

MIL-A-15303P(SH)
19 November 1986
SUPERSEDING
MIL-A-15303N(SHIPS)
20 July 1976
(See 6.8)

MILITARY SPECIFICATION

AUDIBLE SIGNALS: ALARMS, BELLS, BUZZERS, HORNS, AND SIRENS,
ELECTRONIC, SHIPBOARD

This specification is approved for use within the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers various types of audible signals for alarm and signaling purposes on Navy ships.

1.2 Classification. The types of audible signals shall be designated in the following form, as specified (see 6.2.1):

IC/B1D1

"IC/" is the basic part of each audible signal designator, B indicates the general type of signal (see 1.2.2), 1 indicates special characteristics of the general type (see 1.2.3), D indicates type of supply current (see 1.2.4) and 1 indicates the supply voltage (see 1.2.5). When an audible signal may be used at more than one type of supply current, a combination of designators may be used in the type designation.

1.2.1 Basic indicator. The basic indicator for Naval interior communication equipment shall be "IC/".

1.2.2 General type. General type of signal shall be designated by a single letter as follows:

B - Bell
Z - Buzzer
H - Horn
S - Siren
E - Electronic

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1.2.3 Special characteristics. Special characteristics of the general type shall be designated by a number as follows:

Bells

- 1 - 3 inch diameter gong
- 2 - 8 inch diameter gong
- 3 - Cow bell shaped gong
- 4 - Single stroke bar chime
- 5 - Bus failure alarm signal

Buzzers

- 1 - Low intensity, watertight

Horns

- 1 - Nonresonated, 100 to 600 hertz (Hz), 95 decibels (dB)
- 2 - Resonated, 250 to 350 Hz, 95 dB
- 3 - Resonated, 300 to 350 Hz, 112 dB (general and motor boat navigational signal)
- 6 - Mechanical, 100 to 600 Hz, motorboat use, 90 dB
- 7 - Mechanical, 200 to 350 Hz, fog signal, 110 dB
- 8 - Motor-operated, 100 to 600 Hz, 103 dB

NOTE: Navigational horns constructed of corrosion resistant materials shall be identified by the letter "N" as the last element of the type designation.

Sirens

- 1 - Low pitch, 600 to 1200 Hz
- 2 - High pitch, 1750 to 2500 Hz

Electronic signals

- 1 - Bus failure alarm signal 800 to 1800 Hz
- 3 - Switchboard, audible and remote signals 500 to 1000 Hz

1.2.4 Supply current. Type of supply current shall be designated by a single letter as follows:

- D - Direct current (dc)
- S - 60 Hz alternating current (ac)
- F - 400 Hz ac

1.2.5 Supply voltage. Supply voltage shall be designated by a number as follows:

- 1 - 6-volt (V) supply
- 2 - 12-V supply
- 3 - 24-V supply
- 4 - 115-V supply
- 5 - 440-V supply

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1.3 Part identification. The audible signals furnished under this specification shall be identified by a part number as follows:

M15303-IC/B1D1

"M" prefix and specification no.

Basic indicator for Naval interior communication equipment

Type of audible signal (see 3.5)
(defining a 3-inch diameter gong,
operating on a 6 volt dc (Vdc)
power supply)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbook. The following specifications, standards, and handbook 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

FF-B-171 - Bearings, Ball, Annular (General Purpose).

MILITARY

MIL-E-2036 - Enclosures for Electric and Electronic Equipment, Naval Shipboard.
MIL-E-16400 - Electronic, Interior Communication and Navigation Equipment, Naval Ship and Shore: General Specification for.
MIL-E-17555 - Electronic and Electrical Equipment Accessories, and Provisioned Items (Repair Parts): Packaging of.

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-108 - Definitions of and Basic Requirements for Enclosures for Electric and Electronic Equipment.
MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.

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- MIL-STD-462 - Electromagnetic Interference Characteristics, Measurement of.
- MIL-STD-740 - Airborne and Structureborne Noise Measurements and Acceptance Criteria of Shipboard Equipment.
- MIL-STD-785 - Reliability Program for Systems and Equipment Development and Production.
- MIL-STD-810 - Environmental Test Methods and Engineering Guidelines.
- MIL-STD-1310 - Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety.
- DOD-STD-1399, Section 300 - Interface Standard for Shipboard Systems, Electric Power, Alternating Current. (Metric)

HANDBOOK

MILITARY

- MIL-HBDK-217 - Reliability Prediction of Electronic Equipment.

2.1.2 Other Government drawings. The following other Government drawings 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

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

- NAVSHIPS 803-73904 - Bell, Watertight, 115 Volts, 60 Cycles, Type IC/B1S4, Sym. 2622.
- NAVSHIPS 803-73905 - Buzzer, Watertight, Type IC/Z1S4 115 Volts, 60 Cycles, Sym. 2623.
- NAVSHIPS 803-74308 - Horn, Motor Driven Types IC/H8D3, Watertight, 24 Volts D.C., IC/H8D4, Watertight, 115 Volts D.C., and IC/H8S4, Watertight, 115 Volts A.C., Sym. 2628.
- NAVSHIPS 803-74309 - Siren - 115 Volts A.C. - D.C., Low and High Pitch - SP, Sym. 2627.
- NAVSHIPS 803-74320 - Horns, Resonated - 115 Volts AC/DC, High Intensity, Watertight, Types IC/H2S4 and IC/H2D4.
- NAVSHIPS 803-74342 - Bell, Watertight and Explosionproof, 115 Volts, 60 Cycle, Types IC/B2S4, IC/B2S4(EXP), and IC/B3S4, Sym. 2622.1, 2622.2, 2622.3.
- NAVSHIPS 803-74354 - Horn-Vibratory Watertight, 115 Volts, D.C. Type IC/H1D4, Sym. 2944.
- NAVSHIPS 803-74465 - Horn, Vibratory, 115 Volts, Watertight, Type IC/H1S4, Sym. 2626.
- NAVSHIPS 803-74488 - Bell, Dripproof, Type IC/B5S5, Sym. 3004, 3005.
- NAVSHIPS 803-1197104 - Buzzer, Watertight, 115 Volts, 400 Cycles, Type IC/Z1F4, Sym. 3003.

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NAVAL SEA SYSTEMS COMMAND (NAVSEA) (Continued)

- NAVSHIPS 803-1853029 - Horn, Resonated, High Intensity, Water-tight, Types IC/H3D2, 12 Volts D.C., Sym. 2939, IC/H3D3, 24 Volts D.C., Sym. 2940, IC/H3D4, 115 Volts D.C., Sym. 2941, IC/H3S4, 115 Volts A.C., Sym. 2939, 2942.
- NAVSHIPS 803-1853145 - Airflow Indicator and Alarm System, 115 Volts, A.C., 60 Cycles, Circuit HF.
- NAVSHIPS 804-1853037 - Signal, Electronic, Audible, Type IC/E3D2, 12 Volts DC.
- NAVSHIPS 804-1853042 - Alarm Signal, Bus Failure (Electronic), Type IC/E1D1, Monitoring, 115 Volts DC or 115 Volts 60-400 Cycles, Sym. 2943.

(Copies of specifications, standards, handbooks, and drawings 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 document forms 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 issue of the nongovernment documents which is current on the date of the solicitation.

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)
J 517 - Hydraulic Hose.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), 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 Qualification. Audible signals furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 General features. The equipment, in addition to the requirements specified herein, shall be in accordance with MIL-E-16400, except for the accelerated life test (see 3.13 and 4.5.4) and shall conform to the tests specified in section 4.

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3.3 Construction. Audible signals constructed in accordance with drawings specified herein shall meet the performance requirements specified herein.

3.3.1 Audible signals are shown on Drawings 803-73904, 803-73905, 803-74308, 803-74309, 803-74320, 803-74342, 803-74354, 803-74465, 803-74488, 803-1197104, 803-1853029, 804-1853037, 804-1853042 and 803-1853145 and shall be constructed in accordance with these drawings for form, fit and functions (see 6.4).

3.3.2 Unless otherwise specified herein (see 3.10.1.1 and 6.2.1), all signals shall be two- or three-point vertically mounted.

3.3.3 The signals shall provide for adjustment for optimum audible output. Adjustment features shall be constructed to be securely locked to insure stability of positioning.

3.3.4 Audible signals shall be painted in accordance with MIL-E-16400, except that the surfaces of identification plates, bell gong, and strikers shall not be painted.

3.3.5 Grounding and bonding. Short circuits or grounds which could be caused by excessive motion of armatures or other moving parts shall be prevented. Bonding shall be in accordance with MIL-STD-1310.

3.3.6 Shielding and electromagnetic interference reduction. Shielding and electromagnetic interference characteristics shall be in accordance with class A4 or A5 of MIL-STD-461 for all types of audible signals. Certain audible signals shown on drawings specified in 3.3.1 incorporate radio interference filters. Filters are required only when essential to enable the audible signals to meet these characteristics.

3.3.7 Special tools. Audible signals shall be so constructed that special tools will not be required for disassembly, repair, or reassembly. Special tools are defined as those tools not listed in the Federal Supply Catalog (copies of this catalog may be consulted in the office of the Defense Contract Administration Services Management Area (DCASMA)).

3.4 Power supply tolerances. The audible signals shall pass the tests of 4.5.2 and 4.5.3 when operated from a power supply at the upper and lower voltage and frequency limits specified hereinafter:

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Normal power source	Upper limit	Lower limit
6 Vdc	7.1 V	5.25 V
12 Vdc	14.2 V	10.5 V
24 Vdc	28.4 V	21 V
115 Vdc	122 V	108 V
115 V	123 V	107 V
60 Hz	63 Hz	57 Hz
115 V	123 V	107 V
400 Hz	420 Hz	380 Hz
440 V	471 V	410 V
60 Hz	63 Hz	57 Hz
440 V	471 V	410 V
400 Hz	420 Hz	380 Hz

Requalification testing shall be at rated voltage and frequency only to meet the acoustical output specified (see 3.5).

3.5 Types of audible signals. The various types of audible signals shall conform to table I. For those signals designated to be resonated, the signal shall be fitted with a resonating projector or chamber so as to produce a tone containing principally the fundamental frequency and its harmonics.

TABLE I. Types of audible signals.

Type IC/	Acoustical output		Degree of enclosure
	Fundamental frequency Hz	dB (minimum)	
B1D1	----	73	Dripproof ^{3/}
B1D2	----	73	Dripproof ^{3/}
B1D3	----	73	Watertight ^{1/}
B1D4	----	73	Dripproof ^{3/}
B1S4	----	75	Watertight ^{1/}
B2D1	----	85	Dripproof ^{3/}
B2D2	----	85	Dripproof ^{3/}
B2D3	----	85	Dripproof ^{3/}
B2D4	----	85	Dripproof ^{3/}
B2S4	----	85	Watertight ^{1/}
B2S4 (EXP)	----	85	WT ^{1/} - Explosionproof ^{2/}
B3D2	----	85	Dripproof ^{3/}
B3D3	----	85	Watertight ^{1/}
B3D4	----	85	Dripproof ^{3/}

See footnotes at end of table.

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TABLE I. Types of audible signals. - Continued

Type IC/	Acoustical output		Degree of enclosure
	Fundamental frequency Hz	dB (minimum)	
B3S4	----	85	Watertight ^{1/}
B4S4	----	73	Dripproof ^{3/}
B5S5	----	78	Dripproof ^{3/}
Z1D1	----	68	Watertight ^{3/}
Z1D2	----	68	Watertight ^{1/}
Z1D3	----	68	Watertight ^{1/}
Z1D4	----	73	Watertight ^{1/}
Z1S4	----	73	Watertight ^{1/}
Z1F4	----	73	Watertight ^{1/}
H1D4	100 to 600	93	Watertight ^{1/}
H1S4	100 to 600	93	Watertight ^{1/}
H2D4	250 to 350	93	Watertight ^{1/}
	resonated		
H2S4	250 to 350	93	Watertight ^{1/}
	resonated		
H3D2	300 to 350	110	Watertight ^{1/}
	resonated		
H3D2N	300 to 350	110	Watertight ^{1/}
	resonated		
H3D3	300 to 350	110	Watertight ^{1/}
	resonated		
H3D3N	300 to 350	110	Watertight ^{1/}
	resonated		
H3D4	300 to 350	110	Watertight ^{1/}
H3D4N	300 to 350	110	Watertight ^{1/}
H3S4	300 to 350	110	Watertight ^{1/}
	resonated		
H3S4N	300 to 350	110	Watertight ^{1/}
	resonated		
H6	100 to 600	88	^{4/}
H6N	100 to 600	88	^{4/}
H7	200 to 350	108	^{4/}
H7N	200 to 350	108	^{4/}
H8D3	100 to 600	101	Watertight ^{1/}
H8D4	100 to 600	101	Watertight ^{1/}
H8S4	100 to 600	101	Watertight ^{1/}
H8F4	100 to 600	101	Watertight ^{1/}
S1D4	600 to 1200	103	Dripproof ^{3/}
S1S4	600 to 1200	103	Dripproof ^{3/}
S2D4	1750 to 2500	103	Dripproof ^{3/}
S2S4	1750 to 2500	103	Dripproof ^{3/}
E1D1	800 to 1800	88	Dripproof ^{3/}

See footnotes at end of table.

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TABLE I. Types of audible signals. - Continued

Type IC/	Acoustical output		Degree of enclosure
	Fundamental frequency Hz	dB (minimum)	
E1D2	800 to 1800	88	Dripproof ^{3/}
E3D2	Horn tone: 500 to 1000 variable	88	-----

1/ Watertight 3 feet, submerged (in accordance with MIL-E-16400).

2/ Explosionproof against highly volatile petroleum vapor (see 3.7.3).

3/ Dripproof in accordance with MIL-E-16400.

4/ Watertight 3 feet, submerged (in accordance with MIL-E-16400),
except pump, if used, shall be dripproof.

3.5.1 Enclosure. The audible signals shall conform to the enclosure requirements of MIL-STD-108. The degree of enclosure shall be as shown in table I. Following the enclosure test, the dripproof equipment shall operate properly and shall show no signs of accumulation of water and watertight equipment shall show no entry of water greater than allowed by MIL-STD-108.

3.6 Acoustical outputs.

3.6.1 Audible signals shall meet the minimum dB output specified in table I. Sound pressure output tests shall be based on a reference level of 20 micropascals (μ Pa) and shall be measured at a distance of 10 feet from the signal with the microphone positioned to receive maximum output from the signal.

3.6.2 The fundamental frequency of the acoustical output shall be within the frequency (Hz) limits specified in table I.

3.7 Bells.

3.7.1 Type B4S4 bell shall be solenoid actuated. This signal shall be inclined not more than 45 degrees from the normal vertical mounting position for specified output.

3.7.2 Type B5S5 bells shall be self-actuated upon the loss of power on the 440 V bus connected to the signal's bus failure circuit to show a visual signal as well as sound an audible alarm meeting the acoustical output specified in table I. The gong striker shall be operated by an electrically wound spring that shall continuously operate the alarm for a minimum of 15 to 45 seconds after a bus power failure. The power supply for the winding circuit shall be 115 Vac, 60 Hz with operating tolerance as specified in 3.4. The visual signal shall be a rotary drum or disk type annunciator. The visual and audible alarms shall be actuated by a relay which is continuously energized from the bus whose failure is to be indicated. The annunciator shall show a white field to indicate that the bus is energized and a red field to indicate that the bus supply is or has been off (see 3.7.2.2). Vibrations shall not cause the alarm target to move or give false indications.

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3.7.2.1 The relay for the type B5S5 bell shall be suitable for 440 Vac, 60 Hz bus. The alarm shall operate when the voltage is reduced to 350 ± 20 V. When the bus supply is restored to 400 ± 20 V, the relay shall reset.

3.7.2.2 When the bus supply is restored, the relay shall reset, the alarm gong shall cease ringing, if still operating, and the spring winding circuit shall be restored, but the annunciator shall continue to show the red field until manually reset. After the spring has been fully wound, it shall remain in the wound condition until failure of the bus supply causes its operation, even though the winding power supply is disconnected. Time required to wind the spring shall not exceed 2 minutes. These signals shall not be inclined more than 45 degrees from their normal vertical mounting position for specified output. A pushbutton shall be provided for simulating a bus failure condition.

3.7.3 Type IC/B2S4 (EXP), in addition to meeting watertight requirements, shall also meet the explosionproof requirements of MIL-E-2036 against higher volatile petroleum vapor.

3.8 Horns.

3.8.1 Horns with an "N" suffix shall be constructed of corrosion-resisting materials.

3.8.2 Types H6 and H6N intended as an auxiliary horn for motor boats, shall be hand operated as a mechanical signal. The horn construction shall permit maintaining the signal shown in table I for a period of not less than 1 second per stroke. The horn shall withstand a pressure three times greater than the operating pressure without bursting. The force of each stroke required to produce the signal shall not exceed 75 pounds. The horn shall be suitable for vertical or shelf mounting.

3.8.3 Types H7 and H7N shall be air horns manually operated as a ship's auxiliary fog signal. The horn shall be portable and shall be mounted on a non-slip stirrup or similar non-slip pedestal. The horn construction shall permit maintaining a blast as specified in table I for a period of not less than 12 seconds. The horn shall sound short, distinct blasts at a rate of one per second. The force required to produce the signal specified in table I shall not exceed 80 pounds on a down stroke for single action pump. The size of the horn and pedestal shall be such as to permit stowing in a box having inside dimensions of 30 by 16 by 12 inches. The horn shall be equipped with a projector at least 15 inches long. Where flexible air hose is incorporated in the design, the hose shall conform to SAE J 517. The horn shall withstand a pressure three times greater than the operating pressure without bursting. A pressure gauge shall be provided on any accumulator tank of the horn and a pressure relief valve shall be provided for protection. The pumping rate to sound the horn to conform to the requirements of table I continuously for a 12-second period with a 1-second interlude between 12-second periods for a minute of this type of operation shall be 30 down strokes per minute, or less. A spring return button or lever type control device shall be included to control the sounding of the alarm. A condensate drain plug shall be provided in any accumulator tank.

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3.8.4 Types H8D3, H8D4, H8S4, and H8F4 shall incorporate a motor driven ratchet arranged to strike an anvil on the diaphragm. The acoustical output shall include a mixture of as many frequencies as practical.

3.9 Sirens. Siren motors shall be equipped with ball bearings in accordance with FF-B-171, grade 00. Adequate means shall be provided to ensure prevention of injury to personnel by coming in contact with any moving part of the siren. Except for the insert or collar where attached to the motor shaft, rotating cylinders shall be manufactured from a single piece of material. Built-up construction of rotating cylinders shall not be acceptable.

3.10 Electronic signals.

3.10.1 Type IC/E1D1 electronic unit signal shall be self-actuated upon loss of power on the 115 V bus connected to the signal terminals, to show a visual signal as well as sound audible alarm meeting the acoustical output specified in table I. The unit shall consist of an electronic solid state oscillator or tone generator arranged to operate a loudspeaker, howler or other transducer to provide the audible signal upon loss of power on the supervised bus. Power for the electronic circuitry shall be derived from a self-contained rechargeable 225 milliampere-hour (mA/h) (minimum) nickel cadmium (NICAD) battery which shall be charged from the supervised bus at a rate not exceeding the 30 hour rate.

3.10.1.1 Upon loss of power on the bus, the audible signal shall sound for a minimum of 15 minutes and then shall be silenced by a manually operated pushbutton. The red field of the visual signal shall be displayed until power is restored and the reset pushbutton is operated, at which time the red field of the indicator shall disappear. A neon "power-on" light with white lens shall be connected directly across the bus supply. The front panel shall contain the transducer, power-on light, silence-reset pushbutton and visual indicator. The unit shall not exceed 4 inches wide by 4 inches deep by 5-1/2 inches high and shall be universal mounted. The unit shall supervise 115 Vdc, 60- or 400 Hz power without modification and without observing polarity of the dc voltage. The alarm shall sound when the supervised voltage is reduced to between 50 and 70 V. Resetting of the audible signal shall be feasible upon restoration of the voltage to between 75 and 95 V. All parts shall be in accordance with Drawing 804-1853042.

3.10.1.2 Type IC/E1D2 electronic unit shall operate as a part of the airflow indicator and alarm system (see Drawing 803-1853145). In this application, the unit shall operate as a power failure alarm, a power supply, and an alarm signal. The unit shall be identical to the type IC/E1D1, except that it shall be powered by a 12-V rechargeable NICAD battery and shall be made safe by utilizing sealed contacts. (See Drawing 803-1853145 for the requirements for changing the type IC/E1D1 to a type IC/E1D2).

3.10.2 Type IC/E3 electronic signal shall be useable Navy standard alarm systems and shall be integral with the standard Navy alarm switchboards. The type E3 signal shall produce three distinct tones, having a fundamental frequency varying between 500 and 1000 Hz, such as (a) steady siren tone (supervisory failure), (b) siren wail tone (alarm condition) and (c) siren yelp (power failure alarm). Terminals shall be provided to serve as a means

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interconnecting each of the above alarms with its applicable relay. The unit shall be a completely transistorized tone generator which is powered by a NICAD battery that shall sound an alarm from two speakers (see Drawing 804-1853037) simultaneously in case of power failure for a continuous period of 30 minutes and conform to the audible output requirement shown in table I all the while. The NICAD battery shall be so connected that it will float on the line under a continuous charging rate sufficient to maintain the battery in ready condition at all times. All parts shall be in accordance with Drawing 804-1853037. For other sound output and load requirements, see Drawing 804-1853037.

3.11 Temperature and humidity.

3.11.1 Audible signals shall meet the temperature and humidity requirements of MIL-E-16400 and humidity test of MIL-STD-810 with an upper test temperature of 65 ± 5 degrees Celsius ($^{\circ}\text{C}$) in lieu of $60 \pm 5^{\circ}\text{C}$, without degradation of performance.

3.11.2 Extended storage. Audible signals shall meet the extended storage test specified in 4.5.9.2.

3.11.3 Extreme temperature. Watertight audible signals (see table I) shall pass the tests of 4.5.2 and 4.5.3 at normal input voltage and frequency for the extreme temperature range of MIL-E-16400.

3.12 Transient voltage (ac signals). Damage shall not be sustained by the ac audible signals when subjected to the spike voltage of section 300 of DOD-STD-1399.

3.13 Accelerated life. Audible signals shall meet the accelerated life test of 4.5.4.

3.14 Salt spray. Audible signals (watertight enclosure) shall show no corrosion nor other damage when subjected to the salt spray test of MIL-E-16400.

3.15 Reliability. The contractor shall conduct a reliability program in accordance with MIL-STD-785 and shall develop the reliability data items. Each item shall meet a specified mean time between failures (MTBF) of not less than $1 \times 10^4\text{h}$ (failure rate not greater than 1 failure/ 10^4h).

3.15.1 Reliability prediction. A reliability prediction shall be developed using the stress analysis procedures and failure rates of MIL-HDBK-217.

3.16 Drawings. When specified in the contract or order, drawings shall be prepared (see 6.2.2).

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

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reserves the right to perform any of the inspections set forth in the specification 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 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 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.

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

- (a) Qualification inspection (see 4.3).
- (b) Quality conformance examination and tests (see 4.4).

4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory satisfactory to the Naval Sea Systems Command. Three audible signals of each type for which qualification is requested shall be subjected to the tests listed in table II. Tests shall be performed in the order listed.

TABLE II. Qualification inspection.

Test	Requirement paragraph	Test reference
Workmanship/general examination <u>1</u> / Operation	3.2 3.3.3, 3.7, 3.8, 3.9, and 3.10	MIL-E-16400 4.5.1
Acoustical output <u>1</u> / Electromagnetic interference	3.5 and 3.6 3.3.6	4.5.2 and 4.5.3 4.5.8
Transient voltage	3.12	4.5.10
Enclosure	3.2 and 3.5.1	MIL-E-16400
Salt spray <u>2</u> / Extended storage	3.14 3.11.2	MIL-E-16400 4.5.9.2
Humidity	3.11.1	4.5.9.1
Extreme temperature for exposed location	3.11.3	4.5.9.3
Vibration (vital equipment)	3.2	4.5.6
Accelerated life <u>1</u> / Dielectric strength <u>1</u> / Insulation resistance <u>1</u> / Shock	3.13 3.2 3.2 3.2	4.5.4 and 4.5.5 MIL-E-16400 MIL-E-16400 4.5.7
Explosion (type IC/B2S4 (EXP) only)	3.7.3	4.5.11

1/ Tests required for requalification testing.

2/ Applies to watertight signals only.

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4.3.1 Qualification approval.

4.3.1.1 Dc bells and buzzers. Testing any one of the dc bells listed will qualify all of the other bells shown. Testing any one of the dc buzzers shown will qualify all of the other buzzers shown.

IC/B1D1, IC/B1D2, IC/B1D3, IC/B1D4,
 IC/B2D1, IC/B2D2, IC/B2D3, IC/B2D4,
 IC/B3D2, IC/B3D3, IC/B3D4
 IC/Z1D1, IC/Z1D2, IC/Z1D3, IC/Z1D4

4.3.1.2 Ac bells, ac buzzers, horns, sirens, and electronic signals.
 Grouping of units for qualification testing shall be in accordance with table III. Approval of the test unit shown in column 1 will extend approval to the units shown in column 2 of the same category, provided additional testing is done as required by column 3.

TABLE III. Qualification inspection family grouping.

Column 1	Column 2	Column 3
Test unit (approved type) (Type IC/)	Family group (extended approval to) (Type IC/)	Except for test
B2S4(EXP)	B2S4(EXP), B2S4, B3S4	
B1S4	B1S4	
B5S5	B5S5	
Z1S4	Z1S4, Z1F4	
H1D4	H1D4, H1S4	
H2S4	H2S4, H2D4	
H3S4N	H3D2, H3D2N H3D3, H3D3N H3D4, H3D4N H3S4, H3S4N	
H6N	H6, H6N	
H7N	H7, H7N	
H8S4	H8D3, H8D4, H8S4, H8F4	
S1D4	S1D4, S1S4	

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TABLE III. Qualification inspection family grouping. - Continued

Column 1	Column 2	Column 3
Test unit (approved type) (Type IC/)	Family group (extended approval to) (Type IC/)	Except for test
S2D4	S2D4, S2S4	
E1D1	E1D1, E1D2	Shock test <u>1/</u>
E3D2	E3D2	

1/ A manufacturer who has successfully completed qualification tests on type IC/E1D1 may also be qualified for type IC/E1D2 upon successful completion of the shock test only on the IC/E1D2 unit (see 4.5.7).

4.3.2 Information to be furnished with the application for qualification. The following information shall be provided with the application for qualification (see 4.3).

- (a) A legible microfilm aperture card drawing of the alarm with a complete specific list of material used in the manufacture of the product.
- (b) Reliability prediction (see 3.15).

4.3.3 Retention of qualification. To remain on the qualified products list, one representative sample of each qualified audible signal test unit specified in table III, column 1, from current production, shall be subjected to requalification inspection (see table II) at the end of every 3 years after initial qualification or once for each 50 units produced, whichever requires the lower frequency of testing. In the event 50 units are not produced over a period of 3 consecutive years, requalification shall be performed not less frequently than at the end of every 3 years after initial qualification or a previous requalification inspection. Requalification inspection shall be witnessed by a Government representative and two copies of a test report, certified by the Government representative, shall be submitted to the Naval Sea Systems Command.

4.4 Quality conformance examination and tests. Quality conformance examination and tests shall be as specified in table IV. Tests shall be performed in the order listed.

TABLE IV. Quality conformance examination and tests.

Test	Requirement paragraph	Test reference
Group A		
Workmanship/general examination	3.2	MIL-E-16400

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TABLE IV. Quality conformance examination and tests. - Continued

Test	Requirement paragraph	Test reference
Group B		
Operation	3.3.3, 3.7, 3.8, 3.9, and 3.10	4.5.1
Dielectric strength	3.2	MIL-E-16400
Insulation resistance	3.2	MIL-E-16400
Acoustical output (at normal voltage and frequency)	3.5 and 3.6	4.5.2 and 4.5.3
Group C		
Workmanship/general examination	3.2	MIL-E-16400
Design operation	3.3.3, 3.7, 3.8, 3.9, and 3.10	4.5.1
Acoustical output	3.5 and 3.6	4.5.2 and 4.5.3
Electromagnetic interference	3.3.6	4.5.8
Transient voltage (ac signals)	3.12	4.5.10
Enclosure	3.2 and 3.5.1	MIL-E-16400
Salt spray ^{1/}	3.14	MIL-E-16400
Extended storage	3.11.2	4.5.9.2
Temperature and humidity	3.11.1	4.5.9.1
Extreme temperature for exposed location	3.11.3	4.5.9.3
Vibration (vital equipment)	3.2	4.5.6
Accelerated life	3.13	4.5.4, 4.5.5
Dielectric strength	3.2	MIL-E-16400
Insulation resistance	3.2	MIL-E-16400
Shock	3.2	4.5.7
Explosion (type IC/B2S4 (EXP) only)	3.7.3	4.5.11

^{1/} Applies to watertight signals only.

4.4.1 Sampling for quality conformance inspection.

4.4.1.1 Lot. All audible signals of the same type presented for delivery at one time shall be considered a lot. The lot may include the entire contract quantity or it may be the production of any convenient time period. The acceptance and rejection requirements of MIL-STD-105 shall apply.

4.4.1.2 Sampling for group A examination. A random sample of audible signals shall be selected from each lot in accordance with table V and shall be subjected to the group A tests as specified in 4.4. The results of the examination shall be compared with the requirements of this specification. Failure to conform to the requirements of this specification shall be counted as a defect, and the audible signals shall be rejected. If the number of such nonconforming audible signals in any sample exceeds the acceptance number of that sample, this shall be cause for rejection of the lot represented by the sample.

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TABLE V. Sampling for group A examination (AQL = 4.0 percent defective).

Number of audible signals in lot	Number of audible signals in sample	Number of audible signals non-conforming on any group A examination	
		Acceptance number	Rejection number
7 and under	All	0	1
8 to 15	7	0	1
16 to 40	10	0	1
41 to 110	15	0	1
111 to 300	25	1	2
301 to 500	35	1	2
501 and over	50	2	3

4.4.1.3 Sampling for group B tests (except acoustical output test for bells, buzzers and IC/E1D1 electronic signals). Audible signals shall be subjected to the group B tests as specified in 4.4, except for the acoustical output test for bells, buzzers and type IC/E1D1 electronic signals (see 4.4.1.3.1). The results of the test shall be compared with the requirements of this specification. Failure to conform to the requirements of this specification shall be counted as a defect and the audible signals shall be rejected. If the number of nonconforming audible signals in any sample exceeds the acceptance number for that sample as shown in table VI, this shall be cause for rejection of the lot represented by the sample.

TABLE VI. Sampling for group B tests, except for the acoustical output test for bells, buzzers and IC/E1D1 electronic signals (AQL = 5.0 percent defective).

Number of audible signals in lot	Number of audible signals in sample	Number of audible signals non-conforming on any group B test	
		Acceptance number	Rejection number
3 to 15	All	0	1
16 to 50	All	2	3
51 or over	All	Less than 5 percent	5 percent or over

4.4.1.3.1 Sampling for acoustical output test for bells, buzzers, and type IC/E1D1 electronic signals. Two units or 4 percent, whichever is greater, of each production lot of bells, buzzers, and type IC/E1D1 electronic signals shall be subjected to the acoustical output test of 4.5.2 and 4.5.3. The samples shall be selected after all units of the production lot have been adjusted by the manufacturer for maximum output preparatory to being tested for acoustical output. If any sample unit fails the acoustical output test, the lot represented by the sample shall be rejected.

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4.4.1.4 Sampling for group C tests. Three complete audible signals shall be subjected to the group C tests specified in 4.4 only when the basic design of the audible signal or the material of a vital part has been changed.

4.5 Tests.

4.5.1 Design operation. The audible signals shall be examined and tested for conformance to the requirements of 3.3.3, 3.7, 3.8, 3.9, and 3.10.

4.5.2 Acoustical output. Sound pressure output tests shall be based on a reference level of 20 μ Pa and shall be measured at a distance of 10 feet from the signal with the microphone positioned to receive maximum output when the signal is mounted in the normal position. Measurements shall be made with an apparatus having a flat frequency response characteristic. Test shall be conducted to determine that the sound pressure output meets the requirements shown in table I (see 3.5), under the conditions of supply voltage and frequencies specified in 3.5. Measurement shall be made with instruments described and calibrated in accordance with MIL-STD-740. Sound measurements shall be conducted in an anechoic chamber that conforms to the American National Standards Institute, Inc. Calibration shall be made at 250 Hz and at sound pressure of 124 ± 2 dB. The microphone shall be mounted so that the sound arrives at 0 degrees (perpendicular incidence) when sound measurements are made.

4.5.3 Frequency. An analysis shall be made of the acoustic signal to determine conformance to the frequency specified in table I (see 3.5 and 3.6).

4.5.4 Accelerated life.

4.5.4.1 All signals except types B4S4, B5S5, H6, H6N, H7, H7N, and the IC/E electronic types shall operate continually at 30 seconds on and 60 seconds off for periods of time and under conditions of temperature and angles of tilt as specified hereinafter. The periods of time shall be measured from the time the temperature of the audible signal is stabilized at the test temperature. The operation of the audible signal shall be discontinued during the transition time to achieve the test temperature.

<u>Hours</u>	<u>Ambient temperature during test</u>	<u>Angle of tilt</u>
8	25°C nominal (room temperature)	Normal mounting
8	Minus 29°C	Normal mounting
8	65°C	Normal mounting
3	25°C nominal (room temperature)	Inclined 60 degrees forward from normal
2	25°C nominal (room temperature)	Inclined 60 degrees back from normal
2	25°C nominal (room temperature)	Inclined 60 degrees right from normal
2	25°C nominal (room temperature)	Inclined 60 degrees left from normal

4.5.4.2 The type B4S4 bell shall be tested in accordance with 4.5.4.1, except that the periods of operation shall be 3 seconds on and 6 seconds off, and the angle of tilt shall be not more than 45 degrees from the normal vertical mounting position.

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4.5.4.3 Type B5S5 bus failure alarm bells shall be tested in accordance with 4.5.4.1, except as follows:

- (a) The spring winding circuit of the signal shall be continuously energized at its normal rated voltage and frequency.
- (b) The bus failure circuit (protected bus) terminals shall be alternately energized and deenergized every 2 minutes. The annunciator flag shall be reset during each energized period. For the type B5S5 bell, the bus voltage shall be 440 V, 60 Hz ac.
- (c) The angle of tilt shall be not more than 45 degrees from the vertical mounting position.
- (d) In lieu of minus 29°C, test shall be made at 5°C.

4.5.4.4 Type H6 and H6N horns shall be mechanically actuated for 1 second in each 5 seconds for an uninterrupted period of 48 hours.

4.5.4.5 Type H7 and H7N fog horns shall be mechanically actuated for 15 minutes each 30 minutes for an uninterrupted period of 48 hours.

4.5.4.6 All signals shall continue to operate without adjustment during the accelerated life test, except motor operated horns, for which the ratchet may be adjusted a maximum of four times during the test. Measurements of temperature rise shall be made on electrical apparatus during the life tests. The maximum temperature of coil windings during the endurance run at an ambient temperature of 65°C (45°C for E1D1 and E1D2 electronic signals with NICAD batteries) shall not exceed the allowable temperature of coil insulation. The resistance method of measuring temperature rise shall be used.

4.5.4.7 Type E1D1 bus failure signals and E1D2 electronic units shall be tested in accordance with 4.5.4.1 except as follows:

- (a) The signal shall be continuously energized, with the supply varied hourly between 115 Vdc, 115 V, 60 Hz, and 115 V, 400 Hz. Once every half hour the supply (protected bus) shall be deenergized for 1 minute, the audible signal silenced, the supply restored and the visual signal reset.
- (b) Upon completion of the 33 hour life test and retest of acoustical output, the following special test shall be performed: The unit shall be operated for 1000 times without malfunction using the following procedure each time (1) deenergizing the supply bus, (2) silencing audible signal, (3) restoring supply bus and (4) resetting visual signal. The battery shall then be fully deenergized by removing the supply bus for 48 hours without silencing the audible signal. The supply bus shall then be restored and allowed to charge the battery for 8 hours. At the end of this period, the supply bus shall again be deenergized and the acoustic output of the signal shall be measured and shall meet the requirements of table I.
- (c) In lieu of minus 29°C, test shall be made at 5°C.
- (d) In lieu of 65°C, test shall be made at 45°C.

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4.5.4.8 The IC/E3 signals shall be tested as follows:

<u>Hours</u>	<u>Ambient temperature</u>	<u>Operating conditions</u>
0 - 32	Room ambient (25°C)	Signal shall be sounded 5 minutes each hour
32 - 64	Plus 5°C	Signal shall be sounded 5 minutes each hour
64 - 96	Plus 45°C 95 percent relative humidity (R.H.) alternate 30 minute periods	Signal shall be sounded 5 minutes each hour
¹ /96 - 128	Room ambient 25°C	Signal shall be sounded 5 minutes each hour

¹/ After 128 hours, complete the operation test of 4.5.1 and test of 4.5.5. No adjustments shall be permitted during the test.

4.5.5 Retest of acoustical output. Upon completion of the accelerated life test specified in 4.5.4, and without any adjustments being made, the audible signals shall pass the tests as specified in 4.5.2 and 4.5.3 at normal voltage and frequency.

4.5.6 Vibration. The vibration test shall be conducted in accordance with MIL-E-16400 for vital equipment, except that the signals shall be in the operating condition during periods of the time specified under accelerated life tests for each test condition. The signals shall continue to operate when energized, and shall not operate when not energized.

4.5.7 Shock. HI shock tests shall be conducted in accordance with MIL-E-16400 except that single stroke signals shall not be energized. Single stroke signals shall be energized after each blow and shall continue to operate. Other signals shall be shocked while energized and shall continue to operate without further adjustment, but momentary cessation of operation (or operation of bus failure alarm signals) at the time of striking of a blow will be acceptable, provided the audible signal continues to operate satisfactorily during the remainder of the test and after completion of the shock tests. The criterion for "operate satisfactorily" will be the capability of the audible signal to pass the test of 4.5.2 and 4.5.3 at normal voltage and frequency.

4.5.8 Electromagnetic interference. Electromagnetic interference emission and susceptibility tests shall be performed in accordance with MIL-STD-462.

4.5.9 Temperature and humidity.

4.5.9.1 Humidity. The five cycle (120 hours) humidity test of procedure IV of MIL-STD-810 (upper temperature 149 ± 9 degrees Fahrenheit (°F)) shall be conducted on the audible signals in the manner specified in MIL-STD-810. The audible signals shall pass the tests of 4.5.2 and 4.5.3 at normal voltage and frequency at the performance test points of MIL-STD-810. For E1D1, E1D2, and IC/E3 electronic units, the upper temperature shall not exceed 113 ± 9 °F.

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4.5.9.2 Extended storage. All audible signals shall be suitable for extended storage in any ambient temperature between the limits of minus 40 and 167°F. The audible signals shall be subjected to the acoustical test of 4.5.2 and the frequency test of 4.5.3 at normal voltage and frequency subsequent to stabilization at room temperature.

4.5.9.3 Extreme temperature. The acoustical test of 4.5.2 and the frequency test of 4.5.3 at normal voltage and frequency shall be conducted at the extreme temperatures of MIL-E-16400 requirements for exposed locations. After the internal temperature of the audible signals stabilizes the audible signals shall pass these tests.

4.5.10 Transient voltage. The audible signals shall be tested for the ability to withstand, without damage, the spike voltage of section 300 of DOD-STD-1399 applied a minimum of three times. The audible signals, after being subjected to the spike voltage, shall be subjected to the acoustical test of 4.5.2 and the frequency test of 4.5.3 at normal voltage and frequency.

4.5.11 Explosion test (type IC/B2S4 (EXP)). A test shall be conducted in accordance with MIL-E-2036 to determine if the type IC/B2S4 (EXP) audible signal is explosionproof (see 3.7.3).

4.6 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.6).

5.1 Preservation, packing, and marking. The equipment, accessories, and technical publications shall be preserved level A, C, or commercial; packed level A, B, C, or commercial and marked as specified (see 6.2.1) in accordance with MIL-E-17555.

6. NOTES

6.1 Intended use. The audible signals covered by this specification are to be used for signals and alarms on all Navy ships.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Whether mounting for signals is other than specified (see 3.3.2).
- (d) Level of preservation and packing required (see 5.1).
- (e) Quantity required.

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6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.410-6 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
3.16	Drawings, engineering and associated lists	DI-E-7031	Level 3

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5010.12-L., AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 Qualifications. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List QPL-15303 whether or not such products have actually been so listed by that date. The attention of the 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 purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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6.4 When no standard drawing exists for a specific audible signal required to be produced, an existing standard drawing for an audible signal of the same general type (see 1.2.2) and having the same characteristics (see 1.2.3) as that of the required audible signal should be referenced for certain similar parts and configuration.

6.5 Definitions. Definitions shall be in accordance with MIL-E-16400 as supplemented by the following:

- (a) Bell: A hollow object/device, often electrically operated, usually cuplike, made of metal or other hard material which gives forth a ringing sound when struck.
- (b) Buzzer: An electromagnetic device in which the attraction of an armature by an electro-magnet interrupts the current flow; a spring then pulls the armature back, closing the circuit again so that the process repeats itself and creates a buzzing sound.
- (c) Horn: A horn shaped unit whose electromagnetic energy transferring and sound producing device is located at its base.
- (d) Siren: An acoustical device, often electrically operated which produces tones by the rapid interruption of a current of air, steam or fluid when driven against a rotating, perforated disk so as to produce a penetrating warning sound.
- (e) Electronic signals are that type where signals are generated by use of electronic devices which supply a loudspeaker or other type transducer to produce an audible signal.

6.6 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.7 Subject term (key word) listing.

Alarms
Bells
Buzzers
Horns
Signals
Sirens

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

Preparing activity:
Navy - SH
(Project 6350-N146)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-A-15303P(SH)		2. DOCUMENT TITLE AUDIBLE SIGNALS: ALARMS, BELLS, BUZZERS, HORNS, AND SIRENS, ELECTRONIC, SHIPBOARD	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
b. ADDRESS (Street, City, State, ZIP Code)			
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)	

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)