OCEAN ENGINEERING DIVISION

UNITED STATES COAST GUARD

WASHINGTON, D.C.

MAY 1999

SPECIFICATION FOR FABRICATION

OF

VERTICALLY MOUNTED SOLAR PANEL FRAMES

SPECIFICATION NO. 497

1. SCOPE

1.1 Scope. This specification defines the requirements for the fabrication of aluminum and steel vertically mounted solar panel frames for use on navigational buoys.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are referenced in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification, which are recommended for additional information or used as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements cited in sections 3 and 4 of this specification, whether or not the referenced documents are listed here.

2.2 Government Documents. The following documents of the issues specified form a part of this specification to the extent referenced herein. Suffixes denoting the specific issue of each document are omitted from future references to the documents in this specification.

SPECIFICATIONS

MIL-P-24647B 2 April 1991	Paint System, Anticorrosive and Antifouling, Ship Hull
QPL-24647-2 29 January 1993	Qualified Products List of Products Qualified under Military Specification MIL-P-24647, Paint System, Anticorrosive and Antifouling, Ship Hull

2.3 Industry Publications. The following documents of the issues specified form a part of this specification to the extent referenced herein. Suffixes denoting the specific issue of each document will be omitted from future references to the document in this specification.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A36-97a	Standard Specification for Structural Steel
A276-98	Standard Specification for Stainless Steel Bars and Shapes
A570-98	Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
B209-96	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

B221-96	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bar, Rod Wire, Shapes, and Tubes
D1784-96	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1-98	Structural Welding Code – Steel
AWS D1.2-97	Structural Welding Code – Aluminum

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC-SP-10 1994	Near White Blast Cleaning

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ANSI/ASQC Q9002-1994	Quality Systems - Model for Quality Assurance in Production, Inspection, and Servicing

2.4 Drawings. The latest revision of the following United States Coast Guard Office of Civil Engineering drawing forms a part of this specification to the extent referenced herein, and shall be referred to as "the drawing" throughout this specification:

Drawing Number	Title
Vertically Mounted Solar Panel Frame	121179

2.5 Source of Documents. The documents and drawings may be obtained from the following sources:

Government documents.

Standardization Documents Order Desk
Building 4, Section D
700 Robbins Avenue
Philadelphia, PA 19111-5094

Industry Publications.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
1916 Race Street
Philadelphia, PA 19103-1187

AMERICAN WELDING SOCIETY (AWS)
550 NW LeJeune Road
PO Box 351040
Miami, FL 33135

STEEL STRUCTURES PAINTING COUNCIL (SSPC)
4400 Fifth Avenue
Pittsburgh, PA 15213-2683

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)
310 West Wisconsin Avenue
Milwaukee, Wisconsin 53203

2.6 Precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First Article Testing. When specified (paragraph 6.1), solar panel frames shall be subjected to first article testing in accordance with paragraph 4.3.

3.2 Materials.

3.2.1 Steel.

3.2.1.1 Steel Bars, Shapes, and Plates. Steel bars, shapes, and plates 3/16 inch thick or more shall meet the requirements of ASTM A36.

3.2.1.2 Steel Sheets. Steel sheets less than 3/16 inch thick shall meet the requirements of ASTM A611, Grade C, D, or E, or ASTM A570, Grade 36, 40, 45, or 50.

3.2.2 Aluminum.

3.2.2.1 Aluminum Sheet and Plate. Aluminum sheet and plate shall meet the requirements of ASTM B209, Alloy 6061 T6.

3.2.2.2 Aluminum Bar, Rod, Shapes & Tubes. Aluminum bar, rod, shapes, and tubes shall meet the requirements of ASTM B221, Alloy 6061 T6.

3.2.3. Stainless Steel Hardware. Stainless steel hardware (nuts, bolts, pins, swing bolts, etc.) shall meet the requirements of ASTM A276, type 316 or 316L.

3.2.4. PVC Pipe. PVC Pipe shall meet the requirements of ASTM D1784, Type I.

3.3 Design and Construction.

3.3.1 Design, Dimensions, and Dimensional Tolerances. All portions of the solar panel frame shall conform to the design, dimensions, and tolerances as shown in the drawings.

3.3.2 Threads. The threads on all nuts and bolts shall be Unified Course Thread Series (UNC).

3.4 Welding. The plates, bars, and other shapes forming the various components of the solar panel frame shall be fitted and faired prior to being welded in place. All welds shall be performed as indicated on the drawing.

3.4.1 Steel Welding. Shielded Metal Arc Welding (SMAW), Flux-Cored Arc Welding (FCAW), Gas Metal Arc Welding (GMAW), or Submerged Arc Welding (SAW) shall be used to weld all steel parts of the solar panel frame. All welding procedures and weld quality shall meet the requirements of AWS D1.1. All welders employed for welding under this specification shall be qualified by the Contractor using procedures that meet the requirements of AWS D1.1.

3.4.2 Aluminum Welding. Gas Metal Arc Welding (GMAW) shall be used to weld all aluminum parts of the solar panel frame. All welding procedures and weld quality shall meet the requirements of AWS D1.2. All welders employed for welding under this specification shall be qualified by the Contractor using procedures that meet the requirements of AWS D1.2.

3.5 Steel Surface Preparation. All surfaces on the steel frames shall be cleaned of mill scale and corrosion to near white metal in conformance with SSPC-SP-10 and shall be free of all contaminants (oil, water, grease, blasting grit, etc.) prior to painting. Steel surfaces shall be sand blasted with dry sand, shot, or grit.

3.6 Painting. All surfaces on the steel frames shall be painted. All welding, machinery cutting, drilling, severe forming, or any other operation which may damage the paint, shall be performed prior to the application of the paint. Painting shall be performed after the stand has been cleaned. The Contractor shall follow the manufacturer's instructions for mixing, induction time, application, and curing of the paint. The Contractor shall document the ambient temperature, humidity, and cure times on the data sheet.

3.6.1 Epoxy primer. All surfaces on the steel frames shall be coated with epoxy primer. Epoxy primer shall meet the requirements of MIL-P-24647, Type I, Class 1A, Grade A or B, Application 1 or 2, and shall be listed in QPL-24647. The colors required are haze gray and off-white or buff (manufacturers' standard colors are acceptable). Apply by spraying two coats, 5 mils minimum dry film thickness each, using contrasting colors for each coat (off-white or buff followed by haze gray). Sharp corners, edges, and other hard-to-coat areas shall be striped before each full coat is applied.

3.7 Documentation.

3.7.1 Material certifications. The Contractor shall maintain material certifications, from the material manufacturers or a certified independent testing laboratory, indicating that all materials meet the requirements of this specification.

3.7.2 Material Inspection and Receiving Report (DD Form 250). A form DD-250 shall be used as a certification of product quality assurance, as a packing list, and as a certification of acceptance. A separate DD-250 shall be prepared by the Contractor for each shipping lot. Prior to shipment, the DD-250 must be signed by the COTR.

4. VERIFICATION

4.1 General. The Contractor's quality assurance program shall meet the requirements of ANSI/ASQC Q9002. However, the Contractor DOES NOT have to be Q9002 certified.

4.2 Classification of Inspections. The inspections required by this section are not intended to supplant any controls, examinations, inspections, or tests normally employed by the Contractor to ensure product quality. The inspection requirements specified herein are classified as follows:

a. First Article Inspection (see paragraph 4.3)
b. Conformance Inspection (see paragraph 4.4)

4.3 First Article Inspection. When first article samples are required (see paragraphs 3.1 and 6.1), the Contractor shall perform a First Article Inspection. This inspection shall include the tests and examinations listed in paragraphs 4.5.1 through 4.5.5.

4.4 Conformance Inspection. The Conformance Inspection, to be performed by the Contractor, shall include the tests and examinations listed in paragraphs 4.5.1 through 4.5.5.

4.5 Tests and Inspections.

4.5.1 Visual Inspection. Each item shall be visually inspected for conformance to this specification and the drawing. The visual inspection shall include checks of dimensional conformance, mechanical fit, alignment of parts, and workmanship.

4.5.2 Weld Inspection. All welds shall be visually inspected for quality in accordance with section 6 of AWS D1.1 and D1.2.

4.5.3 Surface Preparation. Prior to the application of the epoxy primer, all exterior surfaces of the steel frame shall be inspected to ensure conformance with SSPC-SP-10.

4.5.4 Paint Inspection. The Contractor shall ensure that each steel frame was painted in accordance with paragraph 3.6 and all sub-paragraphs. Paint thickness shall be gauged at no fewer than six different random locations.

4.5.5 Documentation Review. All documents required by section 3.7 shall be provided for review.

5. PACKAGING.

5.1 Packaging requirements are specified in Section D, Part I, Contract Schedule.

6. NOTES

6.1 First Article Inspection. First article inspection shall be performed by the Contractor and at the Contractor's facility. The first articles shall consist of fully assembled solar panel frames and conversion kits with written certifications in accordance with this specification. The first article shall be inspected and tested for requirements in this specification and those tests and inspections listed in paragraphs 4.5.1 through 4.5.5. The type and quantity of first articles required will be listed in Section B, Part I, Contract Schedule. The solar panel frames must pass the first article tests before the Coast Guard will place any production orders.

6.2 Packaging. All stainless steel hardware and PVC spacers shall be packaged in a nylon or burlap sack and securely fastened to the frame.

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10 May 99