

KEMKO, INC.

METAL BUILDING SYSTEM SPECIFICATIONS

1. GENERAL

1.1. SCOPE

1.1.1. These specifications apply to metal building systems as designed, engineered and fabricated and by Kemko, Inc. ("Kemko").

1.1.2. These specifications describe Kemko's "standard" metal building systems. In the absence of contract requirements or restrictions to the contrary, these specifications accurately describe the product provided by Kemko. However, these specifications are in no way intended to limit the available options associated with Kemko's metal buildings.

1.1.3. These specifications are intended for use by architects, engineers, building code officials and Kemko's employees, customers, and vendors.

1.1.4. Because of a continuing program of research and development these specifications are subject to change without notice.

1.2. BASIC BUILDING TYPES

1.2.1. Symmetrical Gable is a continuous frame building with the ridge in the center of the building, consisting of tapered or straight columns and tapered or straight rafters. Sidewall and endwall girts typically by-pass the columns, but they may be flush in the column line. The building may or may not have interior columns.

1.2.2. Unsymmetrical Gable is a continuous frame building with an off-center ridge, consisting of tapered or straight columns and rafters. Eave height and roof slope may differ on each side of the ridge. Sidewall and endwall girts typically by-pass the columns, but they may be flush in the column line. The building may or may not have interior columns.

1.2.3. Single Slope is a continuous frame building which does not contain a ridge, but has one continuous roof sloping from side to side. The primary framing consists of straight or tapered columns and rafters. Sidewall and endwall girts typically by-pass the columns, but they may be flush in the column line. The building may or may not have interior columns.

1.2.4. Lean-to is a building addition which does not contain a ridge, but has one continuous roof slope from side to side. These buildings rely on the frame of another building for partial support.

1.3. BUILDING NOMENCLATURE

1.3.1. Primary frames form the backbone of the building. They are constructed from either hot-rolled wide flange beams or built-up welded steel I shaped members. Kemko never uses light gauge steel to construct its primary framing.

1.3.2. Secondary framing typically consists of purlins, girts and eave struts that are made from 12, 14 and 16 gauge cold-rolled steel. Secondary framing spans between the primary framing and, among other things, supports the wall and roof panels and carries the building loads to the primary framing

1.3.1. Roof Slope is expressed as inches of rise for each 12" of horizontal run.

1.3.2. Building Width is measured from outside face to outside face of sidewall girts.

1.3.3. Eave Height is the nominal dimension measured from the level of the finished floor to the intersection of the inside of the roof and sidewall sheets.

- 1.3.4. Building Length is measured from outside face to outside face of endwall girts.
- 1.3.5. Bay Spacing is the distance between the primary frames measured along the sidewall.
- 1.3.6 Auxiliary Loads are the dynamic loads induced by cranes, conveyors, or other material handling systems.
- 1.3.7 Collateral Loads are the weights of any non-moving equipment or material, such as ceilings, electrical or mechanical equipment, sprinkler systems, plumbing, or ceilings.
- 1.3.8 Dead Load is the actual weight of the building system supported by a given member.
- 1.3.9 Floor Live Loads are the loads induced on a floor system by occupants of a building and their furniture, equipment, etc.
- 1.3.10 Roof Live Loads are the loads produced by maintenance activities, rain, erection activities, and other movable or moving loads but not including wind, snow, seismic, crane, or dead loads.
- 1.3.11 Roof Snow Load is the gravity load induced by the weight of snow or ice on the roof, assumed to act on the horizontal projection of the roof.
- 1.3.12 Seismic Loads are the loads acting in any direction on a structural system due to the action of an earthquake.
- 1.3.13 Wind Loads are the loads on a structure induced by the forces of wind blowing from any horizontal direction.
- 1.3.14 Importance Factors are incorporated into wind, seismic and other load calculations and account for the degree of hazard to human life, damage to property and importance of the structure to the welfare of the community.
- 1.3.15 Exposure Categories are based on the upwind ground surface roughness conditions, determined by natural topography, vegetation and adjacent structures. A building constructed in a wide open area will be designed to a higher standard than one totally surrounded by large obstructions.

2. DRAWINGS

- 2.1. Kemko shall furnish the following drawings with all metal building systems for the proper identification and assembly of building components.
- 2.1.1. Anchor Bolt Plan: Shows the diameter, length location and projection of all anchor bolts for the components of the metal building system. Column reactions will also be shown.
- 2.1.2. Erection Drawings: Roof and wall erection (framing) drawings that identify individual components and accessories furnished by Kemko in sufficient detail to permit proper erection of the metal building system.
- 2.1.3 Certifications: All standard drawings sets will contain summarized engineering data and will bear the seal of a registered professional engineer. Detailed design calculations will be kept on file by Kemko and will be available on request.

3. STRUCTURAL STEEL DESIGN

3.1. GENERAL

- 3.1.1. Kemko shall use standards, specifications, recommendations, findings and/or interpretations of professionally recognized groups such as American Institute of Steel Construction (AISC), American Iron and Steel Institute (AISI), American Welding Society (AWS), ASTM International (formerly the American Society for Testing and Materials, ASTM), Metal Building Manufacturer's Association (MBMA), and the Society for Protective Coatings (SSPC) as the basis for establishing engineering, design, fabrication, and quality criteria, practices, and

tolerances. Kemko's engineering, design, fabrication and quality criteria, practices, and tolerances shall govern, unless specifically stated otherwise in the contract documents.

3.1.2. Structural mill, or welded up plate components shall be designed in accordance with AISC's "Specification for Structural Steel for Buildings," latest edition using ASD or LRFD method.

3.1.3. Cold-formed steel structural members will be designed in accordance with AISI's "Specification for the Design of Cold-formed Steel Structural Members," latest edition.

3.2. DESIGN LOADS

Design loads shall be as specified on Kemko's drawings and set forth in the contract documents. Design loads typically include dead load, live loads; seismic loads wind loads collateral loads, auxiliary loads, floor loads, and other specified loads. Loads are also affected by importance factors based on the intended use of the building and deflection limits based on materials used in the building.

3.3. DEFLECTION AND DRIFT

Kemko's standard design practices incorporate serviceability limits from the applicable building codes and professional standards. Owner requirements that exceed Kemko's standards must be included in the building contract documents. The applicable building code may also provide deflection limitations. "Flexible Ceiling" schedule will be used for buildings that have suspended or sheet rock ceilings. "Flexible Wall" schedule will be used for buildings that have some type of flexible exterior wall material (e.g., wood or HardiePlank®). "Brittle Ceiling" schedule will be used for buildings that have plaster ceilings. "Brittle Wall" schedule will be used for buildings that have masonry, glass, stucco, EIFS, or similar type materials.

See next page.

Metal Roof & Wall Panels

Endwall Column	L/120
Endwall Rafter (live)	L/180
Endwall Rafter (wind)	L/180
Wall Girt	L/90
Roof Purlins (live)	L/150
Roof Purlins (wind)	L/150
Wall Panel	L/60
Roof Panel (live)	L/60
Roof Panel (wind)	L/60
Rigid Frame (horizontal)	H/60
Rigid Frame (vertical)	L/180
Wind Framing	H/60

Flexible Walls

Endwall Column	L/120
Endwall Rafter (live)	L/180
Endwall Rafter (wind)	L/180
Wall Girt	L/120
Roof Purlins (live)	L/150
Roof Purlins (wind)	L/150
Wall Panel	L/60
Roof Panel (live)	L/60
Roof Panel (wind)	L/60
Rigid Frame (horizontal)	H/60
Rigid Frame (vertical)	L/180
Wind Framing	H/60

Brittle Walls

Endwall Column	L/240
Endwall Rafter (live)	L/180
Endwall Rafter (wind)	L/180
Wall Girt	L/240
Roof Purlins (live)	L/150
Roof Purlins (wind)	L/150
Wall Panel	L/60*
Roof Panel (live)	L/60
Roof Panel (wind)	L/60
Rigid Frame (horizontal)	H/120
Rigid Frame (vertical)	L/180
Wind Framing	H/120

* - If EIFS is attaching to metal panels, use L/240.

Flexible Ceilings

Endwall Column	L/120
Endwall Rafter (live)	L/240
Endwall Rafter (wind)	L/240
Wall Girt	L/90
Roof Purlins (live)	L/240
Roof Purlins (wind)	L/240
Wall Panel	L/60
Roof Panel (live)	L/60
Roof Panel (wind)	L/60
Rigid Frame (horizontal)	H/60
Rigid Frame (vertical)	L/240
Wind Framing	H/60

Brittle Ceilings

Endwall Column	L/120
Endwall Rafter (live)	L/360
Endwall Rafter (wind)	L/360
Wall Girt	L/90
Roof Purlins (live)	L/360
Roof Purlins (wind)	L/360
Wall Panel	L/60
Roof Panel (live)	L/60
Roof Panel (wind)	L/60
Rigid Frame (horizontal)	H/60
Rigid Frame (vertical)	L/360
Wind Framing	H/60

4. BASIC MATERIAL SPECIFICATIONS

4.1. PRIMARY FRAMING STEEL

4.1.1. Steel for Wide-Flange Beams shall conform to the requirements of ASTM Specification A992 Grade 50, with a minimum yield of 50 ksi. All other hot-rolled shapes, including Channels and S-Beams, shall conform to ASTM A-36 or A-572, with a minimum yield of 36 ksi.

4.1.2. Steel for the web and flange portions of built-up sections shall conform to ASTM A-1011, A 529, A 572 or ASTM A-36 as applicable, with minimum yield of from 42 to 55 ksi as indicated by the design requirements.

4.1.3. Pipe shall conform to the requirements of ASTM A 53 Grade B with a minimum yield strength of 35 ksi.

4.1.4. X-Bracing shall conform to ASTM A 36 for rod bracing and ASTM A 475 for cable bracing.

4.2. SECONDARY FRAMING STEEL

4.2.1. Steel for purlins, girts, eave struts, and "C" sections shall conform to the requirements of ASTM A-1011 Grade 55. Minimum yield shall be 55 ksi.

4.2.2. Steel used to form galvanized purlins, girts, eave struts, and "C" sections shall conform to the requirements of ASTM A-653 G90 Grade 55. Minimum yield shall be 55 ksi.

4.3. ROOF AND WALL PANEL MATERIAL

4.3.1. Panel material specified as 26 gauge (.0185 min.) shall be Galvalume® or Galvalume® Plus material conforming to the requirements of ASTM A792 Grade 80. Minimum yield stress shall be 80 ksi (industry standard Grade E.)

4.3.2. Panel material specified as 24 gauge (.023 min.) shall be Galvalume® or Galvalume® Plus material conforming to the requirements of ASTM A792 Grade 50. Minimum yield stress shall be 50 ksi (industry standard Grade D.).

4.3.3. Panel material specified as 22 gauge (.029 min.) shall be Galvalume® or Galvalume® Plus material conforming to the requirements of ASTM A792 Grade 50. Minimum yield stress shall be 50 ksi (industry standard Grade D.).

5. STRUCTURAL FRAMING SPECIFICATIONS

5.1. GENERAL

5.1.1. All framing members shall be shop fabricated for field bolted assembly. The surfaces of the bolted connections shall be smooth and free from burrs or distortions.

5.1.2. All shop-welded connections shall be in accordance with the American Welding Society (AWS) Code for Building Construction.

5.1.3. All framing members, where necessary, shall have an identifying mark.

5.1.4. Visual inspection methods will be used for verification of weld quality as outlined by the AWS Structural Steel Welding Code, Visual Inspection Acceptance Criteria, Table 6.1

5.2. PRIMARY FRAMING

5.2.1. Rigid Frame: All rigid frames shall be welded built-up sections or mill shapes as required by design specifications. The built-up columns and rafters may be either constant or tapered depth. Flanges shall be connected to webs by means of a continuous fillet weld on one side.

5.2.2. Endwall Frames: All endwall roof beams and endwall columns shall be mill-rolled sections, or built-up “T” sections depending on design requirements.

5.2.3. Plates, Stiffeners, etc.: All base plates splice plates, cap plates, and stiffeners shall be factory welded into place on the structural members.

5.2.4. Bolt Holes: All base plates, splices, and flanges shall be shop fabricated to include bolt connection holes. Webs shall be shop fabricated to include bracing holes.

5.3. SECONDARY FRAMING

5.3.1. Minimum decimal equivalent thicknesses for gauges are as follows:

16 Gauge 0.059 inches

14 Gauge 0.070 inches

12 Gauge 0.105 inches

5.3.2. Purlins and Girts: Purlins and girts shall be cold-formed “Z” sections with stiffened flanges. They shall be pre-punched at the factory to provide for field bolting to. They shall be flush or by-pass as required by design and the contract documents. Connection bolts will install through the webs and flanges as necessary.

5.3.3. Eave Struts: Eave Struts shall be unequal flange cold-formed “C” sections.

5.3.4. Base Angle: A base member will be supplied by which the base of the wall covering may be attached to the perimeter of the slab. Base angle shall be secured to the concrete slab with expansion anchors.

5.4. BRACING

5.4.1. Diagonal Bracing: Diagonal bracing in the roof and sidewalls shall be used to remove longitudinal loads (wind, crane, etc.) from the structure. This bracing will be furnished to length and equipped with a bevel washer, flat washer, and nut at each end. It may consist of rods threaded at each end or galvanized cable with suitable threaded-end eyebolts. If load requirements so dictate, bracing may be of structural angle and/or pipe, bolted in place.

5.4.2. Flange Bracing: The compression flange of all primary framing shall be braced laterally with angles connecting to the webs of purlins or girts so that the flange compressive stress is within allowable limits for any combination of loadings.

5.4.3. Special Bracing: When load requirements or window and door placements do not allow diagonal bracing, a wind bent frame, wind column, or fixed base columns will be used.

6. ROOF AND WALL COVERING

6.1. GENERAL

6.1.1. Standard roof and wall panels shall be “PBR” profile.

6.1.2. Kemko offers a wide variety of other panel profiles and panel coating systems. For specific details and costs, contact Kemko at 1-800-831-1652.

6.2. STANDARD PANEL DESCRIPTION

6.2.1. “PBR” profile panels shall have major ribs 1 ¼” high spaced 12” on center, with a purlin bearing leg. In the flat area between the major ribs are two smaller ribs. Each panel shall provide 36” net coverage in width. All sidelaps shall be at least one major rib.

6.2.2. Panel Length: All wall panels shall be continuous from sill to roofline and all roof panels shall be continuous from eave to ridge except where lengths become prohibitive for handling purposes. All end laps shall be at least 6" on roof, 4" on walls, and 3" on wall lights.

6.2.3. Endwall Edge Cuts: All endwall panels for buildings with 1:12, or less, roof slope shall be square cut. All endwall panels for buildings with more than a 1:12 roof slope shall be bevel cut in the field by the building erector if necessary.

7. MISCELLANEOUS MATERIAL SPECIFICATIONS

7.1. FASTENERS

7.1.1. Structural Bolts:

7.1.1.1. All bolts used in frame splices shall comply with ASTM A325 or A325T. The nuts used shall comply with ASTM 563, and the washers, when specified, shall comply with ASTM A436.

7.1.1.2. All bolts used in connections of secondary framing to primary framing shall be zinc plated ANSI Grade 2, ASTM A307. The nuts used shall comply with ASTM 563, and the washers, when specified, shall comply with ASTM 844.

7.1.2. Fasteners for Roof Panels: All panels shall be attached to the secondary framing members by means of #12-14 x 1-1/4" self-drilling structural carbon steel screws with a long-life zinc-alloy head, with or without paint, assembled with an EPDM washer. These fasteners are applicable for use with fiberglass blanket insulation up to 4" thick. If no roof insulation is present, #12 x 1 self-drilling screws with a long-life zinc alloy head and EPDM washers will be used. All self-drilling lap screws are 1/4"-14 x 7/8" with a long-life zinc alloy head and EPDM washer, regardless of structural screw length.

7.1.3. Fasteners for Wall Panels: Wall panels shall be attached to the secondary framing members by means of a self-drilling fastener made of carbon steel, #12 x 1-1/4" hex washer head with EPDM washers for fiberglass insulation up to 3" thick and #12 x 1-1/2" for fiberglass insulation 4" to 6" thick. If no wall insulation is present, #12 x 3/4" hex washer head screws with EPDM washers will be used. Screws for panel laps shall be with self-drilling 1/4"-14 x 7/8" hex washer head with EPDM washers.

7.1.4. Anchor Bolts: All anchor bolts shall comply with ASTM F1554.

7.2. SEALANTS AND CLOSURES

7.2.1. Closure Strips: The corrugations of the roof and wall panels shall be filled with solid or closed-cell, preformed rubber, neoprene or polyethylene closures where required.

7.2.3. Sealants: Roof panels shall be installed with a tape sealer. This material shall be a butyl base elastic compound with a minimum solid content of 99%, and shall be Schnee-Morehead #5227 or equal. The sealer shall have good adhesion to metal and be non-staining, non-corrosive, non-shrinking, non-oxidizing, nontoxic and non-volatile.

7.3. GUTTER, FLASHING & DOWNSPOUTS

7.3.1. Gutters and Flashing: Gutters and rake shall be 26 (.0185 min.) gauge Galvalume® or Galvalume® Plus steel conforming to ASTM A792, with a minimum yield of 50 ksi (industry standards Grade D).

7.3.2. Downspouts: All downspouts shall be rectangular in shape and shall be 26 gauge (.0185 min.) Galvalume® or Galvalume® Plus steel conforming to ASTM A792, with a minimum yield of 50 ksi (industry standards Grade D).

8. PAINTING

8.1. STRUCTURAL PAINTING

8.1.1. All uncoated structural steel shall be cleaned and primed as required by the Society for Protective Coatings (SSPC) as follows:

8.1.1.1. Primary framing steel preparation specification shall be SSPC-SP 2

8.1.1.2. Primary framing will be painted with Kemko's standard red oxide primer.

8.1.2. Pre-coated cold-form members shall be cleaned according to SSPC-SP 8 or SSPC-SP 6, and then chemically pretreated before being coated with a minimum of .5 mils of polyester based red primer. The primer contains a "wax" type lubricant to facilitate roll-forming and deter marring during these operations. Hairline crazing, which may occur during forming operations, is considered normal. Special preparation is required before a finish coat can be applied over this "wax" finish.

Note: Primer systems are not intended as finish coat paint systems and do not offer the uniformity of appearance, durability or corrosion resistance of a top coat applied over a primer. Primers are designed to promote the wetting action and adhesion of a top coat and offer only short-term corrosion protection from ordinary atmospheric exposure. Primer is compatible only for top coating with solvent-based alkyd and modified alkyd top coat paints. Abrasions caused by handling after paintings as well as the flaking of tight mill scale are to be expected.

8.2. PAINTED PANELS

8.2.1. The painted panel exterior finish shall be either Siliconized Polyester, or Kynar 500 as specified in the contract documents.

8.2.2. Interior Finish: The painted panel interior finish shall have a white or parchment top coat over epoxy primer or an epoxy base coat, white or parchment, with a clear polyester top coat.

9. ACCESSORIES

9.1. WINDOWS

Standard windows shall be self-framing horizontal slide, vertical single hung or fixed narrow lite units. They are available in a variety of sizes.

9.2. PERSONNEL DOORS

9.2.1. Personnel door shall be 3' x 7' single leaf, 4' x 7' single leaf or 6' x 7' double leaf manufactured from 20 gauge galvanized steel.

9.2.3. Door leafs shall have an embossed finish with a white prime coat.

9.2.8. Door leafs shall be solid, half glass, or side vision (narrow lite).

9.2.11. Doors shall be constructed for non-hand installation.

9.2.14. The standard lockset shall have a lever passage handle.

9.3. OVERHEAD DOORS

9.3.1. Doors will be Overhead Door Corporation Model 790 unless otherwise specified.

9.3.2. Doors shall be designed to resist applicable wind loads and are available in a variety of sizes.

9.3.2. Door Framing: Overhead door support framing shall be designed to resist applicable wind loads and shall typically consist of cold-formed "C" jambs with a cold-formed "C" header at the top of the opening. Cold-formed "C" framing will be galvanized unless specified otherwise. If wind loads are sufficiently high or other factors warrant it, mill-rolled channels will be used in lieu of cold-rolled "C" sections. Mill-rolled channels will be primer painted unless otherwise specified.

9.4. GRAVITY VENTILATORS

9.4.1. Gravity ridge ventilators shall be manufactured from Galvalume® A792 Grade 50 pre-painted or bare. The ventilator body shall be 26 gauge (.0185 min.) with flat skirts and shall be pre-formed for a 1:12 pitch. Ventilators shall be equipped with birdscreens, dampers, and riveted end caps. Ventilators shall be 10' long and have a 9" throat. Twelve inch throat ventilators are available as an option.

9.4.2. Round ventilators shall be 24 gauge and shall have an adjustable base for ridge mounting or a pitched base for on-slope mounting.

9.5. LOUVERS

Louver frames shall be 18 gauge galvanized steel frame with 20 gauge blades, and shall be self-framing and self-flashing. The color shall be as specified by the customer. They shall be equipped with adjustable or fixed blades as specified.

9.6. LIGHT TRANSMITTING PANELS

High Strength light transmitting panels are fiberglass reinforced polyester and shall comply with ASTM D3841, Type CC2, and Grade 2. Standard light transmitting panels will match Kemko's standard "PBR" roof panels.

9.7. INSULATION

9.7.1. Fiberglass Blanket Insulation shall conform to ASTM specification C991 NAIMA 404. Standard insulation shall be 3" and 4" thick. (R-10 and R-13 respectively). Other insulation systems with higher R values are available.

9.7.2. The standard facing for fiberglass insulation shall be reinforced white vinyl – WMP-VR. Other facings are available.

10. ERECTION AND INSTALLATION

10.1. Building erection and the installation of accessories shall be performed in accordance with erection drawings by a Kemko erection crew, or an otherwise qualified erector using proper tools and equipment. Erection practices shall conform to MBMA's Metal Building Systems Manual, latest edition

10.2. There shall be no field modifications to primary structural members except as authorized and specified by Kemko.

11. BUILDING ANCHORAGE AND FOUNDATION

10.1. The building anchor bolts shall be designed to resist the maximum column reactions resulting from the specified combinations of loadings. These designs and sizes shall be specified by Kemko. Anchor bolts typically are supplied by Kemko.

10.2. Foundations shall be adequately designed by a qualified foundation engineer to support the building reactions and other loads that may be imposed by the building use. The design shall be based on the specific soil conditions of the building site. The engineering of the foundation may or may not be provided by Kemko. Kemko assumes no responsibility for the integrity of any foundation designed by others or stamped by an engineer other than one of Kemko's choosing.

11. WARRANTIES

Kemko offers a variety of warranties for panel coatings, roof systems, weather tightness, and manufactured materials. For specific warranty details, contact Kemko at 1-800-831-1652.