

SECTION 32 31 24

ALUMINUM FENCING

******* Ametco Manufacturing Corporation manufactures several types of aluminum, galvanized steel, and stainless steel fencing. This guide specification section can be used to specify Ametco's Apollo, Blade, Corral, Falcon, Galaxy, Sedona and Venus Aluminum Fencing. These extruded aluminum fencing systems are functional, decorative, and lightweight with a smooth finish and durable polyester powder coating. Other fencing systems manufactured by Ametco Manufacturing Corporation can be specified with the following guide specifications:**

SECTION 32 31 17 - ORNAMENTAL WELDED WIRE FENCING

SECTION 32 31 20 - ORNAMENTAL STEEL FENCING

SECTION 32 31 21 - ALUMINUM LOUVER FENCING

SECTION 32 31 22 - STAINLESS STEEL LOUVER FENCING

The specifier will need to edit this product specification for a specific project to reflect the options and applications being used. The guide section has been written so that most editing can be accomplished by deleting unnecessary requirements. Options are indicated by []. Notes to assist the specifier in selecting options and editing the specification guide are printed in bold and indicated with ***. For final editing, all brackets and notes will need to be deleted from the guide.**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Aluminum fencing fabricated from extruded aluminum sections including aluminum fence posts [and aluminum gates].
- B. Related sections:

******* List other specification sections dealing with work directly related to this section such as the following. *******

1. Section 03 30 00 - Cast-in-Place Concrete: Concrete footings for support of fence posts.
- [2. Section 32 31 30 - Gate Operator: Electric operator for aluminum gates.]

1.2 REFERENCES

****** List by number and full title reference standards referred to in remainder of specification section. Delete non-applicable references. ******

- A. American Society for Testing and Materials (ASTM) Publications:
 - 1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
 - 3. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 4. ASTM D822 - Tests on Paint and Related Coatings Using Filtered Open-Flame Carbon-Arc Exposure Apparatus.
 - 5. ASTM D2794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 - 6. ASTM D3363 - Test Method for Film Hardness by Pencil Test.

1.3 SUBMITTALS

- A. Provide in accordance with Section 01 33 00 - Submittal Procedures:
 - 1. Product data for components and accessories.
 - 2. Shop drawings showing layout, dimensions, profiles, spacing of components, [interface with electric gate operator,] and anchorage and installation details.
 - 3. Copy of warranty specified in Paragraph 1.4 for review by Architect.

1.4 WARRANTY

- A. Provide in accordance with Section 01 77 00 - Closeout Procedures:
 - 1. 20 years warranty for factory finish against cracking, peeling, and blistering under normal use.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Ametco Manufacturing Corporation, 4326 Hamann Parkway, P.O. Box 1210, Willoughby, Ohio 44096; 800-362-1360.

- B. Requests to use equivalent products of other manufacturers shall be submitted in accordance with Section 01 63 00 - Product Substitution Procedures.

2.2 MATERIALS

- A. Extruded aluminum: ASTM B221, Alloy 6061, Temper T-6.
- B. Sheet aluminum: ASTM B209 6061, Temper T-6.
- C. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing additives.

2.3 FENCE SYSTEM

***** **Ametco Manufacturing Corporation provides six types of aluminum fencing.**

Apollo: 1/2 by 2 inch (13 by 52mm) extruded aluminum tubular blades spaced vertically on 2 inch (102mm) centers. Fence weighs 2.75 PSF (13.43 kg/sq M)

Blade: 1/2 by 4 inch (13 by 52mm) extruded aluminum tubular blades spaced vertically or horizontally on 4 inch (102 mm) centers. Fence weighs 1.75 PSF (8.54 kg/sq M)

Corral: 1/2 by 4 inch (13 by 102 mm) extruded aluminum tubular horizontal blades attached to vertical posts. Fence can be provided with 2, 3, or 4 horizontal rails.

Falcon: 1 inch [26 mm] extruded aluminum tube spaced horizontally 4 inch [102 mm] on center. Fence weight .085 PSF [.415 kg/sq M]

Galaxy: 1/2 by 4 inch (13 by 51 mm) extruded aluminum tubular blades spaced vertically on 3-1/2 inch (89 mm) centers Fence weighs 1.75 PSF (8.54 kg/sq M)

Sedona: 1/2 by 2 inch (13 by 51mm) and 1/2 by 4 inch 913 by 102mm) extruded aluminum tubular alternating blades spaced either vertically or horizontally. Opening between blades can range from 1 to 4 inches (25 to 102mm). Fence weight with 1 inch (25 mm) opening space is 2 PSF (9.76 kg/sq/M).

Venus: 1/2 by 2 inch (13 by 51) extruded aluminum tubular blades spaced either vertically or horizontally. Opening between blades can range from 1 to 4 inches (25 to 102 mm). Fence weight with 1 inch (25mm) opening space is 1.75 PSF (8.54 kg/sq M)

***** **Include the following to specify Apollo Aluminum Fencing.** *****

- A. Type: System of extruded aluminum tubular vertical blades attached to aluminum extruded framing bars and aluminum posts; Apollo Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.

***** **Apollo Aluminum Fencing is provided with [1/2 inch x 2 inch] [13 x 52mm] tubular aluminum blades on 2 inch (51 mm) centers** *****

1. Blades : Ridged, tubular aluminum sections equally spaced vertically on 2 inch center
 - a. Size: [1/2 by 2 inch] [13 by 51 mm].
 - b. Material thickness: [0.09 inch] [2 mm].

***** **Apollo Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).**

2. Fence height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for aluminum fencing are extruded aluminum tubular shapes.** *****

- B. Posts: [4 by 4 inches] [102 by 102 mm] extruded aluminum tubular shapes.

***** **Post length will be determined by fence height and foundation design.** *****

1. Length: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Include the following to specify Blade Aluminum Fencing.** *****

- C. Type: System of modular fence panels fabricated from extruded aluminum tubular blades and top and bottom aluminum rails field attached to aluminum posts; Blade Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.
2. Blades: Ridged, tubular aluminum sections spaced [vertically] or [horizontally] with [4 inch] [102 mm] opening between blades.
 - a. Size: [1/2 by 4 inch] [13 by 102 mm].
 - b. Material thickness: [0.09 inch] [2 mm].
3. Rails: [1/2 by 4 inch] [13 by 51 mm] extruded aluminum channels.

***** **Blade Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).**

4. Panel height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Include the following to specify Corral Aluminum Fencing.** *****

- D. Type: System of extruded aluminum horizontal rails field attached to aluminum posts; Corral Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.

***** **Corral Aluminum Fencing can be provided with 2, 3, or 4 horizontal rails.** *****

1. Rails: Ridged, tubular aluminum sections equally spaced in [2] [3] [4] horizontal rows.

- a. Size: [1/2 by 4 inch] [13 by 102 mm].
- b. Material thickness: [0.09 inch] [2 mm].

***** **Corral Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).**

2. Fence height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for aluminum fencing are extruded aluminum tubular shapes.** *****

- E. Posts: [4 by 4 inch] [102 by 102 mm] extruded aluminum tubular shapes.

***** **Post length will be determined by fence height and foundation design.** *****

1. Length: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Include the following to specify Falcon Picket Aluminum Fencing.** *****

- F. Type: System of modular fence panels fabricated from aluminum swaged tubular blades and top and bottom aluminum rails field attached to aluminum posts; Falcon Picket Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.

2. Tubes: Ridged, swaged round aluminum sections spaced horizontally [4 inch] [102 mm] on centers.

- a. Size: [1 inch] [26 mm].
- b. Material thickness: [0.083 inch] [2 mm].

3. Top and bottom Rails: [1-1/2 by 3/4 inch] [39 by 20 mm] aluminum channels.

***** **Falcon Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).**

4. Panel height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for aluminum fencing are extruded swaged aluminum tubular shapes.**

- G. Posts: [2-1/2 inch] [65 mm] with [.125 inch] [3.25mm] wall aluminum tube shapes.

***** **Post length will be determined by fence height and foundation design.** *****

1. Length: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Include the following to specify Galaxy Aluminum Fencing.** *****

- H. Type: System of extruded aluminum vertical blades with extruded aluminum frame to be field attached to aluminum posts; Galaxy Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.

***** **Galaxy Aluminum Fencing is provided with vertical blades** *****

1. Blades: Ridged, tubular aluminum sections equally spaced on [3-1/2 inch] center..
 - a. Size: [1/2 by 2 inch] [13 by 52 mm].
 - b. Material thickness: [0.09 inch] [2 mm].

***** **Galaxy Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).**

2. Fence height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for aluminum fencing are extruded aluminum tubular shapes.** *****

- I. Posts: [4 by 4 inch] [102 by 102 mm] extruded aluminum tubular shapes.

***** **Post length will be determined by fence height and foundation design.** *****

1. Length: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Include the following to specify Venus Aluminum Fencing.** *****

- E. Type: System of extruded aluminum [horizontal] or [vertical] tubes with extruded aluminum framing to be field attached to aluminum posts; Venus Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.

***** **Venus Aluminum Fencing can be provided with either vertical or aluminum blades. Opening between blades can range from 1 to 4 inches(25 to102mm) Edit the following paragraphs to reflect required fence configuration.** *****

1. Blades: Ridged, tubular aluminum sections equally spaced [vertically] or [horizontally].
 - a. Size: [1/2 by 2 inch] [13 by 52 mm].
 - b. Material thickness: [0.09 inch] [2 mm].
 - c. Opening between blades: [] [inch] [mm]

***** **Venus Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).**

2. Fence height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for aluminum fencing are extruded aluminum tubular shapes.** *****

3. Posts: [4 by 4 inches] [102 by 102 mm] extruded aluminum tubular shapes.

***** **Post length will be determined by fence height and foundation design.** *****

4. Length: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Include the following to specify Sedona Aluminum Fencing.** *****

I. Type: System of extruded aluminum [vertically] [horizontal] blades with extruded aluminum framing to be field attached to aluminum posts. Sedona Aluminum Fencing as manufactured by Ametco Manufacturing Corporation.

***** **Sedona Aluminum Fencing is provided with two widths of blades which are installed either vertically or horizontally in an alternating pattern. Opening between blades can range from 1 to 4 inches (25 to 102mm). Edit the following paragraphs to reflect required fence configuration.** *****

1. Blades: Two widths of rigid, tubular aluminum section installed [vertically] [horizontally] in an alternating pattern:
 - a. Size: [1/2 by 2 inch] [13 by 52mm] and [1/2 by 4 inch] [13 by 102 mm].
 - b. Material thickness: [0.09 inch] [2 mm].
 - c. Openign between blades: [] [inch] [mm]

***** **Sedona Aluminum Fencing can be provided in heights up to 96 inches (2438 mm).** *****

2. Fence height: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for aluminum fencing are extruded aluminum tubular shapes.** *****

J. Posts: [4 by 4 inches] [102 by 102 mm] extruded aluminum tubular shapes.

***** **Post length will be determined by fence height and foundation design.** *****

1. Length: [[_____] [inches] [mm].] [As indicated on Drawings.]

***** **Fence posts for Blade, Venus, and Corral Aluminum Fence Systems can be spaced up to 96 inches (2438 mm).** *****

2. Spacing: [[_____] [inches] [mm].] [As indicated on Drawings.]

2.4 GATES

***** **Edit and include this article if gates are required. Ametco Manufacturing Corporation provides single and double hinged swinging gates, V-wheeled rolling gates, and cantilevered horizontal sliding gates for aluminum louver fences. Gates can be operated with various types of electric operators specified in other sections. Refer to Ametco product literature for available sizes and types of gates.** *****

A. Provide gates of type and size indicated on Drawings. Equip gates with

manufacturer's standard hardware as required for complete functional operation.

******* Hinged swinging gates are available for Blade, Venus, Apollo, Falcon, Galaxy, and Sedona Aluminum Fence Systems. Include the following paragraph if hinged gates are required. *******

B. Type: Hinged swinging [single] [double] gate.

******* Size of extruded aluminum tubing used to fabricate swinging gate frames will depend on gate size. Refer to Ametco product literature for recommended sizes. *******

1. Construction: Welded frame fabricated from [_____] by [_____] [inches] [mm] extruded aluminum tubing with aluminum fixed blade panels to match fencing design and material.
2. Nominal size: [_____] wide by [_____] high.
3. Hardware:
 - a. Hinges: Size and type as determined by manufacturer. Provide 2 hinges for each leaf up to [6 feet] [1829 mm] high and 1 additional hinge for each additional [24 inches] [610 mm] in height or fraction thereof.
 - b. Latch: [3/4 inch] [19 mm] diameter slide bolt to accommodate padlock.
 - c. For double gates provide padlockable, [5/8 inch] [16 mm] diameter center cane bolt assembly and strike.

******* Horizontal rolling gates are available for Blade, Apollo, Falcon, Galaxy, Venus and Sedona Aluminum Fence Systems. Include the following paragraphs if hinged V-wheeled rolling gates are required. Refer to Ametco product literature for recommended aluminum tubing sizes used to fabricate gate frame and wheel diameters to accommodate different gate weights and sizes. *******

C. Type: V-wheeled rolling gates.

1. Construction: Welded frame fabricated from [_____] by [_____] [inches] [mm] extruded aluminum tubing with aluminum fixed blade panels to match fencing design and material. Frame configuration shall be as indicated on Drawings and reviewed shop drawings.
2. Nominal size:
 - a. Gate opening: [_____].
 - b. Gate: [_____] wide by [_____] high.
 - c. Gate travel distance: [_____].
3. Support posts: Pair of [_____] diameter tubular aluminum posts with solid cap.
4. Rolling mechanism: Steel wheels with V-shaped edge groove and [[4] [6] inches] [[102] [152] mm] diameter, mounted to gate frame and riding on ground set V-track. Assembly braced at top by adjustable guide wheels mounted with

brackets to support posts.

******* Cantilevered horizontal sliding gates are available for Blade, Apollo, Falcon, Galaxy, Venus and Sedona Aluminum Fence Systems. Include the following paragraphs if cantilevered gates are required. *******

D. Type: Cantilevered horizontal sliding gate.

******* Size of aluminum tubing used to fabricate cantilevered gate frame will depend on gate size. Refer to Ametco product literature for recommended sizes. *******

1. Construction: Welded frame fabricated from [_____] by [_____] [inches] [mm] extruded aluminum tubing with aluminum fixed blade panels to match fencing design and material. Frame configuration shall be as indicated on Drawings and reviewed shop drawings.
2. Nominal size:
 - a. Gate opening: [_____] wide by [_____] high.
 - b. Gate: [_____] wide by [_____] high.
 - c. Overhang distance: [_____].
3. Support posts: Pair of [_____] diameter tubular aluminum posts with solid cap.
4. Cantilever mechanism: Aluminum top track and wheeled carriers and bottom roller guides supported by brackets attached to support posts.

******* Include the following paragraph if gates are to be operated with electric gate operator. *******

- E. Coordinate provision of gate with electric operator specified in Section 32 31 30 - Gate Operator to ensure size, weight, and design of gate is compatible with operator.

2.5 ACCESSORIES

- A. Fasteners: Stainless steel bolts of type, size, and spacing as recommended by fence manufacturer for specific condition.
- B. End caps: Provide aluminum caps for exposed open extruded aluminum sections and for attachment of components to posts.

******* Include the following paragraph if fencing is erected in high-security area and anti-intruder bolts are required. *******

- C. For exposed locations, provide anti-intruder bolts consisting of cup head bolt and nut with clamping hexagon such that tightening shears hexagon and render bolt impossible to release.

2.6 FACTORY FINISH

******* Except for large gate panels, factory applied finish for aluminum fencing is a polyester powder coating. Large gate panels will receive a factory applied durable**

polyurethane coating. Contact Ametco Manufacturing Corporation for size limitations.

- A. Aluminum fence panels and posts shall receive polyester powder coating. [Large gate panels shall be coated with 2-part polyurethane coating.]
- B. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.
 - 1. Minimum hardness measured in accordance with ASTM D3363: 2H.
 - 2. Direct impact resistance tested in accordance with ASTM D2794. Withstand 160 inch-pounds.
 - 3. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95 degrees F and 95 percent relative humidity and after 1000 hours less than [3/16 inch] [5 mm] undercutting.
 - 4. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted at 45 degrees.

***** **Include the following paragraphs if a polyurethane coating is required for large gate panels.** *****

- C. Polyurethane coating: 1.0 mil dry film thickness of coating cured 30 minutes at 180 degree F and aged 14 days shall resist the following test conditions without failure:
 - 1. 5 percent salt spray for 500 hours.
 - 2. 100 percent relative humidity for 1000 hours.
 - 3. Water immersion for 100 hours.
 - 4. 20 double rubs with cloth saturated with either lacquer thinner, acetone, MEK, gasoline, xylene.
 - 5. Exposure to lubricating oils, hydraulic fluids, and cutting oils.
 - 6. 16 cycles of 24 hours at 100 percent humidity, 24 hours at 10 degrees F, and 24 hours at 77 degrees F.
 - 7. Hardness: H to 2H.
 - 8. Flexibility: [1/8 inch] [3 mm] conical mandrel.

***** **Ametco Manufacturing Company provides 15 standard colors. Custom colors are available for minimum size orders. Contact Ametco Manufacturing Company for information on custom colors.** *****

- D. Color: [[Red Baron] [Black Velvet] [Blue Streak] [Bronze Mat] [Cal Gray] [Charlie Brown] [Cream] [Light Blue] [Light Ivory] [Moss Green] [Pale Green] [Safety Orange] [Safety Yellow] [Silver with weather resistant clear coating] [White] as

manufactured by Ametco Manufacturing Company.] [Selected by Architect from manufacturer's standard range.] [Custom color as selected by Architect.]

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to fabrication, field verify required dimensions.

******* Include the following paragraph if electric gate operators are required, *******

B. Coordinate fence and gate installation with provision of gate operator specified in Section 32 31 30 - Gate Operator to ensure proper power supply and that conduit and wiring are concealed.

******* Size of concrete fence footings will depend on fence height, post spacing, and other project conditions. Footing dimensions may be indicated on Drawings or in this section but not both locations in order to eliminate potential conflicts. Edit the following paragraphs to reflect specific project conditions. *******

C. Cast concrete footings in accordance with Section 03 30 00 - Cast-in-Place Concrete as detailed on Drawings and approved shop drawings.

1. Minimum footing diameter:

a. Terminal and gate posts: [12 inches.] [305 mm.]

b. Intermediate line posts: [10 inches.] [254 mm.]

2. Allow [8 inches] [203 mm] [_____] minimum embedment of posts.

3. Allow [6 inches] [152 mm] [_____] minimum concrete beneath post bottom.

D. [Provide setting holes for embedment of fence posts.] [Core drill existing concrete footings for embedment of fence posts.] Hole shall be [2 inches] [51 mm] minimum greater than post width.

3.2 INSTALLATION

A. Install fencing in accordance with manufacturer's installation instructions and reviewed shop drawings.

B. Install fence posts plumb and level [by setting post in hole [cast] [drilled] in concrete and grouting solid.] [by embedding post directly in concrete footing.] Temporarily brace fence posts with wood supports until [concrete] [grout] is set.

C. Do not installed bent, bowed, or otherwise damaged components. Remove damaged components from site and replace.

D. Secure fence [panels] [rails] with [standard stainless steel bolts] [stainless steel anti-intruder bolts] to fence posts [prior to setting posts in footings.] [after posts have been set in footings.]

E. Gates:

1. Install gates and adjust hardware for smooth operation.
 2. [Provide concrete center foundation depth and drop rod retainers at center of double swinging gate openings.]
 3. [Provide concrete surface for length of operation of V-wheeled rolling gate. Anchor track to concrete with countersunk fasteners.]
 4. After installation, test gate [and operator]. Open and close a minimum of five times. Correct deficiencies and adjust.
- F. Touch-up damaged finish with paint supplied by manufacturer and matching original coating.

END OF SECTION