NOTE: The document identifier and heading has been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

MIL-PRF-907E
18 June 1985
SUPERSEDING
MIL-A-907D
22 June 1966
(See 6.4)

PERFORMANCE SPECIFICATION

ANTISEIZE THREAD COMPOUND, HIGH TEMPERATURE

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers antiseize compound for use on threads of steel nuts, studs, bolts and other mating surfaces, including those of superheated steam installations, at temperatures up to 1050 degrees Fahrenheit (°F).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

P-D-680	- Dry Cleaning Solvent.
PPP-C-96	- Cans, Metal, 28 Gage and Lighter.
PPP-T-1637	- Tubes, Shipping, Collapsible.

MILITARY

MIL-S-1222	- Studs, Bolts, Hex Cap Screws and Nuts.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 8030

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STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.
FED-STD-791 - Lubricants, Liquid Fuels and Related Products; Methods of Testing.

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-290 - Packaging of Petroleum and Related Products.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 109 - Steel, Carbon, Cold-Rolled Strip. (DoD adopted)
A 193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service. (DoD adopted)
A 194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service. (DoD adopted)
A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate and Higher-Temperature Service. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Qualification. The antiseize compound furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 Material. The compound shall be a smooth homogeneous mixture, uniform in appearance, free from lumps, abrasive materials, or otherwise undesirable fillers or impurities. There shall be no odor of rancidity or perfume.

3.3 Corrosion on copper. After 24 hour exposure, the compound shall show no green color, no pitting or etching on the copper, nor shall a dark brown or black stain remain on the copper strip after washing with N-hexane when tested as specified in 4.5.1. A slight brown stain shall not be cause for failure.

3.4 Toxicity. The compound shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to potential health hazards shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting activity (see 3.10).

3.5 Homogeneity. The compound shall be completely homogeneous at the time of inspection or during storage awaiting completion of the qualification tests. It shall possess a smooth greasy consistency without lumps, crusts or granular particles when examined as specified in 4.4.2.1.

3.6 Oil separation. The vehicle of the compound shall separate not more than 10 percent of the compound's weight in 30 hours when tested at 150 ± 5°F (66 ± 3 degrees Celsius (°C)) as specified in 4.5.1.

3.7 Storage stability. After the compound has been stored for 6 months at a temperature of 150 ± 5°F (66 ± 3°C), it shall be examined in accordance with 4.5.3. The compound shall be a smooth homogeneous mixture free from lumps and granular materials.

3.8 Performance. There shall be no galling of the stud threads, the nut threads, the nut contacting surface and the corresponding plate contacting surface when the test apparatus is disassembled following the performance test as specified in 4.5.2. The average breakaway torque for the loosening of the nuts from the studs shall be as specified in 4.5.2.1.4.

3.9 Containers. The compound shall be furnished, ready for use, in containers specified in 5.1 and 6.2.1.

3.10 Material safety data sheet. The contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS is form OSHA-20 and found as part of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 3.4).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) Qualification inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory acceptable to the command or agency concerned. Qualification inspection shall consist of examination and tests specified in 4.4 and 4.5.

4.4 Quality conformance inspection.

4.4.1 Lot. For purposes of sampling, a lot shall consist of all compound manufactured as one batch.

4.4.2 Examination of filled containers. A sample of filled containers selected from each lot in accordance with MIL-STD-105 at inspection level I and acceptable quality level (AQL) of 2.5 percent defective shall be examined to verify compliance with all stipulations of this specification regarding fill, closure, marking and other requirements not involving tests. Containers shall be examined for defects of the container and the closure, for evidence of leakage, and for unacceptable markings; each sample filled container shall also be weighed to determine the amount of the contents. Any container in the sample having one or more defects, or under required fill shall cause rejection of the container and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan as specified in MIL-STD-105, this shall cause rejection of the lot represented by the sample.

4.4.2.1 Examination of compound material. Portions of the compound material shall be taken from top, bottom and intermediate parts of the sample of containers and examined visually to determine that there is no apparent difference in appearance or consistency. The material shall be homogeneous and show a smooth greasy consistency without lumps, crusts or granular particles. It shall not have an odor of rancidity or perfume.

4.4.3 Sample material for testing. From each lot, containers shall be selected to form two separate specimens of 5-pounds each. These shall be sealed and marked for forwarding to a testing laboratory acceptable to the command or agency concerned. One of the two 5-pound sample specimens shall be subjected to the test specified in 4.5.1 for quality conformance. The other 5-pound sample specimen shall be retained by the manufacturer or contractor for verification testing, if required, at a later date.

4.4.4 Sampling for production check tests. Unless otherwise specified (see 6.2.1), from the first lot produced on a contract or order and thereafter at such intervals as may be considered necessary by the command or agency concerned to verify the consistency of production quality, one 2-pound sample and two 1-pound samples of compound shall be forwarded to a laboratory acceptable to the command or agency concerned. These samples shall be subjected to any of the tests specified in 4.5 deemed necessary by the command or agency concerned to determine conformance of the product.

4.4.3 Certification of quality conformance. A certification of compliance shall be prepared in accordance with the data ordering document (see 6.2.2).

4.5 Tests.

4.5.1 Test procedures. The following tests shall be performed in accordance with table I.

TABLE I. Test methods.

Test	Applicable FED-STD-791 test method	Test paragraph	Acceptance criteria
Corrosion on copper	5309	----	3.3
Oil separation (150°F)	321	----	3.6
Storage stability	3467	4.5.3	3.7
Performance		4.5.2	3.8

4.5.2 Performance tests.

4.5.2.1 Torque, galling and seizing test.

4.5.2.1.1 Apparatus. The test apparatus shall consist of the following: A fixture made of carbon steel, using material in accordance with ASTM A 515, grade 70, 12 by 3 inches by approximately 1-1/2 inches thick for the end blocks which shall have five equally spaced holes, 13/16 inch in diameter, with surface finish of 250 roughness height rating (RHR), to allow for insertion of 3/4 inch-10 UNC studs (see figure 1). The top and bottom faces of the steel end blocks shall have a surface finish of 250 RHR and be parallel within plus or minus 0.002. Five unused coarse thread studs, in accordance with grade B16 of MIL-S-1222, ASTM A 193 or equal, cut from the same length of a continuously threaded stud stock and ten unused nuts, in accordance with grade 4 of MIL-S-1222, ASTM A 194 or equal, shall be used for this test. Each stud shall be 12.000 ± 0.125 inches long and shall have end surfaces which are perpendicular to the axis of the stud to a degree which shall allow stud length measurements of the required accuracy. Two carbon steel face plates in accordance with ASTM A 109, 12 by 3 inches and 0.125 inch thick, with a surface finish of 62 RHR or smoother and five equally spaced holes to match those of the above described end blocks, shall be furnished for this test. Components for this test shall be as shown on figure 1. A torque wrench shall be used which is easily readable, graduated in foot-pounds (ft-lb) and has a degree of accuracy of plus or minus 5 percent. The overall length of each stud shall be measured with a dial indicator type device or equal, graduated in 0.0001 inch divisions, having an overall accuracy of plus or minus 0.0001 inch.

4.5.2.1.2 Preparation. Dry-cleaning solvent shall be in accordance with type I of P-D-680. Each component shall be cleaned in the dry-cleaning solvent and dried just prior to lubrication. The test equipment shall be assembled using the two plates as specified in 4.5.2.1.1. The threads of the studs and nuts shall be evenly coated with the antiseize compound as follows:

(a) A liberal quantity of compound shall be applied to the studs and nuts.
(b) The nuts shall then be run on to the ends of the studs (prior to assembly with the block).
(c) The excess compound shall be removed from the ends of nut travel on the studs and from the edges of the nuts after removal from the studs.

The block and plates shall be assembled with a stud in each of the five holes. The surface of the plates and the mating surfaces of the nuts shall be coated with a light coating of the antiseize compound. The nuts shall be run on to the studs, hand tight, against the plates. The overall length of each stud shall be measured to plus or minus 0.0001 inch and recorded.

4.5.2.1.3 Procedure. The nuts shall be tightened until an elongation of 0.0162 ± 0.0001 inch is obtained, which corresponds to a stress of approximately 50,000 pounds per square inch at the root area of the stud thread. The torque required for each nut and stud tightening shall be recorded. The test block assembly shall be placed in an electrically heated oven and subjected to 1050 plus 10 minus 0°F for 6 hours. Then the assembly shall be removed from the oven and allowed to cool to room temperature. The nuts shall be loosened and breakaway torque shall be measured and recorded. The length of the studs shall be measured. The nuts shall be tightened to re-establish the elongation of the stud lengths (that is, 0.0162 ± 0.0001 inch) and the torque required recorded. The heating, cooling, breakaway measurement and stud length measurement shall be repeated. Then for the third time the assembly shall be heated, cooled and subjected to a spray of 20 percent aqueous solution of sodium chloride for 7 days. At the end of this period, the assembly shall be removed and allowed to dry at room temperature for 24 hours. The torque required to loosen the nuts shall be determined and recorded. The condition of the threads and other contact surfaces, seizing of the nuts and shearing of studs shall be noted and properly recorded. A five-point check of the torque wrench calibration (at 50, 100, 150, 200 and 250 ft-lb) shall be made at the beginning of the test sequence and upon its completion. A one-point check of the wrench calibration against another calibrated wrench at 150 ft-lb shall be made prior to torquing and untorquing each assembly. If the torque wrench is dropped or otherwise damaged during its use, its calibration shall be completely rechecked (five points) before further usage. The torque wrench calibration shall be considered acceptable if the torque reading is within 5 percent of the actual torque.

4.5.2.1.4 Acceptance criteria.

(a) No nuts shall seize during this test.
(b) There shall be no galling evident on the threads of the nuts or studs, the nut surfaces and the plate surfaces (under the nut faces). Only one nut per stud need be removed to inspect for galling on threads. Mating surfaces of each nut and plate shall be inspected after disassembly. No galling is defined as no raised metal on any contacting surfaces (as can be observed with 20-20 vision at 1X magnification within the distance range of 1/2 to 2 feet).
(c) The average breakaway torque for the loosening of the nuts from the five studs shall not exceed 250 ft-lb.

4.5.3 Storage stability. Storage stability shall be in accordance with method 3467 of FED-STD-791 with the modifications specified herein. Two one-pound cans shall be stored covered in an oven at a temperature of 66 ± 3°C (150 ± 5°F) for 6 months. The samples shall then be examined in accordance with 4.4.2.1 and for presence of crystalline material. No crystalline material or lumps are acceptable.

4.6 Toxicological data and formulations. The contractor shall furnish the toxicological data and formulations required to evaluate the safety of the material for the proposed use.

4.7 Inspection of packaging. Sample packages and packs and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisition.)

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2.1). The containers shall be of a type and have a capacity in accordance with table II.

TABLE II. Container type and capacity.

Container	Size
Cans	5 pound 1 pound
Dispensing tube	8 ounce

5.1.1 Level A.

5.1.1.1 Unit packaging. The compound shall be furnished in 8-ounce tubes or 1-pound cans as specified (see 6.2.1). Tubes shall conform to type I or type II, class optional in accordance with PPP-T-1637 and cans shall conform to type V, class 2 in accordance with PPP-C-96. Cans shall require exterior plan A coating. Wire handles, when furnished, shall be galvanized or protectively coated to resist corrosion.

5.1.1.2 Intermediate packaging. When specified (see 6.2.1), 8-ounce tubes and 1-pound cans shall be intermediate packaged in accordance with PPP-T-1637 or PPP-C-96, as applicable.

5.1.2 Level C. Compound in the quantity and container specified (see 6.2.1) shall be packaged in containers, to afford protection against deterioration, loss of contents and physical damage during shipment from the supply source to the first receiving activity for immediate use. The contractor's normal retail or wholesale packaging methods may be utilized when such meets the requirements of this level.

5.1.3 Container materials. The container materials in contact with the compound shall be inert, corrosion resistant and free of contaminants in accordance with 3.2, throughout the shelf life of the compound.

5.2 Packing and marking. Antiseize compound packaged as specified shall be packed level B, C, or commercial as specified (see 6.2.1) and marked in accordance with MIL-STD-290.

6. NOTES

6.1 Intended use. The antiseize compound covered by this specification is intended for use on carbon steel materials. Specifically, it is to be used on threads of nuts, studs, bolts and other mating surfaces at temperatures up to 1050°F.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

(a) Title, number and date of this specification.
(b) Size and type of container required (see 3.9, 5.1.1.1 and 5.1.1.2).
(c) If sample size is other than specified (see 4.4.4).
(d) Levels of packaging, packing and marking required (see 5.1 and 5.2).

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of FAR 52.227-7031 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraph.

Paragraph no.	Data requirement title	Applicable DID no.	Option
4.4.5	Certificate of compliance	DI-E-2121	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4 or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List QPL-907 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

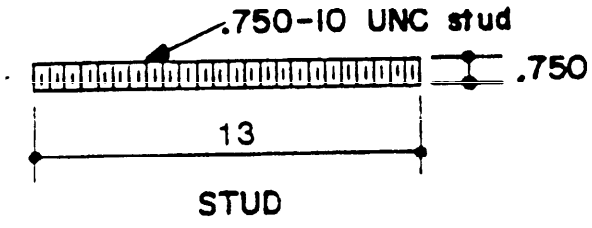
6.4 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army - MR
Navy - SH
Air Force - 99

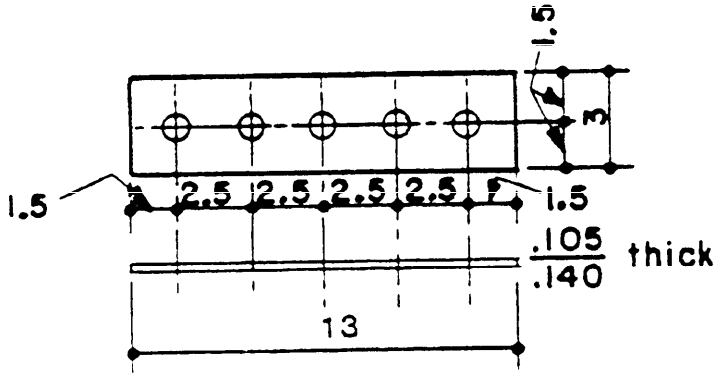
Review activities:
Army - EA
Navy - YD, AS
Air Force - 84

User activities:
Army - GL, MI, ME, AT, AR
Navy - MC, OS

Preparing activity:
Navy - SH
(Project 8030-0510)



STUD



FACE PLATE

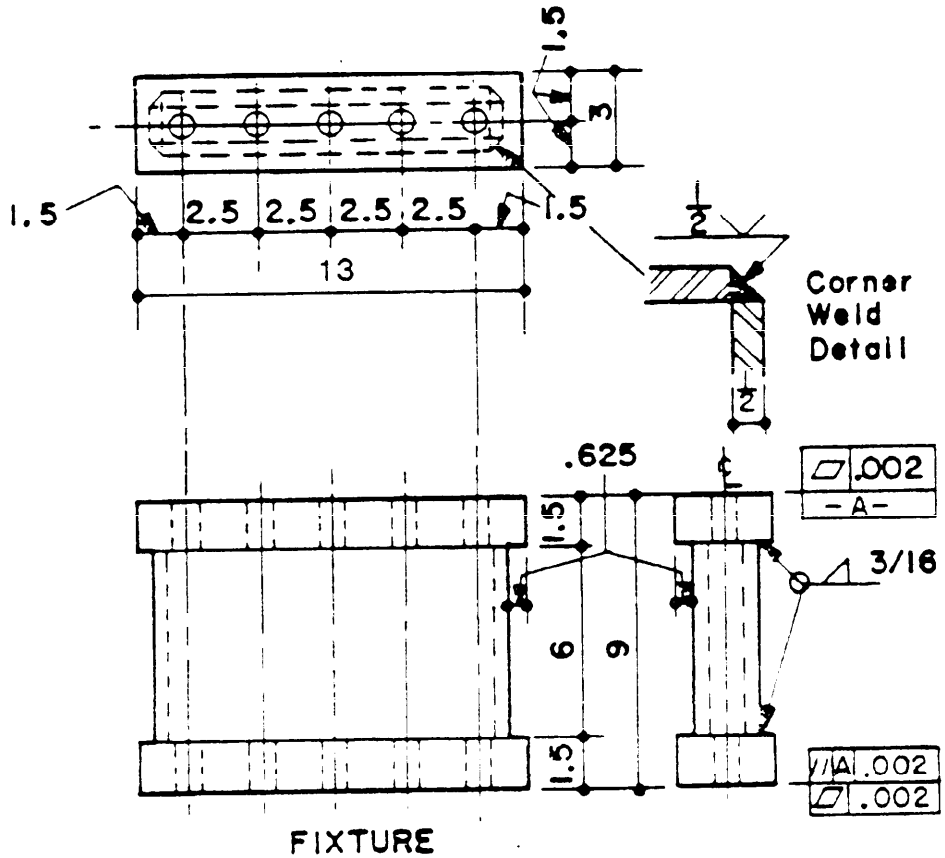
NOTES:

All dimensions are in inches.

Tolerances are ±0.020 except as otherwise specified.

The welded fixture shall be stress relieved before finish machining.

See 4.5.2.1.1 for materials, number of parts required, and other instructions.



FIXTURE

SH 12499

FIGURE 1. Test fixture.

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-A-907E	Antiseize Thread Compound, High Temperature

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5 PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation

6 REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

DD FORM 82 MAR 1426

PREVIOUS EDITION IS OBSOLETE.