

§ 160.024-2

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§ 160.024-2 Type.

(a) Pistol-projected parachute red flare distress signals specified by this subpart shall be of one type which shall consist essentially of a cartridge having centered primer, propelling charge, and projectile consisting of a case, delay element, expelling charge, and pyrotechnic candle attached to a parachute by shroud lines; the cartridge to be of such dimensions that it can be fitted into and fired from a signal pistol with chamber and bore dimensions within the limits provided by Figure 160.028-2(a) of subpart 160.028 of this chapter.

(b) [Reserved]

§ 160.024-3 Materials, workmanship, construction, and performance requirements.

(a) *Materials.* The materials used in pistol-projected parachute red flare distress signals shall conform strictly to the specifications and drawings submitted by the manufacturer and approved by the Commandant. In general, all metallic parts shall be corrosion-resistant or properly protected against corrosion.

(b) *Workmanship.* Pistol-projected parachute red flare distress signals shall be of first class workmanship and shall be free from imperfections of manufacture affecting their appearance or that may affect their serviceability.

(c) *Construction.* The exterior case of the cartridge shall be made of suitable metal and shall protect against the entrance of moisture. The projectile case and delay element shall be so constructed as to prevent any possibility of the propelling charge blowing by and causing premature ejection of the projectile contents. The shoulder of the base of the cartridge shall be between 2.29 mm (0.090 in.) and 2.67 mm (0.105 in.) in thickness. The centered primer shall be set below the surface of the base between 0.25 mm (0.010 in.) and 0.50 mm (0.020 in.).

(d) *Performance.* Signals shall meet all of the inspection and test requirements contained in § 160.024-4.

§ 160.024-4 Approval and production tests.

(a) *Approval tests.* The manufacturer must produce a lot of at least 100 signals from which samples must be taken for testing for approval under § 160.024-7. The approval tests are the operational tests and technical tests in paragraphs (c) and (d) of this section. The approval tests must be conducted by an independent laboratory accepted by the Commandant under § 159.010 of this chapter.

(b) *Production inspections and tests.* Production inspections and tests of each lot of signals produced must be conducted under the procedures in § 159.007 of this chapter. Signals from a rejected lot must not be represented as meeting this subpart or as being approved by the Coast Guard. If the manufacturer identifies the cause of the rejection of a lot of signals, the signals in the lot may be reworked by the manufacturer to correct the problem. Samples from the rejected lot must be retested in order to be accepted. Records shall be kept of the reasons for rejection, the reworking performed on the rejected lot, and the results of the second test.

(1) *Lot size.* For the purposes of sampling the production of signals, a lot must consist of not more than 30,000 signals. Lots must be numbered serially by the manufacturer. A new lot must be started with: (i) Any change in construction details, (ii) any change in sources of raw materials, or (iii) the start of production on a new production line or on a previously discontinued production line.

(2) *Inspections and tests by the manufacturer.* The manufacturer's quality control procedures must include inspection of materials entering into construction of the signals and inspection of the finished signals, to determine that signals are being produced in accordance with the approved plans. Samples from each lot must be tested in accordance with the operational tests in paragraph (c) of this section.

(3) *Inspections and tests by an independent laboratory.* An independent laboratory accepted by the Commandant under § 159.010 of this chapter must perform or supervise the inspections and

tests under paragraph (b)(2) of this section at least 4 times a year, unless the number of lots produced in a year is less than four. The inspections and tests must occur at least once during each quarterly period, unless no lots are produced during this period. If less than four lots are produced, the laboratory must perform or supervise the inspection and testing of each lot. In addition, the laboratory must perform or supervise the technical tests in paragraph (d) of this section at least once for every ten lots of signals produced, except that the number of technical tests must be at least one but not more than four per year. If a lot of signals tested by the independent laboratory is rejected, the laboratory must perform or supervise the inspections and tests of the reworked lot and the next lot of signals produced. The tests of each reworked lot and the next lot produced must not be counted for the purpose of meeting the requirement for the annual number of inspections and tests performed or supervised by the independent laboratory.

(c) *Operational tests.* Each lot of signals must be sampled and tested as follows:

(1) *Sampling procedure and accept/reject criteria.* A sample of signals must be selected at random from the lot. The size of the sample must be the individual sample size in Table 160.024-4(c)(1) corresponding to the lot size. Each signal in the sample is tested as prescribed in the test procedure in paragraph (c)(2) of this section. Each signal that has a defect listed in the table of defects. (Table 160.024-4(c)(2)) is assigned a score (failure percent) in accordance with the table. In the case of multiple defects, only the score having the highest numerical value is assigned to that signal. If the sum of all the failure percents (cumulative failure percent) for the number of units in the sample is less than or equal to the accept criterion, the lot is accepted. If this sum is equal to or more than the reject criterion the lot is rejected. If the cumulative failure percent falls between the accept and reject criteria, another sample is selected from the production lot and the operational tests are repeated. The cumulative failure percent of each sample tested is

added to that of the previous samples to obtain the cumulative failure percent for all the signals tested (cumulative sample size). Additional samples are tested and the tests repeated until either the accept or reject criterion for the cumulative sample size is met. If any signal in the sample explodes when fired or ignites in a way that could burn or otherwise injure the person firing it, the lot is rejected without further testing. (This procedure is diagrammed in figure 160.024-4(c).)

(2) *Test procedure.* Each sample signal (specimen) must be tested as follows:

(i) *Conditioning of test specimens—water resistance.* Immerse specimen horizontally with uppermost portion of the signal approximately 25 mm (1 in.) below the surface of the water for a period of 24 hours.

(ii) *Firing and operating characteristics.* Signals shall fire and operate satisfactorily when shot from a pistol of the type described in subpart 160.028. The parachute and pyrotechnic candle shall be ejected at approximately the maximum altitude reached by the projectile case. The parachute shall open and properly suspend the pyrotechnic candle without fouling. The pyrotechnic candle shall burn with uniform intensity and without damaging the parachute, shrouds, or leader line.

(iii) *Altitude.* The altitude reached by a signal is considered to be the height at which the parachute and pyrotechnic candle are ejected from the projectile case, as determined by visual observation against an object of known height, such as a tower or ballon, or by triangulation from two or more points of observation, or by other method satisfactory to the Commandant. The altitude reached shall be not less than 45 m (150 ft.).

(iv) *Rate of descent.* The rate of descent of a signal is considered to be the calculated average rate obtained by dividing the altitude by the time of descent to the surface. The rate of descent shall not exceed 1.8 m (6 ft.) per second.

(v) *Burning time.* The burning time of the pyrotechnic candle shall be obtained by stop watch measurement from the time distinct, sustained flame is emitted until it ceases. The burning time shall be not less than 30 seconds.

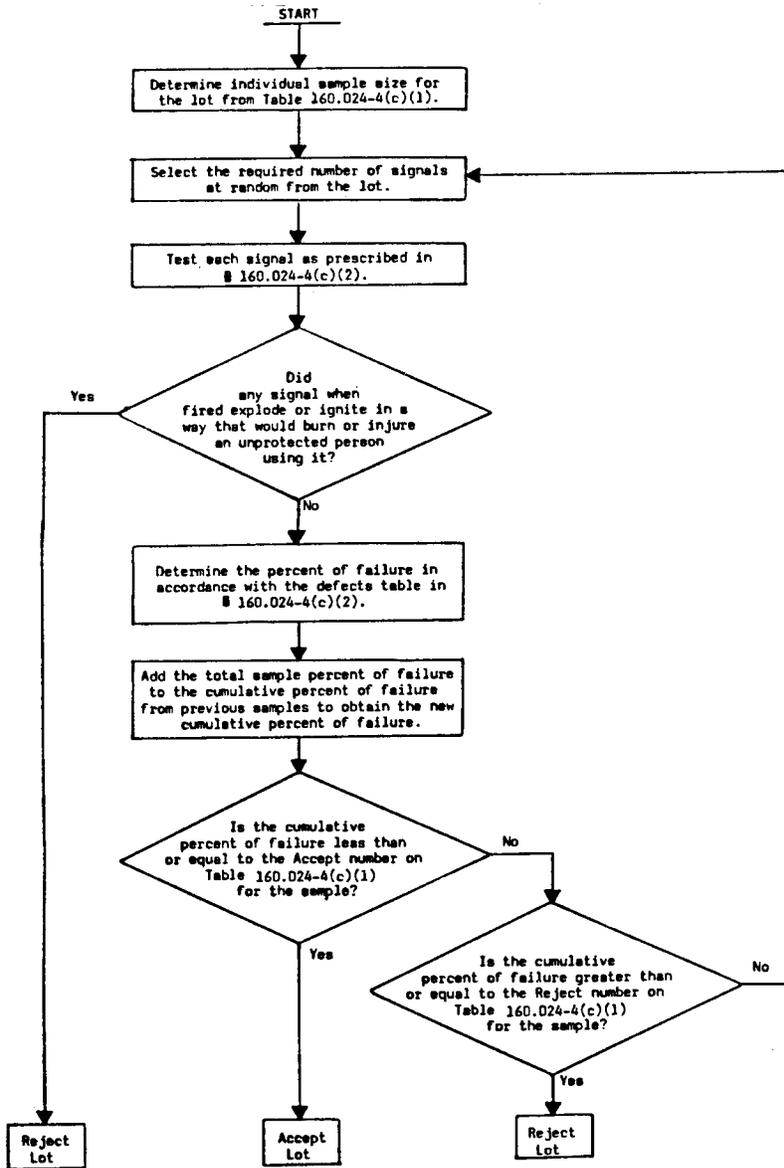


Figure 160.024-4(c). Operational test procedure.

TABLE 160.024-4(c)(1)—ACCEPT AND REJECT CRITERIA FOR OPERATIONAL TEST LOTS.

| Lot size | Individual sample size | Sample | Cumulative sample size | Accept ¹ ≤ | Reject ¹ |
|------------------|------------------------|-------------|------------------------|-----------------------|---------------------|
| 280 or less. | 8 | First | 8 | (?) | 400 |
| | | Second | 16 | 100 | 500 |
| | | Third | 24 | 200 | 600 |
| | | Fourth ... | 32 | 300 | 700 |
| | | Fifth | 40 | 500 | 800 |
| | | Sixth | 48 | 700 | 900 |
| | | Seventh | 56 | 950 | 951 |
| 281 to 500. | 13 | First | 13 | 0 | 400 |
| | | Second | 26 | 100 | 600 |
| | | Third | 39 | 300 | 800 |
| | | Fourth ... | 52 | 500 | 1,000 |
| | | Fifth | 65 | 700 | 1,100 |
| | | Sixth | 78 | 1,000 | 1,200 |
| | | Seventh | 91 | 1,350 | 1,351 |
| 501 to 1,200. | 20 | First | 20 | 0 | 500 |
| | | Second | 40 | 300 | 800 |
| | | Third | 60 | 600 | 1,000 |
| | | Fourth ... | 80 | 800 | 1,300 |
| | | Fifth | 100 | 1,100 | 1,500 |
| | | Sixth | 120 | 1,400 | 1,700 |
| | | Seventh | 140 | 1,850 | 1,851 |
| 1,201 to 3,200. | 32 | First | 32 | 100 | 700 |
| | | Second | 64 | 400 | 1,000 |
| | | Third | 96 | 800 | 1,300 |
| | | Fourth ... | 128 | 1,200 | 1,700 |
| | | Fifth | 160 | 1,700 | 2,000 |
| | | Sixth | 192 | 2,100 | 2,300 |
| | | Seventh | 224 | 2,550 | 2,551 |
| More than 3,201. | 50 | First | 50 | 200 | 900 |
| | | Second | 100 | 700 | 1,400 |
| | | Third | 150 | 1,300 | 1,900 |
| | | Fourth ... | 200 | 1,900 | 2,500 |
| | | Fifth | 250 | 2,500 | 2,900 |
| | | Sixth | 300 | 3,100 | 3,300 |
| | | Seventh | 350 | 3,750 | 3,751 |

¹ Cumulative failure percent.
² Lot may not be accepted. Next sample must be tested.

TABLE 160.024-4(c)(2)

| Kind of defect | Percentage of failure |
|---|-----------------------|
| a. Failure to fire (when attributable to the primer and not to the malfunction of the pistol) ... | 100 |
| b. Failure to eject projectile contents | 100 |
| c. Failure to ignite pyrotechnic candle | 75 |
| d. Failure of parachute to open completely | 75 |
| e. Complete carrying away or destruction of parachute | 75 |
| f. Altitude less than 70 pct of that required | 100 |
| g. Altitude at least 70 pct but less than 80 pct of that required | 75 |
| h. Altitude at least 80 pct but less than 90 pct of that required | 50 |
| i. Altitude at least 90 pct but less than 100 pct of that required | 25 |
| j. Average rate of descent greater than 4 times maximum permitted | 100 |
| k. Average rate of descent less than 4 but greater than 3 times maximum permitted | 75 |
| l. Average rate of descent less than 3 but greater than 2 times maximum permitted | 50 |
| m. Average rate of descent less than twice but greater than maximum permitted | 25 |
| n. Burning time less than 70 pct of that required | 100 |

TABLE 160.024-4(c)(2)—Continued

| Kind of defect | Percentage of failure |
|--|-----------------------|
| o. Burning time at least 70 pct but less than 80 pct of that required | 75 |
| p. Burning time at least 80 pct but less than 90 pct of that required | 50 |
| q. Burning time at least 90 pct but less than 100 pct of that required | 25 |

(d) *Technical tests.* Three signals must be subjected to each of the following tests. Two of the three signals must pass each test in order for the lot of signals to be accepted.

(1) *Luminous intensity.* The luminous intensity of each pyrotechnic candle tested shall be measured by a visual photometer or equivalent photometric device while the specimen is supported in a horizontal position and the photometer is at right angles to the axis of

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the specimen. Visual luminous intensity readings shall be observed and recorded at approximately 5-second intervals during the burning of the specimen. The minimum photometric distance shall be 3 m (10 ft.). Recording photometers shall have a chart speed of at least 10 cm (4 in.) per minute. The luminous intensity of the specimen shall be computed as the arithmetical average of the readings recorded. The average luminous intensity of a specimen shall be not less than 20,000 candela.

(2) *Elevated temperature, humidity, and storage.* Place specimen in a thermostatically controlled even-temperature oven held at 75 °C. with not less than 90 percent relative humidity for 72 hours. Remove specimen and store at room temperature (20° to 25 °C.) with approximately 65 percent relative humidity for 10 days. If for any reason it is not possible to operate the oven continuously for the 72-hour period, it may be operated at the required temperature and humidity for 8 hours out of each 24 during the 72-hour conditioning period. (Total of 24 hours on and 48 hours off.) The signal shall not ignite or decompose during this conditioning. The signal shall fire and operate satisfactorily following this conditioning.

(3) *Spontaneous ignition.* Place the specimen in a thermostatically controlled even-temperature oven held at 75 °C. with not more than 10% relative humidity for 48 consecutive hours. The signal shall not ignite or undergo marked decomposition.

(4) *Chromaticity.* The color of the burning signal must be vivid red as defined by Sections 13 and 14 of the "Color Names Dictionary." Two identical test plates of white cardboard about 30 cm x 60 cm (12" x 24") are used. Except for a negligible amount of stray daylight, the first test plate is illuminated by light from the specimen placed at a distance of about 1.5 cm (5 ft.). The second test plate is illuminated only by light from an incandescent lamp operated at a color temperature close to 2,848° K at a distance of about 30 cm (1 ft.). The first plate is viewed directly, the second through combinations of lovibond red, yellow, and blue glasses selected so as to ap-

proximate a chromaticity match. By separating the test plates by a wide unilluminated area (subtending at the observer about 45°), it is possible to make accurate determinations of chromaticity in terms of the 1931 CIE Standard Observer and Coordinate System, in spite of fluctuations in luminous intensity of the specimen by factors as high as 2 or 3. The CIE coordinates are converted to the Munsell notation which is cross-referenced to the color name in Section 13 of the "Color Names Dictionary" (see the discussion in section 10 of "the Universal Color Language").

§ 160.024-5 Marking.

(a) *Cartridge.* Each pistol-projected parachute red flare distress signal shall be legibly marked as follows:

PISTOL-PROJECTED PARACHUTE RED FLARE
DISTRESS SIGNAL

20,000 candela—30 seconds burning time
USE ONLY WHEN AIRCRAFT OR VESSEL IS SIGHTED DIRECTIONS—Fire upward from signal pistol
Service Life Expiration Date (date to be inserted by manufacturer) (Month and year manufactured) Lot No. _____
Manufactured by (Name and address of manufacturer)
U.S. COAST GUARD APPROVAL NO. _____

(b) *Marking of expiration date.* The expiration date must be not more than 42 months from the date of manufacture.

(c) *Other marking.* (1) On each pistol-projected parachute red flare distress signal there shall be die-stamped, in figures not less than 3mm (1/8 in.) high, on the cartridge, numbers indicating the month and year of manufacture, thus: "6-54" indicating June 1954.

(2) The pyrotechnic candle shall be legibly marked with the month and year of manufacture.

(3) In addition to any other marking placed on the smallest packing carton or box containing cartridges, each carton or box shall be plainly and permanently marked to show the service life expiration date, the date of manufacture, and the lot number.

(4) The largest carton or box in which the manufacturer ships signals must be marked with the following or equivalent words: "Keep under cover in a dry place."