AFCESA-TR-2006-0017

USE OF ACRYLIC DIFFUSERS WITH METAL HALIDE FIXTURES

ENGINEERING TECHNICAL LETTER

DR. DARYL I. HAMMOND
HQ AFCESA/CESM, TYNDALL AFB, FL

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AIR FORCE CIVIL ENGINEER SUPPORT AGENCY
139 BARNES DR, SUITE 1
TYNDALL AIR FORCE BASE, FLORIDA 32403-5319

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

This ETL provides recommendations for use of acrylic diffusers with metal halide lamps and fixtures at Air Force installations to minimize the possibility of personal injury, burns, and fire from lamp ruptures.

15. SUBJECT TERMS

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FOR THE DIRECTOR:

//SIGNED//

Dr. Daryl I. Hammond, P.E.
Acting Chief of Mechanical Division

//SIGNED//

Brent E. Hill, Colonel, USAF
Director of Engineering Support

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

5 FEB 2005

FROM: HQ AFCESA/CESM
139 Barnes Drive Suite 1
Tyndall AFB FL 32403-5319

SUBJECT: **Engineering Technical Letter (ETL) 05-1: Use of Acrylic Diffusers with Metal Halide Fixtures**

1. Purpose. This ETL provides recommendations for use of acrylic diffusers with metal halide lamps and fixtures at Air Force installations to minimize the possibility of personal injury, burns, and fire from lamp ruptures.

2. Application. Requirements in this ETL are mandatory.

2.1. Authority:
- Air Force Instruction (AFI) 32-1064, *Electrical Safe Practices*
- Unified Facilities Criteria (UFC) 3-520-01, *Interior Electrical Systems*

2.2. Effective Date: Immediately.

2.3. Intended Users:
- Major command (MAJCOM) engineers
- Base civil engineers (BCE)
- Base maintenance organizations

2.4. Coordination: MAJCOM electrical engineers
Air Force Safety Center

3. Referenced Publications.

3.1. Air Force:
- Air Force Regulation (AFR) 91-12, *Electrical Safe Practices*, available at http://www.afcesa.af.mil/ces/cesm/cesm_electrical.asp
- AFI 32-1064, *Electrical Safe Practices*, available at http://www.e-publishing.af.mil

3.2. Joint Service:
- UFC 3-560-02, *Electrical Safety* (Draft), available at http://www.afcesa.af.mil/ces/cesm/cesm_electrical.asp
- UFC 3-520-01, *Interior Electrical Systems*, available at http://65.204.17.188//report/doc_ufc.html

4. Background.

4.4.1. Metal halide lamps are designed to operate under high temperatures and pressure and are subject to unexpected rupture. When the arc-tube ruptures, the outer bulb may break and result in scattering pieces of extremely hot glass that, if not contained, may cause personal injury, burns, and fire.

4.4.2. Diffusers made of acrylic material, and without any other overlay or containment barrier, cannot adequately contain the molten glass when multiple catastrophic lamp ruptures occur. Consequently, molten glass, plastic, and metallic particles can drip or fall on personnel or equipment located under the lamp when the diffuser has been weakened by a previous lamp failure. Underwriters Laboratory (UL) listing requires the fixture's diffuser/lens to contain one lamp rupture.

5. Specific Requirements.

5.1. For existing projects in design and not yet awarded, and for new or planned projects, metal halide luminaries incorporating acrylic lens diffusers shall be UL listed and:

5.1.1. Contain a tempered glass overlay between the lamp and acrylic diffuser; or

5.1.2. Incorporate metal halide lamps rated for use in open luminaries (internal lamp shielding, typically termed "O-rated") if acrylic lens diffusers are used without a glass overlay. All lamp manufacturers' instructions and warnings shall be followed.

5.1.3. Follow guidance contained in paragraphs 5.3 through 5.6.

5.2. Metal halide luminaries that do not incorporate requirements of paragraph 5.1 and subparagraphs shall:

5.2.1. Have the diffuser/lens inspected for damage, cracking, or scarring from previous lamp ruptures. All damaged, cracked, or scarred units shall be replaced.

5.2.2. Comply with paragraph 5.1 and subparagraphs, if practical, by installing open rated lamps or retrofitting existing diffusers with tempered glass overlays. Otherwise, replace diffusers following any lamp rupture regardless if the acrylic diffuser appears damaged.

5.2.3. Replace any acrylic diffuser, tempered glass overlays, and high intensity discharge lamps with the exact specifications in the design and ensure UL requirements are met and maintained.

5.2.4. Follow guidance contained in paragraphs 5.3 through 5.6.

5.3. Relamp fixtures at or before the end of a fixture's rated life. Allowing lamps to operate until they fail is not advisable and may increase the possibility of arc tube rupture.

5.4. Turn off lamps at least once a week for a minimum of fifteen (15) minutes when they are in continuous operation.

5.5. Do not operate a fixture with missing, damaged, scarred, or broken diffusers/lens.

5.6. Do not touch the lamp with bare hands.

6. Point of Contact. Recommendations for improvements to this ETL are encouraged and should be furnished to Dr. Daryl Hammond, HQ AFCESA/CESM, 139 Barnes Drive, Suite 1, Tyndall AFB FL 32408-5319, DSN 523-6352, commercial (850) 283-6352, FAX DSN 523-6219, Internet Daryl.Hammond@tyndall.af.mil.

JOSUELITO WORRELL, Colonel, USAF
Director of Engineering Support

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