

SECTION 13121

ENGINEERED METAL BUILDINGS

PART 1--GENERAL

1.01 DESCRIPTION

A. SCOPE:

This section specifies pre-engineered and shop fabricated metal buildings for the electrical building, including frames, standing seam roof systems, roof ridge and/or vent, trim, insulation, metal siding, and gutters, as required. The roof panels and metal siding panels shall match, or shall be similar, to the profile and color of the existing buildings in the treatment plant.

B. TYPE:

The structures supplied under this specification shall be clear span, rigid frame connection type, and braced-frame type in the direction and location shown on the Drawings, with the dimensions and clearances as shown on the Drawings. Building geometry, column locations and depth contemplate an "inner girt" design. Columns may not extend further into the building space than indicated. Primary framing shall include main frames, columns and wind bracing. Secondary framing shall include purlins, girts, flange bracing, clips and all other items detailed or required by the metal building manufacturer. Roof sections shall be of metal panels with subgirt framing/anchorage assembly, insulation and ceiling panels as required on the Drawings and accessory components as commonly supplied by the metal building manufacturer.

C. DESIGN CRITERIA:

Design shall comply with CBC; AISC; MBMA "Metal Building Systems Manual" and AISI. Design frames and columns assuming pinned bases.

D. AESTHETIC CRITERIA:

Panels whose profile is substantially similar in appearance to those specified may be utilized upon approval of the CITY.

E. DESIGN LOADS:

Structural design for the building systems will be provided by the building manufacturer for the following load criteria:

1. Governing Building Code: 2013 CBC

2. Wind Load: 115 mph, Exposure C; Wind Pressure Coefficients and the design pressures shall be applied per governing code.
3. Seismic: See Section 01900.
4. Dead Loads: Shall include the weight of building system construction, such as roof, framing, and covering loads.
5. Collateral Loads shall be treated as dead loads in design, and shall be applied at roof levels:
 - a. Electrical/lighting = 3.5 psf.
 - b. Supported HVAC and process piping = 15 psf.
6. Roof Live Loads: 20 psf.

F. DEFLECTIONS:

Deflections under the various loading conditions shall be limited to those which will not impair the structure's serviceability nor induce additional stresses which have not been accounted for in analysis and load resistance design:

1. Calculations for deflections shall be done using only the bare frame method. Reductions based on engineering judgment using the assumed composite stiffness of the building envelope shall not be allowed. Where not specified below, drift shall follow AISC's "Serviceability Design Considerations for Low-Rise Buildings." When maximum deflections are specified, calculations shall be included in the design data.
2. Lateral Deflection at Eave:
 - a. $H/200$ for seismic.
 - b. $H/240$ for all other cases.
3. Roof panels shall not deflect more than $L/180$ from support to support when subjected to design wind loads.

G. STRUCTURAL DESIGN DETAILS:

The CONTRACTOR shall utilize its standard details and methods to the greatest extent possible, consistent with the Drawings and these specifications. Specific details to provide for:

1. Anchor bolts are assumed to be galvanized ASTM A307 material, fully developed. CONTRACTOR shall provide anchor bolt sizes, quantity,

material specification (if higher strength) and layout patterns with bid. CONTRACTOR shall provide and install anchor bolts. Base plates may be on 1 1/2 inch of 5000 psi non-shrink grout at CONTRACTOR's option - coordinate prior to submitting shop drawings for review.

2. Frame bracing and roof in-plane bracing shall not interfere with doors or mechanical equipment/ducts. Conform to braced bays shown and bracing general arrangement with bid.

1.02 QUALITY ASSURANCE

A. REFERENCES:

This section contains references listed to the documents listed below. They are a part of this section as specified and modified. Where a referenced document cites other standards, such standards are included as references under this section as if referenced directly. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, has been discontinued or has been replaced.

Reference	Item
AA DAF45	Designation System for Aluminum Finishes
AISC	Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 9 th Edition
AISI	Specifications for the Design of Cold Formed Steel Structural Members
ASTM A36/A36M	Carbon Structural Steel
ASTM A242/A242M	High-Strength Low-Alloy Structural Steel
ASTM A307	Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM A325	Structural Bolts, Steel, Heat-Treated, 120/150 KSI Minimum Tensile Strength

Reference	Item
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A529/A529M	High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A572/A572M	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A588/A588M	High-Strength Low Alloy Structural Steel with 50 KSI (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM D523	Specular Gloss
ASTM D2244	Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D4214	Evaluating the Degree of Chalking of Exterior Paint Films
ASTM E1592	Structural Performance of Sheet Metal Roof and Sliding Systems by Uniform Static Air Pressure Difference
AWS A2.0	Self Shielding Electrodes
AWS D1.1/D1.1M	Structural Welding Code--Steel
CBC, 2013	California Building Code
MBMA	Metal Building Manufacturers Association

B. GENERAL:

Structural assemblies, bolting, shop and field welding shall meet the requirements of the AISC specifications. The building generally shall conform to MBMA requirements.

The use of salvaged, reprocessed or scrap materials shall not be permitted.

C. MANUFACTURER'S QUALIFICATIONS:

Company specializing in manufacturing products identified in this section shall have a minimum of 3 years of documented experience. AISC Certification – Category MB certified.

D. INSTALLER QUALIFICATIONS:

1. Approved or licensed by manufacturer of building system.
2. Submit list of three other building system installations of similar scope to this project completed within the last 5 years.

SEE "OR EQUAL"
ON PAGE 10.

E. REGULATORY REQUIREMENTS:

1. Cooperate with regulatory agency or authority and provide data as requested.
2. Comply with ANSI/AWS D1.1/D1.1M.

F. SITE SAMPLES:

1. Install 2 square feet minimum size field sample of roof and wall panels.
2. Acceptable site samples may be incorporated in the work.

1.03 SUBMITTALS

Submittals shall be provided in accordance with Section 01300 and shall include the following information:

1. A copy of this specification section, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. A check mark shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the CONTRACTOR, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the CONTRACTOR with the specifications. *Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.*
2. Engineering design calculations for the structural system, roofing and cladding, sealed by a civil or structural engineer currently registered in the State of California. Calculations shall indicate foundation reactions for all loading cases with the controlling reactions entered for review.
3. Structural framing drawings, anchor bolt setting drawings and framing erection drawings; steel framing dimensions; roof system dimensions, panel layout, general construction details, anchor bolt settings, weld lengths with AWS A2.0 symbols, and roof panel profile data.

4. Accessory installation details indicated to show proper assembly of building components.
5. Manufacturer's installation instructions.
6. Two feet square sample roof and wall panels in color to be supplied.
7. Samples of manufacturer's standard colors and finishes.
8. Primer and finish coat compatibility certification described in paragraph 13121-2.06.
9. List of maintenance stock items supplied.
10. Product information for exhaust fan, including performance curves for the specified operating conditions.
11. Product information for louvers, including certified results of pressure drop test data and water penetration data.

PART 2--PRODUCTS

2.01 MANUFACTURERS

The CITY and ENGINEER believe the following candidate manufacturers are capable of producing equipment and/or products that will satisfy the requirements of this section. This statement, however, shall not be construed as an endorsement of a particular manufacturer's products, nor shall it be construed that named manufacturers' standard equipment or products will comply with the requirements of this section. Candidate manufacturers include Varco-Pruden Buildings, American Metal Buildings, Butler Metal Building Systems, or equal.

2.02 FRAMING MATERIALS

Component	Material
Structural steel members	ASTM A36/A36M, ASTM A572 Gr 50, or ASTM A529/A529M
Structural tubing	ASTM A500, Grade B, Fy=46 ksi
Brace rods	Minimum ASTM A307
Plate or bar stock	ASTM A529/A529M
Bolts, nuts and washers	ASTM A325 or A307 as required

Component	Material
Purlins and girts	ASTM A242 or ASTM A588/A588M, 50 ksi and ASTM A529, and ASTM A572/A572M, 42 ksi
Welding materials	AWS D1.1/D1.1M; type required for materials being welded
Shop primer	Manufacturer's standard rust inhibitive primer
Finish coating	See Section 09900

2.03 ROOF SYSTEM

The following items shall be provided in accordance with the approved Shop Drawings:

A. ROOF PANELS:

Standing Seam Roof (SSR) Panels shall be 12 inches wide net coverage, with 2-1/2 inches high major ribs formed at the panel side laps and formed for field seaming using electrically operated seaming machine.

1. Side Joints: Factory applied sealant for field seaming.
2. Material: Stucco embossed aluminum, fluorocarbon painted alloy 3004
3. Thickness: 0.040-inch minimum, or as required for loading.
4. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, mechanically field-seamed into place to form a double-fold 360 degree seam.
5. Length: Continuous from eave to ridge up to 41 feet (12.5 m) in length.
6. Endlaps, where required: 7 inches (178 mm) wide, located at a support member.
7. Finish: Aluminum components shall receive a two-coat system of baked-on epoxy primer and fluorocarbon polymeric finish coat equivalent to Kynar 500 coatings or PPG Duranar. Color shall be as selected to match existing structures or be selected by the CITY from the manufacturer's full range of colors.
8. Panel-to-roof purlin structural attachments: SSR clips with movable tabs which interlock with seamed SSR panel ribs and provide for 1-1/2 inch of panel movement in either direction from center of clip to compensate for thermal effects.

9. The SSR Roof System shall be tested and certified to meet Underwriters Laboratory UL 580 class 90 wind uplift rating.
10. Panels shall have been tested in accordance to ASTM E1592.
11. Panel fastening to meet uplift requirements shall be based on tested fastener values with appropriate Safety Factors.
12. Purlin strength with the SSR roof panel shall be determined and tested in accordance with AISI procedures

B. NOT USED

C. RIDGE ASSEMBLY FOR HIGH END OF SLOPES:

SSR ridge vent or closed ridge as shown on the Drawings. Closed ridge: draw-formed aluminum seam caps factory-attached to SSR ridge panels that are mechanically field-seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement. Ridge vent: as shown on the Drawings per manufacturer's standard with manual opener if noted.

D. PANEL FASTENERS:

1. Stainless steel fasteners with integral sealing washer.
2. Color of exposed fastener heads to match the wall panel finish.
3. Concealed fasteners: Self-drilling type, of size as required.
4. Provide fasteners in quantities and location as required by the manufacturer.

E. FLASHING AND TRIM:

Flashing and trim shall be fabricated from 0.032-inch minimum aluminum in same alloy, finish and embossing as roof panels. Provide trim at rakes, peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance. Unless otherwise required by the CITY, all flashing, trim, accessories and similar pieces shall be standard color from "Varco-Pruden" standard palette that matches the color of existing facilities.

F. PLASTIC PARTS:

Glass fiber reinforced resin or thermoformed ABS (Acrylonitrile-Butidene-Styrene).

1. ABS: Minimum 1/8 inch (3 mm) thick.

2. Color: Manufacturer's standard color.

G. SEALANTS, MASTICS AND CLOSURES:

Sealants, mastics, and closures shall be manufacturer's standard type.

1. Provide at roof panel endlaps, sidelaps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; use tape mastic or gunnable sealant at sidelaps and endlaps.
2. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.
3. Tape mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.
4. Gunnable sealant: Non-skinning synthetic elastomer based material; gray or bronze.

2.04 METAL SIDING SYSTEM

A. METAL SIDING

Metal Siding Panels shall be 36 inches wide coverage, be 1-1/2 inches deep, with a 6-inch pitch.

1. Material: Stucco embossed aluminum, fluorocarbon painted alloy 3004
2. Thickness: 0.040-inch minimum, or as required for loading.
3. Length: Continuous along height of walls up.
4. Finish: Aluminum components shall receive a two-coat system of baked-on epoxy primer and fluorocarbon polymeric finish coat equivalent to Kynar 500 coatings or PPG Duranar. Color shall be as selected to match existing structures or be selected by the CITY from the manufacturer's full range of colors.
5. Panel fastening: Aluminum or nonmagnetic stainless steel. Anchor clip fasteners shall be zinc-plated, cadmium-plated, or stainless-steel.
6. Panels shall have been tested in accordance to ASTM E1592.
7. Panel fastening to meet wind requirements shall be based on tested fastener values with appropriate Safety Factors.

8. Girt strength with the wall panels shall be determined and tested in accordance with AISI procedures

B. SUBGIRTS:

Subgirts shall be aluminum hat or Z-sections, as shown on the drawings or as required for proper installation. Subgirts shall be located at each structural support and shall be spaced not more than 4 feet on center.

C. FLASHING:

Flashing and trim shall be fabricated from 0.032-inch minimum aluminum in same alloy, finish and embossing as wall panels. Unless otherwise required by the CITY, all flashing, trim, accessories and similar pieces shall be standard color from "Varco-Pruden" standard palette that matches the color of existing facilities.

D. CLOSURES:

Closures shall be made from closed cell premolded neoprene or polyethylene foam or metal and provided where indicated on the drawings or as required to make a watertight assembly.

E. SEALANTS, MASTICS AND CLOSURES:

Sealants shall be only high quality products which meet or exceed federal and military specifications. Exposed sealant shall cure to rubber-like consistency. Concealed sealant may be a permanently nonhardening type. Oil or asphalt-type caulking is not acceptable. Sealant manufacturer's written recommendations shall be followed for priming and application. See also Section 07900 for additional sealant requirements.

2.05 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be fabricated from 0.064-inch minimum aluminum in the same alloy, finish and embossing as trim. Gutters, downspouts and scuppers shall be of standard profile and dimensions to collect and remove water. Gutters, downspouts and scuppers shall be fabricated using maximum lengths possible, and connection pieces between lengths. Joints shall be designed to allow for expansion and contraction. All exposed edges shall be hemmed. Support straps shall be fabricated of the same material as the roofing material. Buildings require gutters and downspouts, whether indicated on the Drawings or not.

2.06 FRAMING FINISH

All framing members shall be cleaned, prepared and shop primed. Surfaces to be field welded shall not be primed. For final finish coating, see Section 09900. Submit certification that primer proposed for use is compatible with finish coat material specified elsewhere.

2.07 ALUMINUM DOORS AND FRAMES

Aluminum doors and frames shall be designed by the building manufacturer to withstand wind load provisions. The door heights shall be the building manufacturer's standard height. The door widths shall be as shown on Drawings. The double-door frame on the electrical building shall have a transom to provide a minimum clear height of 8 feet. Each door shall include a 2'-0" x 2'-0" x 1/4" thick tempered glass window located in the top half of the door panel.

The finish on doors and frames shall be factor finish of anodic coating. Exposed aluminum surfaces shall be cleaned and provided with an anodized finish conforming to AA DAF45. Finish shall be AA-M10-C22-A42 Architectural Class 1 color-anodized finish. Color shall be dark bronze.

2.08 FABRICATION

A. FIELD MEASUREMENTS:

1. Verify that field measurements are as indicated on shop drawings.
2. Starting fabrication constitutes acceptance of field conditions.

B. FABRICATION OF STRUCTURAL FRAMING:

1. Framing members: Shop fabricated for field bolted assembly.
2. Primary framing: Steel beams, columns, intermediate columns, bearing end frames, end wall columns, and wind bracing.
3. Secondary framing: Steel purlins, girts, eave struts, chord bracing, clips, flange bearing, and base angles. Inner girt system required.
4. Shop connections: Submerged or shielded arc welded in accordance with Structural Welding Code.
5. Field bolted connections: Standard bolts, ASTM A307 for secondary members and high strength bolts, ASTM A325 for primary members.

C. METAL BUILDING DESIGN:

1. Type: Clear span with tapered outside columns, braced frame and rigid frame, as indicated on the Drawings.
2. Width and length: As shown on the Drawings.
3. Eave height: As indicated on the Drawings.

4. Eave overhang: As indicated on the Drawings.
5. Roof slope: As indicated on the Drawings.

2.08 VENTILATION SYSTEM

The building shall be provided with a ventilation system consisting of a wall-mounted propeller exhaust fan and air supply louvers.

A. EXHAUST FAN:

The exhaust fan shall be the wall mounted direct-driven propeller type including OSHA motor guard, weather shroud and bird screen. The fan propellor shall be fabricated aluminum. Each fan panel shall have a spun venturi to direct air smoothly to the propeller blades. The fan shall be sized for the operating condition to deliver 950 scfm at static pressure of 0.125 inches water column, and maximum motor speed of 1750 rpm and 1/10 HP maximum. Fans shall be manufactured by Greenheck Model SE1 or equal, modified to provide the specified features and to meet the specified operating conditions.

B. INTAKE LOUVERS:

Two intake louvers shall be provided in the lower portion of the double doors. Louvers shall stationary blade type and provide a minimum of 2.4 square feet free area, and be nominally 24-inch wide, 18-inch tall, and depth sized based to meet door installation requirements. Louvers shall be Airolite, Construction Specialties, Ruskin, or equal, modified to provide the specified features. Louvers shall bear the AMCA certified ratings seal for both air performance and water penetration.

Blades for all louvers shall be minimum 0.081 inch (12 gage) thick. Blades shall be of the fixed, drainable type with interlocking blade braces to provide an uninterrupted horizontal line. Slideable interlocked mullions shall have provisions for expansion and contraction. The frame shall be minimum 0.081 inch (12 gage) thick for all louvers.

The louver frame shall be assembled by welding. The head, sill, and jamb shall be one-piece structural members and shall have an integral caulking slot and retaining bead.

The louver shall be furnished with a removable bird screen constructed of 1/2-inch mesh, 16-gage (0.063 inch) wire and secured within a 10-gage extruded aluminum frame. The screen shall be mounted on the interior louver face but independent of the louver.

Unless otherwise specified, all louvers shall receive a 215-R1, Aluminum Association Code AA-C22A41, clear anodized finish after assembly. Minimum coating thickness shall be 0.7 mil.

PART 3--EXECUTION

3.01 FRAMING ERECTION

*FOR A BLDG, CONSTRUCTED ON-SITE,
NOT A PREFABRICATED BLDG.*

Framing shall be erected in accordance with AISC specifications. Temporary bracing shall be provided to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Temporary bracing shall be designed to accommodate wind loads. Column base plates may be set with nonshrink grout to full plate bearing if required. Structural members shall not be field cut or altered in anyway without approval of the Engineer. All welds, abrasions, and surfaces not shop primed shall be coated using primer consistent with the applied shop primer. Existing structure shall be protected in place during erection of new building.

Where aluminum will be in contact with concrete, apply a heavy coat of approved alkali-resistant paint.

3.02 ROOFING SYSTEMS

All components of the roofing system shall be installed per manufacturer's recommendation. End laps shall be located over supports, with end lap panels having a minimum width of 2 inches. Sidelaps shall be placed over bearing. Expansion joints shall be installed where indicated or required. All roof fasteners shall be concealed. Sealant and gaskets shall be used to prevent weather penetration. The building system shall be free of rattles and noise due to thermal movement and wind. All cuttings shall be removed from finished surfaces.

3.03 WALL PANEL SYSTEMS

Siding systems shall be installed plumb and true in accordance with manufacture's instructions.

Siding fasteners or anchor clips shall be applied to structure at each panel joint (36 inches on center), at intermediate locations as required, and at vertical spacing not greater than 7 feet 4 inches to meet the requirements of CBC but not less than 15 psf positive uniform load and negative uniform load of 15 psf.

All perforations made in siding panels by fasteners for lap joints, flashing, closures, or trim shall be made watertight. Penetrations for plumbing, ventilators or any equipment or structures that are supported by the siding panels shall be installed in accordance with manufacturer's recommendations such that they will allow for thermal movement of the siding panels.

Calking shall be applied between the lapped seams.

Siding, flashing, and accessories shall be left in clean, undamaged, and watertight condition.

3.04 DOORS AND FRAMES

Frames shall be plumb, square, and level and anchored to the adjacent construction as specified and in accordance with manufacturer's printed instructions. Doors shall be hung to produce clearances specified. After erection, doors and hardware shall be adjusted to operate properly.

3.03 TOLERANCES

A. FRAMING MEMBERS:

All framing members shall be installed within 1/4 inch from level and 1/8 inch from plumb.

B. ROOFING AND WALL PANELS:

All roofing and wall panels shall be installed within 1/8 inch of true position.

3.04 INSTALLATION OF ACCESSORIES

All ridge vents, and associated frames shall be installed in accordance with the manufacturer's recommendations. All penetrations shall be sealed watertight.

3.05 GUTTER AND DOWNSPOUT ERECTION

Gutters and downspouts shall be rigidly and securely supported. Lengths shall be joined with formed seams and sealed watertight. Joints between gutters and downspouts shall be flashed and sealed. Aluminum surfaces in contact with cementitious surfaces shall be coated with bituminous paint. All gutters shall be sloped a minimum 1/8 inch per foot.

3.06 COMPLETION

A. ADJUSTING DEFECTIVE WORK:

Touch-up painted finishes. Touch-up factory painted surfaces as recommended by the manufacturer.

B. FINAL CLEANING:

Clean roof panels and gutters. Wash exposed wall panels, doors, and frames.

C. MAINTENANCE STOCK:

Provide spare roof and wall fasteners in 1-full box quantity each. Provide other maintenance stock as typically provided for similar installations. Store maintenance stock as directed by the Engineer.

3.07 WARRANTIES

A. Manufacturer warrants that roof panel coating shall not blister, peel, crack, chip, or experience material rust through for 20 years. For a period of 20 years, chalking shall not exceed #8 in accordance with ASTM D4214 and fading shall be less than 2 color difference units in accordance with ASTM D2244.

B. Submit written certification prepared and signed by a civil or structural engineer currently registered in the State of California, verifying that the building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction. The certification must reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end use categories, governing code bodies, including year and load applications. In addition to mill certifications of structural steel, the manufacturer shall provide, upon request, evidence of compliance with specifications through testing independent of the manufacturer's suppliers. This quality assurance testing to include structural bolts, nuts, screw fasteners, mastics, and metal coatings (primers, metallic coated products, and painted coil products).

C. Provide manufacturer's written weathertightness warranty for a maximum of twenty (20) years against leaks in roof and wall panels arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the manufacturer and installer. Maximum liability of warranty shall be no less than \$0.40 per square foot of roof area or replacement value. NOTE: Also included in this submittal will be certification of the manufacturer's compliance with AISC-MB category.

****END OF SECTION****

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