

U.S. Department  
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**United States  
Coast Guard**

NVIC 12-86  
9 Sep 1986

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 12-86

Subj: Replacement of Flame Safety Lamps with Combination Oxygen/Combustible Gas Indicators

Ref: (a) 46 CFR 160.016  
(b) 46 CFR 77.35-10  
(c) 46 CFR 96.35-10  
(d) 46 CFR 167.45-60  
(e) 46 CFR 195.35-10  
(f) 33 CFR 149.517

1. PURPOSE. The purpose of this Circular is to provide guidance on the substitution of combination oxygen and combustible gas indicators (meters) for flame safety lamps on commercial vessels and in deepwater ports.
2. BACKGROUND.
  - a. The passenger, cargo and miscellaneous, nautical school, and oceanographic vessel regulations of Title 46, and the deepwater ports regulations of Title 33 of the Code of Federal Regulations require the carriage or provision of approved flame safety lamps as part of the required fireman's outfits.
  - b. The approval specification for flame safety lamps is 46 CFR 160.016. This specification requires these lamps to be constructed in accordance with MIL-L-1204 to be eligible for approval.
3. DISCUSSION.
  - a. Flame safety lamps have been used for many years to indicate the oxygen depletion in confined spaces aboard ship, which may result from the decomposition of organic material, rusting of iron, drying of paint, etc., in sealed cargo holds, tanks, double bottoms, and unused boilers. Testing such a space with a flame safety lamp before allowing personnel to enter has undoubtedly saved lives which otherwise may have been lost through oxygen depletion.
  - b. Flame safety lamps operate on the simple principle that if there is sufficient oxygen to keep a flame burning, there is sufficient oxygen to sustain life. While air normally contains 21% oxygen, a flame will be extinguished if the oxygen concentration is lowered to about 16.5%. By comparison, an oxygen concentration of approximately 15% may affect muscular coordination, and 13.5% will result in unconsciousness.

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- c. However, current industrial safety standards, such as OSHA regulations (29 CFR 1910.94) and NFPA Standard No. 306, consider an oxygen level of 19.5% to be the minimum to ensure the safety of personnel in confined spaces. Since the flame safety lamp will only provide an indication of the oxygen level at 16.5%, it cannot be used to determine compliance with current industrial safety standards. It is industrial practice to use oxygen meters or combination oxygen combustible gas indicators to determine compliance with the 19.5% oxygen level.
  - d. Although not their primary purpose aboard ship, flame safety lamps can also give an indication of the presence of combustible gases.
  - e. In view of the above, the Coast Guard has given consideration to revising its regulations to require carriage of oxygen/combustible gas indicators in lieu of flame safety lamps, and replacing approval specification 46 CFR 160.016 with an approval specification for oxygen/combustible gas indicators. However, since there are currently no published consensus standards covering these indicators which can be incorporated into Coast Guard regulations by reference, and since the Coast Guard lacks the resources to develop its own approval standard, such action will not be taken at this time. Instead, the Coast Guard will permit the substitution of combination oxygen combustible gas indicators for flame safety lamps, provided that the indicators carried are approved by independent testing laboratories as intrinsically safe in atmospheres containing combustible gases.
  - f. At least one acceptance standard for indicators is being prepared by voluntary standards organizations. After such a standard is published, the Coast Guard will initiate a regulatory project to revise references (a) through (f) to delete the carriage or installation requirements and approval specification for flame safety lamps, and substitute appropriate carriage and approval requirements for indicators.
5. ACTION. Combination oxygen/combustible gas indicators listed by Underwriters Laboratories, Inc. (UL) or approved by Factory Mutual (FM) as intrinsically safe may be carried or installed in lieu of flame safety lamps. The substitution must be made on a one-for-one basis, i. e. one UL or FM labeled indicator for each required flame safety lamp.



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