U.S. Department of Homeland Security

United States Coast Guard

Marine Safety Center Technical Note

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MARINE SAFETY CENTER TECHNICAL NOTE (MTN) NO. 01-18

Subj: GUIDANCE FOR ESTABLISHING EQUIVALENCY TO UL 1104 NAVIGATION LIGHTS

Ref: (a) Underwriter Laboratories Inc., UL 1104, "*Standard for Safety for Marine Navigation Lights*", Second Edition, dated 29 October 1998
(b) European Standard, EN 14744, "*Inland navigation vessels and sea-going vessels – Navigation light*," dated 8 July 2005
(c) International Electrotechnical Commission, IEC 60945, "*Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*," Fourth Edition, dated August 2002
(d) IMO Resolution MSC.253(83), "*Adoption of the Performance Standards for Navigation Lights, Navigation Light Controllers and Associated Equipment*," dated 8 October 2007
(e) IMO NCSR 3/INF.14, "*Electromagnetic disturbance due to lighting using LED technology*," dated 23 December 2015

1. Purpose: This Marine Technical Note (MTN) provides guidance to manufacturers and vessel owners on establishing equivalency to reference (a).

2. Background: All inspected vessels over 19.8 meters (65 feet) in length must have navigation lights that meet the standards of UL 1104. The second edition of UL 1104 was promulgated in 1998 and has been dropped from review by Underwriter Laboratories Inc. The current standard does not address light emitting diode (LED) technology. The Marine Safety Center has received numerous requests from U.S. and European manufacturers of LED navigation lights for clarification and guidance on establishing equivalency to this standard. As per 46 CFR 111.75-17 and 46 CFR 110.20-1, the Marine Safety Center shall determine equivalent standards.

3. Applicability: The guidelines provided in this MTN apply to manufacturers and vessel owners wishing to demonstrate equivalency to UL 1104. This guidance does not apply to recreational vessels required to comply with ABYC A-16 navigation lights under 33 CFR 183.810. All inspected vessels over 19.8 meters (65 feet) in length must have navigation lights that meet the standards of UL1104.

4. Discussion:

   a. LED Technology: The current edition of UL 1104 was produced in 1998. Since that time, technology used in the manufacture of navigation lights has dramatically changed. UL 1104 was not devised to address light emitting diode (LED) navigation lights. Various

tests required in UL 1104 are not applicable to LED technology. Additionally, LED lights present different failure modes that are not addressed in UL 1104 testing requirements. LED lights exhibit light degradation over time whereas traditional incandescent lights exhibit a rapid burnout. LEDs may be susceptible to electromagnetic disturbances, which may affect their function. Examination of these LED issues is further discussed in references (d) and (e).

b. EN14744: Various manufacturers have submitted testing reports from the European Union standard, EN14744. This European standard has significant overlaps with UL 1104 requirements, however, various tests of EN14744 are not considered equivalent to the requirements in UL 1104. The colorimetry, intensity, range and function of the navigation lights are identical between the US and EU standards. The standards deviate significantly in regards to testing and construction requirements. The testing and construction requirement of EN14744 are contained in reference (c). Due to such significant overlap between the standards, complete retesting and certification is not necessary. Environmental testing for electromagnetic disturbances and LED degradation requirements are included in EN14744.

5. Action:

a. Traditional Incandescent Lights: All navigation lights that use traditional incandescent bulbs must meet the entirety of UL1104.

b. LED Navigation Lights: All LED lights must have a UL1104 testing report demonstrating full UL1104 compliance with the following exceptions:

i. UL1104, Part 9.1 – The replacement or servicing of lamps or other light sources while at sea is not required if the requirements of reference (d) are met. These lights must have a means of detecting and signaling a light that is degraded. Compliance with the requirements of reference (d) must be attested by a Coast Guard recognized certified testing laboratory.

ii. UL 1104, Part 32 – All LED lights must have a bulb life of at least 500 hours. The Lamp Light Test is not relevant for LED based navigation lights if the requirements of reference (d) are met. The requirements of reference (d) must be attested by a Coast Guard recognized certified testing laboratory.

iii. UL 1104, Part 33 – The Dielectric Voltage Withstand Test is only required for AC powered lights.

iv. UL 1104, Part 35 – The Production Line Dielectric Voltage Withstand Test is not applicable for low voltage LED navigation lights.

v. UL 1104, Part 36 – The Production Line Grounding Continuity Test is not applicable for low voltage LED navigation lights.

Subj: NAVIGATION LIGHTS CONSIDERED EQUIVALENT TO UL 1104

c. EN14744 Gap Testing: Submitters of LED navigation lights certified to comply with EN14744 must provide a third party testing report, specifically from a Coast Guard recognized certified testing laboratory, for review. In addition, the gap testing report must address the following provisions;

i. UL1104, Table 10.1 – The colorimetric color range tests must demonstrate compliance with UL1104 Table 10.1 or EN14744 Table C.2. The colorimetric color range tests of EN14744 Table 2 is not sufficient.

ii. UL1104, Part 15 – The testing report must demonstrate compliance with this subpart in its entirety.

iii. UL1104 Part 16 – The testing report must demonstrate compliance with this subpart in its entirety.

iv. UL1104 Part 17 – The testing report must demonstrate compliance with this subpart in its entirety.

v. UL1104, Part 25 – The testing report must demonstrate compliance with the salt spray corrosion test of 1000 hour duration.

vi. UL1104, Part 27 – The testing report must demonstrate compliance with the temperature test of 72 hour duration.

vii. UL1104, Part 29 – The testing report must demonstrate compliance with the light and water test for sunlight exposure of 720 hours duration.

viii. UL1104, Part 30 – The testing report must demonstrate compliance with the exposure to humid atmosphere test of 168 hour duration.

ix. UL1104, Part 32 – The lamp life test of this subpart must be demonstrated. The test is not required for LED navigation lights if the requirements of reference (d) are met. The requirements of reference (d) must be attested by a certified testing laboratory and provided for review.

6. Policy: This MTN sets specific guidance for the approval of LED navigation lights until a subsequent and updated standard for navigation lights is promulgated.

7. Disclaimer: While the guidance contained in this document may assist the industry, the public, the Coast Guard, and other Federal and State agencies in applying statutory and regulatory requirements, this guidance is not a substitute for the applicable legal requirements, nor is it in itself a regulation. It is not intended to, nor does it impose legally binding requirements on any party, including the Coast Guard, other Federal agencies, the States, or the regulated community.

Subj: NAVIGATION LIGHTS CONSIDERED EQUIVALENT TO UL 1104

8. Questions: Questions concerning this policy should be direct to the Marine Safety Center Electrical Branch at msc@uscg.mil or 202-795-6729.

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