

[INCH-POUND]

FF-S-2738A
March 30, 1999
~~SUPERSEDING~~
FF-S-2738
June 7, 1990

FEDERAL SPECIFICATION

SEALS, ANTIPIRFERAGE

The General Services Administration has authorized the use of this specification by all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers 14 types of antipilferage seals. These seals are not intended to resist a forced entry attack. Special purpose seals, such as fiber optic, sophisticated electronic seals, and pressure sensitive label seals are not covered by this specification. The generic classification of seals utilized in this specification is based on American Society for Testing and Materials (ASTM) standard F832-90, Standard Classification for Security Seals. This is not to imply that other seals do not exist. Other seals for use in higher antipilferage security applications fall outside the scope of this specification. Users of this document are reminded to refer to their individual agencies' Physical Security Manual and the Department of Defense manual 5100.76-M, as appropriate.

1.2 Classification.

1.2.1 General. For the purpose of defining the most appropriate configuration by which to evaluate a security seal in subsequent tests, a seal shall be classified as an initial step.

1.2.2 For the purpose of comparing the physical properties of security seals, seals are grouped in accordance with ASTM F 1157:

Group 1 - Flexible cable and wire seals.

Group 2 - Strap and cinch seals.

Group 3 - Rigid bolt and rod seals, including heavy duty metal padlock type (keyless).

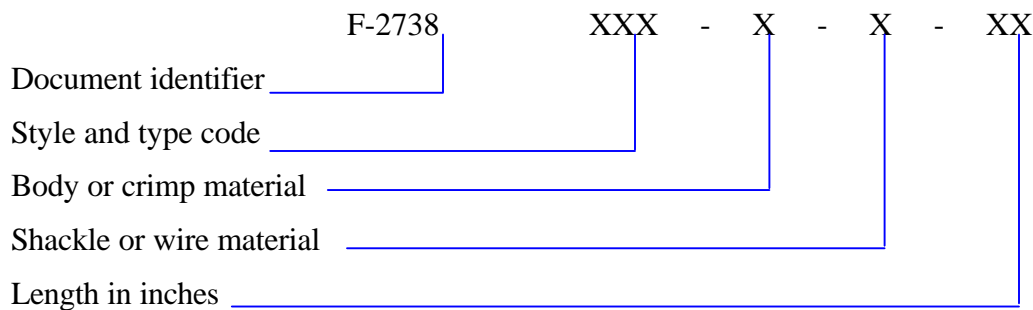
Group 4 - Twisted rod or wire seals.

Group 5 - Padlock type seals, scored seals, metal or plastic base.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may be improve this document should be sent to: Officer in Charge (Code 462), Seabee Logistics Center, 4111 San Pedro St., Port Hueneme, CA 93043-4410.

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1.2.3 Part identification number. Seals covered by this specification are identified by a part identification number (PIN). The PIN consists of a five digit alpha-numeric document identifier plus the PIN code. See paragraph 1.2.4 (right hand column) for the Style and Type PIN code and paragraph 6.5 for further PIN information. The construction of the PIN is indicated below:



1.2.4 Seals described herein are classified by the following styles and types:

Classification:

Style and Type PIN code:

Style A - Wire

Type 1 - Crimp	A01
2 - Fold	A02
3 - Cup	A03

Style B - Padlock Type (keyless)

Type 4 - Wire Shackle	B04
5 - Plastic Shackle	B05
6 - Steel Shackle	B06

Style C - Strap

Type 7 - Car/Box End	C07
8 - Car/Plastic	C08
9 - Car/Ball End	C09
10 - Crimp, Special Marking	C10

Style D - Cable

Type 11 - One Piece	D11
Type 12 - Two Piece	D12

Style E - Bolt

Type 13 - Unthreaded	E13
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Style F - Pull-Tight (Cinch)

Type 14 - Plastic Tie	F14
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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these

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documents are those listed in the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).
Federal Specifications

QQ-S-781 - Strapping Steel and Seals

Military Standards

MIL-STD-810 - Environmental Test Methods and Engineering Guidelines.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

ANSI Z1.4 - Sampling

ASTM F 832 - Standard Classification for Security Seals.

ASTM F 1157 - Standard Practice for Classifying the Performance of the Physical Properties of Security Seals.

ASTM F 1158 - Standard Guide for Evaluation of Tampering of Security Seals.

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detailed specifications, specification sheets, or MS standards), the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable law and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. For the purpose of comparing the physical properties of security seals, seals are grouped in accordance with the following description of application seals:

3.1.1 Groups

3.1.1.1 Group 1-Flexible cable and wire seals.

3.1.1.2 Group 2-Strap and cinch seals.

3.1.1.3 Group 3-Rigid bolt and rod seals, including heavy duty metal padlock type (keyless).

3.1.1.4 Group 4-Twisted rod or wire seals.

3.1.1.5 Group 5-Padlock type seals, scored seals, metal or plastic base.

3.1.2 Seal samples. Seals submitted for inspection shall, as a minimum, conform and perform as required to meet the criteria from ASTM F 1157.

3.1.3 Bid samples. Unless otherwise specified (see 4.3, 6.2, and 6.3) each bidder shall furnish, with the bid, a minimum of 3 seal samples per test, of each seal they propose to furnish under the contract for inspection as specified in 4.3. One intact unit of each of the selected product will be

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returned to the selected bidder to be used as a guide in manufacturing the first article and production quantity.

All samples submitted will be competitively tested and the manufacturers' proprietary information protected. Test results and tested samples become the property of the Government to protect testing methods and techniques, and manufacturers' proprietary information (see 3.1.4 and 6.4). Test units will not be returned to the bidder or supplier.

3.1.4 First article. Unless otherwise specified (see 4.3), 15 samples shall be furnished for first article testing and approval (see 4.4). If the requirement for bid samples is waived, a minimum of 3 seal samples per test shall be furnished for first article testing approval. The first article units shall be selected at random from the first 100 standard production units or from the contractors current inventory. If approved, one intact unit of each of the first article submission will be forwarded to the cognizant quality assurance representative, and one intact unit shall be returned to the contractor to serve as the manufacturing standard. No deviation from the manufacturing standard shall be acceptable without formal written approval of the contracting officer in advance. All samples submitted will be competitively tested and the manufacturers proprietary information protected. Test results and tested samples become the property of the Government to protect testing methods and techniques and manufacturers' proprietary information (see 3.2.2 and 6.4). Test units will not be returned to the bidder or supplier.

3.2 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. Unless otherwise specified none of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification.

3.3 Standard commercial product. The seals of the same classification shall, as a minimum, be in accordance with the requirements of this specification and may be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturers' standard commercial product, shall be included in the seals being furnished. A standard commercial product is a product which has been sold or is currently being offered for sale, on the commercial market through advertisements or manufacturers' catalogs or brochures, and represents the latest production model.

3.4 Resistance to surreptitious attack or tampering. Each seal shall resist surreptitious attack or tampering as specified herein. Should the seal be defeated or compromised by these manipulations, telltale marks or evidence shall be so indicated by inspection and performance evaluation (see 3.5).

3.4.1 The design of the locking device shall be such that when locked the seal is tamper resistant to the extent that it will not unlock as a result of manipulation with a pin, wire, pick, knife, thin piece of metal or any other tool without leaving visible evidence of tampering, or if unlocked, being damaged so that they cannot be re-locked.

3.5 Description.

3.5.1 Style A - wire, type 1 - crimp. Various types of crimp/wire seals are in common use. Essentially crimp/wire seals consist of a small piece of metal with holes for the passage of the sealing wire. The wire is passed through the closure hasp on the container to be sealed and then through the holes in the metal piece, which is then compressed to grasp the wire.

3.5.1.1 Physical requirements. Crimp/wire seals shall be either aluminum or steel sheet with formed holes. Crimp/wire seals shall be furnished with or without marking in accordance with 3.6 as specified (see 6.2). Wire furnished with crimp wire seals shall be spiral wound, single strand, two or 3 ply galvanized or stainless steel wire, specified by the user.

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3.5.1.2 Resistance to tampering. The seals shall resist tampering for a period of at least 30 seconds (see 3.4.1).

3.5.2 Style A - wire, type 2 - folding. This seal uses a spiral wound wire, single strand, two or 3 ply galvanized or stainless steel, specified by the user. The wire is passed through the closure hasp on the container to be sealed. The ends are then inserted into a metal box which is locked onto the serrations of the wire. The metal box is provided with points of frangibility to prevent undetected reopening.

3.5.2.1 Physical requirements. Folded wire seals shall be formed sheet metal boxes which can be locked onto a piece of wire. Boxes shall fracture upon reopening. Boxes shall be coated with material which will discolor upon heating. Boxes shall be marked in accordance with 3.6. Wire furnished with folding wire seals shall be spiral wound.

3.5.2.2 Resistance to tampering. The seals shall resist tampering for a period of at least 30 seconds (see 3.4).

3.5.3 Style A - wire, type 3 - cup. This seal consists of three cup shaped sheet metal stampings, which mate together one way to form an enclosure protecting a crimp/wire seals' crimp point. One hole allows the wire to exit and to pass through a hasp and return. It is a protected crimp seal, or two seals in one. The interior of this seal lends itself to distinctive markings prior to sealing, which if photographically recorded can be used to confirm authenticity of the seal when opened.

3.5.3.1 Physical requirements. Cup seals shall consist of formed sheet metal parts which snap together to form boxes over the knotted wire. Boxes shall not be opened without damage to the box. The box shall be marked in accordance with 3.6. Wire furnished with cup/wire seals shall be 15 strand stainless steel.

3.5.3.2 Resistance to tampering. The seals shall resist tampering for a period of at least 30 seconds (see 3.4.1).

3.5.4 Style B - padlock, type 4 - wire shackle. This seal uses a spring wire shackle which passes through the hasp and is inserted into a block shaped in such a way that once the wire springs into position the shackle cannot be removed without tearing or deforming the block.

3.5.4.1 Physical requirements. Wire shackle padlock seals shall be furnished with either a molded plastic body or a stamped metal body. The wire shall be galvanized or stainless steel of 0.041, 0.047, or 0.055 inch diameter as specified by the user. The body shall be marked in accordance with 3.6.

3.5.4.2 Resistance to tampering. The stamped metal body seal shall resist tampering for a period of at least 1 minute (see 3.4.1). The plastic body seal shall resist tampering for a period of at least 15 seconds (see 3.4.1).

3.5.5 Style B - padlock, type 5 - plastic shackle. This seal consists of one piece of molded plastic shaped similar to a padlock. The shackle is provided with locking devices to engage in the body of the seal. Points of frangibility are provided on the shackle if desired for hand breaking on both sides of wire hasp. This should be noted as "scoring required". Non-scored seals normally require a cutting tool for removal.

3.5.5.1 Physical requirements. The hasp opening shall be nominally 1 inch by 1/2 inch. The seal shall be marked in accordance with 3.6.

3.5.5.2 Resistance to tampering. The seal shall resist tampering for a period of at least 15 seconds (see 3.4).

3.5.6 Style B - padlock, type 6 - steel shackle. These padlock seals are keyless locks. The body of the seal contains the locking mechanism. A hardened shackle is utilized.

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3.5.6.1 Physical requirements. All padlock seals shall have both pieces marked in accordance with 3.6.

3.5.6.2 Resistance to tampering. The seal shall resist tampering for a period of at least 15 seconds (see 3.5.5.2).

3.5.7 Style C - Strap, type 7 - car/box end. The car/box end seals are steel strap or aluminum strap seals with a comparable metal box as specified (see 6.2). This seal employs a strap which passes through a staple to secure a hasp. One end of the strap is folded and crimped to form a box which contains a capture mechanism. The other end, when inserted into the box is captured forming a seal.

3.5.7.1 Physical requirements. The car/box end seal shall consist of a metal strap not less than 6 inches long and not less than 0.3 inches wide and a comparable metal box. The seal strap shall be marked in accordance with 3.6.

3.5.7.2 Resistance to tampering. The seal shall resist tampering for a period of at least 30 seconds (see 3.4.1).

3.5.8 Style C - strap, type 8 - car/plastic. This seal is a plastic version of the type 7 and 8 car seal. One end of the strap locks into a plastic capture device, molded on the other end of the strap.

3.5.8.1 Physical requirements. The car/plastic seal shall consist of a thermosetting plastic strip not less than 6 inches long and not less than 0.3 inches wide. The seal shall be marked in accordance with 3.6.

3.5.8.2 Resistance to tampering. The seal shall resist tampering for a period of at least 15 seconds (see 3.4).

3.5.9 Style C - strap, type 9 - car/ball end. The car/ball end seals are steel strap or aluminum strap seals with a comparable metal ball as specified (see 6.2). The latching mechanism is two or more piano-wire loops which capture both ends of the strap within the ball, when sealed.

3.5.9.1 Physical requirements. The car/ball end seal shall consist of a metal strap not less than 6 inches long and not less than 0.3 inches wide and comparable metal ball. The seal shall be marked in accordance with 3.6.

3.5.9.2 Resistance to tampering. The seal shall resist tampering for a period of at least 30 seconds (see 3.4).

3.5.10 Style C – strap, type 10 – crimp, special marking. Strap seals are standard steel strapping closures with a controlled lithographic design and with special marking.

3.5.10.1 Physical requirements. Strap seals shall conform to QQ-S-781. Lithography and marking shall be as specified (see 6.2).

3.5.10.2 Resistance to tampering. The seal shall resist tampering for a period of at least 5 minutes.

3.5.11 Style D - cable, type 11 - one piece. These cable seals are high strength seals using 0.1875 or 0.25 inch diameter aircraft cable which either has a swaged capture device at one end or both ends. When at only one end, the device captures the inserted cable directly and can be cinched up on the staple or hasp. If at both ends, then one end is a male which fits into the other end's swaged female fitting.

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3.5.11.1 Physical requirements. As specified (see 6.2) the cable shall be a minimum of 0.188 or 0.250 inch diameter of galvanized steel for pull through seals. The cable shall be a minimum of 8 inches long from the locking mechanism to the end of the cable.

3.5.10.2 Resistance to tampering. The seal shall resist tampering for a period of at least 30 seconds (see 3.4).

3.5.12 Style D - cable, type 12 - two piece. The two piece seal consists of a piece of steel cable to which a separate locking mechanism is connected at the time of sealing. The attachment of the locking mechanism may be either to the cable or to an attached locking point on the cable.

3.5.12.1 Physical requirements. As specified (see 6.2), the cable shall be a of minimum 0.188 or 0.250 inch diameter galvanized steel. Both pieces of a two piece seal shall be marked in accordance with 3.6.

3.5.12.2 Resistance to tampering. The seal shall resist tampering for a period of at least 30 seconds (see 3.4).

3.5.13 Style E - bolt.

3.5.13.1 Type 13 - unthreaded. The unthreaded bolt seals shall consist of an unthreaded pin and locking cylinder. When the pin is inserted in the cylinder, a notch on the pin shall be captured by a locking ring, locking the seal.

3.5.13.2 Physical requirements. Both pieces of the bolt seal shall be marked in accordance with 3.7 if the locking end is reusable.

3.5.13.3 Resistance to tampering. The seal shall resist tampering for a period of at least 30 seconds (see 3.4).

3.5.14 Style F - pull-tight (cinch), type 14 - plastic tie. This one piece plastic seal consists of two parts, a string or slender strap that is connected to a capture device at one end. The free end is inserted through the capture device and cinched. Spring fingers grasp the serrated string and prevent its removal.

3.5.14.1 Physical requirements. The plastic tie seal shall be marked in accordance with 3.6.

3.5.14.2 Resistance to tampering. The seal shall resist tampering for a period of at least 30 seconds (see 3.4).

3.6 Marking. All seals shall be marked with letters and numerals as specified herein and in accordance with manufacturers standard practice (see 6.2).

3.6.1 Letters. Unless otherwise specified, the seals shall be marked with the letters "US" and agency initials specified by the ordering agency (see 6.2).

3.6.2 Serial numbers. All seals shall be marked with consecutive serial numbers excluding any duplication of serial numbers. Serial numbers should be specified by the ordering agency. Alpha numeric serial numbers are permitted unless specifically prohibited (see 6.2).

3.6.3 Marking location. All marked seals shall be marked on the main body of the seal. Seals constructed in more than one piece shall have the same serial number marked on each piece except for the wire used in types 1, 2, 3, and 4 or break-off type set screws used in types 6, 11, 12, and 13. Any part(s) that can be reused after removal shall also be marked.

3.7 Finish. When specified (see 6.2), and when not otherwise specified herein, the finish shall be tinned, galvanized, painted, or other finish if the manufacturers option is not acceptable. When color is a disqualifying factor, it shall also be as specified in the contract.

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 (examinations and tests) 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all their specific requirements of sections 3. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspection. Inspection shall be classified as follows:

- a. Bid sample inspection (see 4.3 and 6.3).
- b. First article inspection (see 4.4 and 6.4).
- c. Quality conformance inspection (see 4.5).
- d. Inspection of packaging (see 4.8).

4.3 Bid sample inspection. Bid sample inspections shall be conducted by agencies as specified in the contract. Sample selection shall be at the manufacturer's option as specified in 3.1.3 and 4.3.1.

4.3.1 Bid sample examination. Bid sample seals shall be examined for compliance with the requirements of this specification. The presence of any defect or dimensions not within specified requirements shall be cause for rejection of the bid. Bid sample seals, after inspection and examination, shall be handled as specified in the contract. Bid samples shall be reproduction or standard production units from the contractor's current inventory.

4.3.2 Bid sample test. Bid sample seals shall be tested in accordance with 4.1.1, 4.5, and 4.6.

4.4 First article inspection.

4.4.1 Sampling for first article. When a first article is required for seals that were inspected as bid samples, refer to paragraphs 3.1.4 and 6.2.1.1.

4.4.2 First article tests. The first article shall be subjected to the tests as specified in 4.6.2 and 4.6.3 (see 6.4). Failure of any test shall be cause for rejection.

4.5 Quality conformance inspection.

4.5.1 Sampling.

4.5.1.1 Sampling for examination. Sampling for examination shall be in accordance with ANSI Z1.4.

4.5.1.2 Examination. Samples selected in accordance with 4.5.1.1 shall be examined for compliance with the requirements of this specification.

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4.5.2 Sampling for tests. Seals shall be randomly selected from the lot submitted for acceptance in accordance with ANSI Z1.4.

4.5.3 Tests. The seals selected in accordance with 4.5.1.2 shall be subjected to the tests specified in 4.6.3.

4.6 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions and procedures specified herein.

4.6.1 Classification of defects. The seals selected as specified shall be examined for compliance with the requirements of this specification.

4.6.2 Test conditions. Except as otherwise specified herein, tests shall be conducted at prevailing ambient temperatures and humidity in the test facility.

WARNING

THESE TESTS MAY BE HAZARDOUS TO YOUR HEALTH AND/OR CAUSE
SERIOUS INJURY. PROPER SAFETY PRECAUTIONS SHOULD BE TAKEN.

THE UNITED STATES GOVERNMENT NEITHER ASSUMES NOR ACCEPTS
RESPONSIBILITY FOR ANY INJURY OR DAMAGE TO NON-GOVERNMENT
PERSONNEL OR PROPERTY THAT MAY OCCUR DURING OR AS THE RESULT OF
ANY TEST REQUIRED BY THIS SPECIFICATION.

4.6.3 Test procedures.

4.6.3.1 Performance of Physical Properties. Tests for the relative performance and classification of the physical properties of security seals shall be conducted in accordance with ASTM F 1157. The extreme temperature tests, paragraph 6.5.1 of ASTM F 1157, shall be modified as follows:

4.6.3.1.1 During the extreme temperature tests, paragraph 6.5.1 of ASTM F 1157, allow at least two (2) hours for the test chamber to reach equilibrium. Once equilibrium has been attained, continue the high temperature exposure for four (4) hours and the low temperature exposure for a minimum of eight (8) hours. Then continue the pull and impact tests as directed in paragraph 6.5.1 of ASTM F 1157.

4.6.3.2 Surreptitious neutralization test. The seal(s) shall be manually locked, or closed, or applied (by crimping, twisting, bending, inserting, etc.) as intended by design. After locking, subject the seal(s) to be tested to a non-destructive attack in an attempt to defeat, compromise, or remove, and reapply the seal by any surreptitious action, tampering, manipulation, or any other method without leaving evidence of the attack.

4.6.3.2.1 Test Fixtures. Test fixtures for surreptitious neutralization shall depict a real life scenario with seals mounted on a container hasp or similar device.

4.7 Preparation for inspection. The seal(s) shall be manually locked, or closed, or applied (by crimping, twisting, bending, inserting, etc.) as intended by design. After locking, subject the seal(s) to be tested to a non-destructive attack in an attempt to defeat, compromise, or remove, and reapply the seal by any surreptitious action, tampering, manipulation, or any other method without leaving evidence of the attack. After this function, continue with the inspection. The seal(s) shall perform and resist the attacks of section 3 for the minimum period specified. When specified in the contract, a certificate of compliance (see 6.2), approved by the contracting officer, may be accepted as evidence that the seal has passed the required tests. The certificate shall be from a laboratory approved by the U.S. Government. Tests shall be conducted as outlined in the referenced documents and as specified herein.

4.7.1 Style A and D seals. Inspect and evaluate as specified in ASTM F 1158 for group 1 seals.

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4.7.1.1 Style C and F seals. Inspect and evaluate as specified in ASTM F 1158 for group 2 seals.

4.7.1.2 Style B, type 5, and style E seals. Inspect and evaluate as specified in ASTM F 1158 for group 3 seals.

4.7.1.3 Style B, type 4 and 5 seals. Inspect and evaluate as specified in ASTM F 1158 for group 5 seals.

4.8 Packaging inspection. The preservation, packing, and marking of the seals shall be inspected to determine compliance with the requirements of section 5 of this specification.

5. PACKAGING

5.1 Packaging requirements: The preservation, packing, and marking shall be as specified in the contract or order.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. For the purpose of this document only a antipilferage seal is a passive device used to detect tampering or entry. A seal is not expected to present a serious obstacle to entry or tampering. The passive nature of seals is indicated in that inspection is required to determine whether entry or tampering has occurred.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).
- c. When first article is required (see 3.1, 4.3 and 6.4).
- d. Type of metal desired for strap (see 3.5.7.1).
- e. Lithography and marking if different (see 3.6).
- f. Diameter of cable required (see 3.5.11.1 and 3.5.12.1).
- g. Whether marking is required on seals (see 3.6).
- h. When seals shall be marked other than as specified (see 3.6.1).
- i. Serial number required (see 3.6.2).
- j. When alpha numeric characters are prohibited (see 3.6.2).
- k. Finish and color required if other than manufacturers option (see 3.7).
- l. When certificate of compliance is acceptable (see 4.7).

6.2.1 Sampling procedures.

6.2.1.1 First article. 10 Sample units should be provided for inspection. When the requirement for bid samples is not required or waived, 20 samples should be provided for inspection. The first article unit(s) should be selected from the first 100 standard production units or from the contractor's current inventory or should be exactly the same as accepted bid samples set aside for production samples (see 6.3). Unless otherwise specified in the contract, first article units, after inspection, should be handled as specified in 3.1.4.

6.2.1.2 Examination. Recommended inspection level is S-3 and AQL level is zero percent defective for major and critical defects, and 4.0 for minor defects. A lot will be all units offered for delivery at one time not to exceed 100 units per lot.

6.2.1.3 Tests. Recommended inspection level is S-2 and AQL is zero percent defective.

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6.2.1.3.1 Environmental tests. Seals that pass or fail the following environmental tests shall not be rejected based upon these test results. The test results shall be recorded and used as additional reference material to guide the seal selectee in proper seal selection and application for their specific requirements. Tests shall be conducted in accordance with MIL-STD-810, methods 502.3, 505.3, 508.4, 509.3, 510.3, 514.4, and 521.1 as follows:

6.2.1.3.1.1. Method 502.3, Low Temperature. Follow Procedure 1 - Storage. Allow two hours for the test chamber to attain equilibrium. The test duration shall be four (4) hours for non-plastic seals and 72 hours for plastic seals after the test chamber attains equilibrium. Seals are to be unprotected. Test temperature to be $-60 \pm 3^{\circ}\text{F}$.

6.2.1.3.1.2. Method 505.3, Solar Radiation (Sunshine). Follow Procedure II - Steady state for prolonged actinic effects. Locate temperature sensors as close as practicable to the seals. Test shall consist of fifteen (15) cycles. Light emissions shall satisfy the full spectrum of Table 505.3-II. Seals shall be cleaned prior to testing. Suspend/support seals to expose as much surface area as practicable.

6.2.1.3.1.3 Method 508.4, Fungus. Suspend/support seals to expose as much surface area as practicable. Test duration shall be forty-five (45) days. Seal functions shall not be inhibited as a result of these tests.

6.2.1.3.1.4 Method 509.3, Salt Fog. Follow Procedure I - Aggravated screening. Use a salt concentration of five percent (5%). Alternate twenty-four (24) hour periods of salt fog exposure and standard ambient (drying) conditions for a total of eight (8) 24 hour periods. Suspend/support seals to expose as much surface area as practicable.

6.2.1.3.1.5 Method 510.3, Sand and Dust. Follow Procedure I - Blowing dust and Procedure II - Blowing sand. Relative humidity (RH) shall be less than thirty percent (30%) throughout the conduct of the tests. Air velocity shall be 8.9 m/s (1750 ft/min.) for blowing dust and 29 m/s (5700 ft/min.) for blowing sand. For dust: use either red china clay or silicon flour as described in Method 510.3, section I-3.2d(1)a or b, respectively. For sand: use silica sand as described in Method 510.3, section I-3.2d(2). Dust concentrations shall be $10.6 \pm 7 \text{ g/m}^3$ ($0.3 \pm .2 \text{ g/ft}^3$). Sand concentrations shall be 0.177 g/m^3 (0.0050 g/ft^3). Test times to be ninety (90) minutes per face at 71°C (160°F) for Procedure I - Blowing dust. Test times to be six (6) hours at 23°C (73°F) per face and six (6) hours at 71°C (160°F) per face for Procedure II - Blowing sand. Seals are to be non-protected and exposed to the environment. Suspend/support seals to expose as much surface area of each face as practicable.

6.2.1.3.1.6. Method 514.4, Vibration. Follow Procedure I - Transportation Vibration I-3.3.1 Category I - Basic transportation. Configure seals on mounts or shipping containers similar to their intended use. Seals must maintain their integrity throughout the tests. Use the test levels for two-wheeled trailers, Table 514.4-AI, "Random Vibration Program Data for Secured Cargo Transportation, Composite Two-Wheeled Trailer" for twenty-five (25) hours in each axis. Representative spectral shapes of wheeled (or two-wheeled) vehicle environments are shown in Figure 514.4-4 "Representative Spectral Shape, Wheeled Vehicle". Setup as necessary. Accelerometers should be located as near to seals as practicable.

6.2.1.3.1.7. Method 521.1, Icing/Freezing Rain. Suspend/support seals to expose as much surface area as practicable. Use the test temperatures, rain delivery methods, and wind velocities recommended in Method 521.1. Assume a marine environment and add a third thickness of 75mm as suggested in paragraph I-3.1.b-Test Procedures of Method 521.1.

6.2.2 Data requirements. When this specification is used in an acquisition and data is required to be delivered, the data requirements shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements list (DD Form 1423), incorporated into the contract. When provisions of DoD Federal Acquisition Regulations (FAR) Supplement, Part 27, Sub-Part 27.475-1 are invoked and the DD Form 1423 is not used, the data should be delivered by the contractor in accordance with the contractor or purchase order requirements.

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6.3 Bid Samples. When required, bid samples should be provided as specified in the contract. The contract should include specific instructions regarding arrangements for evaluation of the seals and associated testing.

6.4 First article. When a first article inspection is required, the contracting officer should provide specific guidance to offerors whether the items should be a reproduction sample, a first article sample, a first production item, a sample selected from the first production items, or a standard production item from the contractors current inventory and the number of items to be tested as specified (see 3.1 and 4.3). A first article sample unit consists of one seal. The contracting officer should include specific instructions in all acquisition instruments, regarding arrangements for examinations, tests and approval of the first article test results and disposition of the first articles. Invitations for bids should provide that the government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.5 Part or identifying number (PIN). The PIN corresponds to the types of seals covered by this specification and defines the requirements of the options presented under this specification. The document identifier number, style and type code number, body or crimp material, and shackle or wire material are combined to form the PIN as shown in the following example:

PIN code option assignments (also see paragraphs 1.2.3 and 1.2.4 and Table 1 for PIN ordering options):

Space one identifies style with an alpha character. Space two and three identifies type with a numeric character.

A01 - Crimp/wire
A02 - Fold/wire
A03 - Cup/wire
B04 - Wire shackle padlock
B05 - Plastic shackle padlock
B06 - Steel shackle padlock

C07 - Car/box end
C08 - Car/plastic
C09 - Car/ball end

D11 - Cable/one piece
D12 - Cable/two piece

E13 - Bolt, unthreaded
F14 - Pull-tight (cinch), plastic tie

Space four identifies seal body, or crimp material with either an alpha (O for Optional) or numeric character.

O. Optional, at manufactures option
1. Steel
3. Aluminum
4. Plastic
5. Other

Space five identifies shackle, or wire material with either an alpha (O for Optional) or a numeric character.

O. Optional, at manufactures option
1. Steel

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2. Aluminum
3. Plastic
4. Other

Spaces six and seven identify length with a numeric character.

- 00 - Manufacturers' standard length in inches
- 01 to 99 - Optional length in inches as specified in the order

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TABLE 1.
Possible PIN Assignment Options

Style/Type	Material		
	Body	Shackle/Wire	Length
A01	O, 1, 3, 5	0, 1, 2	00, 01 to 99
A02	O, 1, 3, 5	0, 1, 2	00, 01 to 99
A03	O, 1, 3, 5	0, 1, 2	00, 01 to 99
B04	O, 1, 3, 4, 5	0, 1, 2	Optional
B05	4	0, 3	Optional
B06	1	0, 1	Optional
C07	1, 3	0, 1, 2	00, 01 to 99
C08	4	0, 3	00, 01 to 99
C09	1, 3	0, 1, 2, 4	00, 01 to 99
C10	1	0, 1, 2	00, 01 to 99
D11	O, 1	0, 1	00, 01 to 99
D12	O, 1	0, 1	00, 01 to 99
E13	1, 4	0, 1	00, 01 to 99
F14	4	0, 1	00, 01 to 99

6.6 Background information. Background information on the selection and use of seals and photographic examples of the different types may be found in the following sources:

“Antipilferage Seal User’s Guide”, The United States Department of Defense, October 1997.

"Security Seal Handbook" - David L. Poli, Sandia Laboratories (SAND 78-0400), December 1978.

"The Use of Seals as a Safeguard Tool" - Caesar Sastre, Brookhaven National Laboratories (BNL 13480) March 6, 1969.

"Security Seals for the Protection and Control of Special Nuclear Material" United States Nuclear Regulatory, Commission Regulatory Guide 5.15, January 1974.

6.7 Definitions. Seal, antipilferage - A passive, one-time locking device used to detect tampering or entry, affords limited resistance to entry or provides a combination of both.

Tamper - Non-destructive attack in an attempt to compromise the seal and reapply the seal to cover up entry without leaving evidence of the defeat (surreptitious attack).

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MILITARY INTERESTS:

Custodians:

Army - AR
Navy – YD3
Air Force 82

Review Activities:

Army – CR4
Navy - SA, SH, MC
Air Force - 99
DLA – IS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - 7FXE
NASA - MSF
ENERGY - DOE
POSTAL - USPS
TRANSPORTATION - OST
TREASURY - ATF, OAP
NSA - NS

Preparing Activity:

Navy – YD3
(Project 5340-2375)