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MIL-DTL-32146
30 June 2004

DETAIL SPECIFICATION

WRIST SEAL, FLYERS', ANTI-EXPOSURE, RUGGEDIZED

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

1. SCOPE

1.1 Scope. This specification covers one type of flyers' ruggedized anti-exposure wrist seal. The wrist seal is furnished in one size.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 documents are those cited in the solicitation or contract.

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division (Code 414100B120-3), Highway 547, Lakehurst, NJ 08733-5100 or emailed to Tom.Omara@navy.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

AMSC N/A FSC 8475

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COMMERCIAL ITEM DESCRIPTION

A-A-50195 - Thread, Aramid

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-32149 - Cloth, Waterproof, Flame Resistant, Moisture Vapor Permeable

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch or www.dodssp.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government drawings. The following Government drawing forms a part of this document to the extent specified herein. Unless otherwise specified, the issue of this document is that cited in the solicitation or contract.

NAVAL AIR SYSTEMS COMMAND (NAVAIR)

3769AS120 - Wrist Seal, Flyers' Ruggedized Anti-Exposure

(Copies of this drawing are available online at http://ct.dscp.dla.mil/contracting/, or from Defense Supply Center Philadelphia, Code CBTC Bldg. 6, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQ-Z1.4 - Procedures, Sampling, and Tables for Inspection by Attributes. (DoD adopted)

(Copies of this document are available from www.asq.org or the American Society for Quality, 600 Plankinton Avenue, Milwaukee, WI 53203.)

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AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL (ASTM)

ASTM-D412	-	Rubber, Vulcanized and Thermoplastic Elastomers - Tension, Standard Test Method for. (DoD adopted)
ASTM-D573	-	Rubber Deterioration in an Air Oven, Standard Test Method for. (DoD adopted)
ASTM-D751		Coated Fabrics, Standard Test Method for.
ASTM-D6193	-	Stitches and Seams, Standard Practice for. (DoD adopted)

(Copies of these documents are available from www.astm.org or ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2 (see 6.3).

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3 Materials and components. Unless otherwise specified in the contract or purchase order (see 6.2), the material and components specified in 3.3.1, 3.3.2, and 3.3.4 shall not have been manufactured more than 18 months prior to the date of delivery of the wrist seal(s).

3.3.1 Laminated cloth attachment panel. The base cloth for the laminated cloth attachment panel shall be in accordance with MIL-DTL-32149.

3.3.2 Neoprene. The neoprene used in the wrist seal shall be a four-way hyperstretch black smooth-skin neoprene with a tricot backing. The neoprene shall conform to table I when tested as specified in 4.4.1 (see 6.5)

TABLE I. Neoprene characteristics

CHARACTERISTIC	REQUIREMENT
Thickness, mm	3
Ultimate elongation, %, min	700
100% modulus, psi, min	40
300% modulus, psi, min	120
Ultimate tensile strength, psi, min	2300+
Heat elongation	less than 1% change

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3.3.3 Thread. The thread for stitching the laminated cloth attachment panel shall be aramid thread conforming to A-A-50195. The color shall match the material specified in 3.3.1

3.3.4 Adhesive. The adhesive for gluing the neoprene gasket shall be a clear, high viscosity, concentrated, thermoset urethane rubber. When cured, the adhesive shall be elastic, stable over the range of -40 °F to 400 °F, insoluable in water, and insoluable in petroleums. The adhesive shall have a specific gravity of 1.0 and a flashpoint of not less than 68 °F. The adhesive shall not have been manufactured more than 6 months prior to the date of delivery of the wrist seal (see 6.2 and 6.6).

3.4 Design. The wrist seal shall be a stretchable neoprene gasket with a tape sealed seamed laminated cloth attachment panel.

3.5 Patterns. The Government furnished patterns (see 6.4) which show directional lines, and notches for assembly and seam allowances, shall not be altered in any way. The furnished Government patterns shall be used as a guide for cutting the working patterns. Minor modifications of the working patterns are permitted when using automated equipment or to meet a manufacturer's process, but the alterations shall not affect the serviceability, dimensions, or appearance of the wrist seal.

3.5.1 List of pattern parts. The pattern parts and cutting quantities for the seal shall be cut from the materials specified in table II.

TABLE II. Pattern parts

MATERIAL	PATTERN NOMENCLATURE	COMPUTER NOMENCLATURE	CUT PARTS
Laminated Cloth	Wrist Attach Panel	WRISTATHPNL	1
Neoprene	Wrist Seal	WRIST_SEAL	1

3.6 Construction. The wrist seal shall be constructed in accordance with drawing 3769AS120.

3.7 Marking. Cut parts shall be marked, ticketed, or bundled to ensure a uniform size throughout the seal. Any method of marking shall be used except metal fastening devices, sewn on tickets, or adhesive type tickets that leave traces of adhesive on the material after removal of the ticket.

3.8 Stitches, seams, and stitching. ASTM-D6193, Stitch Type 301, with 6 to 8 stitches per inch shall be used in the construction of the laminated cloth attachment panel. Seams shall be as specified in construction drawings (see 3.6).

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3.9 Heat sealing. All sewn seams and stitching shall be covered on the inside of the wrist seal and sealed with the seam tape. The entire width of the seam tape shall be heat sealed over the seams and stitching. Crossover areas and ends left unsealed after heat sealing shall be taped. To maintain a tape overlap, sealed sewn seams shall not contain more than two layers of seam tape per seam. The tape shall not lift from the seam at any point. End joints where the tape passes over taped seams on the wrist seal shall be avoided. The overlap of splicings and tape ends shall not be less than ¾ inch.

3.10 Finished dimensions. The finished wrist seal dimensions shall be as specified in table III. A tolerance of ± $^{3}/_{16}$ inch shall be used for all table III dimensions. The wrist seal shall be measured flat. Locations A, B, C, and D are shown on figure 1.

TABLE III. Finished dimensions

LOCATION	LOCATION NAME	DIMENSIONS (INCHES)
A	Width of attachment panel	8 $^{1}/_{8}$
B	Length of attachment panel	3 $^{1}/_{4}$
C	Length of neoprene	5 $^{1}/_{4}$
D	Width of neoprene	2 $^{1}/_{2}$

3.11 Markings.

3.11.1 Identification. Each wrist seal shall contain identification markings conforming to drawing 3769AS120.

3.12 Workmanship. The finished wrist seal shall be uniform in quality and free from loose thread, foreign matter, and irregular defects that can adversely affect usage or durability.

NOTE:

1. Depicts table III locations, and is for informational purposes only.
2. Not to scale.

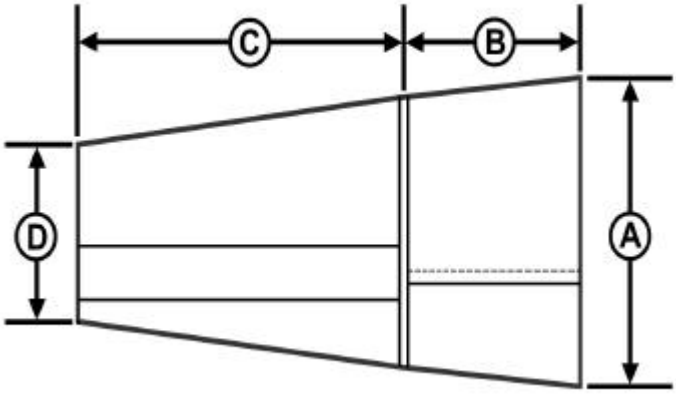

FIGURE 1. Wrist seal dimension

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4. VERIFICATION

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

a. First article inspection (see 4.2).
b. Conformance inspection (see 4.3)

4.2 First article inspection. First article inspection shall consist of the examinations and tests specified in 4.4.1, 4.4.2, 4.4.3, and 4.4.4.

4.2.1 First article samples. Unless otherwise specified in the contract or purchase order (see 6.2), the number of samples for first article inspections shall be one wrist seal. The sample unit shall be one wrist seal and the lot size shall be expressed in units of wrist seals.

4.3 Conformance inspection. Conformance testing shall consist of the examinations specified in 4.4.1, 4.4.2, 4.4.3, and 4.4.4.

4.3.1 Conformance inspection samples. Sampling for inspection shall be performed in accordance with ASQ-Z1.4. The sample unit shall be one wrist seal and the lot size shall be expressed in units of wrist seals.

4.4 Examinations and tests.

4.4.1 Material and component examinations and tests. Materials and components shall be examined and tested in accordance with the specified examinations and tests in table IV.

TABLE IV. Materials and components examinations and tests

MATERIALS	CHARACTERISTICS	REQUIREMENT PARAGRAPH	EXAMINATIONS AND TESTS
Laminated cloth	Material identification	3.3.1	All examinations and tests specifed in MIL-DTL-32149
Neoprene	Thickness	3.3.2	ASTM-D751, section 9
	Ultimate elongation	3.3.2	ASTM-D412, Method A, Die D, 20 in/min
	100% modulus	3.3.2	ASTM-D412, Method A, Die D, 20 in/min
	300% modulus	3.3.2	ASTM-D412, Method A, Die D, 20 in/min
	Ultimate tensile strength	3.3.2	ASTM-D412, Method A, Die D, 20 in/min
	Heat elongation	3.3.2	ASTM-D573, 70 hrs, 158 °F
Thread	Material identification	3.3.3	All examinations and tests specified in A-A-50195

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4.4.2 Classification of end item defects. The end items shall be visually examined and measured for the defects specified in table V.

TABLE V. Classification of end item defects

EXAMINE	DEFECT	CLASSIFICATION		
		CRITICAL	MAJOR	MINOR
General	Any hole, scissor or knife cut, tear, mend, burn, or weakening defect such as multiple floats, slubs, skips, needle chew or abraded area.		101	
	Any evidence of fabric delamination.		102	
	Any spot or stain (compound, oil, dirt, including marks) clearly visible.			201
	Color of any component not as specified.			202
	Any thread not trimmed to $^{1}/_{16}$ inch and not covered by heat sealed seam tape.		103	
	Any thread not trimmed to $^{1}/_{16}$ inch or thread scraps not removed.			203
	Any damaged tape edges greater than $^{1}/_{16}$ inch from outside edge.			204
	Material and components more than 18 months old.	1		
Components and assembly	Any defective component or defect that will affect the form, fit, and function of the assembly.		104	
	Any component part or operation omitted, not as specified, or required operation improperly performed.		105	
	Any component part not cut in accordance with the patterns.		106	
Heat sealing	Any seam tape not located as specified.		107	
	Any stitching not covered by seam tape.		108	
	Any spliced tape not overlapped $^{3}/_{4}$ inch.		109	

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TABLE V. Classification of end item defects – Continued.

EXAMINE	DEFECT	CLASSIFICATION		
		CRITICAL	MAJOR	MINOR
Seams and stitching	Any seam or attachment of any component twisted, puckered, pleated or caught in any unrelated operation, or stitching that is not properly forced out or contained in a fold more than 1/8 inch.		110	
	End of stitching not securely backstitched for at least 1/2 inch when not caught in other seams or stitching.		111	
	Thread breaks, skips and run-offs not securely overstitched for at least 1/2 inch.		112	
	Any stitching irregular or unevenly gauged (greater than 50% of the seam length or 4 inches, whichever is less).		113	
	Not specified seam or stitch type.		114	
	Loose tension resulting in a loose seam or tight tension resulting in breaking of stitches when normal pull is applied.			205
	Stitches per inch - one or two stitches more or less than specified (to be scored only when condition exists on 25% of the seam or more).		115	
	Stitches per inch more than two stitches more or less than specified (to be scored only when condition exists on 25% of the seam or more).		116	
	Any open seam.		117	
Adhesive seam	Any interruption of adhesive bead along butt seam.		118	
	Any gap greater than 1/32 inch along butt seam.		119	
	Adhesive missing.		120	
	Any overlap along butt seam.		121	

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TABLE V. Classification of end item defects – Continued.

EXAMINE	DEFECT	CLASSIFICATION		
		CRITICAL	MAJOR	MINOR
Identification marking	Identification missing, incorrect, or illegible.		122	
	Misplaced by more than 1 inch.			206
End item measurements	Any dimension not within the specified tolerance.		123	

4.4.3 End item dimensional examination. The end item shall be measured for conformance to the dimensions specified in 3.10 and table III as follows:

Dimension A - Measure top edge of wrist seal attachment panel from folded edge to folded edge.

Dimension B - Measure across wrist seal attachment panel from top edge to neoprene attachment seam.

Dimension C - Measure length of neoprene from attachment panel seam to edge of neoprene.

Dimension D - Measure across edge of neoprene from folded edge to folded edge.

4.4.4 Visual examination. The end item shall be visually examined for compliance to 3.4, 3.6, 3.8, 3.9, 3.11, and 3.12.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The wrist seal is military unique due to the wrist seal's use with the continuous wear coverall worn during overwater flights to protect the aircrewmember from

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hypothermia in the event of immersion in cold water. The seal is intended to be fitted on an individual basis and altered by maintenance personnel for use with all sizes of continuous wear coveralls.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification, including any amendments
b. Quantity desired (see 1.2).
c. National stock number
d. Applicable Government patterns and drawings, including revisions
e. When first article is required (see 3.1).
f. First article samples (see 4.2.1).
g. Name and address of the first article inspection facility; and the name and address of the Government activity responsible for conducting the first article inspection program.
h. Packaging requirements (see 5.1)

6.3 First article. When first article inspection (see 3.1) is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory, and the number of items to be tested. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of 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

6.4 Patterns. For access to patterns, write the procuring activity issuing the invitation for bid.

6.5 Neoprene. Neoprene rubber conforming to 3.3.2 is available from Henderson, 301 Orange Street, Millville, NJ 08332.

6.6 Urethane adhesive. The urethane adhesive conforming to 3.3.4, Aquaseal item #10714 or Seam Grip item #10910, is available from McNett Corporation, 1411 Meador Ave., Bellingham, WA 98229-5845.

6.7 Shelf-life. This specification covers items where shelf-life is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order. The shelf-life codes are contained in the Federal Logistics Information System Total Item Record. Additive

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information for shelf-life management may be obtained from DoD 4140.27-M Shelf-life Management Manual, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points (ICPs), and (2) the DoD Service and Agency administrators for the DoD Shelf-Life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: http://www.shelflife.hq.dla.mil/

6.8 Subject term (key word) listing.

Anti-exposure coveralls
Neoprene
PTFE laminate material
Sealing Machine, Heat
Shelf life

Custodians:
Army-AV
Navy-AS
DLA-CT

Preparing activity:
Navy-AS

(Project 8475-0018)

Review activity:
Navy-NU

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at www.dodssp.daps.mil.