

**SPECIFICATIONS - DETAILED PROVISIONS**  
**Section 05600 - Standards for Aluminum Work**

**C O N T E N T S**

<b>PART 1 - GENERAL</b> .....	<b>1</b>
1.01 SCOPE.....	1
1.02 GENERAL REQUIREMENTS .....	1
1.03 QUALITY ASSURANCE.....	2
<b>PART 2 - PRODUCTS</b> .....	<b>3</b>
2.01 COORDINATION OF MATERIALS .....	3
2.02 MATERIALS.....	3
2.03 ALUMINUM FINISHES .....	3
<b>PART 3 - EXECUTION</b> .....	<b>5</b>
3.01 GENERAL .....	5
3.02 JOINTING AND CONNECTIONS.....	5
3.03 FINISHING.....	6
3.04 ERECTION .....	6
3.05 PROTECTION AND CLEANING .....	7



**SECTION 05600**  
**STANDARDS FOR ALUMINUM WORK**

**PART 1 - GENERAL**

1.01 SCOPE

Requirements of Division I apply to this Section. This Section contains specifications for materials, fabrication, finishing, erection, isolation, protection and cleaning pertaining to aluminum work, and forms a part of other Sections wherein aluminum work is specified to conform to requirements of this Section.

1.02 GENERAL REQUIREMENTS

Refer to Division I for requirements pertaining to submittals, including preparation, transmittals, and guarantees.

- A. Samples. Submit triplicate Samples of aluminum items specified under other Sections to be finished in accordance with this Section.
  - 1. Finish Samples. Submit samples of alloy or alloys, each with finish as specified, clearly marked as to type of pretreatment, anodizing process, alloy, and coating thickness, color, sealing, protective coating, and identified as to which portion of the Work that the sample represents. Samples must be actual production sections of both extrusions and sheets, of size sufficient that comparisons can be made to establish allowable color range. Work provided must be within the approved color range, not to exceed 3 Delta Units. Promptly submit additional samples to replace any rejected samples, at no extra cost to Owner. Delay the processing of aluminum until Owner's approval has been obtained.
  - 2. Approved Samples, returned to Contractor in duplicate, shall be used for control purposes during production finishing.
  
- B. Testing
  - 1. Test Methods. Coating thickness, ASTM B244; coating weight, ASTM B137; stain-resistance, ASTM B136; and sealing test, ASTM B457.
  - 2. Color Control Standard. Delta units referred to herein for color control of anodized finishes shall be as defined in National Bureau of Standards Circular C-429, "Photo-Electric Tri-Stimulus Colorimetry".
  - 3. Production Tests. Make random production tests by above test methods.

Standards for Aluminum Work  
Section 05600 – 2

4. Tests By Owner. At its expense, Owner may perform above specified tests on finished Work. Contractor shall reimburse Owner for costs of tests and retesting caused by failure of materials to pass specified tests, and shall replace unsatisfactory Work with approved conforming Work.
- C. Certificates. Deliver to Owner a notarized certificate stating that anodized finishes provided conform to these Specifications. With certificate, deliver finisher(s) test reports of tests made on random production samples, each test report certified.
- D. Guarantee. Contractor and manufacturers shall jointly furnish written guarantees to Owner covering aluminum finishing performed in accordance with this Section for a period of one year from date of final acceptance of project by the Owner.
  1. Defects. Guarantee shall cover all defects, including fading, corrosion, pitting, blistering, and changes in surface appearance and characteristics. Abuse or physical damage after final acceptance of project is not considered a defect.
  2. Removal and Rework. Guarantee shall also cover all costs incidental to removal, rework, refinishing and reinstallation of aluminum members showing any of the above described finish failures within the guarantee period; and all costs incidental to the removal, rework, reinstallation and refinishing of other work to enable performance of these guarantee requirements; and all costs incidental to protection of other work, building contents, occupants and equipment from damage, loss or injury.
- E. Cleaning and Maintenance Instruction: Provide printed or typewritten detailed instructions for Owner's cleaning and maintenance of anodized aluminum surfaces during life of the structure. Also provide precautions for cleaning of glass or adjacent surfaces to prevent damage to anodized finishes and members.

1.03 QUALITY ASSURANCE

Unless otherwise specified, all Work specified herein and shown on the Drawings shall conform to the applicable requirements of the following specification and codes:

- A. Fabricate and erect aluminum Work in conformance with applicable requirements of Chapter 28 of the UBC and herein referenced standards of the Aluminum Association.

## **PART 2 - PRODUCTS**

### **2.01 COORDINATION OF MATERIALS**

In writing, Contractor shall instruct the various subcontractors, suppliers and manufacturers for aluminum Work of materials to be used to ensure compliance with specified requirements, especially with respect to alloys for color anodized work. Submit to Owner one copy of each written instruction as evidence that materials have been properly coordinated.

- A. Alloys and Tempers for various members where not otherwise designated shall be as required for proper forming and fabrication to meet or exceed structural requirements, and shall be of alloys specially produced to best achieve specified color anodized finishes. Provide supporting printed recommendations from parent aluminum producer. For sheet fabricated members use only homogenous aluminum products and no clad products.

### **2.02 MATERIALS**

Materials shall be new, sound and shall conform to the following:

- A. All plate, pipe and structural shapes shall be new and shall conform to ASTM B209 (Plate), B308 (Shapes), B429 (Pipe and Tubing), B211 (Bar Stock) and applicable Federal Specifications for 6061-T6 alloy, unless otherwise noted.
- B. Aluminum pipe rail shall be of 6061-T6 alloy and be Schedule 40 or greater.
- C. Alloys and tempers for various members where not otherwise designated, shall be as required for proper forming and fabrication to meet or exceed structural requirements, and shall be of alloys specially produced to best achieve specified color anodized finishes. Provide supporting printed recommendations from parent aluminum producer. For sheet fabricated members use only homogenous aluminum products and no clad products.
- D. Contingent upon alloys being welded, use only inert gas shielded arc or resistance welding process with filler alloys as specified in the UBC. Use no process requiring a welding flux.

### **2.03 ALUMINUM FINISHES**

Finishes are defined by, and shall conform to, Aluminum Association "Standards for Anodically Coated Aluminum Alloys for Architectural Applications". Pretreatments and finishes to be used for various items of Work are specified in other Sections, and shall conform to requirements herein.

Standards for Aluminum Work  
Section 05600 – 4

A. Pretreatments. Clean per AA-C12 prior to pretreatments.

As Fabricated	AA-M12, mill finish
Etched	AA-C21, C22 or C23, chemical matte etch as required to produce selected texture matching approved samples
Directional Textured	AA-M31, fine satin finish
Buffed	AA-M21, smooth specular

B. Clear Anodized Finishes. Natural aluminum color.

1. Class I. AA-A41, Architectural Class I clear anodized finish having 0.0007" coating thickness, 27 mg/sq inch coating weight, and 2.32 g/cc apparent density as minimums. For exterior and interior clear anodized work unless otherwise specified.
2. Class II. AA-A31, Architectural Class II clear anodized finish having 0.0004" coating thickness, 15.5 mg/sq inch coating weight, and 2.3 g/cc apparent density as minimums. For interior clear anodized work only where specified.

C. Color Anodized Finishes

1. Type. AA-A42, Architectural Class I integral color coating having 0.0007" (0.018mm) coating thickness, 32 mg/sq inch coating weight, and 2.55 g/cc apparent density as minimums.
2. Color. Equivalent to Kawneer's "Permanodic" Dark Bronze, as approved. This paragraph specifies required color only, not alloys to be used. Refer to Paragraph "Coordination of Materials" hereinbefore. Perform color anodic finishing in strict accordance with procedures established by parent aluminum manufacturer whose finishing system is used, and such finishing shall be performed by finisher licensed by said parent aluminum manufacturer. Provide written certification of compliance with each.

D. Clear Protective Coating. In addition to sealing, exposed anodized surfaces shall be treated with spray-applied clear water-white methacrylate lacquer applied to minimum 0.0005" total thickness. Allow to completely harden and cure prior to handling. Do not apply on surfaces to contact caulking or sealants.

E. Usages. Unless otherwise indicated on Drawings or specified within respective trade Sections, provide the following finishes:

1. All Aluminum Work, except as hereinafter specified, shall be uniformly finished with bronze colored anodic hardcoat AA-M12C22A42 finish of thickness not less than 0.0007" (0.018mm) and in uniform color matching Kawneer's Dark Bronze "Permanodic". Matching and approved equal Alcoa "Duranodic" or Kaiser's "Kalcolor" finishes are acceptable.
2. Acoustical Louver Assemblies. Aluminum surfaces of these assemblies at Compressor Building shall be finished in conformance with requirements specified in Section "Wall Louvers" to provide uniform color and specular finish match with above specified bronze colored anodic hardcoat finish.
3. Aluminum Rail and Railing Assemblies. Uniformly finish with bronze colored anodic hardcoat finish AA-M31A42 consisting of fine satin directional texture and specified Dark Bronze Permanodic or matching and approved equal Duranodic or Kalcolor.
4. Aluminum Gratings. Aluminum Associations AA-M12A41 finish consisting of an as-fabricated cleaned surface with uniform clear anodic coating.

### **PART 3 - EXECUTION**

#### 3.01 GENERAL

Accurately form and fit metal to dimensions, shapes and details shown on Drawings, approved shop drawings, and manufacturer's details of approved items. Furnish brake-formed and molded members with true, straight, sharp lines and angles, free of fractures or flaws. Brake-formed sections may not be substituted for required extruded shapes. Do not use scratched, gouged, twisted, dented or otherwise defective materials.

#### 3.02 JOINTING AND CONNECTIONS

Accurately cope and join connecting members to a hair-line fit unless otherwise detailed or approved. Except at required offsets, construct exposed surfaces with flush joints.

- A. Mechanically Assembled Joints. Provide concealed reinforcing shapes and accessories, of type and design to equal or exceed the strength of the strongest member connected. Use aluminum, non-magnetic stainless steel, or zinc-coated steel that is carefully isolated as specified hereinafter.

- B. Welded Joints. Perform welding by inert gas shielded arc method, or fluxless resistance welding method in accordance with parent metal manufacturer's published recommendations and requirements herein. Unless otherwise shown or approved, place welds on concealed surfaces and take precautions to minimize heat discoloration of exposed surfaces. Make welds of size and type to develop at least twice the strength of the connected members, except where more stringent requirements are shown, specified, or are standard with item manufacturer. Preheat and anneal as necessary to relieve residual stresses. Finish exposed welds to match adjoining surfaces. No welding will be permitted unless prior approval has been granted.
1. Welding Assemblies To Be Anodized. Construct members so faying surfaces are free rinsing and do not trap anodizing solutions. Where weld metal is exposed, use filler rods of composition recommended by manufacturer or member to be welded.
  2. Assemblies Anodized Prior to Welding. Clean areas of fusion free of anodic film prior to welding. Parts may be masked during anodizing, or sanded clean in weld area. Heat crazing or discoloring of anodic film on exposed surfaces is not acceptable.
  3. Rejected Welds. Repair by re-welding only. Remove defective welds by chipping or grinding. Gas cutting is prohibited.
- C. Fasteners. Unless shown, specified, or approved, do not use screws or other fasteners on exposed surfaces. Where used, provide countersunk exposed fasteners with Phillips type flat heads. On clear anodized work, use aluminum or non-magnetic stainless steel. On color anodized work, use aluminum alloy fasteners finished to match adjoining surfaces. Provide fasteners of suitable sizes, located and spaced to securely connect work and resist imposed loads, and as may be required under other Sections, all subject to approval.

### 3.03 FINISHING

Perform anodized finishing in plant of finisher approved and licensed by parent metal manufacturer. Exposed Work shall be free of finger marks, stains, scratches and other undesirable marks or flaws, and gripper or rack marks. Perform finishing after fabrication and forming operations are completed. Finishes shall be uniform on exposed surfaces including edges of members.

### 3.04 ERECTION

By skilled mechanics in accordance with Code requirements, Drawings and approved Shop Drawings, plumb, level, square, true to line or curvature as required, in alignment with Work of other trades, free from waves, buckles, sags or other defects. Provide secure anchorage for all parts of Work. Drill new or existing Work as required. Coordinate with related trades to ensure proper mating and connecting of all Work.



- A. Color Anodized Work. Control and erect to maintain uniform color and appearance within one Delta unit range, with no abrupt or noticeable changes in color in adjoining pieces. Mismatching work, as determined by Architect, is subject to rejection even though individual pieces are within allowable color and one Delta unit range.
- B. Isolation. Isolate aluminum from contact with dissimilar metals and materials, other than stainless steel, as follows:
  - 1. Metals. Apply on contact surfaces a heavy brush coat of approved zinc chromate primer made with a synthetic resin vehicle, followed by two brush coats of approved aluminum metal and masonry paint; or apply a heavy coat of approved alkali-resistant bituminous paint; or separate surfaces with a non-absorptive tape or gasket.
  - 2. Masonry, Concrete or Plaster. Apply a heavy brush coat of approved alkali-resistant bituminous paint, or separate surfaces with non-absorptive tape or gasket.
  - 3. Moisture-absorbent Materials and Preservatively Treated Wood. Paint such absorbent materials with two coats of approved aluminum house paint and protect aluminum contact surfaces with bituminous paint.

### 3.05 PROTECTION AND CLEANING

- A. Protection. Provide and be responsible for protection and repair of adjacent surfaces and areas which may become damaged as a result of Work of this Section. Protect Work performed hereunder until completion and final acceptance of project by Owner. Repair or replace all damaged or defective Work to original specified condition, at no additional cost to the Owner.
  - 1. Deliver, handle and store materials in manner to prevent damage due to stains, discolorations, abrasions, scratches, dirt or other damaging causes. Store indoors in clean, dry, protected location.
  - 2. Provide approved compatible, strippable, pressure-sensitive coverings or other approved protective coverings. Perform removal of strippable protective coatings immediately before acceptance of the completed building.
- B. Cleaning. Maintain Work clean as Work progresses. After installation, and after danger of subsequent damage or staining has passed, remove protective coverings from exposed surfaces, and clean all surfaces of soil and discoloration. Cleaning shall be in accordance with recommendations in Aluminum Association's Publication entitled "Care of Aluminum". All cleaners shall be acceptable to the aluminum manufacturer.

Standards for Aluminum Work

Section 05600 – 8

- C. Clean-up. Contractor shall keep his Work and the adjacent areas affected, free and clear from all debris caused by the Work of this Section. During and upon completion of Work herein specified, remove from building and site all debris, unused materials and equipment caused by Work of this Section, and leave Work in a clean, acceptable condition.
  - 1. Immediately prior to final acceptance of project, thoroughly clean all Work provided under this Section unless instructed to do so sooner by Owner. Use no abrasive or damaging cleaning agents or procedures.

**END OF SECTION 05600**