

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

MARCH 2000

SPECIFICATION FOR FABRICATION
OF
POLYCARBONATE ICE BUOY DOMES

SPECIFICATION NO. 345

REVISION C

1. SCOPE

1.1 Scope. This specification defines the requirements for the fabrication of polycarbonate ice buoy domes for use on aids to navigation 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 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)

D3935-94	Standard Specification for Polycarbonate (PC) Unfilled and Reinforced Material
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AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ANSI/ASQC Q9002-1994	Quality Systems - Model for Quality Assurance in Production, Inspection, and Servicing
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2.3 Drawings. The latest revision of the following United States Coast Guard Ocean Engineering drawing forms a part of this specification to the extent referenced herein, and shall be referred to as "the drawing" throughout this specification:

<u>Drawing Number</u>	<u>Title</u>
120981	Ice Buoy Dome

2.4 Source of Documents. The documents may be obtained from the following sources:

Industry Publications.

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

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

2.5 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), buoy bell and gong tappers shall be subjected to first article inspection in accordance with paragraph 4.3.

3.2 Material.

3.2.1 Polycarbonate Plastic. The polycarbonate plastic shall be natural-color virgin material meeting the requirements of ASTM D3935, Group 1 (polycarbonate), Class 3 (UV-stabilized).

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 drawing.

3.3.2 Molding. The plastic shall be injected at the apex of the dome. The resulting sprue at the apex shall be removed and the area ground flush and polished smooth. Ejector pins or other mechanical means of removing the dome from the mold shall contact the flange portion of the dome. Depressions in the flange portion of the dome resulting from the use of ejector pins shall be no more than 1/16-inch deep and 1/2-inch in diameter. The outer edge of the depressions shall be at least 1/4-inch from the outer edge of the flange.

3.3.3 Clarity. Clarity shall be such that 1/8-inch high block letters, placed at least 6 feet from the dome, are legible to an observer viewing them from any angle within the dome.

3.3.4 Workmanship. The domes shall be free of pinholes, wrinkling, burning, crazing, bubbling, rough surfaces, and other defects which would affect the strength, serviceability, or optical properties of the domes. All excess material from the molding process shall be removed. The finished domes shall be polished smooth.

3.4 Marking.

3.4.1 Identification Marking. For tracking purposes, each item shall be identified by an identification marking. The marking shall be stamped, engraved molded, or otherwise permanently affixed to each item. The marking shall consist of ½ inch tall block alphanumeric characters and be clearly visible. 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.

3.4.2 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.

3.5 Documentation.

3.5.1 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.

3.5.1.1 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.

3.5.2 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 paragraph 3.2.1 has 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.

3.5.3 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. Documentation review

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

4.6.1.1 Material Thickness. Verification of material thickness shall be by one of two methods.

Method 1. (Preferred) The Contractor shall provide a calibrated device capable of measuring the thickness to the tolerances specified without cutting the battery boxes.

Method 2. The COTR will select one dome at random from each batch (paragraph 6.2) offered. The dome shall be cut in half along a plane perpendicular to the base and through the apex of the dome At the COTR's discretion. Using a micrometer, the thickness of the dome shall be measured at selected points along the cutting lines. Any dome destroyed as a result of the testing or inspection procedures shall not be included as deliverables under the contract.

4.6.2 Documentation Review. The documentation required by paragraph 3.5 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.

6.2 Batch. A batch will consist of all domes submitted for inspection at the same time.

**SPECIFICATION NO. 345C - FABRICATION OF POLYCARBONATE ICE BUOY
DOMES**

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