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CERTIFIED LIGHTING EFFICIENCY PROFESSIONAL
CLEP OVERVIEW

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MODULE

6

Environmental Concerns in Lighting Technology

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CERTIFIED LIGHTING EFFICIENCY PROFESSIONAL CLEP OVERVIEW

The use of artificial lighting has revolutionized our lives, but it also raises significant environmental concerns. Fluorescent lamps, known for their energy efficiency and longevity, contain mercury, a toxic heavy metal that poses severe environmental and health risks. When improperly discarded, the mercury can leach into soil and water sources, leading to bioaccumulation in aquatic ecosystems. The U.S. Environmental Protection Agency (EPA) sets a limit for mercury levels in drinking water at 0.002 mg/L.

Learning Objectives

- Introduction and Course Outline
- Quality Lighting for High-Performance Buildings
- LED Technology & its Operating Characteristics
- Lighting Quantity and Quality Fundamentals
- Lighting and control system maintenance and commissioning.
- Environmental Concerns in Lighting Technology
- Certified Lighting Efficiency Specialist Certification
- Summary and Resources
- CLEP Practice Test V.4.1_Test Your Knowledge



INTRODUCTION

- Mercury in Fluorescent Lamps: Fluorescent lamps contain small amounts of mercury, a toxic heavy metal that poses severe environmental and health risks. When improperly discarded, the mercury can leach into soil and water sources, leading to bioaccumulation in aquatic ecosystems. The U.S. Environmental Protection Agency (EPA) has set a limit for mercury levels in drinking water at 0.002 mg/L.
- Toxicity Characteristic Leaching Procedure (TCLP) Compliance: TCLP testing is critical in assessing mercury leachability and ensuring compliance with hazardous waste regulations. Wastes exceeding the TCLP threshold for specific contaminants are classified as hazardous under the Resource Conservation and Recovery Act (RCRA).
- Lamp Disposal and Recycling: Proper disposal and recycling of fluorescent lamps are critical to mitigating their environmental impact. Many jurisdictions have established programs for collecting and recycling these lamps.

ENVIRONMENTAL CONCERNS IN LIGHTING TECHNOLOGY +



- Ballast Disposal Issues: Improper disposal of PCB-containing ballasts can lead to soil and water contamination. The EPA regulates the disposal of these materials under the Toxic Substances Control Act (TSCA).
- LED Issues: LEDs are often touted as a more environmentally friendly alternative to fluorescent lamps due to their energy efficiency and longer lifespan. However, they present their own set of environmental challenges.
- Sustainable Manufacturing: Sustainable manufacturing practices in the lighting industry focus on minimizing environmental impact throughout the product lifecycle. Key principles include material selection, energy efficiency, and design for disassembly. Companies like Philips and Osram have initiated programs to develop circular lighting solutions that emphasize reuse and recycling.

LIGHTING DISPOSAL AND HAZARDOUS WASTE MANAGEMENT - LAMPS AND BALLASTS

- Wholesale replacement of lamps and ballasts can lead to the disposal of "waste," triggering state and federal regulations.
- Hazardous waste lamps, including fluorescent, high-pressure sodium, metal halide, mercury vapor, and neon lamps, are considered hazardous waste when they fail the EPA's Toxicity Characteristic Leaching Procedure (TCLP).
- The EPA changed the rules for mercury-containing lamps in 2000, allowing for their classification as universal waste with fewer regulatory requirements if recycled.
- Major lamp manufacturers have voluntarily reduced the amount of mercury in their lamps and made changes in their operating design to pass the TCLP test.
- State governments may create stricter requirements for mercury-containing lamps, with California, Connecticut, Florida, Maine, Minnesota, Rhode Island, and Vermont banning all mercury-containing lamps from solid waste landfills.



LIGHTING DISPOSAL AND HAZARDOUS WASTE MANAGEMENT +

Disposal Methods

- Place waste lamps in the box in which replacement lamps arrived or in special cartons provided by the lamp recycler.
- Store lamps in a safe place to avoid breakage.
- Separate broken lamps and place them in a heavy plastic bag inside a rigid container.
- Do not place broken fluorescent lamps in metal receptacles as metal boxes will absorb mercury and become hazardous waste containers.



LIGHTING DISPOSAL AND HAZARDOUS WASTE MANAGEMENT - COLLECTION AND TRANSPORTATION

- Most lamp recyclers offer transportation services.
- Waste lamp generators may collect waste lamps from several locations and store them in a central facility.
- Transportation to another state may require the use of a transporter licensed in that state and compliance with that state's hazardous waste transportation laws.



LIGHTING DISPOSAL AND HAZARDOUS WASTE MANAGEMENT - PCB BALLASTS



- PCBs are a hazardous waste regulated by the TSCA Section of EPA regulations.
- PCB-containing ballasts must be disposed of with strong precautions and incinerated.



THE CONCEPT OF GREEN BUILDINGS

- Green buildings are designed, built, and operated in an environmentally friendly manner.
- Key principles include energy efficiency, water efficiency, and indoor air quality.
- Energy efficiency involves using materials and technologies that minimize energy consumption and greenhouse gas emissions.
- Water efficiency involves implementing water-saving fixtures and using rainwater harvesting systems.
- Indoor air quality is improved through non-toxic building materials, proper ventilation systems, and natural lighting.
- Sustainable building materials, such as recycled or renewable materials, are used to minimize environmental impact.
- Green buildings represent a holistic approach to sustainable design, considering environmental, social, and economic impacts.



ENERGY STAR BUILDINGS

- Energy Star buildings are designed to be energy-efficient and environmentally friendly.
- Certified by the EPA, they meet strict energy performance standards.
- Key features include high energy efficiency, using energy-efficient appliances, lighting, and insulation.
- Energy Star buildings often use LED lighting and high-efficiency HVAC systems.
- They focus on sustainability and environmental responsibility, reducing greenhouse gas emissions, water consumption, and waste generation.
- Benefits include better indoor air quality, temperature control, and lighting quality.
- Energy Star buildings may qualify for incentives and rebates from local utility companies or government agencies.
- They represent a sustainable and cost-effective approach to construction and operation.



RATING SYSTEMS FOR GREEN BUILDINGS



- Rating systems evaluate and measure sustainability and environmental performance of buildings.
- Key systems include LEED, developed by the U.S. Green Building Council, which uses a point-based system to assess buildings across various sustainability categories.
- LEED certification levels can be achieved by achieving different levels of certification, such as Certified, Silver, Gold, or Platinum.
- Green Star, an Australian rating system, evaluates buildings based on energy efficiency, water conservation, indoor environment quality, and innovation.
- Rating systems promote sustainable design and construction practices, encouraging the incorporation of sustainable features into projects.
- They contribute to creating more environmentally friendly and energy-efficient buildings.

THE LEED GREEN BUILDING RATING SYSTEM

- Developed by the U.S. Green Building Council (USGBC), it provides a framework for sustainable building design, construction, and operation.
- LEED certification levels are Certified, Silver, Gold, and Platinum, with Platinum being the highest level.
- Points are awarded based on meeting specific criteria within each category, such as reducing water usage, using sustainable materials, and optimizing energy performance.
- The LEED certification process includes registering the project with the USGBC, submitting compliance documentation, and undergoing a third-party review.



THE LEED GREEN BUILDING RATING SYSTEM +

- Strategies like installing solar panels, using low-flow fixtures, and incorporating green roofs can earn points towards higher LEED certification.
- Benefits of LEED certification include reduced operating costs, improved occupant health and productivity, and a smaller environmental footprint.
- LEED certification can enhance a building's marketability and value, demonstrating a commitment to sustainability and responsible building practices.



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THANK YOU

