MILITARY SPECIFICATION

HELMET, GROUND TROOPS'; PARACHUTISTS, STEEL, M-1

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

1. SCOPE

1.1 Scope. This document covers steel helmets identified as M-1, with chin strap.

1.2 Classification. The helmets shall be of the following types, as specified (see 6.2).

Type I	- Helmet, ground troops', steel, M-1
Type II	- Helmet, parachutists, steel M-1

2. APPLICABLE DOCUMENTS

2.1 Government documents.

* 2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

QQ-S-766 - Steel Plates, Sheets, and Strip - Corrosion Resisting

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 8470

PPP-B-636 - Boxes, Shipping, Fiberboard
PPP-C-1797 - Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam

MILITARY

MIL-T-704 - Treatment and Painting of Material
MIL-A-13259 - Armor, Steel: Sheet, Strip, and Fabricated Forms; Rolled, Non-Magnetic; for Helmets and Personnel Armor Requirements
MIL-L-35078 - Loads, Unit: Preparation of Semiperishable Subsistence Items; Clothing, Personal Equipment and Equipage; General Specification For
MIL-S-43841 - Strap, Chin; Ground Troops' Helmet, Steel, M-1
MIL-S-43912 - Strap, Chin, Parachutist's; Helmet, Steel, M-1
MIL-C-46168 - Coating, Aliphatic Polyurethane, Chemical Agent Resistant

STANDARDS

FEDERAL

FED-STD-595 - Colors

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-147 - Palletized Unit Loads
MIL-STD-414 - Sampling Procedures and Tables for Inspection by Variables for Percent Defective
MIL-STD-662 - Ballistic Test for Armor

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

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS

U.S. ARMY NATICK RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER

2-1-87	- Helmet, Ground Troops'; Parachutists, Steel, M-1; Types I and II Assemblies
2-1-88	- Helmet, Ground Troops'; Parachutists, Steel, M-1; Contour and Dimensions
4-1-438	- Helmet, Ground Troops'; Parachutists, Steel, M-1; Hinge Loop Assembly

(Copies of 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 specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issues of the nongovernment documents which are current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

A 580 - Stainless and Heat Resisting Steel Wire

C 117 - Materials Finer Than 75- m (No. 200) Sieve in Mineral Aggregates by Washing

C 136 - Sieve Analysis of Fine and Coarse Aggregates

(Copies should be obtained from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which 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, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3, 6.2, and 6.3).

* 3.2 Materials and components. All materials and components shall be as specified herein or on the applicable drawings.

3.2.1 Armor, steel. The steel armor for the helmet shell and edging shall conform to MIL-A-13259. The thickness for the helmet shell shall be as specified in 3.3.2.1 and for the edging as specified on Drawing 2-1-87.

* 3.2.2 Wire, corrosion-resisting. The corrosion-resisting steel wire for the hinge loop shall be stainless steel condition A, round, type 430 of ASTM A 580. The diameter shall be as specified on Drawing 4-1-438.

3.2.3 Sheet and strip, corrosion-resisting steel. The loop hinge shall be fabricated from corrosion-resisting steel sheet or strip. The steel sheet shall conform to class 430, condition A, finish number 2D of QQ-S-766. The steel strip shall conform to class 430, condition A, cold rolled, finish number 1 of QQ-S-766. The thickness shall be as specified on Drawing 4-1-438.

3.2.4 Strap, chin, type I helmet. The chin strap assembly for the type I helmet shall conform to MIL-S-43841.

3.2.5 Strap, chin, parachutist's, type II helmet. The chin strap assembly for the type II helmet shall conform to MIL-S-43912.

* 3.2.6 Sand aggregate. The aggregate for sand texturing shall be banding silica sand, water washed and kiln dried, free of salts and deleterious matter, and containing not more than 1.5 percent of dirt or foreign matter. The sand aggregate shall be that known commercially as No. 70 (average size) and have a screen analysis as specified in table I. The coating-sand mixture shall contain 6 pounds of sand to one base gallon of coating and shall be reduced to spraying consistency.

TABLE I. Screen analysis of sand aggregate

Sieve No. (U.S. STD)	Percent retained
No. 40	0.5 maximum
No. 50	6.0 ± 3
No. 70	34.0 ± 5
No. 100	82.0 ± 5
No. 140	97.0 + 3 or - 5

* 3.2.7 Coating. The coating for finishing the helmet shell (see 3.4.2) shall conform to MIL-C-46168, color Olive Drab 34087 of FED-STD-595.

3.3 Construction. The construction shall conform in all respects to the drawings listed in section 2 and as specified herein. The finished helmet shall be free of cracks, checks, wrinkles, dents, depressions, and rough and sharp edges. The type I and type II helmets shall consist of the following:

a. Type I helmet - Assembly of helmet shell, edging and 2-hinge loop assemblies, together with the attached chin strap assembly conforming to 3.2.4.

b. Type II helmet - Assembly of helmet shell, edging and 2-hinge loop assemblies, together with the attached chin strap assembly conforming to 3.2.5.

3.3.1 Spot welding. All spot welding shall be as specified on the drawings. Materials to be welded shall be clean and free of rust, scale, corrosion, oil, water, and other foreign matter. Spot welds shall be free from pits, burn through, and flash. When tested in accordance with 4.4.3.4, the spot welds shall pull a nugget or button from the spot welded test specimens without any evidence of failure of the weld.

3.3.2 Helmet shell. Prior to assembling the edging to the helmet shell, the helmet shell brim edge shall be trimmed and ground square to the shape shown on Drawings 2-1-87 and 2-1-88. The helmet shells shall be formed so as to be free from stress risers and stress concentrated areas. When tested in accordance with 4.4.3.1, the helmet shells shall show no evidence of splitting or cracking.

3.3.2.1 Helmet shell thickness. The average thickness of the helmet shell prior to finishing shall be not less than 0.033 inch with no single thickness measurement less than 0.031 inch when tested as specified in 4.4.3.1. Helmet shells conforming to the above shall meet the ballistic resistance requirement specified in 3.5.

3.3.2.1.1 Alternate helmet shell thickness. As an alternative, the average thickness of the helmet shell prior to finishing shall be not less than 0.034 inch with no single thickness measurement less than 0.029 inch, when tested as specified in 4.4.3.1. Helmet shells conforming to the above are not required to be ballistically tested.

3.3.2.2 Helmet shell heat treatment lot number identification. The supplier shall incise or indent the steel supplier's heat treatment lot number on each helmet shell. The characters shall be legible and visible on the inside surface of the finished helmet.

3.3.3 Helmet shell edging. The helmet shell edging shall conform to the thickness, width, and configuration shown on Drawing 2-1-87. The edging shall be spanked to the helmet shell as shown on Drawing 2-1-87 with the inside and outside inner edges firmly pressed against the helmet shell so that the edges are in contact with the helmet shell around the entire periphery.

3.4 Finish of helmet shell.

* 3.4.1 Surface preparation. The inside and outside surface of the helmet shell and edging and the surfaces of the hinge loops shall be cleaned, treated, and primed in accordance with type F of MIL-T-704. The final drying operation shall be conducted in such a manner as to ensure thorough drying within the edging and hinge loops.

* 3.4.2 Finish. Following the surface preparation and priming specified in 3.4.1, the entire helmet shall be coated with the coating specified in 3.2.7. A coat of the same coating containing the aggregate specified in 3.2.6 shall then be applied uniformly on the outside surface of the helmet shell and edging. There shall be no sand particles on the inside of the helmet shell or edging. After drying and curing, the finish shall be uniform in texture and appearance and free of sags, runs, wrinkles, chips, blistering, flaking, or peeling.

3.5 Ballistic resistance. Helmet shells conforming to the thickness requirement of 3.3.2.1 shall have a Vp 50 ballistic resistance limit of not less than 900 feet per second when tested as specified in 4.4.3.1. Helmet shells conforming to the alternate thickness requirement of 3.3.2.1.1 are not required to be tested for ballistic resistance.

3.6 Weight. The weight of the finished helmet, complete with chin strap assembly, shall not exceed the weights indicated below. The weight of the helmet shall be determined by means of a scale that has 1/8 ounce graduations minimum and is accurate to 1/8 ounce minimum.

Type I Helmet - 40-1/4 ounces
Type II Helmet - 40-1/8 ounces

3.7 Workmanship. The finished helmet shall conform to the quality of product established by this document and the occurrence of defects shall not exceed the applicable acceptable quality levels.

* 4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirement in the document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for assuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point or at all points in the manufacturing process necessary to assure compliance with all dimensional requirements.

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

a. First article inspection (see 4.3).
b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article is required (see 6.2), it shall be examined for the defects specified in 4.4.4 and 4.4.5. The presence of any defect shall be cause for rejection of the first article.

4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document.

4.4.1.1 Testing of sand aggregate. The sand aggregate shall be tested in accordance with table II. The lot shall be the amount of sand aggregate required for use in one batch of enamel.

TABLE II. Testing of sand aggregate

Characteristics	Requirement paragraph	Test method	Sample unit	Number of determinations per sample unit	Results reported as Pass or fail
Cleanness	3.2.6	ASTM C 117	ASTM C 117	1	X
Screen analysis	3.2.6	ASTM C 136	ASTM C 136	1	X

4.4.2 In-process inspection. Examination shall be made during the manufacturing process for requirements specified in table III to establish that no deviation is made from the specified requirements. Whenever nonconformance is noted, correction shall be made to the affected items and lot in process.

TABLE III. In-process inspection of helmet shell

Requirement	Requirement paragraph
Surface preparation of helmet shell for welding	3.3.1
Surface preparation of helmet shell for finishing	3.4.1
Priming and initial coating of enamel to inside and outside surface of helmet shell	3.4.2
Hinge loop dimensions	Drawing 4-1-438

4.4.3 Intermediate testing and inspection. Unless otherwise specified, visual defects shall be scored on an individual basis (i.e., each crack, wrinkle, spot weld defect, etc.).

4.4.3.1 Testing of helmet shells. After forming, trimming, and edge grinding, helmet shells shall be tested for the applicable characteristics indicated in table IV. The lot for ballistic testing and alternate thickness testing shall consist of helmet shells formed from armor steel of the same heat treatment lot number and with the same nominal thickness. The lot for other characteristics shall be all helmet shells offered for inspection at one time.

TABLE IV. Testing of helmet shells

Characteristic	Requirement paragraph	Test method	Sample unit	Inspection level	AQL
Stress concentration	3.3.2	4.5.2	1 helmet shell	S-2	1.5
Thickness	3.3.2.1	4.5.3	1 helmet shell	I	0.15
Alternate thickness	3.3.2.1.1	4.5.3.1	1 helmet shell	I	0.65
Ballistic resistance 1/ 2/	3.5	4.5.4	1 helmet shell	I	0.15

1/ Sampling for inspection per MIL-STD-414 (unknown variability, standard deviation method sampling plans, acceptability criteria form 2).

2/ Ballistic resistance testing is not required when helmet shells conform to the alternative thickness requirement specified in 3.3.2.1.1.

4.4.3.2 Visual examination of helmet shells. After forming, trimming and grinding operations, and before attachment of edging, the helmet shells shall be examined and the defects shall be classified in accordance with table V. The lot size shall be expressed in units of helmet shells. The sample unit shall be one helmet shell. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total defects.

TABLE V. Visual defects for helmet shells

Examine	Defect	Classification	
		Major	Minor
Surface condition	Any crack, check, or fracture	101	
	Form marks clearly noticeable without magnification		201
	Surface wrinkle or corrugation		202
	Edge of brim not ground smooth and square, i.e., sharp fin, burr, notch, nick	102	
	Any void or cavity other than minute surface irregularities	103	
Steel heat treatment lot number identification marking	Not identifiable with a steel lot		203
	Missing or illegible		204
	Not located on inside surface of helmet shell		205

4.4.3.3 Examination of helmet shell shape. After forming and grinding, the drawn helmet shell shall be examined for shape. The shape of the helmet shall conform to profile gages and the brim edge shall be the proper shape around the periphery. The lot size shall be expressed in units of formed helmet shells. The sample unit shall be one formed helmet shell. Profile gages of the brim edge, curves AOZ and MOM, and planes 10, 14, and 18 shall be fabricated in accordance with the data on Drawing 2-1-88. The helmet shell shall be examined using the profile gages on the brim edge and the applicable curve or plane. Any deviation from the profile gage along the brim edge exceeding 1/16 inch or any deviation from the profile gage(s) for the curves and planes exceeding 1/16 inch shall be scored as a defect. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

4.4.3.4 Testing of spot welds. At least one spot weld test specimen shall be made and tested in accordance with 4.5.1 at each of the following intervals:

a. At the beginning of each welding shift and at intervals not greater than one hour during production.
b. Upon replacement, adjustment, or dressing of electrodes.
c. Each time a change is made in the welding schedule or procedure.

Production spot welding shall be commenced only after a determination has been made that the test specimens, made and tested at the prescribed intervals, conform to 3.3.1.

4.4.3.5 Visual examination of helmet shell after spot welding. After attachment of edging and hinge loops, and before further finishing, the formed helmet shell shall be examined for defects in table VI. The lot size shall be expressed in units of spot welded helmet shells. The sample unit shall be one spot welded helmet shell. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total defects.

TABLE VI. Visual defects for spot welded helmet shells

Examine	Defect	Classification	
		Major	Minor
Edging	Butt joint at ends open more than 1/64 inch		201
	Not spanked to provide flush fit to body; opening exceeds 1/64 inch		202
	Spot weld burn resulting in a hole or noticeable reduction in thickness	101	
	Spot weld misplaced (i.e., not confined on edging)		203
	Pin head hole in weld over 1/16 inch in diameter	102	
	Pin head hole in weld over 1/32 inch but not over 1/16 inch in diameter		204
	Crack or fracture totaling more than 1/4 inch in length	103	
	Crack or fracture totaling 1/4 inch or less in length		205

TABLE VI. Visual defects for spot welded helmet shells - Continued

Examine	Defect	Classification	
		Major	Minor
Edging - continued	Joined to helmet shell with less than specified number of welds:		
	- less than one on each side and front and less than two (one on each side of butt joint) on back	104	
	- less than twelve but more than five (at least five welds shall be spaced as indicated for the major defect classification above)		206
Hinge loop assembly	Spot weld burn resulting in a hole or noticeable reduction in thickness	105	
	Cracked or fractured	106	
	Spot welds omitted: (applicable each hinge loop assembly)		
	- one		207
	- two or more	107	
	Spot weld misplaced		208

4.4.4 End item visual examination. The end item shall be examined for the defects listed in table VII. The lot size shall be expressed in units of completely assembled and finished helmets. The sample unit shall be one helmet. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects.

TABLE VII. End item visual defects

Examine	Defect	Classification	
		Major	Minor
Helmet soundness	Dent or depression, such as a sharp nick or dig, or deformation, affecting surface contour or outline:		
	- greater than 1/8 inch in depth	101	
	- 1/8 inch or less in depth		201

TABLE VII. End item visual defects - Continued

Examine	Defect	Classification	
		Major	Minor
Helmet exterior finish	Finish wet or tacky to the touch	102	
	Color characteristic of finish not as specified		202
	Lusterless characteristic of finish not as specified		203
	Enamel-sand aggregate omitted	103	
	Enamel-sand aggregate not uniformly distributed 1/		204
	Blemish, such as peeling, blistering, or flaking not exposing base metal, affecting an area more than 1/4 square inch or in several areas the combined areas of which exceeds 1/4 square inch		205
	Foreign matter embedded in or appearing on the finish, such as soil, stain, dirt, oil or grease, affecting an area more than one square inch or in several areas the combined areas of which exceeds one square inch 1/		206
	Any area of base metal exposed: 1/		
	- all areas except along outer edge of edging	104	
	- along outer edge of edging		207
	Finish abraded, scratched or chipped, not exposing the base metal, affecting an area more than 1/4 square inch or in several areas the combined areas of which exceeds 1/4 square inch 1/		208
	Not a smooth, uniform coating (i.e., run or sag affecting an area more than one square inch) 1/		209

TABLE VII. End item visual defects - Continued

Examine	Defect	Classification	
		Major	Minor
Helmet interior finish	Finish wet or tacky to the touch	105	
	Enamel finish omitted	106	
	Any area of base metal exposed 1/	107	
	Blemish, such as peeling, blistering or flaking, or abraded, scratched or chipped finish, not exposing base metal, affecting an area more than one square inch or in several areas the combined areas of which exceeds one square inch		210
	Foreign matter embedded in or appearing on the finish, such as soil, stain, dirt, oil or grease, affecting an area more than one square inch 1/		211
	Enamel-sand aggregate overrun affecting an area which extends beyond the edge 3/8 inch or more in any one area		212
	Not a smooth, uniform coating (i.e., run or sag affecting an area more than one square inch) 1/		213
Edging	Omitted	108	
	Sharp or rough edge (including weld flash not removed)	109	
Hinge loop assembly	Omitted	110	
	Any component damaged or malformed, affecting proper functioning	111	
	Loop does not move freely within hinge when manual force is applied		214
	Sharp or rough edge (including weld flash not removed)		215
	Area of no finish, exposing base metal for an area greater than 1/4 inch in longest dimension, except at moving joint surfaces that are subject to friction		216

TABLE VII. End item visual defects - Continued

Examine	Defect	Classification	
		Major	Minor
Chin strap assembly (types I and II)	Omitted	112	
	Any component damaged or malformed, affecting proper functioning	113	
	Type I assembly attached to helmet shell in reverse position	114	
	Type II assembly reversed (i.e., long strap on left hand hinge loop and short strap on right hand hinge loop)	115	
	Chin strap clips attached to helmet shell in reverse position resulting in chin strap assembly being attached in reverse (i.e., release hardware faces inside of helmet) (applicable to type II assembly)	116	
	Chin strap clips on type II assembly not secured as specified		217
	Incorrect chin strap	117	

1/ For these defects the helmet shall be examined from a distance of approximately 3 feet.

4.4.5 End item dimensional examination. The end item shall be examined for the defects listed in table VIII. The lot size shall be expressed in units of completely assembled and finished helmets. The sample unit shall be one helmet. The inspection level shall be S-3 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

TABLE VIII. End item dimensional defects

Examine	Defect
Edging	Edging does not extend equal distance on both sides of brim by more than 1/16 inch Joint misplaced (i.e., not at rear center line by more than 1/4 inch)
Hinge loop assembly	Not located as specified, exceeding tolerance
Type II chin strap assembly	Ends of long and short straps (snap fastener ends) not located as specified exceeding tolerance

4.4.6 Weight examination. The finished helmet shall be examined for compliance with the specified weight in 3.6. Any weight exceeding the weight limitation shall be classified as a defect. The lot size shall be expressed in units of finished helmets. The sample unit shall be one helmet. The inspection level shall be S-3 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

4.4.7 Packaging examination. The fully packaged end items shall be examined for the defects listed below. The lot size shall be expressed in units of shipping containers. The sample unit shall be one shipping container fully packaged. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

Examine	Defect
Marking (exterior and interior)	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application
Materials	Any component missing, damaged, or not as specified

Workmanship	Inadequate application of components, such as incomplete sealing or closure of flap, improper taping, loose strapping, or inadequate stapling Bulged or distorted container
Content	Number per container is more or less than required

4.4.8 Palletization examination. The fully packaged and palletized end items shall be examined for the defects listed below. The lot size shall be expressed in units of palletized unit loads. The sample unit shall be one palletized unit load, fully packaged. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

Examine	Defect
Finished dimensions	Length, width, or height exceeds specified maximum requirement
Palletization	Pallet pattern not as specified Load not bonded as specified
Weight	Exceeds maximum load limits
Marking	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application

4.5 Test methods.

4.5.1 Weld test. Test specimens shall be used to validate the adequacy of production spot welds. The test specimens shall be any convenient shape and size, compatible with the testing machine employed. A test specimen shall consist of one piece of the same material and thickness as the helmet body, and one piece of the same material and thickness as the hinge. Spot weld the two pieces together in the same machine and in the same manner to be used in production spot welding. Separate the test specimens by applying tension forces in opposite directions to determine compliance with 3.3.1.

4.5.2 Stress concentration test. Completely submerge formed helmet shells processed through draw, trim, edge grinding, cleaning, and drying in a vessel containing a 5 percent phosphoric acid solution for 24 hours ± 1/2 hour. After the prescribed immersion period, remove the helmet shell, rinse it with tap water, and examine the etched surface to determine compliance with 3.3.2.

4.5.3 Thickness measurement. After forming but prior to painting, the helmet shell shall be measured for averge thickness using the following procedure:

a. Locate the center of the uppermost point of the helmet shell shown in Drawing 2-1-88.

b. Draw four concentric circles forming five circumferential zones on the helmet shell surface. Measure the circle radii from the center point located in (a). The top circle shall have a radius of 1-1/4 inches. The second circle shall have a radius of 2-1/2 inches. The third circle shall have a radius of 3-3/4 inches, and the bottom circle shall have a radius of 5 inches.

c. Subdivide the second, third, and fourth zones into twelve zones by drawing lines from the front to the rear and from side to side through the uppermost center point dividing the helmet into four equal quadrants.

d. Number the twelve zones. The numerical sequence shall be clockwise with number 1 being in the lower right front section. Locate twelve points one at the center of each zone. Measure the helmet shell thickness at each point, record the values and compute the average thickness to determine compliance with 3.3.2.1. The thickness gage shall have an anvil radius not to exceed 1/8 inch.

4.5.3.1 Alternate thickness measurement. After forming, but prior to painting, the helmet shell shall be measured for average thickness using the following procedure:

a. Locate the center of the uppermost point of the helmet shell shown in Drawing 2-1-88.

b. Draw five concentric circles forming six circumferential zones on the helmet shell surface. Measure the circle radii from the center point located in (a). The top circle shall have a radius of 1-1/4 inches. The second circle shall have a radius of 2-1/2 inches. The third circle shall have a radius of 3-3/4 inches. The fourth circle shall have a radius of 5 inches, and the bottom circle shall have a radius of 6-1/4 inches.

c. Subdivide the second, third, fourth, and fifth zones into sixteen zones by drawing lines from the front to the rear and from side to side through the uppermost center point dividing the helmet into four equal quadrants.

d. Number the sixteen zones. The numerical sequence shall be clockwise with number 1 being in the lower right front section. Locate sixteen points, one at the center of each zone. Measure the helmet shell thickness at each point, record the values, and compute the average thickness to determine compliance with 3.3.2.1.1. The thickness gage shall have an anvil radius not to exceed 1/8 inch.

4.5.4 Ballistic test. After forming, trimming, and edge grinding of helmet shells has been done, tests to determine compliance with the ballistic resistance requirement of 3.5 shall be performed in accordance with MIL-STD-662, except that the weight of armor test material requirement in MIL-STD-662 shall not apply. Testing shall be accomplished by firing one shot each into at least ten of twelve sections, starting with the lower right front section and continuing clockwise around the lower zone and proceeding with each next higher zone in the same manner until the required number of sections have been tested. If additional shots are required, testing shall be continued by repeating the firing sequence and stopping when sufficient data have been obtained to permit calculation of the V_p 50 limit.

4.5.4.1 Target area. Rigidly mount the helmet so that the area subjected to impact shall be normal to the line of fire. The area to be tested is designated as follows: Using as a center the uppermost point of the helmet as shown on Drawing 2-1-88, draw four concentric circles 1-1/4 inches apart, measured along the surface. The top zone is not to be fired. Further subdivide each of the remaining three zones into four sections by drawing meridional lines through the uppermost center point. This will divide the helmet into quadrants.

4.5.4.2 V_p 50 calulations. The V_p 50 limit for each test helmet shall be the average of the velocities recorded for ten fair impacts, consisting of five lowest velocities recorded for complete penetration, and of the five highest velocities recorded for partial penetration, provided the spread for the ten velocities used is not greater than 125 feet per second. In cases where the spread is greater than 125 feet per second, the V_p 50 limit shall be the average of fourteen fair impact velocities, consisting of seven lowest complete penetration velocities and the seven highest partial penetration velocities. All velocities used in these calculations shall be striking velocities calculated at the point of initial contact with the test helmet. A fair impact results when a projectile strikes an unsupported area of the test helmet at a distance of at least 1-1/4 inches from any other point of impact.

5. PACKAGING

5.1 Preservation. Preservation shall be level A.

5.1.1 Level A. Five helmets of one type only, with the long and short chin straps placed on the outside of each helmet except the straps shall be inside for the bottom helmet, shall be nested compactly together in a stack with a separator between each helmet. The separator shall be made of embossed or indented paperboard having a basis weight of not less than 48 pounds per 1,000 square feet after embossing or indentation, or the equivalent (i.e., Shocksorb, Waffleboard, or Trunk Wrapper). The separator may also be made of 1/8-inch minimum thickness cushioning material conforming to PPP-C-1797. The separator shall be a disc of approximately 17 inches in diameter, slotted at 90-degree intervals around the perimeter so that the disc will fold to the

shape of the helmet. Prior to nesting, the hinge loop assemblies on the inside of each helmet shall be completely covered with cloth backed pressure sensitive tape.

5.2 Packing. Packing shall be level A or B, as specified (see 6.2).

* 5.2.1 Level A packing. Twenty helmets of one type only, preserved as specified in 5.1, shall be packed in a fiberboard shipping container conforming to style RSC-L, grade V2s of PPP-B-636. The inside of each fiberboard container shall be fitted with a box liner conforming to type CF, class weather resistant, variety SW, grade V3c of PPP-B-636. In addition, each container shall be provided with a full-height, half-slotted style interlocking partition or full-height scored and folded fiberboard sheets fabricated of the same material as the box liner to form four cells within the container. Each nested stack of five helmets shall be packed upright (crowns of helmets up) within each of the four cells. The inside dimensions of the shipping container shall be approximately 23 inches in length, 19-3/4 inches in width, and 13-3/4 inches in depth. Approximate dimensions are furnished as a guide only. Each fiberboard container shall be closed in accordance with method III, waterproofed in accordance with method V, and reinforced as specified in the appendix of PPP-B-636 except that the inspection shall be in accordance with 4.4.7. Shipping containers shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.2). When unit loads are strapped, strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

* 5.2.2 Level B packing. Twenty helmets of one type only, preserved as specified in 5.1, shall be packed in a fiberboard container conforming to style RSC-L, type CF (variety SW) or SF, class domestic, grade 350 of PPP-B-636. The inside of each fiberboard container shall be fitted with a box liner conforming to type CF, class domestic, variety SW, grade 200 of PPP-B-636. In addition, each container shall be provided with a full-height, half-slotted style interlocking partition or full-height scored and folded fiberboard sheets fabricated of the same material as the box liner to form four cells within the container. Each nested stack of five helmets shall be packed upright (crowns of helmets up) within each of the four cells. Inside dimensions of each shipping container shall be approximately 23 inches in length, 19-3/4 inches in width, and 13-3/4 inches in depth. Approximate dimensions are furnished as a guide only. Each fiberboard container shall be closed in accordance with method II as specified in the appendix of PPP-B-636 except that the inspection shall be in accordance with 4.4.7.

* 5.2.2.1 Weather-resistant container. When specified (see 6.2), the shipping container shall be a grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with method III as specified in the appendix of PPP-B-636 except that the inspection shall be in accordance with 4.4.7.

* 5.3 Palletization. When specified (see 6.2), helmets of one type only, packed as specified in 5.2.2, shall be palletized on a 4-way entry pallet in accordance with load type Ia of MIL-STD-147. Pallet type shall be type I (4-way entry), type IV or type V in accordance with MIL-STD-147. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means K and L or film bonding means O or P. Pallet pattern shall be number 90 in accordance with the appendix of MIL-STD-147.

* 5.4 Marking. In addition to any special marking required by the contract or purchase order, shipping containers, and palletized unit loads shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The helmets are intended for use with the Liner, Ground Troops' Helmet (Combat) per MIL-L-41800. The type I helmet is for use by ground troops and the type II helmet is for use by parachutists.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this document.
b. Type required (see 1.2).
c. When a first article is required (see 3.1, 4.3, and 6.3).
d. Selection of applicable level of packing (see 5.2).
e. Type and class of unit load required (see 5.2.1).
f. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.1).
g. When palletization is required (see 5.3).

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for selection, inspection, and approval of the first article.

6.4 Subject term (key word) listing.

Body armor
Headgear
Helmet

6.5 Changes from previous issue. The margins of this document are marked with an asterisk (*) to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only, and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content, as written, irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - GL
Navy - NU
Air Force - 99

Review activities:

Army - MD
Air Force - 82
DPSC - FS

User activities:

Navy - MC, YD
Air Force - 45

Preparing activity

Army - GL

Project No. 8470-0122

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-H-1988G	Helmet, Ground Troops'; Parachutists, Steel, M-1

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

5 PROBLEM AREAS

a. Paragraph Number and Wording

b. Recommended Wording:

c. Reason/Rationale for Recommendation

6. REMARKS

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

DD FORM 1426

PREVIOUS EDITION IS OBSOLETE.