Systems

3.3.1 Girt/Purlin Stabilizers: A cold formed member used to brace a girt or purlin in the direction of its weak axis, stabilizing top and bottom flanges preventing the purlins from rolling down-slope under heavy snow loads.

3.3.2 Cross Bracing: Rods and/or cables used on roof and walls of buildings to transfer wind, seismic, and lateral crane forces to the foundation. Cross bracing might also be referred to as "Brace Rods".

3.3.3 Flange Braces: A bracing member used to provide lateral support to the flange of a structural member.

3.3.4 Material:
- 3.3.4.1 Flange brace: to G40.21, ASTM A653/A653M, A1011/A1011M, HSLAS Class 1 or 2, or SS, 55 ksi (380 MPa) minimum yield. Z275 (G90) pre-galvanized coil.
- 3.3.4.2 Rod: to G40.21, ASTM A572/A572M, A529/A529M, 50 ksi (350/340 MPa) minimum yield, shop primed with single coat Grey Primer (Alkyd, Quick Dry Universal Primer) to CISC/CPMA Standard 2-75, 1.5 to 2 mils film thickness. Note: An optional Single Coat White Primer is available at an additional cost.
- 3.3.4.3 Cable: Galvanized strand to ASTM A475, Grade EHS, 7 wire strand, Class A coating (CSA G12). Design strength based on Steelway's published breaking strengths.
- 3.3.4.4 Eye bolts: Forged, 1030 carbon steel, hot dip galvanized. Design strengths based on Steelway's published breaking strengths.
  - 3.3.4.4.1 Hillside/Sloped Washers: to ASTM A-47, galvanized to A153
  - 3.3.4.4.2 Bracer Hillside Washers: to ASTM 526, grade 65, gray enamel or hot dip galvanized to A153, class A.

4.0 RTL (Roll-to-Lock) Standing Seam Roof System

4.1 General

4.1.1 Minimum recommended roof slope for RTL roof panels is 1/4"(6.mm) to 12"(305mm).

4.2 Panel Material

4.2.1 Steelway's panels shall be precision roll-formed from an applicable gauge of steel sheeting for a selected profile.

4.2.2 Standing Seam: 24 gauge (0.024 inch/0.61 mm) panel minimum, 3 inch (76 mm) raised panel seams, 24 inch (610 mm) coverage. Major corrugations at 24 inch (610 mm) on centre, shallow corrugations in panel flat. Factory applied mastic for side lap, pre-punched and factory notched.

4.2.3 Standing Seam Panel Thermal Clips and Related Panel Fasteners: extra heavy duty, 20 gauge (0.036 inch/0.91 mm), corrosion resistant, purpose made clips with movable tabs. Spacing of clips and fasteners to be Steelway's design to suit the loads indicated. Floating clips to allow the roof a 3.5 inch (89 mm) range of thermal movement (1¾ inch (44 mm) of expansion and 1 ¾ inch (44 mm) of contraction).

4.2.4 Thermal Block Spacers: continuous 1 inch (25 mm) thick, extruded polystyrene meeting CAN/CGSB-51.20-M87, Type 4, 210 KPa compressive strength.

4.2.5 Steel Sheet, Aluminum-Zinc Coated: to ASTM A792/A792M, structural quality, class 1 or 4, Grade 50 (340 MPa) with AZM165 Galvalume Plus coating, regular spangle surface, passivated for unpainted finish and AZM150 un-passivated for paint finish.

4.2.6. Paint System:
- 4.2.6.1 Exterior – Minimum Standard 20000 series colours, use a Silicone Modified Polyester paint system
- 4.2.6.2 Interior – wash coat (minimum)

4.2.7 Colour: choose from manufacturers Minimum Standard Series 20000.

4.2.8 Screws: corrosion resistant purpose made, head colour to match cladding.

4.3. Roof Stand-off Systems

4.3.1 Notched Zee: 16 gauge (0.06 inch/1.52 mm) minimum, factory notched zee to suit the liner profile. The depth must suit the insulation value required. Hot Rolled Sheet Steel conforms to G40.21, ASTM A1011/A1011M, A653/A653M, HSLAS or SS, Class 1 or 2, 55 ksi (380 MPa) minimum yield, galvanized to G90. Include the required fasteners.

4.3.2 Hat and Chair: 16 gauge (0.060 inch/1.52 mm) minimum, brake formed to suit the liner profile. The depth must suit the insulation value required. Hot Rolled Sheet Steel conforms to G40.21, ASTM A1011/A1011M, A653/A653M, HSLAS or SS, Class 1 or 2, 55 ksi (380 MPa) minimum yield, galvanized to G90. Include the required fasteners.

4.4 Panel Configuration

4.4.1 Panels shall have 3" (76 mm) deep trapezoidal ribs spaced 24" (635 mm) on center. Three minor ribs are spaced in the flat of the panel between the major ribs.

4.5 Panel Clip and Fasteners

4.5.1 Fixed panel clips shall only be used with panel runs of less than 120'. Floating panel clips shall be used up to a 250' panel run and shall be self-centering and allow for up to 1-1/2" (38 mm) expansion and/or contraction of total movement from the centered position. The clip design shall insure that movement does not occur between the panel and clip.

4.5.2 The panel clips shall have factory-applied mastic to insure a weather-tight installation.

4.5.3 Each clip shall be attached to the joist or purlin with a minimum of two fasteners. In certain instances, three fasteners may be required. Size and type of clip and fastener quantity will be recommended by Steelway for the specific application. Clip fasteners for retrofit applications are not by Steelway and must be specified by the owner or his agent.

4.5.4 Panel end lap fasteners shall be a No. 12 self-drilling carbon steel screw, hex washer head, 1-1/4" (32mm) long. Fastener shall have a 20-year corrosion resistant coating.

4.6 Trim and Flashing

4.6.1 High eave flashing and flashing parallel to the roof panels shall accommodate the thermal expansion and contraction of the roof without damage to the roof panels or flashing. Counter-flashing for parapet conditions and flash to existing buildings are not provided by Steelway.

4.6.2 All exposed trim and flashing material shall be manufactured from Galvalume® steel strip.

4.6.3 Accessories to Roof Cladding: brake or bend to shape, the material and finish to match roof cladding or wall cladding where applicable, comprising cap flashing, drip flashing, coping and closures for corners, soffit and fascia.

4.6.4 Ridge Cap: brake or bend to shape, 26 ga (0.018 inch/0.46mm) minimum, and colour to suit roof cladding or as specified.

4.6.5 Gutters: 26 gauge (0.018 inch/0.46 mm) factory brake formed, material and finish to match roof or wall cladding. Include brackets, fasteners, end caps and closures as required.

4.6.6 Downspouts: Available in QC28305 Stone Grey or QC28317 White White, 10' lengths.

4.6.7 Downspout Elbows: Available in QC28305 Stone Grey or QC28317 White White, 135° only.

4.7 Installation

4.7.1 Storage and installation of the roofing system shall be in accordance with Steelway's printed instructions.

4.7.2 To ensure the highest quality of work proper tools and equipment must be on hand. The tools must be in good condition and operators should adhere to safety precautions at all times. Improperly operated tools, too few tools, inadequate power source, or equipment deficiencies slow down the installation process. The cost of inefficient working is usually greater than the cost of providing good equipment.

4.7.3 The Steelway's roof hand crimper is specially designed for use with Steelway RTL-24™ roof panel. Under no circumstances shall the Steelway crimper be used on another manufacturer's roof system. In addition, under no circumstances is another manufacturer's crimper to be used on the Steelway RTL-24™ roof (even if they appear to be the same). Permanent damage to the seam and/or the panel finish may occur if the Steelway crimping tool is not used and shall void all warranties.

4.7.4 Temperature extremes must be considered during installation of the roof due to the sensitivity of sealants the recommended installation temperature range is –7 °C (20 °F) to 49 °C (120 °F). At colder temperatures the sealant stiffens resulting in loss of adhesion and compressibility. At hotter temperatures, the sealant becomes too soft for practical handling. On cold but sunny days, the panel's surface may become warm enough to accept the application of a heated sealant even though the air temperature is below –7 °C (20 °F). Heated sealant will stay warmer if stored in plastic coolers while working on roof.

4.7.5 Abrasive saws are not recommended for cutting roof panels or flashing. Abrasive saws create high heat that may burn away the protective cladding from the panel edge, causing the edge to rust. Also, abrasive saw dust contains fine, hot steel particles, which accumulate on panel and flashing surfaces where they rust and can cause staining and rusting of those surfaces. Rust caused by abrasive saw damage or abrasive dust particles may be excluded from warranty claims.

4.7.6 The use of cutting tools that damage the panel finish shall not be allowed.

4.7.7 Panels shall not be marked with any graphite or lead markers.

4.8 Clean-up

4.8.1 The roof surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.

4.8.2 The Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

4.9 Maintenance

4.9.1 The owner shall keep the roof free and clean of debris and corrosive materials at all times.

4.9.2 Gutters and downspouts shall be cleaned periodically and kept free-flowing at all times.

4.9.3 Flashing and sheeting interfaces shall be inspected yearly to ensure connection and water-tightness.

4.9.4 End laps, eaves, ridges, curbs, translucent panels, and other interfaces shall be inspected and maintained yearly. Normal adjustments or tightening of fasteners may be required.

4.9.5 The use of tar and other topical applied products shall not be permitted unless specified by the manufacturer.

4.9.6 Copper, lead flashing, exposed iron, or debris shall not be permitted on the roof.

4.9.7 Pipes and supports for roof-supported units shall be of a non-corrosive or rust- free material. Field painting of pipes and supports may be required to resist corrosion. Condensation from roof-top units shall be piped to interior or exterior locations. Damage due to condensate water is not covered under manufacturer's warranty.

4.10 Erection Sequence

4.10.1 The Steelway RTL-24™ Roof System is designed to be erected starting from the defined end of the building. In rare cases, due to the building layout, it may be required to start erection from a specified end. In those cases, it will be noted as such on the erection drawings.

4.11 Coordination with Other Trades

4.11.1 Supports for the Steelway RTL-24™ Roof System shall be provided and are required as shown on the drawings and as noted in these specifications. All necessary clearance dimensions for proper elevations relative to the roof panels have been shown.

4.11.2 The customer shall be responsible for coordinating these dimensional requirements with other trades associated with the building roof system.

4.12 Erection Care

4.12.1 The erector must be skilled in the erection of steel building systems and is responsible for complying with all applicable local, federal, and state construction and safety regulations. This includes OSHA regulations as well as any applicable requirements of local, national, or international union rules or practices. The Erector remains solely responsible for the safety and appropriateness of all techniques and methods utilized by its crews in the erection of the steel building system and/or the RTL-24 roof system. The Erector is also responsible for supplying any safety devices such as scaffolds, runways, nets, etc., which may be required by the governing codes to safely erect the steel building system and/or RTL-24 roof system.

4.12.2 Anchorage for safety devices may be added at an additional cost provided specific connections are designed and clearly noted on the order documents. All anchorage points must be noted with exact location, magnitude, and direction of force for a fully-braced structure.

4.12.3 The erector of the Steelway RTL-24™ erection drawings shall exercise great care and attention to the details as shown on the erection drawings and in the Steelway RTL-24™ erection manual to insure a secure and proper fit of all components. Steelway shall not be responsible for supervising and/or coordinating the erection of the RTL-24 Roof System with other trades. Erection drawings take precedence when a situation differs from that shown in the erection manual.

4.12.4 Due consideration must be given by the erector to the effects of thermal expansion and contraction when erecting a roof tie-in to an existing structure to insure a safe, secure, weather-tight condition. Flashing for tie-ins to existing buildings is typically not included as part of the material provided by Steelway. Refer to the sections and details for specific materials provided by Steelway.

4.12.5 The erector acknowledges that all details for all conditions can be noted on the plans and that due care and judgment are required to make a safe and watertight condition. Sealants and caulking may be required based upon actual conditions encountered.

4.13 Field-Cutting of Panels

4.13.1 When field-cutting or mitering Steelway RTL-24™ roof panels, non-abrasive cutting tools such as nibblers or tin-snips shall be used. Abrasive cutting tools such as mechanical grinders, saws, shears, or scissors can damage the Galvalume® or painted finish and create excess metal shavings that can corrode the panels. The use of non-approved cutting devices may void your manufacturer's warranty.

4.14 Roof-Top Units and Curb Supports

4.14.1 The Steelway RTL-24™ Roof Curb Framing System is level with roof secondary structural members. The outer roof curb in a double curb system, will have channels attached to accommodate the clip off set of ½" (13 mm) for short clips and 1 ½" (38 mm) for tall clips. Refer to the details for proper dimensions.

4.14.2 The Steelway RTL-24™ Roof System is designed as a floating system. Curb framing and flashing must be designed accordingly to allow the curb system to float with the RTL-24 roof during thermal expansion and contraction.

4.14.3 Roof curbs should be laid out maintaining a "3-purlin-space" rule. This rule is that a roof curb should always be located a distance of at least the equivalent of three purlin spaces from the ridge or eave of a building and from any adjacent roof openings or curbs.

5.0 Screw Down Roof Panels

5.1 General

5.1.1 Minimum recommended roof slope for screw down roof panels is 1:12.

5.1.2 Maximum recommended building width is 60' [18.288 m] (gable) or 30' [9.144 m] (single slope) for "Z" purlin roofs. Steelway profiles shall be used in conjunction with zee or cee purlins as supports.

5.1.3 Please note: Steelway does not offer a weather tightness warranty for screw-down roofs. These roof systems are susceptible to leaking due to thermal expansion and contraction. The problem is exacerbated by low slopes (<1:12), and long roof surfaces (>30'-0" [9.144 m]). Steelway expressly disclaims responsibility for weather tightness performance of screw-down roofs.

5.2. Panel Material

5.2.1 Steelway's panels shall be precision roll-formed from an applicable gauge of steel sheeting for a selected profile.

5.2.2 Sheet Steel: 26 gauge (0.018 inch/0.46 mm) minimum standard factory pre-formed steel sheet aluminum-zinc coated to match existing, pre-finished profile. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation.

5.2.3 Steel Sheet, Aluminum-Zinc Coated: to ASTM A792/A792M, structural quality, class 1 or 4, Grade 50 (340 MPa) with AZM165 Galvalume Plus coating, regular spangle surface, passivated for unpainted finish and AZM150 un-passivated for paint finish.

5.2.4 Paint System:
5.2.4.1 Exterior – Minimum Standard 20000 series colours, use a Silicone Modified Polyester paint system
5.2.4.2 Interior – wash coat (minimum)

5.2.5 Colour: choose from manufacturers Minimum Standard Series 20000.

5.2.6 Screws: corrosion resistant purpose made, head colour to match cladding.

5.2.7 Through Fastened: 26 gauge (0.018 inch/0.46 mm) panel minimum, 1.5 inch (38 mm) deep profile, and 36 inch (914 mm) coverage. Major corrugations at 12 inch (305 mm) on centre, shallow corrugations in panel flat. Structural bearing side edge for stable side lap.

5.3 Panel Configuration

5.3.1 Roof panel to secondary structural fastener shall be a No. 12 self-drilling carbon steel screw, hex washer head with sealing washer, 1-1/4" (32 mm) long. Fastener shall have a 20-year corrosion resistant coating. Fastener shall have a painted head to match panel and/or trim color when used with painted material.

5.3.2 Panel to panel, flash to flash, (stitch) fastener for roof shall be a No. 12 self- drilling carbon steel screw, hex washer head with sealing washer, 7/8" (22 mm) long. Fastener shall have a 20-year corrosion resistant coating. Fastener shall have a painted head to match panel and/or trim color when used with painted materials.

5.4 Trim and Flashing

5.4.1 Standard trim colours are available in 20'-2" (5.0 m) lengths. Special trim colours are available in 16'-3" (6 m) lengths.

5.4.2 Neither counter-flashing for parapet conditions nor tie-in flashing to existing buildings shall be provided by Steelway.

5.4.3 All exposed trim and flashing material shall be manufactured from galvanized or Galvalume® steel strip.

5.4.4 Exterior gutters and gable flash shall be manufactured in 20' (6 mm) lengths wherever possible.

5.5 Sealants

5.5.1 Sealant for interior and exterior locations - a Polyurethane `Dymonic 100' sealant, conforming to CAN/CGSB-19,13-M87 manufactured by Tremco Manufacturing Co. (Canada) Ltd. or an approved equal manufacturer. Colour selected to match background.

5.5.2 Sealant for vertical surfaces of structural expansion joints - Sikaflex 2C NS by Sika Canada Inc. or Sikaflex 1a.

5.5.3 Polyethylene backer rod is recommended as joint backing to control sealant depth and ensure intimate contact of sealant with joint substrate.

5.5.4 Excess sealant and smears adjacent to the joint interface can be carefully removed with xylene or mineral spirits before the sealant cures.

5.5.5 Insulation as recommended by Steelway.

5.5.6 Vapor Barrier and Sealing Tape: as recommended by insulation supplier.

5.5.7 Sealant & tape mastic: as recommended by Steelway.

5.6 Closures

5.6.1 Closures shall be closed cell polyethylene foam to match the panel configuration.

5.6.2 Closures shall be provided at the eave of roof panels.

5.7 Installation of Panels

5.7.1 Storage and installation of the roofing system shall be in accordance with Steelway's printed instructions.

5.7.2 All end laps and side laps on roof panels shall be sealed with a continuous row of tape mastic to prevent air and water from infiltrating the building.

5.7.3 The use of cutting tools that damage the panel finish shall not be allowed.

5.7.4 Panels shall not be marked with any graphite or lead markers.

5.8 Clean-up

5.8.1 Roof surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.

5.8.2 Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

5.9 Field-Cutting of Panels

5.9.1 When field-cutting or mitering Steelway panels, non-abrasive cutting tools such as nibblers or tin-snips shall be used. Abrasive cutting tools such as mechanical grinders, saws, shears, or scissors can damage the Galvalume® or painted finish and create excess metal shavings that can corrode the panels. The use of non-approved cutting devices may void your manufacturer's warranty.

6.0 Wall Panels

6.1 General

6.1.1 Through Fastened Panel: 26 gauge (0.018 inch/0.46 mm) panel minimum, 1.5 inch (38 mm) deep profile (standard or reversible face (wide rib out)), and 36 inch (914 mm) coverage. Major corrugations at 12 inch (305 mm) on centre, shallow corrugations in panel flat. Structural bearing side edge for stable side lap.

6.1.2 Through Fastened Panel: 29 gauge (0.015 inch/0.34 mm) panel minimum, 0.625 inch (16 mm) deep profile (standard or reversible face (wide rib out)), and 36 inch (914 mm) coverage. Major corrugations at 6 inch (152 mm) on centre, shallow corrugations in panel flat.

6.1.3 Concealed Fastener Panel: 26 gauge (0.018 inch/0.46 mm) panel minimum, 3 inch (76 mm) deep profile, flat face or sculptured, 16 inch (406 mm) coverage, embossed finish (optional).

6.2. Panel Material

6.2.1 Steelway's panels shall be precision roll-formed from an applicable gauge of steel sheeting for selected profile.

6.2.2 Sheet Steel: 26 gauge (0.018 inch/0.46 mm) minimum standard factory pre-formed steel sheet aluminum-zinc coated to match existing, pre-finished profile. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation.

6.2.3 Steel Sheet, Aluminum-Zinc Coated: to ASTM A792/A792M, structural quality, class 1 or 4, Grade 50 (340 MPa) with AZM165 Galvalume Plus coating, regular spangle surface, passivated for unpainted finish and AZM150 un-passivated for paint finish.

6.2.4 Paint System:
6.2.4.1 Exterior – Minimum Standard 20000 series colours, use a Silicone Modified Polyester paint system
6.2.4.2 Interior – wash coat (minimum)

6.2.5 Colour: choose from manufacturers Minimum Standard Series 20000.

6.2.6 Screws: corrosion resistant purpose made, head colour to match cladding.

6.2.7 Through Fastened: 26 gauge (0.018 inch/0.46 mm) panel minimum, 1.5 inch (38 mm) deep profile, and 36 inch (914 mm) coverage. Major corrugations at 12 inch (305 mm) on centre, shallow corrugations in panel flat. Structural bearing side edge for stable side lap.

6.3 Panel Configuration

6.3.1 Wall panel to secondary structural fastener shall be a No. 12 self-drilling carbon steel screw, hex washer head with sealing washer, 1-1/4" (32 mm) long. Fastener shall have a 20-year corrosion resistant coating. Fastener shall have a painted head to match panel and/or trim color when used with painted material.

6.3.2 Panel to panel, flash to flash, (stitch) fastener for wall shall be a No. 12 self- drilling carbon steel screw, hex washer head with sealing washer, 7/8" (22 mm) long. Fastener shall have a 20-year corrosion resistant coating. Fastener shall have a painted head to match panel and/or trim color when used with painted materials.

6.4 Trim and Flashing

6.4.1 Exterior Corners: the material must match the finish and profile of adjacent cladding material, shop cut and brake formed to the correct angle.

6.4.2 Accessories to Exterior Wall Cladding: brake or bend shape, of material and finish to match wall cladding, consisting of cap flashings, drip flashings, corner flashings, header, jamb and sill trims. Closures to be foam (grey only) or metal (colour and material to match wall cladding). All trim material is to be pre-finished 26 gauge (0.018 inch/0.46 mm) minimum.

6.4.3 Foam closures: Cross-linked polyethylene with UV stabilizers. Field applied tape sealant as required.

6.4.4 Downspouts: 26 gauge (0.018 inch/0.46 mm) factory brake formed, material and finish to match wall cladding. 28 gauge (0.015 inch/0.38 mm) minimum, roll formed, aluminum alloy #3105-H14 (Stone Grey QC28305, White White QC28317).

6.5 Sealants

6.5.1 Sealant for interior and exterior locations - a Polyurethane `Dymonic 100' sealant, conforming to CAN/CGSB-19,13-M87 manufactured by Tremco Manufacturing Co. (Canada) Ltd. or an approved equal manufacturer. Colour selected to match background.

6.5.2 Sealant for vertical surfaces of structural expansion joints - Sikaflex 2C NS by Sika Canada Inc. or Sikaflex 1a.

6.5.3 Polyethylene backer rod is recommended as joint backing to control sealant depth and ensure intimate contact of sealant with joint substrate.

6.5.4 Excess sealant and smears adjacent to the joint interface can be carefully removed with xylene or mineral spirits before the sealant cures.

6.5.5 Insulation as recommended by Steelway.

6.5.6 Vapor Barrier and Sealing Tape: as recommended by insulation supplier.

6.5.7 Sealant & tape mastic: as recommended by Steelway.

6.6 Closures

6.6.1 Closures shall be closed cell polyethylene foam to match the panel configuration.

6.6.2 Closures shall be provided at the eave of the roof panels.

6.7 Installation of Panels

6.7.1 Storage and installation of the wall system shall be in accordance with Steelway's printed instructions.

6.7.2 All end laps and side laps on wall panels shall be sealed with a continuous row of tape mastic to prevent air and water from infiltrating the building.

6.7.3 The use of cutting tools that damage the panel finish shall not be allowed.

6.7.4 Panels shall not be marked with any graphite or lead markers.

6.8 Clean-up

6.8.1 The wall surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.

6.8.2 The Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

6.9 Field-Cutting of Panels

6.9.1 When field-cutting or mitering Steelway panels, non-abrasive cutting tools such as nibblers or tin-snips shall be used. Abrasive cutting tools such as mechanical grinders, saws, shears, or scissors can damage the Galvalume® or painted finish and create excess metal shavings that can corrode the panels. The use of non-approved cutting devices may void your manufacturer's warranty.

7.0 Rake/Eave Extensions/Canopies

7.1 Roof rake/eave extensions shall consist of cantilevered extension beams or roof purlins, 2'-0" (610 mm or 4'-0" (1219 mm) beyond steel line, complete with all trim, closures, and all necessary flashing to provide a weather-tight overhang. Soffit panel is required for rake/eave extensions.

7.2 Canopies shall consist of roof panels supported by cantilevered beams and purlins, 5'-0" (1524 mm) or 10'-0" long (3048 mm), complete with trim, closures, and all necessary flashing to provide a weather-tight overhang. Soffit panel may be requested on the order documents.

8.0 Insulation

8.1. Recommended insulation thickness (insulation supplied by others) is as follows:

8.1.1 Wall or roof blanket insulation over 3" (76 mm) may cause dimpling at support locations.

8.1.2 The maximum thickness available for use with the Steelway StormSeal is 6" (152 mm) of blanket insulation. (Please note: the maximum thickness allowed under UL® 30, 60, and 90 shall be 6" (152 mm).)

8.1.3 Steelway RTL-24™ standing seam roof with 3 1/4" (83 mm) short panel clip may be installed over blanket insulation from 2" (51 mm) to 4" (102 mm) thick.

8.1.4 Steelway RTL-24™ with 4 1/4" (108 mm) tall panel clip may be installed over blanket insulation from 4" (102 mm) to 6" (152 mm) thick provided a thermal block is placed under the clip. Maximum of 8" (203 mm) single layer batt insulation is allowed, which requires special attention to maintain panel modularity and thermal performance.

8.1.5 It is recommended that insulation be used in all cases to avoid problems with condensation forming on the underside of the sheeting. This also provides a buffer between the purlins and Steelway RTL-24™ to reduce noise and possible damage due to metal-to-metal contact.

8.2 An Insulation Pan (Steelway Classic Wall™ liner panel, 28 gage [(0.015 inch/0.38 mm)]) may be supplied at the ridge for Steelway RTL-24™ systems, but it must be requested in the order documents.

8.3 With the introduction of updated energy codes and standards, such as the National Energy Code of Canada for Buildings (NECB), provincial jurisdictions are enacting more stringent requirements on the thermal transmittance of building envelopes. Steelway Building Systems now offers many roof and wall assemblies that will meet or exceed these new energy code requirements.

9.0 Liner Panel

9.1 Liner panel for a wall or ceiling is produced from a 28 gage [(0.015 inch/0.38 mm)] material with a white Polyester paint coating. Liner panel is not intended to be exposed to the effects of weather, sunlight, moisture, or corrosive environments.

10.0 Standard Serviceability Criteria (Canada)

The most commonly addressed serviceability criteria in steel building systems are deflections and thermal expansion/ contraction. Steelway deflection standards in Canada are based upon the applicable Building Code and the CSSBI Design Criteria for Low Rise Steel Building systems. All projects meet or exceed the following criteria unless otherwise specified on the quote or order documents.

10.1 Serviceability Limit States (SLS)

10.1.1 The NBC Structural Commentaries (Part 4 of Division B) notes that loads and load combinations depend very much on the serviceability limit state and on the properties of structural materials (e.g. creep and cracking). The commentary goes on further to provide some guidance on the load combinations depending on the SLS to be considered. For example, three load combinations are suggested for displacement under the limit state of damage to non-structural components:

$$L + \alpha S$$
$$S + \alpha L$$
$$W$$

These are the recommended limit states for the short-term effects that could cause undesirable effects on non- structural members. Note that S and W include an Importance Factor for the serviceability limit state (see Table 1.1 for SLS). The companion factor, α, is usually assumed to be 0.5 for live loads due to use and occupancy, except in the case of storage uses, where it is assumed to be 1.0, and 0.5 for snow loads.

Table 1.1 Importance Factors

Importance Category	Wind, I_w		Snow, I_s	
	ULS	SLS	ULS	SLS
Low	0.8	0.75	0.8	0.9
Normal	1.0	0.75	1.0	0.9
High	1.15	0.75	1.15	0.9
Post-disaster	1.25	0.75	1.25	0.9

Source: Tables 4.1.6.2.-A and 4.1.7.3. NBC 2015

The following tables give recommendations for the serviceability limit states of steel roofing (Table 2.1), cladding (Table 2.2) and cranes (Table 2.3). The application of these limits is intended for low rise steel building systems, but may be used as a guide for other building types. The design professional is responsible for determining if these limits are appropriate for the specific building project.

Table 2.1
Serviceability Considerations for Steel Roofing

Roofing Type	Structural Element	Deformation	Recommended Serviceability Limit	Loading
Through Fastened (no interior finish)	Expansion Joint	Horz. Movement	100-200 ft. max (along slope of roof)	*T*
	Roof	Slope	0.5/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/150	$S^{(1)}$ *or L or* $W^{(1)}$
	Purlin	Vert. Deflection	Positive Drainage[3]	$D+\alpha^{(2)}S^{(1)}$
Standing Seam (no interior finish)	Expansion Joint	Horz. Movement	150-200 ft. max (along slope of roof)	*T*
	Roof	Slope	0.25/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/150	$S^{(1)}$ *or L or* $W^{(1)}$
	Purlin	Vert. Deflection	Positive Drainage[3]	$D+\alpha^{(2)}S^{(1)}$
Through Fastened (interior finish susceptible to cracking(4))	Expansion Joint	Horz. Movement	100-200 ft. max	*T*
	Roof	Slope	0.5/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/360	$S^{(1)}$ *or L or* $W^{(1)}$
	Purlin	Vert. Deflection	Positive Drainage[3]	$D+\alpha^{(2)}S^{(1)}$

Table 2.1 (Cont'd)
Serviceability Considerations for Steel Roofing

Roofing Type	Structural Element	Deformation	Recommended Serviceability Limit	Loading
Standing Seam (interior finish susceptible to cracking[4])	Expansion Joint	Horz. Movement	100-200 ft. max	*T*
	Roof	Slope	0.25/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/360	*$S^{(1)}$ or L or $W^{(1)}$*
	Purlin	Vert. Deflection	Positive Drainage[3]	*$D+\alpha^{(2)}S^{(1)}$*
Through Fastened (interior finish not susceptible to cracking[5])	Expansion Joint	Horz. Movement	100-200 ft. max	*T*
	Roof	Slope	0.5/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/150	*$S^{(1)}$ or L or $W^{(1)}$*
	Purlin	Vert. Deflection	Positive Drainage[3]	*$D+\alpha^{(2)}S^{(1)}$*
Standing Seam (interior finish not susceptible to cracking[5])	Expansion Joint	Horz. Movement	100-200 ft. max	*T*
	Roof	Slope	0.25/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/150	*$S^{(1)}$ or L or $W^{(1)}$*
	Purlin	Vert. Deflection	Positive Drainage[3]	*$D+\alpha^{(2)}S^{(1)}$ or D+5 psf*
Through Fastened (suspended ceiling)	Expansion Joint	Horz. Movement	100-200 ft. max	*T*
	Roof	Slope	0.5/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/240	*$S^{(1)}$ or L or $W^{(1)}$*
	Purlin	Vert. Deflection	Positive Drainage[3]	*$D+\alpha^{(2)}S^{(1)}$*
Standing Seam (suspended ceiling)	Expansion Joint	Horz. Movement	100-200 ft. max	*T*
	Roof	Slope	0.25/12 min.	*Drainage*
	Purlin	Vert. Deflection	Span/240	*$S^{(1)}$ or L or $W^{(1)}$*
	Purlin	Vert. Deflection	Positive Drainage[3]	*$D+\alpha^{(2)}S^{(1)}$*
Insulated Metal Panels	Expansion Joint	Horz. Movement	Specified by panel manufacturer	*T*
	Roof	Slope	Specified by panel manufacturer	*Drainage*
	Purlin	Vert. Deflection	Span/240 or specified by panel manufacturer	*$S^{(1)}$ or L or $W^{(1)}$*
	Purlin	Vert. Deflection	Positive Drainage[3]	*$D+\alpha^{(2)}S^{(1)}$*

Table Notes:
(1) S and W include an importance factor for serviceability (see Table 1.1).
(2) The companion factor, α, is usually assumed to be 0.5 for live loads due to use and occupancy, except in the case of storage uses, where it is assumed to be 1.0, and 0.5 for snow loads.
(3) For more information on positive drainage and ponding refer to NBC Structural Commentaries.
(4) Interior finish susceptible to cracking would include gypsum drywall.
(5) Interior finish not susceptible to cracking would include Steel liner panels.

Table 2.2
Serviceability Considerations for Cladding

Cladding Type/ Support Type	Structural Element	Deformation	Recommended Serviceability Limit	Loading
Steel Panels/ Foundation (no interior finish or interior finish not susceptible to cracking[5])	Bare Frame	Drift perpendicular to wall	Height/60	*W*[1]
	Wind Frame	Drift parallel to wall (racking)	Height/100	*W*[1]
	Secondary Structure	Horz. Deflection	Span/90	*W*[1]
	Wind Columns	Horz. Deflection	Height/90	*W*[1]
Steel Panels/ Foundation (interior finish susceptible to cracking[4])	Bare Frame	Drift perpendicular to wall	Height/120	*W*[1]
	Wind Frame	Drift parallel to wall (racking)	Height/240	*W*[1]
	Secondary Structure	Horz. Deflection	Span/240	*W*[1]
	Wind Columns	Horz. Deflection	Height/240	*W*[1]
Insulated Metal Panels/Foundation	Bare Frame	Drift perpendicular to all	Height/120	*W*[1]
	Wind Frame	Drift parallel to wall (racking)	Height/240	*W*[1]
	Secondary Structure	Horz. Deflection	Height/240	*W*[1]
	Wind Columns	Horz. Deflection	Height/240	*W*[1]
EIFS /Foundation (interior finish not susceptible to cracking[5])	Bare Frame	Drift perpendicular to wall	Height/120	*W*[1]
	Wind Frame	Drift parallel to wall (racking)	Height/240	*W*[1]
	Secondary Structure	Horz. Deflection	Span/240	*W*[1]
	Wind Columns	Horz. Deflection	Height/240	*W*[1]
Tilt-Up Precast Panels/Foundation	Bare Frame	Drift perpendicular to wall	Height/100	*W*[1]
	Wind Frame	Drift parallel to wall (racking)	Height/200	*W*[1]
	Secondary Structure	Horz. Deflection	Span/240	*W*[1]
	Wind Columns	Horz. Deflection	Height/240	*W*[1]
Unreinforced Masonry Wall/ Foundation	Bare Frame	Drift perpendicular to wall	1/16 in. crack in base of wall	*W*[1]
	Wind Frame	Drift parallel to wall (racking)	Height/360	*W*[1]
	Secondary Structure	Horz. Deflection	Span/240 ≤ 1.5 in.	*W*[1]
	Wind Columns	Horz. Deflection	Span/240	*W*[1]

Table 2.2 (Cont'd)
Serviceability Considerations for Cladding

Cladding Type/ Support Type	Structural Element	Deformation	Recommended Serviceability Limit	Loading
Reinforced Masonry Wall/Foundation	Bare Frame	Drift perpendicular to wall	Height/100 with appropriate base details for max 1/16 in. crack in base of wall, or H/200 without	*W*(1)
	Wind Frame	Drift parallel to wall (racking)	Height/240	*W*(1)
	Secondary Structure	Horz. Deflection	Span/240 ≤ 1.5 in.	*W*(1)
	Wind Columns	Horz. Deflection	Span/240	*W*(1)
Glass Curtain Wall/ Foundation	Bare Frame	Drift perpendicular to all	Height/240	*W*(1)
	Wind Frame	Drift parallel to wall (racking)	Height/360	*W*(1)
	Secondary Structure	Horz. Deflection	Span/360 or specified by curtain wall manufacturer	*W*(1)
	Wind Columns	Horz. Deflection	Span/360 or specified by curtain wall manufacturer	*W*(1)
Glass Curtain Wall/ Spandrel Beams	Bare frame	Drift perpendicular to all	Height/240	*W*(1)
	Wind frame	Drift parallel to wall (racking)	Height/240	*W*(1)
	Secondary structure	Horz. Deflection	Span/360 or specified by curtain wall manufacturer	*W*(1)
	Wind columns	Horz. Deflection	Span/360 or specified by curtain wall manufacturer	*W*(1)
	Spandrels	Vert. Deflection	Span/400 or specified by curtain wall manufacturer	*D*

Technical Notes:
(1) S and W include an importance factor for serviceability (see table 1.1).
(2) The companion factor, α, is usually assumed to be 0.5 for live loads due to use and occupancy, except in the case of storage uses, where it is assumed to be 1.0, and 0.5 for snow loads.
(3) For more information on positive drainage and ponding refer to NBC Structural Commentaries.
(4) Interior finish susceptible to cracking would include gypsum drywall.
(5) Interior finish not susceptible to cracking would include Steel liner panels.

Table 2.3
Serviceability Considerations for Cranes

Crane Type	Structural Element	Deformation	Recommended Serviceability Limit	Loading
Top Running Cranes	Runway Supports	Relative lateral deflection of runway rails (change in gauge)	1.0 in. max.	$D + \alpha S$
	Runway beam Structural class of service 'A','B','C','D','E','F'	Horz. Deflection	Span/400	$C_{SS}^{(3)}$ or $0.5C_{SM}^{(4)}$
	Runway Beam Structural class of service 'A','B'&'C',	Vert. Deflection	Span/600	$C_{VS}^{(5)}$ or $C_{VM}^{(6)}$
	Runway beam Structural class of service 'D'	Vert. Deflection	Span/800	$C_{VS}^{(5)}$ or $C_{VM}^{(6)}$
	Runway beam Structural class of service 'E'&'F'	Vert. Deflection	Span/1000	$C_{VS}^{(5)}$ or $C_{VM}^{(6)}$
Top Running Cab Operated or Radio Operated Cranes	Bare frame Structural class of service 'A','B'&'C'	Lateral drift at runway elev.	Height/240 ≤ 2 in. max.	$C_{SS}^{(3)}$ or $0.5C_{SM}^{(4)}$ or q1/10
	Bare frame Structural class of service 'D','E'&'F'	Lateral drift at runway elev.	Height/400 ≤ 2 in. max.	$C_{SS}^{(3)}$ or $0.5C_{SM}^{(4)}$ or q1/10
Top Running Pendant Operated Cranes	Bare frame Structural class of Service 'A','B','C','D'	Lateral drift at runway elev.	Height/100 ≤ 2 in. max.	$C_{SS}^{(3)}$ or $0.5C_{SM}^{(4)}$ or q1/10
Underhung Crane (supported by frames)	Runway Supports	Relative lateral deflection of runway rails (change in gauge)	1.0 in. max.	$D + \alpha S$
	Runway beam Structural class of service 'A','B'&'C'	Vert. Deflection	Span/450	$C_{SS}^{(3)}$ or $0.5C_{SM}^{(4)}$
	Bare frame Structural class of service 'A','B','C'	Lateral drift at runway elev.	Height/100	$C_{VS}^{(5)}$ or $C_{VM}^{(6)}$
	Bare frame Structural class of service 'A','B','C'	Vertical deflection at runway	Span/240	$C_{VS}^{(5)}$ or $C_{VM}^{(6)}$

Technical Notes:
(1) S and W include an importance factor for serviceability (see Table 1.1)
(2) S and W include an importance factor for serviceability (see Table 1.1)
(3) The companion factor, α, is usually assumed to be 0.5 for live loads due to use and occupancy, except in the case of storage uses, where it is assumed to be 1.0, and 0.5 for snow loads.
(4) CSS refers to the side-thrust due to a single crane.
(5) CSM refers to the side-thrust due to multiple cranes.
(6) CVS refers to the vertical load due to a single crane, not including impact.
(7) CVM refers to the vertical load due to multiple cranes, not including impact.

11.0 Standard Serviceability Criteria (USA)

The most commonly addressed serviceability criteria in Steel building systems are deflections and thermal expansion/ contraction. Steelway deflection standards in the US are based upon the applicable Building Code and the MBMA serviceability guidelines in the latest MBMA Steel Building Systems Manual. All projects meet or exceed the following criteria unless otherwise specified on the quote or order documents.

Structural Element(s)	Deflection Limit	Loading
Rigid Frames Members:		
Rigid Frame Rafter	Rafter Span / 180 Vertical	Collateral + Roof Live/Snow
	Rafter Span / 120 Vertical	Dead + Collateral + Roof Live/Snow
Rigid Frame Lateral Drift w/ Insulated and Uninsulated Steel Wall	Eave Height / 60 Horizontal	Wind
Pinned-Base Masonry, CMU, or Concrete Panel Walls	Wall Height / 100 Horizontal	Wind
Fixed-Base Masonry or CMU Walls	Wall Height / 200 Horizontal	Wind
Pendant or Radio Operated Top-Running Cranes	Eave Height / 100 Horizontal	Wind
	Top of Rail Elevation / 240	Dead + Crane Lateral
Cab Operated Top-Running Cranes	Eave Height / 240 Horizontal	Wind
	Top of Rail Elevation / 240	Dead + Crane Lateral
Post & Beam Frame Members:		
Post & Beam Rafter	Rafter Span / 180 Vertical	Collateral + Roof Live/Snow
	Rafter Span / 120 Vertical	Dead + Collateral + Roof Live/Snow
Post & Beam, and Sidewall or Endwall Wind Columns	Column Height / 90 Horizontal	Wind
Pinned-Base Masonry, CMU, or Concrete Panel Walls	Wall Height / 200 Horizontal	Wind
Fixed-Base Masonry or CMU Walls	Wall Height / 200 Horizontal	Wind
Roof Secondary Members Supporting:		
Purlins (Roof Slopes > 1/4:12) and Roof Joists	Bay / 120 Vertical	Collateral + Roof Live/Snow
	Bay / 150 Vertical	Roof Live/Snow (No Ceiling)
	Bay / 240 Vertical	Roof Live/Snow (Suspended Ceiling)
Wall Secondary Members Supporting:		
Steel Walls	Bay / 90 Horizontal	Wind
Masonry, CMU, Concrete Panel Walls, and Members w/ Brittle Finishes	Bay / 240 Horizontal	Wind

11.0 Standard Serviceability Criteria (USA) (Cont'd)

Structural Element(s)	Deflection Limit	Loading
Members with Flexible Finishes	Bay / 240 Horizontal	Wind
Roof Sheeting:		
Uninsulated and Insulated Steel Panel (By Steelway)	Secondary Spacing / 60 Vertical	Collateral + Roof Live/Roof Snow
		Load or 200# concentrated load at mid-span of 1'-0" wide panel section
Roof Panels By Others and Other Materials	Per Order Documents	Per Order Documents
Wall Sheeting:		
Uninsulated Metal Panel (By Steelway)	Bay/90 Horizontal	Wind
Insulated Metal Panel (By Steelway)	Bay/240 Horizontal	Wind
Wall Panels By Others and Other Materials	Per Order Documents	Per Order Documents
Crane Runway Beams:		
Top Running Crane:		
CMAA Service Classes A through C	Bay Length / 600 Vertical	Crane Vertical Static Load
CMAA Service Class D	Bay Length / 800 Vertical	Crane Vertical Static Load
CMAA Service Classes E and F	Bay Length / 1000 Vertical	Crane Vertical Static Load
CMAA Service Classes A through F	Bay Length / 400 Horizontal	Crane Lateral
Underhung Running Crane:		
CMAA Service Classes A through C	Bay Length / 450 Vertical	Crane Vertical Static Load
	Bay Length / 400 Horizontal	Crane Lateral
Floor Framing:		
Floor Beams and Floor Joists	Beam Length / 360 Vertical	Floor Live Load
	Beam Length / 240 Vertical	Dead + Collateral + Floor Live Load
Vibration:		
Due to the somewhat qualitative nature of vibration effects on a building system, Steelway will typically not have any input other than responding to specific order document requests for design criteria. Some areas where the designs are more likely to see impacts from projects specifications include: mezzanine floor designs, buildings with cranes or other similar equipment as part of the end use operation, and large structures supporting HVAC equipment. Steelway will properly address order document specifications but is not in an expert position to give guidance or direction on the matter of vibration.		