INCH-POUND

MIL-A-51384B(EA)
23 November 1988
SUPERSEDING
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20 October 1980

MILITARY SPECIFICATION

ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42

This specification is approved for use within U.S. Army Chemical Research, Development and Engineering Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of remote alarm unit suitable for use with the detector unit of the M8A1 chemical agent alarm.

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 document 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 (see 6.2).

SPECIFICATIONS

MILITARY

MIL-P-60312 - Parts, Molded, Plastic Foam, Polystyrene (For Use With Ammunition).

: Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed: to: Commander, U.S. Army Chemical Research, Development and Engineering Center, ATTN: SMCCR-SPT-S, Aberdeen Proving Ground, MD 21010-5423 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 6665

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STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-252 - Classification of Visual and Mechanical Defects For Equipment, Electronic, Wired, and Other Devices.
MIL-STD-810C - Environmental Test Methods.

2.1.2 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 are those cited in the solicitation.

U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND

CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

DRAWINGS

5-15-4805 - Circuit Card Assembly.
5-15-4819 - Paddle, Alarm Unit, Chemical Agent.
5-15-4824 - Housing, Alarm Unit, Chemical Agent.
5-15-4826 - Alarm Unit, Chemical Agent Automatic Alarm: ABCA-M42.
5-15-6568 - Unit Packing of Alarm Unit, ABCA-M42.
5-15-8754 - Overpack Alarm Unit, Chemical Agent Automatic Alarm, M42.

SPECIAL PACKAGING INSTRUCTIONS (SPI)

P5-15-4826 - Alarm Unit, Chemical Agent, Automatic Alarm - M42.

(Copies are available from Commander, U.S. Army Information Systems Command, ATTN: ASNC-ARI-IMC-TM, Rock Island, IL 61299-7300.)

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

3. REQUIREMENTS

3.1 Materials and components.

3.1.1 Materials. All materials cited on Drawing 5-15-4826 or on the subsidiary drawings shall conform to the specifications listed thereon, or to the specific characteristics set forth on the drawings and in this specification.

3.1.2 Components. All components of the alarm unit shall conform to the specifications and drawings listed on Drawing 5-15-4826 and subsidiary drawings.

3.2 Manufacture and assembly. The components shall be manufactured and assembled as specified on the subsidiary drawings listed on Drawing 5-15-4826.

3.3 Continuity. The interconnecting wiring of the alarm unit shall have a resistance of less than 1.0 ohm between the points listed in table I when tested as specified in 4.4.4.1.

TABLE I. Continuity between points

From	To
J1-B	DS1-2
	LS1-2
	BT1-1
J1-C	DS1-1
J1-H	BT4-2
	S1-4
J1-M	S1-8
J1-N	S1-1

3.4 Resistance. The alarm unit shall have the resistances specified in table II when tested as specified in 4.4.4.2.

TABLE II. Resistance between points

From	To	Resistance (ohms)
J1-H	J1-B	Greater than 100,000
J1P	E1	20,000 ± 1,000
J1R	E2	20,000 ± 1,000
J1-B	J1-M	3.2 ± 0.5 in Switch positions TEST and HORN ON

3.5 Functioning. With the alarm unit energized by 6.0 ± 0.5 volt direct current (V dc) applied at points BT4-2 and BT1-1 and a 12.0 ± 0.5 V dc alarm signal applied at points E1 and E2, the alarm unit shall function as follows when tested as specified in 4.4.4.3:

(a) When switch S1 is in the HORN ON position, the horn shall sound with a cyclic output and the red light shall flash. Reversing the polarity of the voltage applied at points E1 and E2 shall produce no observable change in the sounding of the horn or the flashing of the light.

(b) When switch S1 is in the HORN OFF position, the horn shall not sound but the light shall continue to flash.

(c) When switch S1 is in the TEST position, the horn shall sound with a cyclic output and the red light shall flash.

3.6 Sound level. The sound level of the horn output shall be at least 88 decibels [dB(A)] when measured at a distance of 24.0 ± 2.0 inches (60.96 ± 5.08 cm) from and perpendicular to the horn grill, in a sound test chamber capable of maintaining a reference background noise level of less than 60 decibels [dB(A)] above 2.0×10^{-4} dynes per square centimeter when tested as specified in 4.4.4.4.

3.7 Top panel and gasket leakage. There shall be no evidence of air leakage through the top panel or gasket of the alarm unit or through or around any of the components mounted thereon when the internal air pressure of the alarm unit is increased to 8.0 ± 0.5 inches (20.32 ± i.27 cm) of water greater than the ambient pressure and the alarm unit is immersed in a tank of water to a maximum depth of 2.0 inches (5.08 cm) measured from the top surface of the top panel to the surface of the water for at least 45 seconds when tested as specified in 4.4.4.5.

3.8 Operation at low temperature. When tested as specified in 4.3.3.1, the alarm unit shall meet the requirements of 3.5 and 3.6 when the alarm unit is at a temperature of -40° ± 5°F (-40° ± 2.8°C). The alarm unit shall be subjected to the low temperature for at least 3 hours prior to testing at that temperature.

3.9 Operation at high temperature. When tested as specified in 4.3.3.2, the alarm unit shall meet the requirements of 3.5 and 3.6 when the alarm unit is at a temperature of 120° ± 5°F (48.9° ± 2.8°C). The alarm unit shall be subjected to the high temperature for at least 3 hours prior to testing at that temperature.

3.10 Operation during rain. When tested as specified in 4.3.3.3, the alarm unit shall meet the requirements of 3.5 after the alarm unit has been exposed to rainfall at the rate of 4.0 ± 0.5 inch (10.16 ± 1.27 cm) per hour for 0.5 ± 0.1 hour with the top panel of the alarm unit up, and then with the alarm unit canted 45° ± 5° and each of the four sides in turn exposed to rainfall at the rate of 4.0 ± 0.5 inch (10.16 ± 1.27 cm) per hour for 0.5 ± 0.1 hour. In addition, the horn of the alarm unit shall not sound and the light shall not light during any of the exposures to rain required above.

3.11 Operation after vibration. When tested as specified in 4.3.3.4, the alarm unit shall meet the requirements of 3.5 and 3.6 after exposure to the vibration environment described in MIL-STD-810C, method 514, procedure VIII, curve Y (6,000 miles) (9,656 kilometers). The alarm unit battery shall be in place in the alarm unit during exposure to the vibration environment, but the alarm unit need not be producing a sound. There shall be no physical deterioration of the unit after vibration.

3.12 Preproduction. Prior to the start of regular production, a preproduction sample of the alarm units shall be produced in accordance with this specification for examination and test (see 4.3).

3.13 Workmanship. The workmanship of the alarm unit shall be in accordance with MIL-STD-252.

4. QUALITY ASSURANCE PROVISIONS

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

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

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

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

4.3 Preproduction inspection.

4.3.1 Sample. A preproduction sample of eight alarm units shall be manufactured using the same methods, materials, equipment and processes as will be used during regular production. The eight alarm units shall be unit packed in accordance with Drawing 5-15-6568 as specified in SPI P5-15-4826.

4.3.2 Inspection procedures.

4.3.2.1 For examination and nondestructive tests. The preproduction sample of alarms shall be examined in accordance with 4.4.3.4 and tested in accordance with 4.3.3 and 4.4.4 for conformance to the requirements of this specification.

4.3.2.2 For destructive test. Prior to packaging this preproduction sample of alarms, two overpacks (Drawing 5-15-8754) shall be tested as specified in 4.4.4.6. The acceptance number is zero.

4.3.3 Tests. Tests shall be conducted as follows:

4.3.3.1 Operation at low temperature. Install four cells suitable for low temperature operation into the alarm unit (see 6.3). Connect a source of 12.0 ± 0.5 V dc with an output capability of at least 100 milliamperes to alarm terminals E1 and E2. Include a means of reversing the polarity of the voltage applied at E1 and E2 and opening the circuit while the alarm unit is in a test chamber. Place switch S1 of the alarm in the HORN ON position, and open the circuit to the 12.0 ± 0.5 V dc source. Place the alarm unit into a test chamber already at the temperature required by 3.8 and permit it to remain undisturbed at that temperature for the required period of time. Then, close the circuit to the 12.0 ± 0.5 V dc source and observe the functioning of the alarm unit. Reverse the polarity of the voltage applied at E1 and E2 and again observe functioning. Functioning shall be as required by 3.5(a). Complete the following test sequence, through the measurement of sound level output, within 5 minutes after opening the chamber door: Open the chamber door and place switch S1 in the HORN OFF position, disconnect the 12.0 ± 0.5 V dc source from the alarm unit and then place switch S1 in the TEST position. Functioning shall be as required by 3.5(b) and 3.5(c). Remove the alarm unit from the temperature test chamber and place it into a sound level test chamber that conforms with the requirements of 3.6. Measure the sound output of the alarm unit. The sound output shall be as required by 3.6.

4.3.3.2 Operation at high temperature. Install a suitable battery into the alarm unit. Connect a source of 12.0 ± 0.5 V dc with an output capability of at least 100 milliamperes to alarm terminals E1 and E2. Include a means of reversing the polarity of the voltage applied at E1 and E2 and opening the circuit while the alarm unit is in a test chamber. Place switch S1 of the alarm unit in the HORN ON position, and open the circuit to the 12.0 ± 0.5 V dc source. Place the alarm unit into a test chamber already at the temperature required by 3.9 and permit it to remain undisturbed at that temperature for the required period of time. Then, close the circuit to the 12.0 ± 0.5 V dc source and observe the functioning of the alarm unit. Reverse the polarity of the voltage applied at E1 and E2 and again observe functioning. Functioning shall be as required by 3.5(a). Complete the following test sequence, through the measurement of sound level output, within 5 minutes after opening the chamber door: Open the chamber door and place switch S1 in the HORN OFF position, disconnect the 12.0 ± 0.5 V dc source from the alarm unit and then place switch S1 in the TEST position. Functioning shall be as required by 3.5(b) and 3.5(c). Remove the alarm unit from the temperature test chamber, and place it into a sound level test chamber that conforms with the requirements of 3.6. Measure the sound output of the alarm unit. The sound output shall be as required by 3.6.

4.3.3.3 Operation during rain. Install a suitable battery into the alarm unit and place switch S1 in the HORN ON position. Place the alarm unit, top panel up, into a test chamber previously adjusted to produce rainfall at the rate required by 3.10. Turn on the rain for the required period of time. Connect a source of 12.0 ± 0.5 V dc with an output capability of at least 100 milliamperes to alarm terminals E1 and E2 and observe functioning. Reverse the polarity of the voltage applied at E1 and E2 and again observe functioning. Functioning shall be as required by 3.5(a). Place switch S1 in the HORN OFF position, disconnect the 12.0 ± 0.5 V dc source, and then place switch S1 to the HORN ON position. Cant the alarm 45° ± 5°, and subject it to another period of the rainfall required by 3.10. Test functioning as was done after exposure to rain with the top panel up. Reposition the alarm unit such that it is still canted 45° ± 5° but another side is exposed to the rain. Subject to rain, and then test functioning. Continue this procedure until all four sides of the alarm unit as well as the top panel have been exposed to the rain. During each period of rainfall, monitor the alarm unit for the sounding of the horn and the lighting of the light; 3.10 requires that the horn shall not sound and the light shall not light during exposure to the rainfall.

4.3.3.4 Operation after vibration. Install a suitable battery into the alarm unit, and place switch S1 in the HORN ON position. Subject the alarm unit to the vibration environment required by 3.11. After vibration, subject the alarm unit to the functioning and sound level tests specified in 4.4.4.3 and 4.4.4.4. Functioning and sound level shall be as required by 3.5 and 3.6. Examine the unit for physical deterioration.

4.3.4 Acceptance/rejection criteria. The alarm unit shall comply with the examinations and tests specified in 4.3.2 to be acceptable. The contractor shall obtain written approval from the contracting activity before proceeding with regular production.

4.4 Quality conformance inspection.

4.4.1 Lotting. A lot shall consist of the alarm units offered for acceptance at one time, which have been produced by one manufacturer, and under essentially the same manufacturing conditions.

4.4.2 Sampling.

4.4.2.1 For examination and for sound level, top panel and gasket leakage tests. The alarms shall be sampled in accordance with MIL-STD-105.

4.4.2.2 For destructive test. The polystyrene container (Drawing 5-15-8754) shall be sampled in accordance with MIL-STD-105, level S-1 at the specified AQL.

4.4.3 Inspection procedures.

4.4.3.1 For examination and for sound level, top panel and gasket leakage tests. Sample alarm units and the packaging shall be examined and tested in accordance with the classification of defects (4.4.3.4) and MIL-STD-105.

4.4.3.2 For continuity, resistance, and functioning tests. Each alarm unit in the lot shall be tested in accordance with 4.4.4.1, 4.4.4.2, and 4.4.4.3. Any alarm unit found defective shall be rejected.

4.4.3.3 For destructive test. Sample polystyrene container (Drawing 5-15-8754) shall be tested as specified in 4.4.4.6. The acceptance/rejection criteria shall be at an AQL of 2.5 percent defective.

4.4.3.4 Classification of defects.

(a) Alarm unit, chemical agent automatic alarm: M42 (Drawing 5-15-4826).

Categories	Defects	Acceptance standards
Critical:	None defined	
Major:	AQL 1.0 percent defective	
101	Workmanship (applicable defects listed as Major in MIL-STD-252, see 3.13)	
102	Sound level	4.4.4.4
103	Top panel and gasket leakage	4.4.4.5
Minor:	AQL 4.0 percent defective	
201	Workmanship (applicable defects listed as Minor in MIL-STD-252, see 3.13)	

(b) Packaging inspection (section 5).

Categories	Defects
Critical:	None defined
Major:	AQL 2.5 percent defective
101	Unit packing or packing component missing, incorrect, or incorrectly assembled
102	Unit packing or packing component damaged
103	Markings missing, incorrect, or illegible

4.4.4 Tests. Tests shall be conducted as follows:

4.4.4.1 Continuity. Remove the top panel (Drawing 5-15-4819) from the housing (Drawing 5-15-4824). Remove the circuit card (Drawing 5-15-4805) from the top panel. Connect an ohmmeter having an accuracy of at least ± 2° of arc on the R X 1 scale and 1.5° of arc on the R X 100 and R X 10K scales deflection successively to each pair of test points listed in table I and measure the

resistance. The resistance measured at each pair of test points shall be as required by 3.3. NOTE: Power sources should be disconnected prior to measurement.

4.4.4.2 Resistance. Remove the top panel (Drawing 5-15-4819) from the housing (Drawing 5-15-4824). Remove the circuit card (Drawing 5-15-4805) from the top panel. Connect an ohmmeter having an accuracy of at least ± 2° of arc on the R X 1 scale and 1.5° of arc on the R X 100 and R X 10K scales deflection successively to each pair of test points listed in table II and measure the resistance. The resistance measured at each pair of test points shall be as required by 3.4. NOTE: Power sources should be disconnected prior to measurement.

4.4.4.3 Functioning. Remove the top panel (Drawing 5-15-4819) from the housing (Drawing 5-15-4824). Connect a source of 6.0 ± 0.5 V dc with an output capability of at least 1.0 amp to test points BT4-2 and BT1-1. The plus terminal of the power source must be connected to BT4-2. Connect a source of 12.0 ± 0.5 V dc with an output capability of at least 100.0 milliamperes to points E1 and E2. Place switch S1 in the HORN ON position and observe the functioning of the alarm unit. Interchange the power source connections at E1 and E2, and again observe the functioning of the alarm unit. Functioning shall be as required by 3.5(a). Place switch S1 in the HORN OFF position. Functioning of the alarm unit shall be as required by 3.5(b). Disconnect the 12.0 ± 0.5 V dc source, then place switch S1 in the TEST position. Functioning of the alarm unit shall be as required by 3.5(c).

4.4.4.4 Sound level. Place the completely assembled alarm unit, with battery installed, in a test chamber that conforms to the requirements of 3.6. Position the microphone of the sound level measuring device in the relationship to the alarm unit required by 3.6. Place switch S1 of the alarm unit in the TEST position, and measure the sound output of the alarm unit. The level of this sound output shall conform to requirements of 3.6.

4.4.4.5 Top panel and gasket leakage. Install the alarm unit top panel and gasket onto a test housing conforming to Drawing 5-15-4824. The test housing shall be fitted with a suitable air inlet connection attached to a magnehelic gage, having an accuracy of not less than 2.0 percent full scale deflection in 0.5 inches of water increments, which is then connected to a regulated pneumatic source. Increase the air pressure within the alarm unit until 8.0 ± 0.5 inches (20.32 ± 1.27 cm) of water is indicated on the magnehelic gage. Immerse the alarm unit in a tank of water to the specified depth for the required period of time. The water should contain a suitable wetting agent (see 6.4). Examine the top panel and gasket for evidence of leakage as required by 3.7. A leak is defined as a bubble making or breaking from the surface of the alarm unit top panel or gasket.

4.4.4.6 Moisture content. Prior to packaging the alarms as defined on SPI P5-15-4826, determine the moisture content of the polystyrene containers (Drawing 5-15-8754) in accordance with MIL-P-60312, except that the sampling and acceptance/rejection criteria shall be as specified herein.

5. PACKAGING

5.1 Packaging. Packaging shall be as specified on SPI P5-15-4826.

5.2 Replacement parts. When applicable components for this alarm are procured for storage and issue as a replacement part, preservation, unit packing, packing and marking shall be as specified on the applicable Special Packaging Instruction (SPI) or packaging data sheet which is identified on the part number or National Stock Number (NSN) of the replacement part.

6. NOTES

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

6.1 Intended use. This alarm unit is intended for use as a portable remote alarm in the M8A1 chemical agent alarm.

6.2 Acquisition documments. Acquisition documents should specify the following:

(a) Title, number, and date of this specification.
(b) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).
(c) Preproduction.

(1) Time allowed for contractor submission of samples for Government test and evaluation after award of contract.
(2) Name and address of test facility and shipping instructions when testing is performed by the Government.
(3) Time required for the Government to notify the contractor whether or not to proceed with production.

(d) Level of packing required (see section 5).
(e) Palletization required (see section 5).

6.3 Cells for low temperature operation. Eveready E95 or BA-3030/U cells have been found to be satisfactory for this test.

6.4 Wetting agent. One gram of Aerosol OT per 500 milliliters of water has been found satisfactory for the top panel and gasket leakage test.

6.5 International interest. Certain provisions of this specification are the subject of international standardization agreement QSTAG 251. When amendment, revision, or cancellation of this specification is proposed that will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

6.6 Subject term (key word) listing.

Agent, chemical: alarm
Alarm, chemical agent
Alarm unit, remote, portable
Chemical agent alarm
Chemical agent automatic alarm
Detector unit, chemical agent alarm
Toxic agent alarm

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

Custodian:

Army - EA

Preparing activity:

Army - EA

Project No. 6665-A488

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

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-A-51384B(EA)	ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42

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)*

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