Underwriters Laboratories Inc.

An Illuminating Look at UL Safety Standards with Non-solar UV

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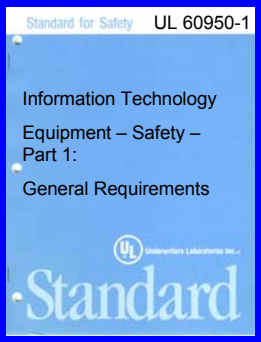
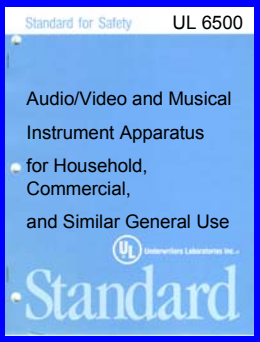
Overview

- Goal of increasing UV safety in UL certified products
- UL's search for UV information
- UL's collaboration with outside agencies to meet this goal

Introduction

- The types of UV generating products submitted to UL Inc. for safety evaluations are increasing





UL's Non-Solar UV Initiative

- To establish and unify non-solar UV safety requirements
  - Identify UV challenges UL faces
  - Safety limits
  - Testing
  - Methodology

UL's Non-Solar UV Initiative

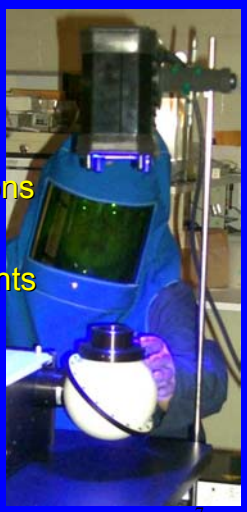
- Identify UV challenges UL faces
- Variables Include:
  - UV sources
  - Products
  - Applications
  - Manufacturers
  - Trade associations, professional organizations, etc.

UL's Non-Solar UV Initiative

- UV sources
  - Issues
    - Controlling lamps and power supplies
    - Irradiance levels vary
    - Spectral output varies
    - Effects of the radiation can vary
    - Application of the lamp physics

UL's Non-Solar UV Initiative

- Products
  - Issues
    - Intentional / unintentional emissions
    - Intended functions
    - Degradation of product components
    - Vast array of products types

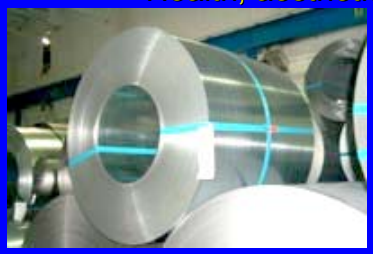


UL's Non-Solar UV Initiative

- Applications
  - Issues
    - Professionally trained users / average consumers
    - Industrial or residential settings
    - Health, aesthetic, or work functions

UL's Non-Solar UV Initiative

- Manufacturers
  - Issues
    - Historically used UV / new technology
    - Traditional materials - metal / polymers
    - Health, aesthetic, work functions



UL's Non-Solar UV Initiative

- Trade Associations, Professional Organizations, etc.
  - Issues
    - Drive industry-specific requirements
    - Influence product-specific safety levels
    - Provide or acquire UV safety knowledge

RadTech North America

IUVA International Ultraviolet Association

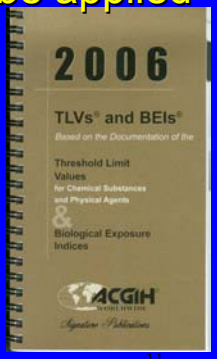
AHAM association of home appliance manufacturers

NEMA

ASHRAE Advancing HVAC&R to serve humanity and promote a sustainable world

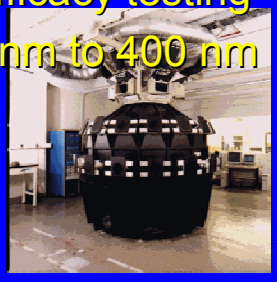
Safety Limits

- UL's product safety standard requirements
- Obtaining safety limits that can be applied to products
- Human tissue damage
- Product component damage
- Germicidal efficacy



Safety Limits

- Non-solar irradiation of polymeric components
- Acceptable levels of degradation
- Appropriate germicidal efficacy testing
- Must accommodate 185 nm to 400 nm



Testing

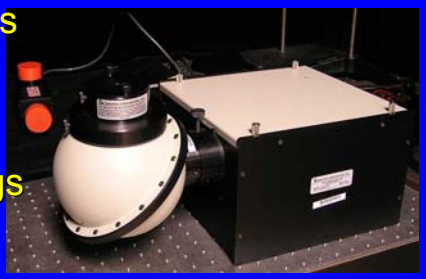
- Portability
- Product specific testing
- Source specific testing
- Test lab conditions

Testing

- Portability
  - Access to client facilities / field locations
  - Sacrifices
    - Measurement errors
    - Calibration issues
  - Transportation costs
  - Ease of measurements
  - Speed of measurements

Testing

- Product-specific testing
  - Provide certification for various standards
  - Various construction shapes
  - Various use conditions
  - Instrumentation cost
  - Limitations
  - Classification markings



Testing

- Source-specific testing
  - Permit product design changes
  - Acceptable classification markings
  - May not apply to all end products
  - May permit inexpensive meters

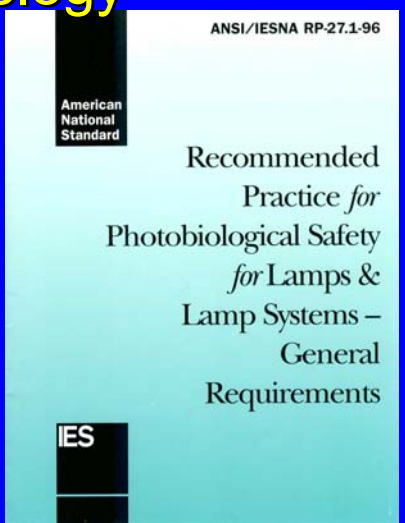
Testing

Test lab conditions

- Dark
- Non-reflective
- Protective barriers
- Environmental
  - Product generated heat
  - Temperature and humidity stability
- Field evaluations

Methodology

- ANSI/IESNA RP-27.1
  - Excellent start
  - Not product specific
  - Expand the series
  - Adaptable



Summary

- UL is pursuing information regarding
  - Non-solar UV / polymeric degradation
  - Product specific UV safety requirements
  - UV testing methodologies
  - Instrumentation specifications
  - UV source hazard classification markings
  - Collaborate with external organizations

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