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SPECIFICATIONS
FOR THE
MANUFACTURE & INSPECTION
OF
HC SMOKE POT MARK 3

4/12/44
Officer in Charge

(Re2d) Officer of Section

H L B 11 January 1944
for Chief Engineer

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CEM 10 JAN. '44
Head Engineer (Mat'ls.)

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Engineer

NAVY DEPARTMENT
BUREAU OF ORDNANCE
WASHINGTON, D. C.

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W R Purnell
By Direction of Chief of Bureau

OS 2730

REVISION			
LOC.	NO.	DATE	CHANGES APPEAR ON SHEETS NOS.
D	6297	1-10-44	
E	6506	3-6-44	5.
F3	2730-F	3-20-45	SHEET 5, 7, & 9
G3	2730-G	6-16-45	SHEET 9 & 10
H2	2730-H	9-7-45	SHEET-9

SPECIFICATION FOR THE MANUFACTURE & INSPECTION OF HC SMOKE POT MARK 3.

A. APPLICABLE SPECIFICATIONS - The following of the issue in effect on date of invitation for bids, form part of this specification. Bidders and contractors should provide themselves with the necessary copies.

A-1. Ordnance Drawings, Specifications & Standards - As listed in the Bureau of Ordnance List of Drawings Sketch No.102925.

A-2. Ordnance Pamphlets - Ordnance Pamphlet No.400 General specifications for Manufacture and Inspection of Ordnance Materiel for the U. S. Navy.

A-3. Navy Department Specifications - General Specifications for the Inspection of Material, together with Appendix II, Metals, and Appendix VII, Welding.

A-4. Federal Specifications - As listed on list of drawings, BuOrd Sketch No.102925.

B. TYPES.

B-1. One type of HC Smoke Pot is covered by this specification.

C. MATERIAL AND WORKMANSHIP.

C-1. Material - All material used in the manufacture of the HC Smoke Pot shall conform strictly with the specifications referred to herein and on the applicable drawings, unless specific approval covering a departure therefrom has been obtained from the Bureau of Ordnance prior to manufacture or use. Where alternative material or methods of manufacture are specified on a drawing or in the specifications, the bidder must specifically state in this proposal which alternative material or method he intends to use. The use of materials and methods of manufacture differing from those indicated on the drawings will be considered by the Bureau of Ordnance where such differences will result in an advantage to the government.

C-2. Workmanship - The workmanship shall conform with that required by the best commercial practices governing the quantity production of generally analogous parts, condition of use, fits, tolerances, interchangeability and appearance being considered.

D. GENERAL REQUIREMENTS -

D-1. In general, the procurement of HC Smoke Pots under this specification consists of two separate and distinct phases, as follows:

D-1(a) - The procurement of the inert metal parts of the charge case, and

D-1(b) - The procurement of the pyrotechnic components and the final loading and assembly operations required to complete the HC Smoke Pot, ready for service use.

D-2. Each of the procurement phases, as outlined in paragraphs D-1(a) and D-1(b) above, will be covered separately herein.

E. DETAIL REQUIREMENTS -

E-1. HC Smoke Pot - Inert Parts - The inert parts comprising the pot consists of the following components:

	BuOrd Drg. No.
One - Smoke Pot Body	344503-4
One - Smoke Pot Bottom Cover	344503-3
One - Smoke Pot Double Seam Cover	344502-1
One - Smoke Pot Tray	344502-2
One - Smoke Pot Tear Strip	344502-3
One - Smoke Pot Primer Pan	344502-6
One - Smoke Pot Primer Pan Cover	344503-1
One - Smoke Pot Envelope	344503-2
One - Smoke Pot Cover Ring	344503-10
One - Smoke Pot Felt Washer	344503-11
One - Smoke Pot Paper Disc	344503-12
One - Smoke Pot Printed Label	344503-13

E-1(a) - Smoke Pot Body - The Smoke Pot Body shall be fabricated in accordance with the form and dimensions shown for Pc. No. 4, BuOrd Drg. No. 344503 and Pc. No. 3, BuOrd Drg. No. 344503. The bottom seam and the longitudinal seam shall be watertight and made up in a neat workmanlike manner. At the top end of body allow sufficient material to form a standard double seam at assembly with cover Pc. No. 1, Drg. No. 344502 and tray, Pc. No. 2, Drg. No. 344502. Body shall be painted as indicated on drawing.

E-1(b) - Smoke Pot Tray - Primer Pan & Cover Ring - The Smoke Pot Tray, Pc. No. 2, BuOrd Drg. No. 344502, shall be accurately formed, within the dimensions and tolerances shown on

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the drawing. The center opening shall be accurately located, and of proper diameter to receive the primer pan, Pc. No. 6, BuOrd Drg. No. 344502 and Cover Ring, Pc. No. 10, BuOrd Drg. No. 344503, which are crimp seamed at assembly.

E-1(c) - Smoke Pot Double Seam Cover - The double seam Cover, Pc. No. 1, BuOrd Drg. 344502, shall be accurately formed within the dimensions and tolerances shown on the drawing. The outer rim is to fit snugly with smoke pot tray, Pc. No. 2, BuOrd Drg. 344502 and the center opening shall be accurately formed to receive the tear strip, Pc. No. 3, BuOrd Drg. 344502, which is secured by soldering.

E-1(d) - Smoke Pot Tear Strip - The smoke pot tear strip, Pc. No. 3, BuOrd Drg. No. 344502, shall be fabricated in accordance with the form and dimensions shown for Pc. 3, BuOrd Drg. No. 344502. The tab end shall be folded around the tear strip handle Pc. 4, BuOrd Drg. No. 344502, and spot welded in place. The assembly of the tear strip and handle shall be accurately located and soldered watertight in a neat and workmanlike manner to the cover, Pc. 1, BuOrd Drg. No. 344502. All traces of soldering flux shall be removed.

E-1(e) - Smoke Pot Envelope - The smoke pot envelope, Pc. No. 2, BuOrd Drg. 344503, shall be made in accordance with the form and dimensions as shown on the drawing and the instructions shall be plainly printed on each envelope as indicated.

E-1(f) - Label - The label or instruction sheet, Pc. No. 13, BuOrd Drg. No. 344503, shall comply in all particulars with the data indicated on the drawing. The label shall be applied to the smoke pot body as indicated on the drawing, using a suitable adhesive. After application to the case, each label shall be coated over with a clear, moisture-resistant lacquer.

E-2. Pyrotechnic Chemicals & Components - The pyrotechnic chemicals and components required to complete each smoke pot consists of the following:

E-2(a) Magnesium Carbonate - This material shall be of the grade known as "Light precipitated" Magnesium Carbonate (Hydrated Basic Magnesium Carbonate $4MgCO_3$, $Mg(OH)_2.5H_2O$. It shall contain a minimum of 39% magnesium oxide, or a minimum of 34% carbon dioxide, and not more than 0.5% free water.

E-2(b) Calcium Carbonate - (Whiting) The particle size of the calcium carbonate (whiting) shall be as specified in U. S. Army Specification 96-31-11.

E-2(c) Ammonium Chloride - The material shall be of good "Battery White" grade and fulfill Federal Specification O-A-491, Type A. It shall not contain more that 0.2% water and must be of such fineness that 100% will pas through a U. S. Standard sieve No.40.

E-2(d). Ammonium Perchlorate - The ammonium perchlorate shall have the following composition and shall be of such fineness that 100% shall pass through a U. S. Standard sieve No. 40.

NH_4ClO_4	98% mimimum
Moisture	0.1% maximum
Chlorides as NH_4Cl	1.0% maximum
NaClO	0.6% maximum
NH_4ClO_3	0.1% maximum
Acidic Materials Calculated as HCl	0.2% maximum

E-2(e) Zinc Dust - The zinc dust shall contain not less than 94.0% metallic zinc and not more than 2.0% impurities other than zinc oxide. It shall be free from matter soluble in an organic solvent mixture. The material shall be of such fineness that not less than 75% will pass through a U. S. Standard Sieve No. 150.

E-2(f) Hexachlorethane - The hexachlorethane shall conform to U. S. Army Spec. 4-503-215.

E-2(g) Potassium Nitrate - The potassium nitrate shall be of a good technical grade, it shall contain not less than 98.5% potassium nitrate and not more than 0.5% moisture, it shall be of such fineness that 100% shall pass through a No. 60 U. S. Standard sieve.

E-2(h) Fuzed Silicon - The fuzed silicon shall conform with the requirements of Chemical Warfare Service Specification No. 196-111-74.

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E-2(i) Potassium Chlorate - The potassium chlorate shall conform to U. S. Army Specification No.50-11-11.

E-2(j) Antimony Sulfide - The antimony sulfide shall be sieved so that 100% of the material shall pass through a No.80 U. S. Standard sieve and not less than 40% shall be retained on a No.230 U. S. Standard sieve.

E-2(k) Dextrin - The dextrin shall be sieved so that 100% of the material shall pass through a No.80 U. S. Standard sieve.

E-2(l) Red Phosphorus - The red phosphorus shall conform strictly to U. S. Army Specification No. 4-503-300-A, and not less than 99% shall wash through a No.100 U. S. Standard sieve.

E-2(m) Sand - The particles of sand shall have clean, sharp fractures and shall be of such a degree of fineness that 100% of the material shall pass through a No.50 U. S. Standard sieve, and none shall pass through a No. 80 U.S. Standard sieve.

E-3. Chemical Components

	BuOrd Drg. No.
One - Scratcher mixture	344503-5
One - Match Head mixture	344503-6
One - Starter mixture (45 grams)	344503-8
One - Smoke mixture (32 pounds)	344503-9

E-3(a) Scratcher Mixture - The scratcher mixture consisting of the chemical components and proportions as listed below shall be spread thinly and evenly over the entire surface of one side of the wood scratch match, Pc. No. 7, BuOrd Drg. 344502.

Red Phosphorus	50% ± 0.5
Sand	30% ± 0.3
Dextrin	20% ± 0.5

E-3(b) Match Head Mixture - The match head mixture consisting of the chemical components and proportions as listed below and while in plastic state, shall be placed in the center hole of primer pan cover Pc. No. 1, Drg. No. 344503 and reinforced by forming a button on each side of the disc. Sufficient time should be allowed to permit the match head to thoroughly dry before final assembly with primer pan.

Potassium Chlorate	50% ± 0.5
Antimony Sulfide	30% ± 0.3
Dextrin	20% ± 0.2

E-3(c) Starter Mixture - The starter mixture consisting of 45 ± 2 grams, in the proportions as listed below, shall be pressed firmly into the primer pan, Pc. No. 6, BuOrd Drg. No. 344502

Potassium Nitrate	50% ± 0.5
Fused Silicon	50% ± 0.5

E-3(d) Smoke Mixture - The smoke mixture shall consist of approximately 32 pounds of pyrotechnic chemicals as follows:

Hexachlorethane	46.7% ± 2.0
Zinc Dust	39.6% ± 2.0
Ammonium Perchlorate	6.0% ± 2.0
Ammonium Chloride	6.0% ± 2.0
Whiting	1.5% ± 1.0
Calcium Carbonate	0.2% ± 0.1
	100.0%

E-4. Loading of Smoke Pot -

E-4(a) The smoke pot shall be carefully and thoroughly cleaned of dirt and grease, and any accumulation of moisture shall be removed, prior to loading.

E-4(b) Divide the 32 pounds of smoke mixture into three increments.

E-4(c) Place the empty smoke pot into a suitable loading tool, then carefully load the first increment into the pot and press in place using a static load of 15,000 ± 1,500 pounds.

E-4(d) The second increment is carefully placed into the pot over the first increment, and pressed in place using a static load of 15,000 ± 1,500 pounds.

E-4(e) The third increment is placed into the pot over the previously loaded increments, and pressed into place using a static load of 15,000 ± 1,500 pounds, filling the smoke pot to the level of the tray, leaving a cavity in the center for receiving the primer pan.

E-4(f) The Tray, Pc. No. 2, BuOrd Drg. No. 344502 into which the loaded primer pan, primer pan cover and cover ring has been crimp seamed, is placed carefully in position with the felt washer placed over the primer pan cover.

E-4(g) The seamed cover with the previously assembled tear strip, and paper envelope, containing scratch match, secured on underside of cover, shall be carefully placed in position,

then the cover worked down until its under side contacts the felt washer, leaving a space between the tray and cover of approximately .375 inches, then the smoke pot sealed by means of a standard water-tight double lock seam.

F. METHOD OF SAMPLING, INSPECTION & TEST.

F-1. Smoke Pots, Inert Parts -

F-1(a) Production Lots - A production lot shall consist of 405 smoke pots loaded and sealed in consecutive order and bearing the same loading lot number. Five loaded pots from each loading lot shall be subjected to static and firing tests.

F-1(b) Inspection - Smoke Pots & Covers - Each smoke pot and cover, after fabrication, but before painting either the interior or exterior surfaces, shall be examined visually to insure that all seams and joints have been properly made, and if, in the inspector's judgment, a seam appears suspicious, such pot shall be filled with fresh water and allowed to stand for at least 5 minutes. Any leaking seam so found shall be repaired and retested. At least one pot and one cover, chosen at random from each 100 pots and covers shall be subjected to the above described water test. If these show evidence of leaks, the entire 100 pots so represented shall be reinspected thoroughly and repaired as found necessary.

F-1(c) Static Test - One smoke pot from each lot of loaded smoke pots shall be broken down and inspected to determine that the assembly and weight of the pyrotechnic and starter, the firing of the igniter and the ignition of the starter are satisfactory and in accordance with all specifications.

F-1(d) Firing Test - Four loaded smoke pots shall be taken from each production lot and test fired in the following manner:

F-1(d)1. The tear strip which is soldered to top of cover is removed, by taking hold of handle and giving the tear strip a quick jerk. With the removal of the tear strip the envelope containing the scratch match is accessible through hole in cover.

F-1(d)2. Remove the envelope from beneath the clip on the underside of cover.

F-1(d)3. Tear open the sealed envelope to remove the scratch match and scratch the match on ignition button, thereby igniting the starter mixture.

F-1(d)4. The starter mixture shall burn through the zinc primer pan and ignite the smoke mixture which shall produce a very dense, persistent, white to gray smoke cloud for a period of 5.5 - 8 minutes.

F-1(e) Surveillance Test - One smoke pot selected at random from any lot may be used for a surveillance test if the Bureau of Ordnance so directs.

F-1(f) Retest & Rejections - One total failure or two partial failures shall subject eight additional pots to a complete test, as above described. One total failure or two partial failures of the eight pots is sufficient for rejection of the entire production lot. A total failure is defined as failure to ignite, or to transfer ignition to the starter mixture, or failure of the pyrotechnic to ignite and produce a minimum of good dense smoke. A partial failure is defined as any of the following conditions: (a) short burning time of the pyrotechnic, (b) bad volume of the smoke, (c) smoke mixture igniting and going out prior to specified burning time, (d) leakage or any improper assembly.

G. PACKING AND MARKING FOR SHIPMENT

(H) → G-1. Packing: Two Smoke Pots, Mark 3, shall be packed in a nailed wood box, complying with Specification JAN-P-106. This box shall be lined with a prefabricated waterproof liner made from Type HC material, complying with specification JAN-B-125. An untaped double cell liner shall be used to encase each pot and a minimum of 3 top and 3 bottom pads shall also be used within the liner. The corrugated liner shall be so constructed as to provide two thicknesses between the pots and one thickness between the pots and the inner surfaces of the waterproof case liner. Both pads and liners shall be made from 200 lbs test corrugated fibreboard, "A" Flute. The case liner shall be securely sealed by means of waterproof adhesive (Minnesota Mining and Manufacturing Company's No. EC164 or equal) or by pressure seal if the nature of the material permits. Seams and closure shall be of such a nature as to provide protection equal to the body material.

G-2 Marking: Each shipping box, packed as specified in paragraph G-1, shall be clearly and legibly marked in quick-drying, waterproof ink or paint on one side panel and one end panel with the following data:

TWO H C SMOKE POTS MARK 3
LOT NO._____ CONTRACT NO._____
MFG. BY_____ MONTH_____YEAR_____
WEIGHT _____ CUBE_____

(H.) REVISION & REPRODUCTION

H.

H-1. Manufacturing Data Cards: Pyrotechnic Ammunition Manufacturing Data Cards (NavOrd Form 1204) as furnished by the Bureau of Ordnance shall be filled out, as outlined below, three copies of which are to be forwarded to the Bureau of Ordnance. These cards are not to be packed with the rounds. All information called for with the exception of the Acceptance Data on the back of the card shall be filled in by the manufacturer. Under the column headed "component" the following items shall be listed:

Red Phosphorus Scratcher
Match Head Mixture
Starter Mixture
Smoke Mixture

The columns headed "Manufactured by", "Lot Number", "Date of Manufacture", and "Additional Data", shall then be filled out as far as practicable for the above components. In addition, all deviations from specifications and drawings shall be entered as required on the bottom of this card. After the manufacturer has filled in the above information, the Naval Inspector will fill in the acceptance data as indicated endorse the cards and forward them to the Bureau of Ordnance.

H-2. Performance Data Cards: Pyrotechnic Ammunition Performance Data Cards (NavOrd Form 1187), as furnished by the Bureau of Ordnance, shall be filled out by the manufacturers as follows:

Name of pyrotechnic ammunition - HC Smoke Pots Mark 3
Contract No._____(fill in number of contract)
Date of Manufacture_____(fill in date of final assembly
Assembly Lot No._____(fill in particular lot number)
Under Reference (b)_____(fill in O.P. No. 1042)

Below the line titled "Date Fired" the following should be entered on separate lines by the manufacturer:

Ripping Action
Match Action
Starter Action
Smoke Ignition
Burning time (5-6M)
Volume

The Schedule of Performance Surveillance Section on the back side of the card shall be filled out as follows:

Before the word "rounds" insert the figure "1".
After the word "Minimum" insert the phrase "about 1 April and 1 October".

G → The cards shall be packed one in each shipping box (one for each four (4) pots), so enclosed or secured that the forms will go through with the signals to the point of use.

H-3. Warning: This pyrotechnic smoke mixture is not stable in excess moisture, therefore it is of paramount importance that all smoke pots be tested carefully for leaks, and that all seams and soldered joints have been properly made as specified on the drawings. A leaky pot may cause the rejection of an entire production lot or cause extensive damage to very necessary materials.

H-4. Drawings of Shipping Containers - As soon as practicable following initiation of the contract, the contractor shall furnish to the Bureau of Ordnance, in quadruplicate, print of a sketch or drawing showing the gross and tare weight, maximum external dimensions, the general construction and the applicable specification covering the carton or other type of shipping container referred to in paragraph G-1 hereof, together with the method of packing the smoke pots therein. This information is required in connection with the shipment and stowage of such containers.

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H-5. Copies of Drawings, Specifications, Etc. - Copies of all drawings and specifications referred to herein may be obtained upon application to the Bureau of Ordnance, Navy Department, Washington, D.C. Such application should state in full the number of the drawing or specification, together with the number of the schedule, requisition, order or contract in connection with which the requested publication is desired.

H-6. SPECIAL NOTICE - When drawings, specifications or other data are furnished to manufacturers or others, 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 supported the said drawings, specification, 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 patented invention that may in any way be related thereto.

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