

OCEAN ENGINEERING DIVISION
UNITED STATES COAST GUARD
WASHINGTON, D.C.

MARCH 2000

SPECIFICATION FOR FABRICATION
OF
ALUMINUM RADAR REFLECTORS

SPECIFICATION NO. 374
REVISION E

1. SCOPE

1.1 Scope. This specification defines the requirements for the fabrication of aluminum radar reflectors for use on aids to navigation buoys. The items covered by this specification are as follows:

- Can Shaped Radar Reflector (green)
- Nun Shaped Radar Reflector (red)

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 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.

STANDARDS

FED-STD-595B(1) 11 JAN 1994	Federal Standard Colors
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SPECIFICATIONS

MIL-P-24647B(1) 9 AUG 1994	Paint System, Anticorrosive and Antifouling, Ship Hull
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QPL-24647-2 9 AUG 1994	Qualified Products List of Products Qualified Under Military Specification MIL-P-24647, Paint System, Anticorrosive and Antifouling, Ship Hull
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DOD-C-24176B 22 August 1983	Military Specification, Cement, Epoxy, Metal Repair and Hull Smoothing
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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)

B209-96	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
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B221-96	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
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D1730-67(1998)	Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting.
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AMERICAN WELDING SOCIETY (AWS)

AWS D1.2-97 Structural Welding Code - Aluminum

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

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

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

<u>Drawing Number</u>	<u>Title</u>
120316	Nun Shaped Aluminum Radar Reflector
121024	Can Shape Aluminum Radar Reflector

2.5 Source of Documents. The documents 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, Florida 33135

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 Inspection. When specified (paragraph 6.1), aluminum radar reflectors shall be subjected to first article inspection in accordance with paragraph 4.3.

3.2 Materials.

3.2.1 Aluminum Plate and Sheet. All aluminum plate and sheet shall meet the requirements of ASTM B209, Alloy 5086, Temper H32.

3.2.2 Aluminum Rod. All aluminum rod shall meet the requirements of ASTM B221, Alloy 5086, Temper H111.

3.3 Design and Construction.

3.3.1 Design, Dimensions, and Dimensional Tolerances. All items shall conform to the design, dimensions, and tolerances shown in the drawings.

3.4 Welding. The plates, bars, rods and other shapes forming the various components of the items shall be fitted and faired prior to being welded in place. All welds shall be performed as indicated on the drawings. Gas Metal Arc Welding (GMAW) or Gas Tungsten Arc Welding (GTAW) shall be used to weld all aluminum parts. 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 which meet the requirements of AWS D1.2.

3.5 Marking.

3.5.1 Identification Marking. For tracking purposes, each item shall be identified by an identification marking. The marking shall be stamped, engraved, or otherwise permanently affixed to each item. The marking shall consist of ½ inch tall block alphanumeric characters and be clearly visible after the items have been painted. The marking shall be of the form 00-XX. The first two digits are the last two digits of the calendar year built and the last two letters are the Contractor's designation, which will be furnished by the Contracting Officer after contract award.

3.5.2 Serial Number. For inspection purposes, the Contractor shall assign each item a unique serial number. The serial number shall be stamped, engraved, or otherwise permanently affixed to each item. The serial number shall consist of ½ inch tall block alphanumeric characters and be clearly visible after the items have been painted.

3.6 Surface Preparation. All exterior aluminum surfaces shall be cleaned of contaminants such as oil, water, grease, dirt, weld spatter and slag utilizing Method A or D specified in ASTM D1730.

3.6.1 Epoxy Repair Compound. After all surfaces have been cleaned, any weld containing porosity shall be filled with an epoxy repair compound meeting the requirements of DOD-C-24176B. The epoxy repair compound shall only be used to fill porosity discontinuities that are within the allowable maximums stated in AWS D1.2.

3.7 Painting. The items shall be painted with the coating system outlined below. All painting shall be performed after the items have been cleaned in accordance with paragraph 3.6. All welding, machining, cutting, drilling, forming, or any other operation

which would damage the coating system shall be performed prior to painting. The Contractor shall follow the manufacturer's instructions for correct application of the coating system. In addition, the Contractor shall be responsible for implementing appropriate worker safety procedures for the application of the coating system, and for ensuring that the procedures are strictly followed by the paint applicators.

3.7.1 Epoxy primer. All exterior surfaces shall be coated with an epoxy primer. The 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 color shall be either haze gray or off-white (manufacturers' standard colors are acceptable). Apply by spraying two coats, 5 mils minimum dry film thickness each. Sharp corners, edges, and other hard-to-coat areas shall be striped before each full coat is applied.

3.7.2 Polyurethane topcoat. All exterior surfaces shall be coated with a marine grade of acrylic aliphatic. This paint shall meet the following requirements: 1) it shall be a commercial product from the same manufacturer that supplies the epoxy primer; 2) it shall have a Volatile Organic Compound (VOC) content of no more than 340 g/L (2.8 lb/gal), a lead content of less than 0.06% by weight, and a chromium content of less than 0.06% by weight; 3) The required colors shall be in accordance with FED-STD-595: red (Federal Color 11350), green (Federal Color 14193). Unless otherwise specified in the delivery order, the nun shaped radar reflector shall be painted red and the can shaped radar reflector shall be painted green. Apply by spraying one coat, 3 mils minimum dry film thickness. Sharp corners, edges, and other hard-to-coat areas shall be striped before the full coat is applied.

3.8 Documentation.

3.8.1 Quality Assurance Inspection Form. The Contractor shall develop and provide a Quality Assurance Inspection Form (QAIF). The QAIF shall be used to document the inspections and tests performed on every item throughout its fabrication process. The form shall be typewritten on standard (i.e., 8½x11 inch) white paper. Inspection results may be handwritten on the form. The form shall be prepared in the Contractor's format and shall be legible, in English, and suitable for reproduction. The form shall be made available to the Contracting Officer's Technical Representative (COTR) for review.

3.8.1.1 QAIF Content. At a minimum the QAIF shall include:

- a) Item serial number.
- b) Date of test or inspection.
- c) Test or inspection to be performed (list every test and inspection require by section 4.0).
- d) Result of test or inspection.
- e) Accept/Reject criteria for each test or inspection.
- f) Corrective action taken (if any).
- g) Notes.
- h) Initials or signatures of Contractor's test personnel.

3.8.2 Material Certifications. When requested by the COTR, the Contractor shall furnish material certifications, either from the material manufacturers or an independent testing laboratory, to the effect that all of the material described in paragraphs 3.2.1 through 3.2.2 have been tested and found to meet the requirements of the applicable sections of this specification. The material certifications shall be stored by the Contractor for the life of the contract.

3.8.3 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. The Contractor shall prepare a separate DD-250 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 inspection requirements specified herein are classified as follows:

- a. First article inspection (paragraph 4.3)
- b. Contractor production inspection (paragraph 4.4)
- c. Coast Guard production inspection (paragraph 4.5)

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 in accordance with paragraph 4.6.

4.3.1 First Article Tests and Inspections Notification. The Contractor shall notify the Contracting Officer in writing at least 7 calendar days prior to the scheduled commencement of any inspections and tests required by this specification.

4.3.2 Waiver of First Article Requirements. The Contracting Officer reserves the right to waive all or part of the first article requirements specified herein.

4.3.3 Rejection Criteria. The results of the first article inspection will be reviewed by the Contracting Officer to determine compliance with the requirements of this specification. Failure of any of the tests or inspections described herein will be cause for rejection of the first article. If the first article is rejected, the Contractor will be notified in writing by the Contracting Officer and allowed 14 calendar days to fix or resubmit a new first article. Repair or replacement of the first article shall be by the Contractor at the Contractor's expense.

4.3.4 Authorization to Proceed. Upon successful completion of the first article inspection, the Contracting Officer will provide the Contractor with written authorization to begin fabricating production quantities.

4.3.5 Standardization. Materials, parts, design, and fabrication methods used in the production quantities shall be identical to those used in the first articles, unless otherwise authorized in writing by the Contracting Officer.

4.4 Contractor Production Inspection. The tests and inspections required by this specification are not intended to supplant any controls, examinations, inspections, or tests normally employed by the Contractor to assure product quality. The Contractor shall perform the tests and inspections specified in paragraph 4.6 to ensure conformance to this specification. The Contractor shall provide space, personnel, and test equipment to conduct all inspection and test requirements.

4.5 Coast Guard Production Inspection. The Coast Guard reserves the right to observe, verify, or perform the tests and inspections outlined in paragraph 4.6.

4.6 Tests and Inspections. The following tests and inspections shall be conducted for each first article unit and subsequent production units:

- a. Visual inspection
- b. Weld inspection
- c. Paint inspection
- d. Documentation review

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

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

4.6.3 Paint Inspection. The Contractor shall provide written proof that each item was cleaned and painted in accordance with paragraphs 3.6 and 3.7. The Contractor shall check the millage at a minimum of six different locations.

4.6.4 Documentation Review. The documentation required by paragraph 3.8 shall be reviewed for conformance with this specification and provided to the COTR upon request.

4.7 Rejection for Defects. The Coast Guard will reject all items which do not conform to the requirements of this specification. Repair or replacement of the rejected items shall be by the Contractor at the Contractor's expense. All rejected items shall be resubmitted for inspection only when they conform to the requirements of this specification. Resubmitted items shall be identified as such, and shall be kept separate from new items. If defective items are found, no further items will be accepted by the Coast Guard until the Contractor has demonstrated that the defects have been corrected and that the cause of the defects has been eliminated from the production process.

5. PACKAGING.

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

6. NOTES

6.1 First Article Inspection. The type and quantity of first articles required will be listed in Section B, Part I, Contract Schedule. A first article inspection shall be performed by the Contractor and at the Contractor's facility. The first articles shall meet the requirements of this specification and shall pass all the tests and inspections listed in paragraph 4.

SPECIFICATION NO. 374E - FABRICATION OF ALUMINUM RADAR REFLECTORS

MARCH 2000

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3/6/00