MILITARY SPECIFICATION

PELLET, DYE, SEA MARKER

1. SCOPE

1.1 Scope. - This specification establishes the requirements for the procurement of a dye pellet which is used as a sea marker to indicate the location of a torpedo at the end of an exercise run. This dye pellet is of one type and one class.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, drawings and publications, or such portions thereof as designated herein, of the issue in effect on the date of invitation for bids form a part of this specification.

SPECIFICATIONS

FEDERAL

PPP-C-96	Cans, Metal, 28 gage and lighter
PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Boxes, Fiber

MILITARY

MIL-P-116	Preservation, Methods of
MIL-T-18404(NOrd)	Torpedoes, Environmental Requirements, General Specification for

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Stowage

FSC 6820

PUBLICATIONS

BUREAU OF ORDNANCE

OP 400	General Instructions for the Design, Manufacture and Inspection of Naval Ordnance Equipment

(Copies of specifications, standards, drawings and publications requested by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Preproduction samples. - Unless otherwise specified in the contract, or order, preproduction samples of the dye pellet shall be manufactured using the methods and procedures proposed for the production lot. These samples will be tested as specified in section 4 herein and are for the purpose of determining that the production item meets the requirements of this specification and this design. Provisions of samples shall be in accordance with 4.1.2.

3.2 Material. - The dye pellet shall be composed of 30 parts by weight of Rhodamine-B and 70 parts by weight of a stabilized mixture consisting of equal parts, by weights, of sodium bicarbonate and citric acid (Bromo Seltzer or equivalent). The dye pellet material shall be suitably mixed and molded to meet the requirements of this specification.

3.3 Size - The dye pellet shall conform to the dimensional requirements of the applicable drawing specified in the contract or order.

3.4 Rhodamine-B content. - When tested as specified in 4.5.4.1, the Rhodamine content of the dye pellet shall be 30% plus or minus 3% of the weight of the pellet.

3.5 Carbon Dioxide production. - When tested as specified in 4.5.4.2, the dye pellet shall produce an amount of carbon dioxide which is 16.5% plus or minus 3.5% of the weights of the pellet.

3.6 Speed of Carbon Dioxide evolution. - When tested as specified in 4.5.4.3, carbon dioxide shall be evolved from the dye pellet within the time range of 8 to 12 minutes.

3.7 Requests for deviation. - Requests for deviation from this specification, specifications, publications, materials and processes specified herein, shall be as set forth in OP 400.

3.8 Conflicting requirements. - Conflicting requirements arising between this specification or any specification or publication listed herein, shall be referred in writing to the procuring agency or appointed agent for interpretation and clarification.

3.9 Environmental requirements

3.9.1 Vibration. - The dye pellet packed and packaged as defined in 5., mounted as specified in 4.6.1, shall be capable of withstanding the vibration tests specified in 4.6.1 and thereafter shall show no damage and shall meet the requirements of 3.4 or 3.5.

3.9.2 Shock. - The dye pellet packed and packaged as defined in 5. shall be capable of withstanding the shock test specified in 4.6.2, and thereafter shall show no damage and shall meet the requirements of 3.4 or 3.5.

3.9.3 Moisture. - The dye pellet packaged as defined in 5.1.1.4 shall be capable of withstanding the immersion test specified in 4.6.3, and thereafter shall show no damage and shall meet the requirements of 3.3, 3.4 or 3.5.

4. QUALITY ASSURANCE PROVISIONS AND TEST REQUIREMENTS

4.1 Government inspection. - The Government inspector will make such inspections as are necessary to determine that material and procedures are in accordance with the requirements of the contract, pertinent drawings and specifications. Unless otherwise specified, these inspections will be conducted in accordance with instructions contained in OP 400.

4.1.1 Sampling. Unless otherwise specified, and when applicable, the sampling plans and procedures used by the Government inspector in the determination of the acceptability of products submitted by a supplier for Government inspection shall be in accordance with the provisions set forth in MIL-STD-105. Compliance with visual and dimensional requirements of this specification shall be determined in accordance with MIL-STD-105, PQL, 1.5 per cent defective.

4.1.2 Pre-Production sample. - Unless otherwise specified for each contract or order, a representative sample of fifteen (15) dye pellets shall be submitted to the Government inspector, packaged and packed as specified in the contract or order, for the examinations and tests of this specification at an activity designated in the contract or by the Bureau of Ordnance. Further production of the dye pellets by the contractor prior to approval of the contracting activity of the pre-production sample shall be at the contractor's risk. Pre-production samples will be applied as part of the quantity specified in the contract or order.

4.1.3 Lot size. - As applied to Government inspection of units of product, the term "lot" shall mean "Inspection lot", i.e., a collection of units of product submitted by a supplier for Government inspection. Unless otherwise specified, the number of units of product in "inspection lots" will be determined by the Government inspector and may differ from the quantity designated in the contract or order in a lot for production, shipment or other purpose.

4.1.4 Samples for Test. - From each inspection lot a random sample of fifteen (15) dye pellets, in five (5) packages packed and packaged as specified in the contract or order, will be selected by the Government inspector for test by contractor or for submission to a Bureau of Ordnance designated activity to determine compliance of the sample with the requirements of the contract, specification and drawing. Two (2) packages of pellets shall be applied to the tests of 4.5, and three (3) packages of pellets to the tests of 4.6 (one each to 4.6.1, 4.6.2, and 4.6.3). The dye pellets shall be considered satisfactory if all specification and drawing requirements are met and the tests as specified in 4.5 and 4.6 are withstood.

4.2 Cnntractor's inspection. - Contractor's inspection shall be conducted in accordance with provisions of "Inspection by Contractor" as contained in OP 400.

4.3 Classification of tests. - The inspection and testing of the pellet shall be classified as follows:

4.3.1 Acceptance tests. - These tests are to be cccomplished on the dye pellets being submitted for acceptance under contract. Acceptance tests shall be performed by the manufacturer and witnessed by the Government inspector, or shall be conducted by the Government inspector. These tests are defined in 4.5 and 4.6.

4.3.2. Pre-Production tests. Pre-production tests are those which are accomplished on samples selected as specified in 4.1.2 and 4.1.4 which are representative of the dye pellets after the award of the contract to determine that the lot and production meet the requirements of this specification. These are detailed in 4.5 and 4.6. Failure of any sample dye pellet in any test or requirement will result in the rejection of the lot or cessation of production, as determined by the procuring activity.

4.4 Test equipment. - In addition to standard laboratory equipment, the following items of test equipment are required to perform the acceptance tests set forth in this specification.

4.4.1 Fisher Electrophotometer or equivalent

4.4.2 Rhodamine-B dye; Color Index No. 749

4.4.3 Linear graph paper

4.4.4 Standard CO_2 evolution train in which the CO_2 is evolved, purified and absorbed in a tube suitable for weighing on an analytical balance.

4.4.5 A two-liter graduate, or any other glass vessel which accommodates a column of water which is 15 inches long and approximately three inches in diameter.

4.4.6 Stop watch

4.4.7 A five (5) inch square of cheese cloth. Cloth shall be of ordinary household variety with comparatively large mesh; i.e. not surgical bandage material.

4.5 Acceptance Tests (Chemical)

4.5.1 The contractor or Government inspector shall conduct acceptance tests as specified in 4.3.1 to assure that the dye pellet is in compliance with the requirements of 3.1 through 3.5 inclusive.

4.5.2 Test conditions. - Unless otherwise specified, the dye pellet shall be subjected to acceptance tests under the following conditions:

4.5.2.1 Temperature: Room ambient, 65 degrees F to 95 degrees F (18.33 degrees C to 35.0 degrees C)

4.5.2.2 Altitude: Normal ground

4.5.2.3 Vibration: None

4.5.2.4 Humidity: Room ambient to 95 per cent relative maximum.

4.5.3 Test and inspection equipment and facilities. - The manufacturer shall furnish and maintain all necessary test equipment, facilities and personnel for performing all acceptance tests. The test equipment shall be adequate in quantity, and when definite requirements are not specified, they shall be of sufficient accuracy and quality to permit performance of the required acceptance tests.

4.5.4 Test procedure

4.5.4.1 Rhodamine-B content

4.5.4.1.1 Preparation of reference chart

4.5.4.1.1.1 Place 0.080 grams of pure Rhodamine-B (4.4.2) into a volumetric flask of one liter capacity.

4.5.4.1.1.2 Add sufficient distilled water to almost fill the flask.

4.5.4.1.1.3 Check that the pH is 4.0 - 4.1, and fill the flask to the mark.

4.5.4.1.1.4 Insert filter No. 425-B into the Fisher Electrophotometer, or the corresponding filter or phototube if another instrument is used.

4.5.4.1.1.5 Transfer some of the Rhodamine solution into an absorption cell, and determine the reading on the "A" scale of the photometer. The "A" scale reading is directly proportional to the concentration of the dye in the solution.

4.5.4.1.1.6 By accurate dilutions of the solution prepared in 4.5.4.1.1.1 through 4.5.4.1.1.3 inclusive, prepare solutions which contain 0.06, 0.04, and 0.02 grams of Rhodamine-B per liter. Maintain a pH of 4.0 - 4.1 in all solutions. Dilute solutions of sodium hydroxide, or acetic acid, may be used to adjust the pH.

4.5.4.1.1.7 Repeat the procedures of 4.5.4.1.1.4 and 4.5.4.1.1.5.

4.5.4.1.1.8 Prepare a reference chart on linear graph paper. Label the ordinate "Scale A Reading",, and the abscissa "Grams of Rhodamine-B per liter of solution". A plot of the readings obtained with the solutions of known concentration of Rhodamine-B will result in a straight line.

4.5.4.1.2 Determination of Rhodamine-B content

4.5.4.1.2.1 Place a 0.100 gram sample of a finished dye pellet into a volumetric flask of one liter capacity.

4.5.4.1.2.2 Add sufficient distilled water and enough acid, or base, to make a solution of pH 4.0 - 4.1.

4.5.4.1.2.3 Repeat the procedures specified in 4.5.4.1.1.4 and 4.5.4.1.1.5, and by means of the reference chart, determine the concentration of Rhodamine-B in the solution.

4.5.4.1.2.4 The percentage of Rhodamine-B in the solution is obtained by the formula:

$$\frac{C \times 100}{\text{Weight of sample}} = \% \text{ Rhodamine-B}$$

Where C is the concentration of Rhodamine-B in grams per liter of solution.

4.5.4.2 Carbon dioxide production

4.5.4.2.1 Sweep the gas-tight train free of CO_2 by applying gentle suction until the absorption tube assumes a constant weight. When this is obtained, add 1.5 grams of the pellet material to the dry evolution flask. Fill the separatory funnel with distilled water. Start a gentle suction and let the water flow into the evolution flask very slowly in order to avoid a very sudden evolution of carbon dioxide. When all the

water has been added, allow air which is free of carbon dioxide to be sucked in. Heat flask to boiling, and allow air to flush out the carbon dioxide slightly faster. When all of the carbon dioxide has been absorbed, remove the absorption tube and weigh it.

4.5.4.2.2 The amount of carbon dioxide obtained is calculated by the formula:

$$\frac{\text{Weight gain of absorption tube} \times 100}{\text{Weight of sample}} = \% CO_2$$

4.5.4.3 Speed of carbon dioxide evolution

4.5.4.3.1 Fill a two-liter graduate to a height of 15 inches with fresh water. Adjust the temperature to 30 degrees C.

4.5.4.3.2 Place a finished standard 20 gram dye pellet and a weight, sufficient to sink the pellet, in the square of cheese cloth. Form the cheese cloth into a sack, closing the open end with a rubber band.

4.5.4.3.3 Place the sack into the fresh water, and, with a stop watch, time the evolution of the gas until the last bubble rises to the surface.

4.5.4.4 Packaging, packing and marking. - The inspector shall ascertain that the packaging and packing of the dye pellets and their marking conform to the applicable requirements of section 5 of this specification.

4.6 Pre-Production and periodic production tests

4.6.1 Vibration. The dye pellet packed and packaged as defined in 5., mounted rigidly in a vibration testing device, shall be subjected to vibration testing as specified in MIL-T-18404(NOrd) for torpedo, non-operating, ready non-operating or ready. At the conclusion of the test, the dye pellet shall show no damage and shall meet the requirements of 3.8.1.

4.6.2 Shock. The dye pellet packed and packaged as defined in 5., shall be subjected to the "free fall drop test" specified in MIL-P-116. At the conclusion of the test, the dye pellet shall show no damage and shall meet the requirements of 3.8.2.

4.6.3 Moisture. - The dye pellet packaged as defined in 5.1.1.4, shall be subjected to the "immersion test" specified in MIL-P-116. At the conclusion of the test, the pellet shall show no damage or moisture and shall meet the requirements of 3.8.3.

4.7 Failure of the pellet to meet any of the requirements and tests of this specification shall be considered cause for rejection.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging

5.1.1 Level A

5.1.1.1 Cleaning. - Not applicable

5.1.1.2 Drying. - Not applicable

5.1.1.3 Preservation. - Not applicable

5.1.1.4 Packaging. - Unit packaging of the pellets shall be in accordance with Method IA-5 of Specification MIL-P-116. The unit package shall contain three (3) pellets, snugly packaged in an hermetically sealed container conforming to Type I of Specification PPP-C-96. The container shall be provided with a suitably scored key-opening band near the top, and a corrosion resistant key shall be attached to one end of the container.

5.1.1.5 Intermediate package. - Pellets, packaged as described in 5.1.1.4, shall be packed in a close-fitting fiber box conforming to Specification PPP-B-636, Type I or II, Class 2. The number of unit packages per intermediate package shall be as specified in the contract or order.

5.1.1.6 Cushioning. - The unit package, intermediate package and pack, shall incorporate sufficient cushioning material, bracing, or other adequate shock absorbing devices,, to insure that the pellets will meet all the performance requirements and product characteristics of this specification after being tested in accordance with 4.6.1 and 4.6.2.

5.1.2 Level B. - Not applicable

5.1.3 Level C. - The pellet shall be preserved and packaged as specified in 5.1.1, except that the use of an intermediate package will be optional.

5.2 Packing

5.2.1 Level A

5.2.1.1 Exterior containers. - Pellets, packaged as described in 5.1.1.5, shall be packed in an overseas type wood box conforming to Specifications PPP-B-601, or PPP-B-621. Gross weight of each container shall not exceed 150 lbs.

5.2.2 Level B

5.2.2.1 Exterior containers. - Pellets, packaged as described in 5.1.1.5, shall be packed in a domestic type wood box conforming to Specification PPP-B-601 or PPP-B-621. Gross weight of each container shall not exceed 150 lbs.

5.2.3 Level C. - Pellets, packaged in accordance with 5.1.3 shall be packed to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Containers shall comply with regulations applicable to the mode of transportation.

5.3 Marking

5.3.1 Special marking. - None, unless otherwise specified.

5.3.2 Normal marking. - In addition to the markings required by contract or order, unit packages, intermediate packages (when used), and shipping containers shall be marked in accordance with the requirements of MIL-STD-129.

6. NOTES

6.1 Intended use. - The pellet is intended for use as a sea marker to indicate the location of a torpedo at the end of an exercise run.

6.2 Ordering data. - Procurement documents should specify the specific title, number and date of this specification and exceptions to this specification, applicable drawings and other documents.

6.2.1 The attention of the contracting officer is invited to the Quality Assurance Provisions and Options in Specification MIL-P-116, and to paragraphs 5.1.1.5 and 5.1.3 of this document.

6.2.2 Criteria for the use of proper level of preservation, packaging, and packing shall be as follows:

For Level A. - This level shall be used for those items which are to be shipped to indeterminate destinations, or stored under indeterminate conditions for redistribution anywhere.

For Level B. - This level shall be used only when it is definitely known that the item will be held in covered storage, either in domestic or overseas locations, for a period of 6 months or less.

For Level C. - This level shall be used only when it is definitely known that the packaged item is to be shipped to domestic installations for immediate use at the first receiving activity.

Notice: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any invention in any way related thereto.