

MIL-P-16594A (NOrd)

30 June 1955

SUPERSEDING

MIL-P-16594 (BuOrd)

10 September 1951

NAVORD OS 1649

8 December 1944

(See 6.3)

## MILITARY SPECIFICATION

### PROJECTILES, BOMBS, ROCKETS, AND GUIDED MISSILE WARHEADS, INERT PARTS, MANUFACTURE OF

#### 1. SCOPE

1.1 This specification covers general requirements for the manufacture of the inert parts of projectiles, bombs, rockets (rocket heads and rocket motors), and guided missile warheads for the U.S. Navy.

#### 2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, drawings, and publications, and others listed on the applicable Bureau of Ordnance "List of Drawings", sketch or detail drawings, of the issue in effect on date of invitation for bids, form a part of this specification:

#### SPECIFICATIONS

##### NAVY DEPARTMENT

General Specifications for the Inspection of Material, and applicable appendices, including the following:

Appendix II, Metals, Part A - Definitions and Tests

Appendix VII - Welding:

Part D, Section D-1-Qualification of Welding Processes,  
General

Part F, Section F-1-Fabrication Tests for Resistance  
Welding

Part G, Section G-1-Qualification of Equipment, General

Part G, Section G-2-Qualification of Spot and Seam  
Welding Equipment - Automatically  
Timed

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**STANDARDS**

**MILITARY**

JAN-STD-19 - Welding Symbols  
MIL-STD-20 - Welding Terms and Definitions  
MIL-STD-129 - Marking for Shipment and Storage

**BUREAU OF ORDNANCE**

NAVORD OSTD 66 - Design of Inspection Gages

**PUBLICATIONS**

**BUREAU OF ORDNANCE**

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

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

**3. REQUIREMENTS**

**3.1 General requirements.**- Items shall be manufactured in strict accordance with the true intent of the applicable specifications and with the data shown or referred to on the drawings. It is the contractor's responsibility to satisfy the inspector as to conformance with the true intent of the terms of the contract, applicable specifications and applicable drawings. Except as modified herein, general requirements shall be in conformance with OP 400.

**3.1.1 Discrepancies.**- Any discrepancy between drawings and specifications, or between any parts of drawings or specifications, or any ambiguity in the language of any part of the complete specification shall be referred to the Bureau of Ordnance via the cognizant inspector (see 6.2) for interpretation or clarification and the decision of the Bureau of Ordnance as to the true intent of the applicable drawings and specifications shall be final. Contractors shall not take advantage of any discrepancies, errors or omissions of details but shall furnish items in accordance with the true intent of the applicable drawings and specifications.

**3.1.2 Unauthorized practices.**- Failure of applicable specifications to preclude specific practices or treatments shall not be interpreted as permitting any such practice or treatment which the Inspector considers deleterious or questionable. Alteration of defects by hammering, peening, filling of voids or building up of areas by soldering, welding, metal spraying, etc.,

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deformation - either hot or cold - after specified physical properties have been obtained by heat treatment or cold work, etc., shall be considered as an unauthorized practice unless specific authorization has been obtained from the Bureau of Ordnance in each instance or unless such practices are directly authorized in the applicable specifications. In general, the repair and rewelding of welds in accordance with generally accepted procedures is permissible except for pieces which have been heat treated prior to the proposed repair or rewelding.

**3.2 Material.-** All materials shall conform strictly with specifications and requirements listed herein or the specifications and requirements shown on the applicable drawings unless specific approval in writing covering a departure therefrom shall have been obtained from the Bureau of Ordnance (see 6.2) prior to manufacture or use. (See also 3.3).

**3.2.1 Alternate materials and designs.-** No reference in the applicable specifications or drawings to allowable alternate materials or designs shall imply that the substitution thereof at random is permissible. Unless otherwise specified, the contractor may choose which alternate he desires to furnish and shall inform the Bureau of Ordnance of his choice.

### **3.3 Freedom from material defects**

**3.3.1 General.-** For purposes of this specification "material defects" shall be taken as including all surface imperfections and all internal defects in the finished component resulting from flaws or lack of soundness in the material of the component or resulting from improper processing of the material into the finished component.

**3.3.1.1 Surface imperfections.-** Surface imperfections include pits, seams, laps, tears, cracks, scale, blisters, and other defects of similar type.

**3.3.1.2 Internal defects.-** Internal defects include pipes, laminations, segregations, internal cracks, porosity, flakes, inclusions, and other defects of similar type.

**3.3.2 General degree of freedom from defects.-** Unless otherwise specified in applicable drawings and specification and unless a special degree of internal soundness or freedom from surface imperfections is required, components shall be free from excessive "material defects". For these components, full consideration will be given to the characteristic soundness of the type of material specified or authorized and the processes used in manufacture. In general, explosive hazard will not be involved directly and the requirement is that "material defects" shall not exceed those encountered in best commercial practice and shall not affect the serviceability of the component.

**3.3.3 Special degree of freedom from defects.-** When a special degree of internal soundness or a special degree of freedom from surface imperfections is required, the applicable component drawing will call for "special internal soundness" or "special surface requirements". In general, when so specified, explosive hazard will be involved and the requirement is that the component shall be free from "material defects" of any degree that may be hazardous in addition to the requirement that "material defects" shall not affect the serviceability of the component.

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3.4 Surface finish. - The surface finish of all components shall be in accordance with the requirements of applicable drawings and specifications, and unless otherwise specified, components shall be free from burrs, sharp edges, sharp corners, areas which fail to clean up, and rough spots.

3.5 Workmanship. - All workmanship shall be high grade and suitable for the purpose intended. No interpretation of any part of this or other applicable specifications shall be construed to relieve the contractor of his responsibility in furnishing items having the required degrees of quality and workmanship.

3.6 Special press fits for sealing. - When the press fit of joints is intended to achieve a perfect gas-tight seal, the applicable component drawings will call for "Special Press Fit for Sealing". When so specified, leakage of any degree through the assembled joint will be hazardous. Each piece shall be free from any defect or indication of defect that makes the attainment of a perfect seal questionable at any place in the joint. Specific defects in regions designated as requiring "Special Press Fit for Sealing" are as follows:

a. Non-conformance with all dimensional and other requirements of the applicable drawings.

b. Departures from truly cylindrical surfaces due to out-of-roundness at any section, taper, non-uniform diameter at all sections, bow, etc.

c. Presence of surface imperfections (see 3.3.1.1) and other surface defects such as dents or scratches made in handling that might permit leakage even if the tendency to leak would be localized at the region of the defect.

d. Presence of internal defects (see 3.3.1.2) that might permit leakage when first assembled, or afterwards, due to the action of agents which are corrosive to non-metallic inclusions.

e. Indications of tool marks other than circumferential (or virtually so).

f. Presence of surface conditions that might cause roughening or galling of either mating part at final assembly such as burrs, sharp edges, inadequate blending of the press fit surface into adjacent surfaces, etc.

3.7 Concentricities of composite surfaces. - When the concentricities of two or more surfaces (one of which may be threaded) are to be controlled to accept a "functional gage" for the composite surface the drawing will so indicate and will specify the minimum diametral allowance between mating parts for each non-threaded surface. The functional gage will be in accordance with NAVORD OSTD 66 and, unless otherwise specified on the drawing, will follow the 40% rule for non-threaded surfaces.

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3.8 Resistance welds, spot and seam, steel components (see 6.3).-  
Surfaces to be welded shall be free from objectionable films detrimental to the welding process. Welds shall have shear strengths equal to or greater than the values specified on the applicable drawings. Test specimens for shear strength shall be actual production parts, portions thereof, or special test specimens which conform to production parts with respect to material, thickness, surface conditions and mass distribution of material within the throat of the machine. Welds shall be free of cracks, pits, tip pick-up or other defects not acceptable in best commercial practice. Representative welds shall be sectioned and examined and shall show sound fused nuggets of diameter at least twice the thickness of the thinner member. It shall be the contractor's responsibility to satisfy the inspector that the required quality of welds is consistently maintained. Nothing in this specification shall be interpreted as limiting the Inspector in using additional tests to assure that all welds are satisfactory. In addition, except as noted herein or on the applicable drawings, the following documents apply:

JAN-STD-19

MIL-STD-20

General Specifications for Inspection of Material, Appendix VII, Welding, including Part D - Section D-1, Part F - Section F-1, Part G - Section G-1, Part G - Section G-2.

### 3.9 Cold worked steel parts, stress relieving of. -

3.9.1 Heat treated components. - Heat treated components on which cold work operations have been authorized (see 3.1.2) shall be adequately stress relieved to assure freedom from susceptibility to cracking or subsequent distortion as a result of unrelieved stresses.

3.9.2 Cold formed components. - Components produced by cold forming operations which reduce ductility appreciably or induce appreciable internal stress shall be adequately stress relieved to assure freedom from susceptibility to cracking or subsequent distortion as a result of unrelieved stresses.

## 4. QUALITY ASSURANCE PROVISIONS AND TEST REQUIREMENTS

4.1 General. - General requirements for inspection shall be in conformance with OP 400.

4.1.1 Contractor's inspection. - The contractor shall determine, by whatever means or methods he desires and to the extent necessary, that all supplies and services and parts thereof offered for government acceptance or delivery conform with the requirements of the contract and all associated applicable documents.

4.1.2 Government inspection. - The Inspector shall, during the process of manufacture and assembly, perform, witness, or participate in such inspections and tests as are required by "Acceptance Inspection Instructions," and as otherwise considered necessary, to assure conformance with the requirements

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of the contract and all associated applicable documents. The "Acceptance Inspection Instructions" will normally be transmitted by the Procuring Activity by official correspondence, at the time inspection cognizance is assigned.

4.2 Threads. - The following exception to the "not go" gaging practice as given in Handbook H28, "Screw Thread Standards for Federal Services" and supplement thereto, shall apply to the items covered by this specification:

4.2.1 "Not go" gaging. - An approved "not go" gage shall not enter or be entered for a distance greater than one half the length of the threads or for a distance greater than four turns, whichever is less.

## 5. PREPARATION FOR DELIVERY

5.1 Packing. - Items shall be prepared and packed for shipment as shown on the applicable drawings or as otherwise specified.

5.2 Marking. - Each packing container shall be marked as shown on the applicable drawings and in accordance with Standard MIL-STD-129.

## 6. NOTES

6.1 Intended use. - See 1.1

6.2 Correspondence. - After the contract has been negotiated, all technical correspondence relating to alternates, waivers, modifications, revisions, clarification of drawings or specifications, approval of chemical composition, and to other technical data shall be forwarded to the Bureau of Ordnance via the cognizant inspector.

6.3 Relation to NAVORD OS 1649. - Paragraph 3.8 of this specification supersedes the requirements of NAVORD OS 1649, Specification For Spot and Seam Welding For Ammunition Components. (Steel).

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, 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.