

INCH-POUND

MIL-DTL-87174B(USAF)

8 SEPTEMBER 2020

SUPERSEDING

MIL-DTL-87174A(USAF)

30 OCTOBER 1998

DETAIL SPECIFICATION

HELMET, FLYER'S HGU-55/P

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

This specification is for an Aviation Critical Safety Item (CSI) / Flight Safety Critical Aircraft Part (FSCAP) and the acquisition process needs to comply with the DoD Supply Chain Materiel Management Procedures, DoDM 4140.01, Volume 11.

1. SCOPE

1.1 Scope.

This specification covers the requirements for the HGU-55/P flyer's helmet.

1.2 Classification.

The helmets are of the following types and sizes, as specified (see 6.2).

1.2.1 Types.

The types of the helmet assemblies are as follows:

- I Standard Helmet Assembly (low speed with MBU-12/P trim, visor assy)
- II Light Weight Helmet Assembly (low speed with MBU-12/P trim visor assy)
- III Light Weight Helmet Assembly (high speed with MBU-20/P visor assy)
- IV Light Weight Helmet Assembly (low speed with MBU-20/P visor assy)

Comments, suggestions, or questions on this document should be addressed to AFLCMC/EZSS, 2145 Monahan Way, Bldg. 28, Wright-Patterson AFB OH 45433-7017 or e-mailed to EngineeringStandards@us.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil/>.

AMSC N/A

FSC 8475

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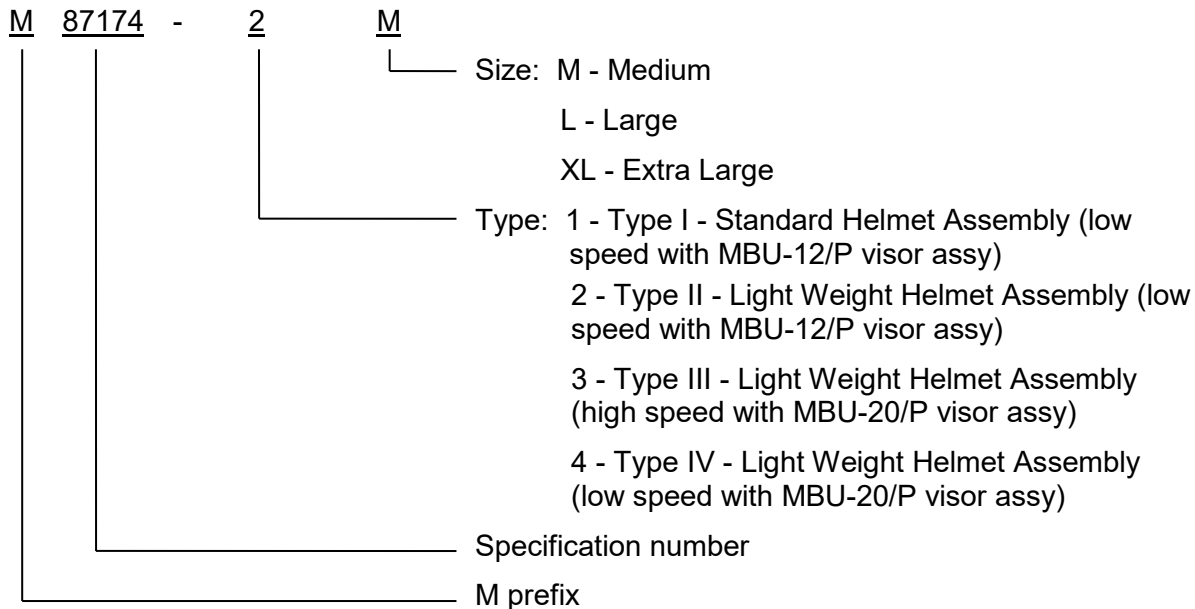
1.2.2 Sizes.

The sizes of the helmets are as follows:

Medium	Large	Extra Large
M	L	XL

1.3 Part or Identifying Number (PIN).

PINs to be used for the helmet assemblies acquired to this specification are created as follows:

**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 need to 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, standards, and handbooks.**

The following specifications, standards, and handbooks 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.

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COMMERCIAL ITEM DESCRIPTIONS

A-A-59826	Thread, Nylon
A-A-59963	Thread, Polyester

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-F-495	Finish, Chemical, Black, for Copper Alloys
MIL-A-5540	Adhesive, Polychloroprene
MIL-P-9400	Plastic Laminate and Sandwich Construction Parts and Assembly, Aircraft Structural, Process Specification Requirements
MIL-DTL-25421	Plastic Materials, Glass Fiber Base - Epoxy Resin, Low Pressure Laminated
MIL-DTL-32067	Leather, Sheepskin, Chrome Tanned
MIL-DTL-43511	Visors, Flyer's Helmet, Polycarbonate
MIL-C-83409	Coatings, Visor, Polycarbonate, Flying Helmet
MIL-PRF-85285	Coating: Polyurethane, Aircraft and Support Equipment
MIL-M-87163	Mask, Oxygen MBU-12/P

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130	Identification Marking of U.S. Military Property
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(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

2.2.2 Other Government documents, drawings, and publications.

The following other Government documents, drawings, and publications 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.

DRAWINGS - AIR FORCE

60B4278	Bracket, Connector - Helmet
64A2217	Pads - Fitting, Flying Helmet
70360	Liner Assembly - Absorbent, Flying Helmet
7136036	Headset Electrical, H-154A/AIC, Assembly of
79B4402	Bag, Lens
80C4782	Chin Strap, Subassembly
80C4784	Nape Strap, Subassembly, Universal Size
81B5370	Lens Stop, Subassembly
81D5189	Visor Assembly, Lightweight, MBU-12/P Trim
81D5330	Helmet Assembly, HGU-55/P
81D5331	Helmet Shell, Subassembly, HGU-55/P
81D5332	Shell, Helmet, Medium, HGU-55/P
81D5333	Shell, Helmet, Large, HGU-55/P
81D5334	Shell, Helmet, X-Large, HGU-55/P

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82A5614	Bayonet, Receiver HGU-55/P
82C5701	Visor, Lens Cover
83C6628	Core, Edgeroll
83D6629	Edgeroll, Leather
84D6838	TPL Layer Assembly, HGU Series
85C7030	Pile Fastener Earcup Retention, HGU-55/P (Thick Edgeroll)
85D7087	Liner Kit, TPL
85D7088	Cover Assembly, Removable
87B7481	Edgeroll Foam
89D7697	Visor, Assembly, Lightweight, Combat Edge
96D9545	Shell, Helmet, Medium, Lightweight, HGU-55/P
96D9546	Shell, Helmet, Large, Lightweight, HGU-55/P
96D9547	Shell, Helmet, X-Large, Lightweight, HGU-55/P
G010-1100	Mask, Oxygen, MBU-20/P

(Copies of these drawings are available online at <https://jedmics.af.mil/webjedmics/index.jsp>, for users with approved access rights granted through the Joint Engineering Data Management Information and Control System (JEDMICS). Users not located on a *.mil network may contact the JEDMICS Help Desk via email at JEDMICS@robins.af.mil for instructions on obtaining and completing the necessary forms.)

U.S. ARMY NATICK SOLDIER RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER (NSRDEC)

4-1-54 Buckles, Tongueless and Web Strap: Buckles -1 Bar, Type I - 2 Bar, Type II

(Copies of this drawing are available from US Army Natick Soldier RD&E Center, ATTN: RDNS-BOO (Clover), 15 Kansas St., Natick, MA 01760.)

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

FMVSS No. 218 Motorcycle Helmets

(Copies of this document are available online at <https://www.transportation.gov/>.)

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/ANSI Z1.4 Sampling Procedures and Tables for Inspection by Attributes (DoD adopted)

(Copies of this document are available online at <http://www.asq.org>.)

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ASTM INTERNATIONAL

ASTM D5118/D5118M Standard Practice for Fabrication of Fiberboard Shipping Boxes

(Copies of this document are available online at <http://www.astm.org>.)

DRAWINGS - GENTEX CORPORATION

90D7916	Integrated Chin/Nape Assembly PRU-53/P
04D11873	Visor Assembly, Light Weight, High Speed (MBU-20/P Trim)
05D11925	XLiner, Assembly
05C12022	Edgeroll Cover
05D12210	Visor Cover
G013-0003	Rotatable Bayonet Receiver (R2) Assembly

(Copies of these drawings are available upon request from AFLCMC/WNUS, 235 Byron Street, Suite 19A, Robins AFB, GA 31098-1813.)

SAE INTERNATIONAL

SAE-AMS-STD-595 Colors Used in Government Procurement

(Copies of this document are available online at <http://www.sae.org>.)

2.4 Order of precedence.

Unless otherwise noted herein or in the contract, 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 Qualification.

The HGU-55/P helmet furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.3 and 6.4).

3.2 Materials.

The materials used in the fabrication and assembly of the helmet and its components shall comply with the requirements of the specifications referenced on the applicable drawings and as specified herein.

3.2.1 Recycled, recovered, environmentally preferable, or biobased materials.

Recycled, recovered, environmentally preferable, or biobased 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.

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3.2.2 Shell construction.**3.2.2.1 Shell (Type I) for standard build.**

The shell shall be a fiberglass cloth and epoxy laminate conforming to Type I, Class 1 laminate, cloth base number 181 or 181-150 of MIL-DTL-25421. The molded shell shall conform in shape, contour and thickness to Drawing 81D5332 for the size M; Drawing 81D5333 for the size L; Drawing 81D5334 for the size XL. The thickness of the shell shall be within a range of 0.035 and 0.050 inch, except that a maximum thickness of 0.095 inch shall be permitted in the area of the laminate where reinforcing material is overlapped. The shell shall be a semi-void-free laminate and shall contain no defects which exceed those defined under 3.6 of MIL-P-9400.

3.2.2.2 Shell (Type II, III, and IV) for lightweight build.

The shell shall be a graphite and para-aramid cloth and epoxy laminate. The molded shell shall conform in shape, contour, and thickness to Drawing 96D9545 for the size M; Drawing 96D9546 for the size L; and Drawing 96D9547 for the size XL. The thickness of the shell shall be within a range of 0.035 and 0.050 inch, except that a maximum thickness of 0.095 inch shall be permitted in the area of the laminate where reinforcing material is overlapped. The shell shall be a semi-void-free laminate and shall contain no defects that exceed those defined under 3.6 of MIL-P-9400.

3.2.3 Fastener pile fabric.

The fastener pile fabric used for earcup retention shall be in accordance with Drawing 85C7030.

3.2.4 Edgeroll.

The leather used in the edgeroll shall be sheepskin in accordance with MIL-DTL-32067, Type A or B, Class 1, Subclass A and Drawing 83D6629. The foam core used in the edgeroll for the standard build helmet (Type I) shall be in accordance with Drawing 83C6628. The foam core used in the edgeroll for the lightweight build helmet (Types II, III, and IV) shall be in accordance with Drawing 87B7481. The adhesive used in the installation of the edgeroll shall be in accordance with MIL-A-5540, and shall be a one or two-part adhesive (base and a separate accelerator), room temperature cured for manufacture (coating to coating, heat stable to 140 °F); room temperature cured for repair (coating to coating heat stable to 140 °F); or room temperature cured for repair (coating to nylon) and shall be a neutral color. The thread used in the installation of the edgeroll shall be polyester waxed thread in accordance with A-A-59963, Type I, Class 3, Subclass C.

3.2.5 Energy absorbing liner.

The energy absorbing liner shall be fabricated from expandable polystyrene plastic foam) having a density of 2.5 to 3.0 pounds per cubic foot (see 6.6). The inner surface (concave side) of the liner shall be coated with white shellac or water thinned black latex coating which will not collapse, soften, or visibly affect the foam structure and which will form a base for adhesion of the fastener tapes to the liner.

3.3 Design and construction.

The helmet and its components shall be constructed in accordance with Drawing 81D5330, its subsidiary drawings and the requirements specified herein.

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<u>DRAWINGS - AF</u>	<u>COMPONENTS</u>
80C4782	Chin Strap, Subassembly
80C4784	Nape Strap, Subassembly, Universal
81B5370	Lens Stop, Subassembly
81D5332	Shell, Helmet, Medium
81D5333	Shell, Helmet, Large
81D5334	Shell, Helmet, X-Large
83D6629	Edgeroll, Leather
85C7030	Pile Fastener, Earcup Retention, HGU-55/P (Thick Edgeroll)

3.4 Performance.**3.4.1 Shell finish adhesion.**

The shell finish coating shall adhere to the shell during normal use (see 4.5.5).

3.4.2 Heat exposure.

The helmet assembly shall not change in weight by more than 1 percent, nor shall there be a change in distance between the shell center reference dimples greater than 0.25 inch. No other changes affecting appearance or serviceability and no visible distortion of the components shall take place as a result of the heat exposure of up to 160 ± 27 °F when tested as specified in 4.5.6.

3.4.3 Penetration resistance.

The helmet shell shall withstand an impact of a pointed, 16-ounce steel bob freely dropped from a height of 10 feet. The bob shall have a point having a maximum radius of 0.015 inch. Penetration shall be less than 0.25 inch when measured from outside the helmet shell when tested as specified in 4.5.7.

3.4.4 Impact protection.

When an impact of 35 foot-pounds energy is applied to the helmet assembly, acceleration experienced by the headform shall not exceed 150 G's for more than 4 milliseconds (ms), 200 G's for 2 ms, or 400 G's for zero ms when tested as specified in 4.5.8.

3.4.5 Windblast protection.

The complete helmet assembly (Types I, II, and IV) shall not loosen or tear away from the headform or break during a windblast of 450 ± 20 Knots Equivalent Air Speed (KEAS). The complete helmet assembly (Type III) shall not loosen or tear away from the headform or break during a windblast of 600 ± 25 KEAS when tested as specified in 4.5.9.

3.4.6 Fastener tape bond.

All fastener tapes shall remain bonded to the liner over at least 75 percent of their total area when the thermo plastic liner (TPL) (see Drawing 85D7087) or XLiner (see Drawing 05D11925) is inserted and removed under normal use.

3.5 Components used with the HGU-55/P helmet.

When procured as part of the HGU-55/P helmet acquisition (see 6.2), the listed components shall meet the requirements specified herein and shall compose a complete assembly.

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3.5.1 Buckles and thread.

Buckles shall be a 2-bar design, 0.75 inch wide, and constructed of brass (see Drawing 4-1-54). The buckles shall have a black, chemical finish applied in accordance with established commercial practices (see MIL-F-495). The thread shall be nylon, in accordance with A-A-59826, Type I or II, Class A, Black AA. Each of the individual yarns shall be twisted initially with not less than 6 turns per inch (TPI) for size E or not less than 7 turns per inch (TPI) for size B, and in the opposite direction to the final twist. The final plied twist shall not be less than 6 tpi for size E, or, 7 tpi for size B. The thread size parameters shall be in accordance with Table I.

TABLE I. Physical characteristics.

Letter size	Plies	Tex Number (g/km)	Breaking strength, lbs. (minimum)	Elongation percent (maximum)
E	3	70	9	30
B	2 or 3	45	6	30

3.5.2 Visors.**3.5.2.1 Visor lens coating.**

The visor lens coating shall be polycarbonate with optical characteristics in accordance with MIL-DTL-43511. The visor lens shall be coated on the front and rear surfaces with an abrasion resistant coating in accordance with MIL-C-83409.

3.5.2.2 Visor assembly, lightweight (Clear - MBU-12/P trim) for the Types I and II helmet assemblies.

The lightweight visor assembly (Clear - MBU-12/P trim) shall be in accordance with Drawing 81D5189-3.

3.5.2.3 Visor assembly, lightweight (Neutral Gray - MBU-12/P trim) for the Types I and II helmet assemblies.

The lightweight visor assembly (Neutral Gray - MBU-12/P trim) shall be in accordance with Drawing 81D5189-4.

3.5.2.4 Visor assembly, lightweight, high speed (Clear, MBU-20/P trim) for the Type III helmet assembly.

The lightweight visor assembly (Clear, MBU-20/P trim) shall be in accordance with Drawing 04D11873-1 and MIL-DTL-43511.

3.5.2.5 Visor assembly, lightweight, high speed (Neutral Gray, MBU-20/P trim) for the Type III helmet assembly.

The lightweight visor assembly (Neutral Gray, MBU-20/P trim) shall be in accordance with Drawing 04D11873-3 and MIL-DTL-43511.

3.5.2.6 Visor assembly, lightweight, low speed (Clear, MBU-20/P trim) for the Type IV helmet assembly.

The lightweight visor assembly (Clear, MBU-20/P trim) shall be in accordance with Drawing 89D7697-1 and MIL-DTL-43511.

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3.5.2.7 Visor assembly, lightweight, low speed (Neutral Gray, MBU-20/P trim) for the Type IV helmet assembly.

The lightweight visor assembly (Neutral Gray, MBU-20/P trim) shall be in accordance with Drawing 89D7697-2 and MIL-DTL-43511.

3.5.3 Headset assembly.

The H-154A/AIC headset assembly shall be in accordance with Drawing 7136036 except that the color of the earcup, earseal, and earcup inserts shall be black. The oxygen mask lower communication cord is not required.

3.5.4 Absorbent liner.

The absorbent liner shall be in accordance with Drawing 70360. The fabric used in the construction of the absorbent liner shall be preshrunk prior to cutting and stitching, shall be knitted simplex, Type I, and shall be Gray. The thread used in the construction of the absorbent liner shall be in accordance with A-A-59826, Type I Class A, Size B, nylon; normal purpose twisted multiple cord (ply) construction, unbonded with a soft finish. Each of the individual yarns shall be twisted initially with not less than 7 tpi, and in the opposite direction of the final twist. The final plied twist shall be not less than 7 tpi. The thread size parameters shall be in accordance with Table I.

3.5.5 Retainer jack.

The retainer jack shall be in accordance with Drawing 60B4278.

3.5.6 Earcup pads set.

The earcup pads set shall be in accordance with Drawing 64A2217-4.

3.5.7 Bayonet receiver kit.

The bayonet receiver kit shall be in accordance with Drawing 82A5614-10.

3.5.7.1 Rotatable bayonet receiver (R2) assembly.

The rotatable bayonet receiver assembly shall be in accordance with Drawing G013-0003.

3.5.8 Lens bag.

The lens bag shall be in accordance with Drawing 79B4402.

3.5.9 Visor lens cover.

The visor lens cover shall be in accordance with Drawing 82C5701 (Type I) and Drawing 05D12210-1 (Types II, III, and IV).

3.5.10 Chin strap assembly, nape strap assembly, integrated chin and nape strap assembly.

3.5.10.1 Chin strap.

The chin strap assembly shall be in accordance with Drawing 80C4782.

3.5.10.2 Nape strap assembly.

The nape strap subassembly shall be in accordance with Drawing 80C4784.

3.5.10.3 Integrated chin and nape strap assembly (ICNS).

The ICNS subassembly shall be in accordance with Drawing 90D7916.

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3.6 Finish and color.

The molded shell shall be trimmed to the specified edge contour and all holes cleanly punched or drilled at the required locations. All flash shall be removed. The exterior surface shall be cleaned and smooth. The edge shall be sanded to remove sharp surfaces. The exterior surface shall be primed and then coated with a polyurethane paint in accordance with MIL-PRF-85285 that will meet the adhesion requirements when tested in accordance with 4.5.5. After drying, the paint finish will be smooth.

3.6.1 Molded shell.

The color of the molded shell shall be gray conforming to color chip 36231 of SAE-AMS-STD-595.

3.6.2 Leather.

The leather used in the edgeroll shall be lusterless gray conforming to color chip 26132 of SAE-AMS-STD-595.

3.6.3 Edgeroll cover.

The edgeroll cover is applied to the edgeroll (Types III and IV) to support visor retention and shall be in accordance with Drawing 05C12022.

3.7 Identification marking of product.

Each helmet assembly and components shall be identified in accordance with MIL-STD-130 and as specified in the contract (see 6.2).

3.8 Helmet weight.**3.8.1 Weight for standard build.**

The weight for the standard helmet (Type I) shell subassembly, consisting of the painted shell, thick leather edgeroll, buffer leather, lens stop devices, fastener pile fabric, and snap fasteners (for visor lens attachment), shall not exceed 1.24 lbs. (560 grams) for size M, 1.37 lbs. (620 grams) for size L, and 1.46 lbs. (660 grams) for size XL.

3.8.2 Weight for lightweight build.

The weight for the lightweight helmet (Types II, III, and IV) shell subassembly consisting of the painted shell, thick leather edgeroll, buffer leather, lens stop devices, fastener pile fabric, snap fasteners (for visor lens attachment), leather protective strip, and edgeroll cover (Types III and IV only) shall not exceed 1.10 lbs. (500 grams) for size M, 1.19 lbs. (540 grams) for size L, and 1.28 lbs. (580 grams) for size XL.

3.9 Workmanship.

All components, parts, and equipment shall be constructed and assembled in accordance with commonly accepted industrial workmanship standards.

4. VERIFICATION**4.1 Classification of inspections.**

The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.3).
- b. Conformance inspection (see 4.4).

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4.2 Inspection conditions.

Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.2.1.

4.2.1 Atmospheric conditions.

Unless otherwise specified in the individual test, all tests shall be performed at ambient pressure, at a temperature of 77 ± 14.5 °F, and at a relative humidity of 70 percent or less.

4.2.2 Items required for windblast test.

The following items are required to conduct windblast tests (see 4.5.9.1 and 4.5.9.2):

- a. Mask, Oxygen MBU-12/P (see MIL-M-87163).
- b. Mask, Oxygen MBU-20/P (see Drawing G010-1100).
- c. Rotatable Bayonet Receiver (R2) Assembly (see Drawing G013-0003)
- d. Bayonet Receiver Kit (Drawing 82A5614-10).
- e. Visor Assembly, Lightweight, MBU-12/P trim (see Drawing 81D5189).
- f. Visor Assembly, Lightweight, High Speed, MBU-20/P trim (see Drawing 04D11873).
- g. Thermo Plastic Liner (TPL) (see Drawing 85D7087) or XLiner (see Drawing 05D11925).
- h. Headform (see 6.7).

4.3 Qualification inspection.**4.3.1 Qualification test samples.**

The qualification test samples shall be representative of the production equipment and shall be identified with the manufacturer's part number and other information as required by applicable drawings.

4.3.1.1 HGU-55/P helmet assemblies.

Unless otherwise modified by the contract or by the procuring activity (see 6.2), qualification test samples shall be as follows:

- a. Sample A (for standard helmet - Type I):
 - (1) One chin strap assembly with installation hardware (see Drawing 80C4782).
 - (2) One nape strap assembly with installation hardware (see Drawing 80C4784).
 - (3) One molded shell of each size, trimmed and drilled, painted, and without edgeroll (see Drawings 81D5332, 81D5333, and 81D5334).
- b. Sample A (for lightweight helmet - Types II, III, and IV):
 - (1) One integrated chin and nape strap assembly with installation hardware (see Drawing 90D7916).
 - (2) One molded shell of each size, trimmed and drilled, painted, and without edgeroll (see Drawings 96D9545, 96D9546, and 96D9547).
- c. Sample B: Two helmet assemblies of each size specified on the contract or purchase order that are completely finished and assembled in accordance with this specification and Drawing 81D5330.

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- d. Sample C: Two helmet assemblies of each size specified on the contract or purchase order that are completely finished and assembled in accordance with this specification and Drawing 81D5330.
- e. Sample D: Four helmet assemblies that are completely assembled in accordance with this specification and Drawing 81D5330. The size of these helmets may be medium or large depending upon the size of the windblast test headform required in the conduct of the test.
- f. Sample E: Two helmet assemblies that are completely assembled in accordance with this specification and Drawing 81D5330.
- g. Sample F: Two helmet assemblies that are completely assembled in accordance with this specification and Drawing 81D5330 ().
- h. Sample G: Two helmet assemblies of each size, consisting of components listed in 3.8.
- i. Sample H: When procured as part of the HGU-55/P helmet acquisition (see 6.2), one each of the following components.
 - (1) Visor Assembly, Light Weight Neutral Gray - MBU-12/P trim (Types I and II) or Visor Assembly, Light Weight, Neutral Gray, High Speed, MBU-20/P trim (Type III) or Visor Assembly, Light Weight, Neutral Gray, MBU-20/P trim (Types II and IV).
 - (2) Headset, Electrical H-154A/AIC Assembly (less the oxygen mask lower communication cord).
 - (3) Absorbent Liner Assembly - Medium or Large
 - (4) Retainer Jack
 - (5) Pad Set, Fittings, Earcup
 - (6) Rotatable Bayonet Receiver Assembly or Bayonet receiver kit
 - (7) Visor Cover
 - (8) Lens Bag
- j. Sample I: When procured as part of the HGU-55/P acquisition (see 6.2) one each of the visor assemblies specified in 3.5.2 of this specification.
- k. Sample J: When procured as part of the HGU-55/P acquisition (see 6.2) one each of the visor assemblies specified in 3.5.2 of this specification.

4.3.2 Qualification testing.

The qualification test samples shall be subjected to the tests listed in Table II.

TABLE II. Qualification tests.

Test Sample	Characteristic	Requirement	Test
A	Materials	3.2	4.5.1, 4.5.2
B	Design and construction	3.3	4.5.4

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TABLE II. Qualification tests - Continued.

Test Sample	Characteristic	Requirement	Test
C	Shell finish adhesion	3.4.1	4.5.5
C	Heat exposure	3.4.2	4.5.6
D	Windblast protection	3.4.5	4.5.9
E	Impact protection	3.4.4	4.5.8
F	Penetration resistance	3.4.3	4.5.7
H	Dimensional examination	3.3, 3.5	4.5.1, 4.5.2
I	Visor lens optical characteristics	3.5.2.1	4.5.10
J	Coating abrasion resistance	3.5.2.1	4.5.11

4.4 Conformance inspection.

Conformance inspections shall consist of the individual tests specified herein. Lot sizes shall be specified by the procuring activity (see 6.2).

4.4.1 Individual tests.

Each helmet assembly and associated components, if applicable, shall be subjected to the following tests:

- a. In-process examination (see 4.5.3).
- b. Visual examination of molded, unpainted shell (see 4.5.3.1).
- c. Visual examination of painted shell prior to installation of edgeroll (see 4.5.3.2).
- d. End-item visual examination (see 4.5.4).

4.4.2 Sampling plans.

Unless otherwise specified, sampling plans shall conform to an accepted commercial sampling standard (see 6.2 and 6.4).

4.4.2.1 Sampling plan A.

The items specified in Table III shall be examined to the requirements of 4.5.1 and the molded shell shall be subjected to the dimensional examination of 4.5.2.

TABLE III. Sample unit for dimensional examinations.

Component	Sample Unit
Molded shell, unpainted	1
Chin strap assembly	1
Nape strap assembly or Integrated chin and nape assembly	1
Pad set, fitting, earcup	1
Absorbent liner, each size	1

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TABLE III. Sample unit for dimensional examinations.

Component	Sample Unit
Visor lense - MBU-12/P (Neutral Gray) or Visor lense - MBU-20/P (Neutral Gray)	1
Rotatable bayonet receiver assembly or Bayonet receiver kit	1
Visor cover	1
Lens bag	1

4.4.2.2 Sampling plan B.

The items listed in 4.5.3.3 shall be subjected to visual examination.

4.4.2.3 Sampling plan C.

Helmet assemblies from each lot shall be subject to the following tests.

- a. Shell finish adhesion (see 4.5.5).
- b. Heat exposure (see 4.5.6).
- c. Penetration resistance (see 4.5.7).
- d. Impact protection (see 4.5.8).

4.4.2.4 Sampling plan D.

Helmet assemblies of each size, assembled in accordance with 3.9 shall be taken from each lot and subjected to examination for the weight as specified in 3.8.

4.4.3 Common hardware.

The common hardware such as screws, nuts, washers, eyelets, and grommets used in the fabrication and assembly of the helmet shell components shall be inspected in accordance with their applicable drawings and specifications.

4.5 Tests.**4.5.1 Materials and hardware examination.**

The materials and hardware used in the fabrication and assembly of the HGU-55/P helmet, and if applicable, the used-with components (see 3.5), shall be examined to determine compliance with the requirements of applicable specifications, standards, and drawings.

4.5.2 Dimensional examination of molded shell.

The dimensional examination of the unpainted molded shell shall be in accordance with applicable drawings and the following shall be checked:

- a. All hole sizes and location dimensions.
- b. Shell thickness at four random locations along the edge contour and at six widely scattered locations along each half of the shell (right and left). The average thickness of the ten locations shall be within the limits specified in 3.2.2.
- c. Overall shell width for the standard build shell (Type I) at the center references dimples and the overall shell height at butt-line 0.00 on Drawing 81D5332 for size

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- M; Drawing 81D5333 for size L; and Drawing 81D5334 for size XL. Each dimension shall be within 0.25 inch of the specified total.
- d. Overall shell width for the lightweight build shell (Types II, III, and IV) at the center references dimples and the overall shell height at butt-line 0.00 on Drawing 96D9545 for size M, Drawing 96D9546 for size L, and Drawing 96D9547 for size XL. Each dimension shall be within 0.25 inch of the specified total.
- e. The overall shell width at the front edge contour at the following specified water lines. Each dimension shall be within 0.25 inch of the specified total.
- Size M: water line 1.50 and 3.50
- Size L: water line 1.00 and 3.00
- Size XL: water line 1.00 and 3.00

4.5.2.1 Dimensional Inspection levels for helmet molded shell.

The inspection level for the dimensional examination shall be conducted using ASQ/ANSI Z1.4. In accordance with drawing, specification, standard, or quality assurance provision (QAP); Critical, Major or Minor attributes shall be inspected. As per specified product, the contractor shall use inspection severity level of S-4, and AQLs of 0 percent for any dimensional defects. The sampling plans for inspection shall use the first sampling plan above the arrow as applicable. The helmet shell components shall be examined for compliance with dimensions required by the applicable drawing. Acceptance would be zero non-conformances (defects) in the sample lot, and any dimension not within the allowable tolerance shall be cause for rejection.

4.5.3 In-process examination.

Visual inspections shall be made during the manufacturing process for defects as specified in Table IV.

4.5.3.1 Visual Inspection levels for helmet shell components and in-process visual examination.

The inspection level for the visual and in-process visual examination shall be conducted using ASQ/ANSI Z1.4. In accordance with drawings, specification, standard, or quality assurance provision (QAP); Critical, Major or Minor attributes shall be inspected. As per specified product, the contractor shall use inspection severity level of II, and AQLs of 0 percent for Major and 2.5 percent for Minor defects. The sampling plans for inspection shall use the first sampling plan above the arrow. Whenever nonconformance is noted, corrections shall be made to the components/parts affected and the lot in process as well as those lots already delivered.

TABLE IV. Classification of defects, in-process visual examination.

Component	Defect	Classification	
		Major	Minor
Molded shell, unpainted	Blisters or delamination	101	
Helmet shell	Shell visibly warped or distorted	102	

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TABLE IV. Classification of defects, in-process visual examination - Continued.

Component	Defect	Classification	
		Major	Minor
	Color not uniform over total surface	103	
	Gloss of finish different than standard color chip	104	
	Orange peels, runs, or sags in paint	105	
	Scratches, scuffed, or abraded areas	106	
	Fitting holes, incorrect location or size	107	
	Edgeroll cover not completely bonded to edgeroll and shell (Types III and IV only).	108	
Visor assembly	Edge bead not securely adhered to visor	109	
	Pile fastener not securely adhered to visor (Types I, II, and IV)	110	
	Pile fastener not securely adhered to outer spacer (Type III)	111	
	Tears, cracks, or holes in beading	112	
	Buckle missing	113	
	Snap fastener component missing	114	
	Snap fastener incorrectly set	115	
	Loose stitching, skipped stitches, or not back stitched	116	
	Webbing routed through buckles incorrectly	117	
	Ends of webbing not seared		203
	Strap attaching rivets incorrectly installed	118	
	Material not as specified	119	
Lens covers, visor	Identification label missing or illegible		204
	Hardware not assembled per drawing	120	
	Materials not as specified	121	
	Loose stitching, skipped stitches, or not back stitched	122	
	Incorrect size marked	123	
Pads, fitting earcup	Any hole, tear, or soiled areas	124	
	Color not as specified	125	
	Hook or pile fasteners not secured properly.		205
Chin strap and nape strap or integrated chin and nape strap	Material not as specified	126	
	Any grommet incorrectly installed	127	
	Snap fastener insecurely set	128	

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TABLE IV. Classification of defects, in-process visual examination - Continued.

Component	Defect	Classification	
		Major	Minor
	Loose stitching, skipped stitches, or not back stitched	129	
	Ends of webbing not seared		206
	Lacing cord not seared properly (Type I only)		207
	Lacing cord improperly laced (Type I only)		208
	Buckle tab missing	130	
Energy absorbing liner (Black)	Liner not properly aligned in shell	131	
	Any gaps between liner and shell exceeding 0.125 inch	132	
	Inner surface of liner not coated		209
	Any fastener tape missing	133	
	Centerline beads not discernible	134	
	Size code letter not discernible		210
	Liner not uniformly fitted into shell	135	
	Excessive glue on edgeroll		211
Edgeroll (Gray leather)	Color not as specified	136	
	Any crack, tear, or hole	137	
	Not properly secured to shell	138	
	Excessive glue on edgeroll		212
Lens stop	Color not as specified	139	
	Any crack, hole, or tear	140	
Rotatable bayonet receiver assembly (gray) or bayonet receiver kit	Color not as specified	141	
	Any sharp edge or burr	142	
	Component missing	143	
Rotatable bayonet receiver	Plastic Housing surface crack	144	
Head set assembly (Black)	Color not as specified	145	
	Materials are not as specified	146	
	Component missing	147	
Absorbent liner assembly (Gray)		148	
	No size identification or incorrect size marked	149	
	Loose or excessively tight stitching, skipped stitches, or not back stitched	150	

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TABLE IV. Classification of defects, in-process visual examination - Continued.

Component	Defect	Classification	
		Major	Minor
	Any hole, tear or soiled areas	151	
	Material not as specified	152	

4.5.3.2 Visual examination of molded shell, unpainted.

The molded, unpainted helmet shell shall be examined as specified in Table IV prior to preparation for finishing.

4.5.3.3 Visual examination of painted shell prior to installation of edgeroll.

The helmet shell shall be examined for defects as specified in Table IV prior to installation of the edgeroll.

4.5.3.4 Visual examination of components prior to assembly of helmet.

The components identified below shall be examined for defects prior to installation on the helmet.

- a. Molded shell, unpainted.
- b. Helmet shell.
- c. Visor, assembly lightweight.
- d. Lens cover, visor.
- e. Absorbent liner assembly.
- f. Pads, earcup set.
- g. Chin strap or nape strap, or Integrated chin and nape assembly.
- h. Energy absorbing liner.
- i. Edgeroll (gray leather).
- j. Lens stop.
- k. Bayonet receiver kit, or Rotatable bayonet receiver assembly.

4.5.4 End-item visual examination.

The complete helmet assembly, consisting of the items below, shall be examined for defects, as specified in Table V and cleanliness prior to packing and shipping. The end-item shall also be visually inspected for compliance with commonly accepted manufacturing and workmanship standards.

- a. Helmet shell.
- b. Edgeroll.
- c. Earcup section fastener, pile fabric.
- d. Visor assembly.
- e. Chin strap or nape strap or integrated chin and nape strap.
- f. Lens stop.
- g. Bayonet receiver or rotatable bayonet receiver.
- h. Energy absorbing liner.

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- i. Absorbent liner.
- j. Visor, lens cover.

4.5.4.1 Visual inspection levels for end-item visual examination.

The inspection level for end-item visual examination shall be conducted using ASQ/ANSI Z1.4. In accordance with drawings, specification, standard, or quality assurance provision (QAP); Critical, Major or Minor attributes shall be inspected. As per specified product, the contractor shall use inspection severity level of II, and AQLs of 0 percent for Major and 2.5 percent for Minor defects. The sampling plans for inspection shall use the first sampling plan above the arrow.

TABLE V. Classification of defects, end-item visual examination.

Component	Defect	Classification		
		Major	Minor	
Helmet shell	Any fastener or hardware missing from visor snap fastener or integrated chin and nape strap or Chin strap or nape strap	101	201	
	Scratched, scuffed, or abraded areas	102		
	Seriously affecting appearance or serviceability			
	Not seriously affecting appearance or serviceability			
	Hardware not black as specified	103		
	Identification label missing, incorrect, illegible, or not of permanent type	104		
Edgeroll (Gray leather)	Color not as specified	105	202	
	Any crack, hole, or tear	106		
	Not properly secured to shell	107		
	Excessive glue on edgeroll			
Earcup section fastener, pile fabric (Black)	Not properly secured to inside of helmet		203	
	Color not as specified	108		
	Improperly located in earcup section	109		
Visor assembly	Edge beading not securely adhered to visor	110	204	
	Pile fastener not securely adhered to visor (Types I, II, and IV)	111		
	Pile fastener not securely adhered to outer spacer (Type III)	112		
	Tears, cracks, or holes in beading	113		
	Buckle missing	114		
	Snap fastener components incorrectly set	115		
	Loose stitching, skipped stitches, or not back-stitched	116		
	Ends of webbing not seared			
	Material not as specified	117		
	Clean, free of fingerprints, dirt			205
	Hardware not assembled per drawing	118		
Snap fastener component missing	119			

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TABLE V. Classification of defects, end-item visual examination - Continued.

Component	Defect	Classification	
		Major	Minor
	Webbing routed through buckles incorrectly	120	
	Strap attaching rivets incorrectly installed	121	
	Identification label missing or illegible		206
Chin strap and nape strap or integrated chin and nape strap	Assembled to helmet incorrectly	122	
	Components damaged	123	
Lens stop	Not properly secured to helmet	124	
	Improperly located on helmet shell	125	
Absorbent liner	Absorbent liner not present	126	
Energy absorbent liner	Liner not properly aligned in shell	127	
	Any gaps between liner and shell exceeding 0.125 inch	128	
	Inner surface of liner not coated		207
	Any fastener tape missing	129	
	Centerline beads not discernible	130	
	Size code letter not discernible		208
	Liner not uniformly fitted into shell	131	
	Excessive glue on edgeroll		209
Bayonet receiver or rotatable bayonet receiver	Installed incorrectly to helmet	132	
Visor, lens cover	Visor, lens cover not present	133	

4.5.5 Shell finish adhesion test.

With a scribe held at approximately a 30-degree angle, cut three parallel lines approximately 0.063 inch apart on the painted surface of the shell. These lines shall be crossed at right angles with three parallel cuts approximately 0.063 inch apart forming four squares. Sufficient pressure shall be applied on the scribe to cut completely through the painted surface. Separation or lifting of any shell finish squares from the shell shall constitute failure to pass this test.

4.5.6 Heat exposure test.

The helmet assembly shall be stabilized for 1 hour at standard test conditions. The helmet assembly shall then be weighed, and the distance between the shell center reference dimples on the shell shall be measured. The helmet shall be placed on its crown in an air circulating oven at a temperature of 160 ± 27 °F for a 4 hour period. The helmet assembly shall then be removed from the oven and stabilized for 1 hour at standard test conditions. Any change in weight shall not exceed 1 percent, nor shall the measured distance vary more than 0.25 inch from the original measurement. Following the heat exposure test, there shall be no distortion of helmet components, defects in finish, or separation of adhesive bonds and any of these defects shall constitute failure to pass this test.

4.5.7 Penetration resistance test.

The helmet assembly shall be fit on a rigid headform (see 6.7) to ensure firm support around the target area when properly positioned for tests. The helmet assembly shall be subjected to impacts

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by a 16-ounce steel bob, having a 60 degree included angle pointed tip with a radius not greater than 0.015 inch and minimum Rockwell hardness of C-60. The bob shall be dropped (free-fall) from a height of 10 feet onto the outside surface of the helmet shell in a direction perpendicular to the surface. The points of impact shall be one in each 60-degree sector at a radial distance of 4.5 inch from the apex and at the apex. After each impact, the test bob shall be reinserted into the depression with approximately a 10-pound force, and the total depth of its penetration into the helmet shell shall be measured. Penetration in excess of 0.25 inch at any test point shall constitute failure to pass this test.

4.5.8 Impact protection test.

Unless otherwise specified by the procuring activity, the impact protection test shall be performed in accordance with this specification and FMVSS No. 218. The helmet shell shall be mounted on a rigid headform (see 6.7) and impact tests shall be performed by the rigid anvil method using the hemispherical impactor, and the following exceptions: the helmet shall be subjected to single impacts only at the front, back, crown, and each side location. The helmet headform off-set distance shall be measured at each impact site and the weight of the headform drop system obtained prior to test. Based on the system drop weight, the height of drop shall be determined to deliver 35 foot-pounds impact energy. The acceleration recorded shall not exceed 150 G's for more than 4 ms, 200 G's for 2 ms or 400 G's for zero ms and the following information shall be recorded on the test summary sheet for each of the test locations on the helmet:

- a. Test configuration drop weight.
- b. Helmet-headform off-set distance.
- c. The contractor shall measure thickness of custom-fit liner and shell opposite all impact sites and shall record the following data:
 - i. Drop height
 - ii. Impact Velocity
 - iii. Impact Energy
 - iv. Acceleration-time data: (1) Peak acceleration and (2) Total time of pulse

4.5.9 Windblast testing.

4.5.9.1 Windblast protection (450 KEAS).

The helmet assembly (Types I, and II) shall be mounted on a rigid headform (see 6.7) with the MBU-12/P oxygen mask or helmet assembly (Type IV) with the MBU-20/P oxygen mask in place and the applicable lightweight visor assembly in the operating (down) position. The headform shall then be secured in the test platform and exposed to windblast velocity of 450 ± 20 KEAS at the attitudes listed below. Separate helmet assemblies may be utilized for each of these attitudes:

- a. Head on
- b. 45 degree yaw to the right
- c. 45 degree yaw to the left
- d. 30 degree pitch aft

The helmet assembly shall not loosen or tear away from the headform and shall not break.

4.5.9.2 Windblast protection (600 KEAS).

The helmet assembly (Type III) shall be mounted on a rigid headform (see 6.7) with the MBU-20/P oxygen mask in place and the lightweight high speed visor assembly in the operating (down) position. The headform shall then be secured in the test platform and exposed to a windblast

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velocity of 600 ±25 KEAS at the attitudes listed below. Separate helmet assemblies may be utilized for each of these attitudes:

- a. Head on
- b. 45 degree yaw to the right
- c. 45 degree yaw to the left
- d. 30 degree pitch aft

The helmet assembly shall not loosen or tear away from the headform and shall not break (see 3.4.5).

4.5.10 Visor optical characteristics.

The visor lens shall be inspected and tested in accordance with MIL-DTL-43511.

4.5.11 Coating abrasion resistance.

The coating on the visor lens shall be inspected and tested in accordance with MIL-C-83409.

4.5.12 Weight.

The complete helmet assembly shall be weighed. Weight of the helmet shall be determined in increments of 1-gram minimum and shall not exceed the weight requirements specified in 3.8.

4.6 Packaging inspection.

An examination shall be made to determine that the preservation-packaging, packaging and marking comply with 3.10. Defects shall be scored in accordance with Table VI. The sample unit shall be one shipping container fully prepared for delivery with the exception that it may not be closed. Examination of closure defects listed below shall be made on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item lot. The inspection shall be conducted using ASQ/ANSI Z1.4 and the contractor shall use inspection severity level of II, and AQL of 2.5 percent for defects. The sampling plans for inspection shall use the first sampling plan above the arrow.

5. PACKAGING**5.1 Packaging.**

For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When 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.

5.1.1 Special packaging.

Since this item is an Aviation Critical Safety Item (CSI) / Flight Safety Critical Aircraft Part (FSCAP), specialized packaging is required (see 6.3).

6. NOTES

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

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6.1 Intended use.

This helmet assembly is intended to be worn by military members of the United States Air Force for use in high performance military aircraft.

6.2 Acquisition requirements.

Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and size of helmet (see 1.2).
- c. Identification or marking of product (see 3.7).
- d. Qualification test samples other than those specified in 4.3.1.1.
- e. Sampling plan requirements (see 4.4.2).
- f. Lot size and if desired, sample size (see 4.4 and 4.4.2).
- g. Procured items such as common hardware (see 4.4.3) will be inspected at receipt and the inspection results will be documented in accordance with the contract.
- h. Packaging requirements (see 5.1 and 5.1.1).

6.3 Special packaging.**6.3.1 Preservation and packaging.**

Preservation-packaging needs to be Level A in accordance with MIL-STD-2073-1, as specified in the contract or purchase order (see 5.1.1 and 6.2). Inspection needs to be in accordance with 4.6.

6.3.1.1 Level A.

The lightweight visor assembly with clear lens needs to be placed within the lens bag conforming to drawing 79B4402, then wrapped in tissue paper conforming to A-A-1249, Type II, and placed within the helmet. The lightweight visor assembly with neutral gray lens needs to be covered with the lens cover described in Drawing 82C5701 for MBU-12/P trim or Drawing 05D12210 for MBU-20/P trim, then wrapped in tissue paper and placed within the helmet. Earcup pads set, packaged in accordance with Drawing 64A2217-4 and absorbent liner, Drawing 70360, needs to be placed within the helmet. The helmet needs to be placed in a snug-fitting bag fabricated from flexible polyolefin film conforming to Type IV, Class 1, Grade B, and Finish 1 in accordance with A-A-3174. The helmet needs to be placed in a container that conforms to style RSC, class domestic of ASTM D5118/D5118M with inserts for protection on all sides at one time, converting the package into a Type 1 or 2 load of ASTM D5118/D5118M.

6.3.1.2 Packaging.

Packaging needs to be Level A, as specified (see 5.1.1 and 6.2) and inspection needs to be in accordance with 4.6.

6.3.1.2.1 Level A.

Helmets preserved and packaged as specified needs to be packed in exterior-type shipping containers that conform to class weather-resistant of ASTM D5118/D5118M. The closure of the shipping container needs to be in accordance with the shipping container specification.

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6.3.1.3 Marking.

In addition to any special marking required by the contract or the order, interior and exterior containers needs to be marked in accordance with MIL-STD-129. Inspection needs to be in accordance with 4.6.

6.4 Inspection levels for helmet shell components and end-item examination.

The inspection level for the dimensional examination should be conducted using ASQ/ANSI Z1.4. The helmet shell components should be examined for compliance with dimensions required by applicable drawing.

6.5 Qualification.

With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List (QPL)-87174 whether or not such products have actually been so listed by that date. The attention of 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 orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from AFLCMC/WNUS, 235 Byron Street, Suite 19A, Robins AFB, GA 31098-1813. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil/>.

6.5.1 Retention of qualification.

To retain qualification, the manufacturer needs to forward certification at two-year intervals to the qualifying activity stating that the company still manufactures the product at the plant shown in the QPD; the plant is still under the same management; the product is being manufactured under the same conditions as originally qualified, with the same process, materials, construction, design and manufacturer's part number; and the product meets the requirements and tests of the latest issue of the specification. The qualifying activity will establish the initial reporting date.

6.6 Custom fit liner.

The manufacturer will fabricate a TPL or an XLiner Assembly suitable for use with the test headform and specific size helmet shell to be subjected to penetration, impact, and windblast testing.

6.7 Test headforms.

The manufacturer may be required to obtain an appropriate test headform from a test agency for use in the fabrication of custom fit liners.

6.8 Subject term (key word) listing.

- Buffer
- Edgeroll
- Fiberglass
- Finish, shell
- Impact protection
- Integrated Chin and Nape Strap (ICNS)
- Liner, absorbent
- Liner, energy absorbing

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Molded
Pad, fitting
Strap, chin
Strap, nape
Windblast protection

6.9 Changes from previous issue.

Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodian:
Air Force - 184

Preparing activity:
Air Force - 184

(Project 8475-2012-001)

Agent:
Air Force - 110

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 the ASSIST Online database at <https://assist.dla.mil/>.