



Standard Specification for Flashlights on Vessels¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers three types of flashlights (see Section 4).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 The following precautionary caveat pertains only to the test method portion, Section 9, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 Military Standard:

MIL-STD-105D Department of Defense Standard; Sampling Procedures and Tables for Inspection by Attributes²

2.2 UL Standard:

UL Standard No. 783³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *lot*—a manufacturer's production run for a specific type of flashlight.

3.1.2 *order batch*—the size of a specific contract or purchase order taken from the lot.

3.1.3 *production testing*—the testing performed during a lot run of specific flashlights.

4. Classification

4.1 The three types of flashlights covered in this specification are classified as follows:

4.1.1 *Type I*—Flashlights for use in lifeboats and liferafts.

4.1.2 *Type II*—Flashlights for use in hazardous locations where fire or explosion hazards may exist due to the presence of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings.

4.1.3 *Type III*—Flashlights for use in lifeboats and liferafts and suitable for hazardous locations.

4.2 Type I flashlights shall be manufactured in accordance with Sections 2-11. Type II flashlights shall meet the requirements in Sections 11 and 12. Type III flashlights shall meet the requirements in Sections 2-12.

5. Materials and Manufacture

5.1 *Materials*—All materials used in the construction of these flashlights shall be of a quality suitable for the purpose intended and shall conform to the requirements of this specification.

5.2 *Manufacture*—Plastic, when used, shall be a suitable thermoplastic or thermosetting material so molded as to produce a dense solid structure, uniform in texture, finish, and mechanical properties.

6. General Requirements

6.1 Each flashlight shall be a three-cell light.

6.2 Each flashlight shall provide a concentrated beam of light. When used in this specification, a concentrated beam of light is light projected in a nearly parallel beam and is used to illuminate objects at considerable distances.

6.3 The flashlight shall show no leakage of water and shall be in perfect working order following the test prescribed in 9.2.

6.4 The proportions and design of each flashlight shall be such that the assembled unit complete with lamp and cells shall be capable of withstanding, without breakage or material distortion of any part and without upsetting the lamp focus, the test specified in 9.6. Damage of lamp filament or shifting of filament within the lamp as a result of this test shall not be cause for rejection of the flashlight if the flashlight operates when the spare lamp is used.

6.5 Each flashlight must be furnished with two lamps. One of these lamps is a spare and must be contained within the body of the flashlight, either in the end cap or reflector head area.

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² Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, Attn: NPODS.

³ Available from Underwriters Laboratories, 333 Pfingsten Rd., Northbrook, IL 60062.

6.6 All metal parts of each flashlight shall be made of corrosion-resistant material. All copper or copper-alloy parts coming in contact with rubber shall not corrode or disintegrate the rubber.

6.7 The construction of each flashlight shall be such that a metallic contact outside the case cannot close the battery circuit and cause the light to come on.

6.8 Each flashlight shall be provided with means to prevent it from rolling.

7. Physical Requirements

7.1 *Dimensions*—Each flashlight shall not exceed 11½ in. (292 mm) in length and shall have a lens ring diameter of no more than 2½ in. (63.5 mm).

7.2 *Case, Lens Head Ring, and End Cap:*

7.2.1 The flashlight case must be suitable to receive three commercial D-size dry cells. The exterior of the flashlight shall have molded flutes or ribs to provide a satisfactory gripping surface when wet. Cells must be held in the case under sufficient pressure to ensure good contact and to prevent breaking of the circuit when the flashlight is tested in accordance with 9.1.2. The flashlight must be constructed so that the cells are readily replaceable.

7.2.2 The case, ring, and cap, need not be made of the same material but cooperating threaded surfaces should be of the same type material.

7.3 *Lens*—The lens shall be of good quality, laminated, shatter-proof glass or clear plastic, free from bubbles, striae, wrinkles, or other defects and blemishes that would affect the light distribution. The lens shall be secured to the lens head ring by a suitable retaining ring or other device so as to prevent it from being dropped when the lens head ring is unscrewed.

7.4 *Reflector*—The reflector may be of metal or plastic and must have sufficient rigidity so as not to become distorted when the flashlight is completely assembled with cells and lamp. It must have an essentially parabolic reflecting surface, highly polished and resistant to corrosion and discoloration. The reflector shall be $1\frac{3}{4} \pm \frac{1}{4}$ in. (44 ± 6 mm) in diameter.

7.5 *Lamps*—The lamps shall be appropriate for use with alkaline or carbon-zinc batteries. Each lamp must have a lamp life of at least 15 h at the rated battery voltage.

7.6 *Lamp Holder*—The lamp shall be firmly positioned in the reflector. It shall be so positioned that the lamp, when assembled in the holder, shall have its filament located at the focus of the reflector, with the accuracy necessary to produce a concentrated beam of light as specified in 9.7. It shall have sufficient rigidity so as not to become distorted when the flashlight is completely assembled with cells and lamp. Means shall be provided to protect the lamp from damage by battery impact and for conveniently removing and replacing the lamp. The mounting adjustment shall have sufficient stability to retain the focal adjustment of the lamp under a condition of vibration, and when the flashlight is tested in accordance with 9.1.2.

7.7 *Switch*—The switch shall be conveniently located and securely attached to the flashlight. It shall be provided with a permanent “ON” position, a manually operable signaling or “FLASHING” position, and a locked “OFF” position. It shall be provided with means to prevent accidental closing of the

lamp circuit. The switch parts and switch contact strip shall be adequately insulated so that it will be impossible for metal-clad cells to close a circuit when the switch is on the “OFF” position. The flashlight shall be designed with a switch guard. Contact springs shall be of phosphor bronze, spring brass, or other corrosion-resistant equivalent material.

7.8 *Suspension Member*—Each flashlight shall be equipped with a suitable suspension ring or clip. The ring or clip shall be tested as specified in 9.8.

8. Workmanship

8.1 Flashlights shall be of sturdy construction and free of mechanical, electrical, or other imperfections or defects that materially affect appearance or that may affect quality, reliability, or serviceability. The finished flashlight shall not contain rough edges, burrs, blemishes, or other disfigurements and shall be clean, free from rust, toolmarks, pits, and other injurious defects.

8.1.1 Threaded parts shall be smooth and close fitting and shall be capable of being easily moved by hand relative to each other. Threaded parts shall not jump or change adjustment when being put together or when subjected to the tests in Section 9.

9. Test Methods

9.1 *Switches:*

9.1.1 *Switch Leakage*—With the lamp and reflector removed, insert fresh batteries into the flashlight. Connect a voltmeter across the switch and battery or the switch and battery contacts, as appropriate, in such a way as to read the battery voltage through the switch. With the switch in the “OFF” position, read the voltage. Any distinguishable deflection of the meter hand when the meter is set in the voltage range, nearest the battery voltage, shall constitute failure of this test.

9.1.2 *Operation*—Insert batteries into the flashlight and operate the switch five times in each of the three switch positions. Shake the flashlight vigorously in each “ON” and “FLASHING” switch position. The flashlight must not go off when shaken vigorously while the switch is in the “ON” or “FLASHING” position.

9.1.3 *Switch Endurance*—Test the contact switch mechanism of the flashlight by operating the switch for 25 000 continuous cycles. A cycle shall consist of movements from “OFF” position through the full “ON” and “FLASHING” positions and back to “OFF” position. Operate the switch under normal electrical load conditions, and replace the lamp and batteries as often as required to ensure that the switch mechanism is operating under normal load throughout the 25 000 cycles. Burning out of bulbs and batteries during the test shall not constitute failure of this test. Failure of the switch to complete 25 000 cycles shall constitute failure of this test.

9.2 *Watertightness*—Test the flashlight as follows:

9.2.1 Submerge the assembled flashlight in a salt water solution (1.04 sp gr) under a head of 1 ft (0.3 m) for a period of 24 h at a water temperature of 65°F (18°C). Remove the flashlight and wipe off the excess water. The total water absorption shall not exceed 5 % weight. The flashlight shall be

capable of being disassembled and reassembled without undue difficulty upon completion of the test and shall be in perfect working order.

9.3 Impact:

9.3.1 *Test Conditions*—Place the flashlight, without batteries installed, in a cold chamber at $-40 \pm 5^\circ\text{F}$ ($-40 \pm 3^\circ\text{C}$) for 2 h. With the flashlight stabilized at this temperature, immediately subject it to the low- and high-impact test specified in 9.3.2 and 9.3.3. Apply the point of impact to the following:

9.3.1.1 The outside of the flashlight case at a point midway between the ends of the case on a side 90° from the switch,

9.3.1.2 The switch (in the “ON” position and in the “OFF” position),

9.3.1.3 The lens cap, and

9.3.1.4 The end cap.

9.3.2 *Low Impact*—Subject the flashlight to a 12-lbf-in. (1.4 N·m) impact using a 1-lb (0.4-kg) steel ball at each of the points of impact specified in 9.3.1. Provided the flashlight remains intact, next subject the flashlight to the watertightness test (see 9.2). There shall be no evidence of breakage from impact or moisture in the case.

9.3.3 *High Impact*—After the flashlight passes the low-impact test, again place the flashlight in the cold chamber at $-40^\circ\text{F} \pm 5^\circ\text{F}$ ($-40 \pm 3^\circ\text{C}$) for 2 h, and then immediately subject it to a 20 lbf-in. (2.3 N·m) impact using a 1-lb (0.4-kg) steel ball at each of the points of impact specified above. There shall be no evidence of damage to the case, the lens, or the end cap.

9.4 Environmental:

9.4.1 *Heat and Humidity*—Place the flashlight, with dry cells, on a horizontal surface and subject to dry heat at $150 \pm 5^\circ\text{F}$ ($65.6 \pm 3^\circ\text{C}$) for 16 h, followed by an $85 \pm 5\%$ relative humidity at $100 \pm 2^\circ\text{F}$ ($38 \pm 1^\circ\text{C}$) for 6 h. The flashlight shall be compared with untested flashlights for dimensional stability, crazing of surface, and then tested to determine that the flashlight operates in accordance with 9.1.2.

9.5 *Corrosion*—Subject the flashlights, without dry cells, to salt spray for 200 h. Then wash the flashlight with fresh water, dry, and then test to determine that the flashlight operates in accordance with 9.1.2. There shall be no evidence of corrosion.

9.6 *Rough Use*—Drop the flashlight, complete with dry cells, lamps, and lens, 5 ft (1.5 m) in free fall onto a vinyl-asbestos tiled concrete floor. Drop the flashlight twice in a horizontal position upon the switch, with the switch in the “ON” position, twice in a horizontal position upon the switch, with the switch in the “OFF” position, twice in a vertical position upon the head of the flashlight, and upon the base of the flashlight. Do not tighten parts once the test has begun. There shall be no evidence of damage to any part of the flashlight. Then test the flashlight in accordance with 9.1.3.

9.7 *Light Projection*—The flashlight must project a concentrated beam of light not less than 5 in. (127 mm) nor more than 11 in. (279 mm) in diameter when located 5 ft (1.524 m) from a screen. The plane of the screen must be perpendicular to the optical axis of the flashlight.

9.8 *End Cap Ring*—The end cap ring shall support a weight of 25 lb (11.3 kg) for 1 min without evidence of distortion.

10. Marking, Packaging, and Packing

10.1 *Product Marking*—Each flashlight conforming to all the requirements in this specification shall be marked with the name, brand, or trademark of the manufacturer, this ASTM specification number, the type of flashlight (Type I, Type II, or Type III), and any other information as may be specified in the contract or purchase order.

10.2 Unless otherwise specified by the customer in the contract or purchase order, the flashlight shall be packaged, packed, and marked in accordance with the manufacturer’s commercial practice to ensure acceptance and safe delivery by the carrier for the mode of shipping and handling.

11. Quality Assurance Provisions

11.1 Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection and requirements as specified herein. Except as otherwise specified in the contract or purchase order, the producer may use his own or any other facilities suitable for the performance of the inspection requirements specified herein. The purchaser reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure that the flashlights conform to the prescribed requirements.

11.2 The producer shall perform the necessary inspection and tests to ensure that an S-4 inspection level, in accordance with MIL-STD-105D, is provided. An Acceptable Quality Level (AQL) of 1 % defective for the operational test and the switch leakage test, and an AQL of 4 % for any of the other requirements or tests specified shall be provided. Sample testing shall be in accordance with Table 1.

12. Flashlights for Use in Hazardous Locations on U.S. Flag Merchant Vessels

12.1 Details such as dimensions, construction criteria, battery configuration, and voltage shall be provided by the procuring agency in the contract or purchase order.

12.2 Flashlights that are to be used in hazardous locations shall conform to the requirements of Underwriters Laboratories (UL) Standard No. 783, or equivalent standard, and to the following requirements.

12.3 Flashlights that are to be used in hazardous locations shall be listed by an independent testing laboratory that is concerned with product evaluation, that maintains periodic inspection of production of listed flashlights, and whose listing states that the flashlight has been tested and found suitable for

TABLE 1 Sample Testing

Production	Order Batch
1. Switch leakage (9.1.1)	1. Switch leakage (9.1.1)
2. Operation (9.1.2)	2. Operation (9.1.2)
3. Switch endurance (9.1.3)	3. Rough use (9.6)
4. Watertightness (9.2)	4. Light projection (9.7)
5. Impact (9.3)	5. End cap ring (9.8)
6. Heat and humidity (9.4.1)	
7. Corrosion (9.5)	
8. Rough use (9.6)	
9. Light projection (9.7)	
10. End cap ring (9.8)	

use in the hazardous location specified (that is, Class and Group designation). The testing laboratory must be acceptable to the appropriate regulatory bodies or the procurement agency.

12.4 Flashlights that have been listed by a testing laboratory meeting the criteria in 12.3 shall affix a label, symbol, or other

identifying mark to the flashlight that shall indicate that the flashlight is suitable for use in the hazardous location.

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