



Republic of the Philippines
DEPARTMENT OF ENERGY

FUELS AND APPLIANCE
TESTING LABORATORY

Lessons Learned in Lighting Equipment Testing in the Philippines

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Lessons Learned in Asia:
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Efficiency Standards and Labeling

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Department of Energy (DOE) Mandate

To prepare, integrate, coordinate, supervise, and control plans, programs, projects, and activities of the Government relative to energy exploration, development, utilization, distribution and conservation.

DOE Energy Efficiency Program

To increase awareness among users of energy in the commercial, industrial, transport, and household sectors, on how to use energy efficiently and to promote increased levels of efficiency of energy utilization among these sectors.



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**FUELS AND APPLIANCE
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Fuels and Appliance Testing Laboratory

Established in June 1991 to conduct energy performance tests on electrical household appliances and lighting systems as well as to serve the energy testing requirements of the industry sector.



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The Philippine Appliance Energy Standards and Labeling Program

- *A government driven initiative*
- *Administered by the Department of Energy (DOE) and the Department of Trade and Industry (DTI)*
- Combination of efficiency standards and energy labeling
- Comparison type of labeling
- Product covered (RACs, Refrigerators and Freezers, compact fluorescent lamps, fluorescent lamp ballasts)



Laboratory Study on Performance of Lighting System

Electromagnetic ballasts

- *90 various models and brands tested in 1997*
- Criteria in establishing the efficiency standards
- Maximum ballast loss of conventional ballasts
 - 10 – 12 watts for 20 watts ballasts
 - 12 – 20 watts for 40 watts ballasts
- Maximum ballast loss of “low loss ballast”
 - 6- 8 watts for both 20 and 40 watts ballasts



Laboratory Study on Performance of Lighting System

Linear Tubular Fluorescent Lamps

- 140 various models and brands tested in 1996
- To determine if 18 W and 36 W lamps are more efficient than 20 W and 40 W, respectively.
- Utilized the laboratories of FATL and 2 major manufacturers of lamps
- 40 watts lamps produced 10 – 12 percent higher light output compared 36 watts lamps
- 20 watts lamps produced 3 – 6 percent higher light output compared with 18 watts lamps



Laboratory Study on Performance of Lighting System

DOE-World Bank Study on Lighting Systems

- To determine the light output, average operating hours and cause of lamp failures
- To determine CFLs performance on the electricity supply system in the Philippines
- Compare the technical performance of the tested CFLs to incandescent lamps



Laboratory Study on Performance of Lighting System

DOE-World Bank Study on Lighting Systems

Compact fluorescent lamps

- 350 various models and brands tested in 1994
- Test samples subjected to 207 and 230 nominal voltage supply
- Tested under a switching cycle of 2 h and 45 min “on” and 15 min “off”
- “integral type” and “modular type” of CFLs lived up to their rated life when subjected to 230 nominal voltage supply
- Majority of “integral type” failed under low voltage supply (207 V)
- “modular type” of CFLs exceeded to their rated life when subjected to 207 nominal voltage supply



Laboratory Study on Performance of Lighting System

DOE-World Bank Study on Lighting Systems

Incandescent Lamps

- 75 incandescent lamps tested (25 and 50 watts)
- Tested under a switching cycle of 2 h and 45 min "on" and 15 min "off" at test voltage of 230 volts
- All incandescent lamps failed to reach 1,000 operating hours
- The average operating hours of the tested lamps was 640 hours



Laboratory Study on Performance of Lighting System

In-house Testing of Compact Fluorescent Lamps

- 120 samples tested in June 2000
- Tested under a switching cycle of 2 h and 45 min "on" and 15 min "off" at test voltage of 230 volts
- 76 test samples or 63 percent failed to reach 2,000 operating hours
- The average difference between the initial average measured power input and rated wattage is -50.25 percent
- The average lumen maintenance of the remaining test samples is 65.50%
- The average operating hours of the tested lamps was 1,550 hours



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Compact Fluorescent Lamps Certification Testing

- Started in 1998
- Self-ballasted integral type CFLs (encapsulated and bare lamps) and combination of modular lamp and ballasts
- DOE-FATL conducts the performance requirements (lumen maintenance and power input tests)
- DTI-BPS conducts the the safety requirements



Development and Review of Philippine National Standards on Lamps and Related Products

Energy Standards and Labeling

- Philippine National Standard (PNS) 12-3:1999 "Lamp and related equipment: Electromagnetic ballasts-Energy standards and labeling requirements"
- Philippine National Standard (PNS) 603-2-Amd. 1: 2001 "Self-ballasted lamps for general lighting service"

Standard test conditions, procedure and test facility

- Relevant IEC Standards



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FLUORESCENT LAMP BALLASTS

Regulation or program (target date)

Philippine National Standard (PNS) 12-3:1999 "Lamp and related equipment: Electromagnetic ballasts-Energy standards and labeling requirements" (2002)

Product category

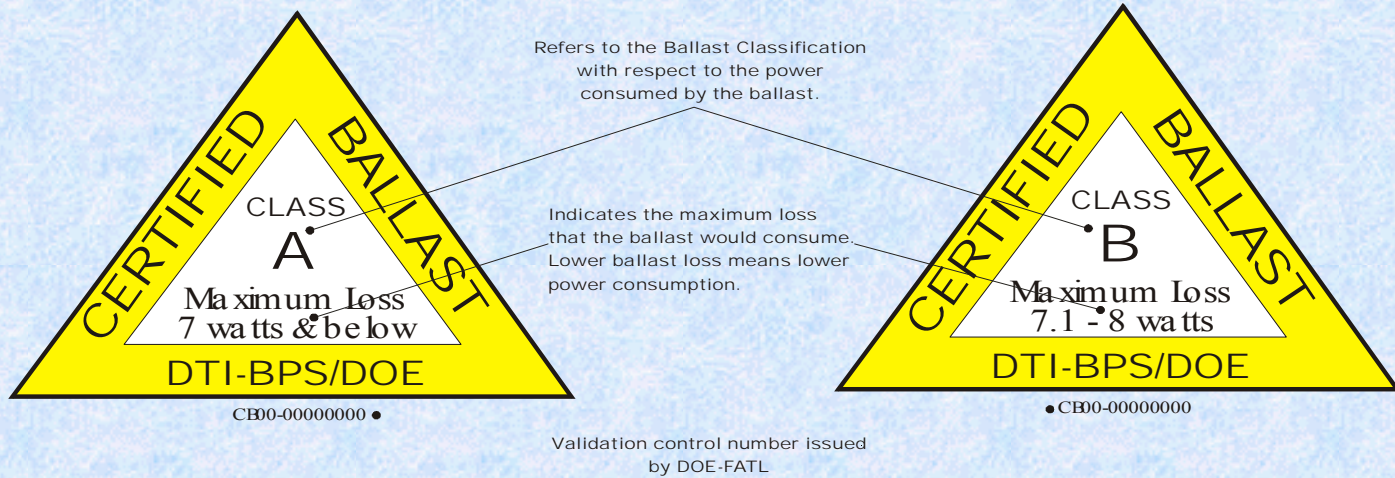
Electromagnetic ballasts

Criteria and requirements

Based on on 4 classes (A – D) of maximum ballast loss (watts)



The Fluorescent Lamp Ballast Energy Label



Standard Classification of Ballast Power Loss

Preheat Ballast Power Loss

BALLAST RATING	CLASS A	CLASS B	CLASS C	CLASS D
1 x 18/20 watts 1 X 36/40 watts	Up to 7 watts	Above 7 watts up to 8 watts	Above 8 watts up to 10 watts	Above 10 watts up to 12 watts

Rapid Start Ballast Power Loss

BALLAST RATING	CLASS A	CLASS B	CLASS C	CLASS D
1 x 18/20 watts 1 X 36/40 watts	Up to 12 watts	Above 12 watts up to 13 watts	Above 13 watts up to 15 watts	Above 15 watts up to 18 watts
2 X 36/40 watts	Up to 17 watts	Above 17 watts up to 18 watts	Above 18 watts up to 20 watts	Above 20 watts up to 30 watts



Testing standards and procedures

Prescribe the maximum ballast loss and labeling requirements

Philippine National Standard (PNS) 12-3:1999 "Lamp and related equipment: Electromagnetic ballasts-Energy standards and labeling requirements"

Defines the test facility, test conditions and procedure

PNS 02:1994 (IEC 60081:1984) – "Tubular fluorescent lamps for general lighting service"

PNS 12-1:1996-Amd. 02:1997 (IEC 60921:1990-Amd. 02:1995)
"Fluorescent lamp ballasts-general and safety requirements"

PNS 12-2:1996-Amd. 02:1997 (IEC 60921:1990-Amd. 02:1994)
"Fluorescent lamp ballasts-performance requirements"

PNS 1261:1995 (IEC 60901:1987) – "Single-capped fluorescent lamps-safety and performance requirements"



COMPACT FLUORESCENT LAMPS

Regulation or program (target date)

Philippine National Standard (PNS) 603-Amd. 1: 2001
"Self-ballasted lamps for general lighting service" (2003)

Product category

Self-ballasted integral type CFLs

- encapsulated (with plastic or glass covering)
- bare lamp(2U, 3U and quad tube)

Modular CFL products

- modular ballast and modular lamp combination operating as a unit



Criteria and requirements

Lumen maintenance (after 2000 operating hours)

75 percent for encapsulated type of CFLs

70 percent for bare type CFLs

Labeling requirements

Individual lamp – rated power, supply voltage and frequency and mark of origin in the form of trademark of the manufacturer's name

Lamp packaging - percent lumen maintenance, light output in lumens, rated average life, and other electrical characteristics



Testing standards and procedures

Prescribe the maximum ballast loss and labeling requirements

Philippine National Standard (PNS) 603-2-Amd. 1: 2001
"Self-ballasted lamps for general lighting service"

Defines the test facility, test conditions and procedure

Philippine National Standard (PNS) 603-2-Amd. 1: 2001
(IEC 969:1988) "Self-ballasted lamps for general lighting service"



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GLOBAL ENVIRONMENT FACILITY (GEF) PROJECTS

IFC/GEF Efficient Lighting Initiative (ELI) Project

- To accelerate the promotion and increased penetration of energy efficient lighting technologies
- To promote the voluntary adoption of international standards performance and technical specifications for efficient and reliable lighting products



GLOBAL ENVIRONMENT FACILITY (GEF) PROJECTS

Philippine Efficient Lighting Market Transformation (PELMATP) Project

- Transform the Philippine market for energy efficient lighting
- Assist the local lighting industry in lighting product design and manufacture and promotion and sale of the same
- To strengthen and expand FATLs role and capabilities in testing lighting products with regional significance
- To develop commercially sustainable recycling and disposal of discarded lighting products



Lessons Learned in Lighting Equipment Testing in the Philippines

- Claimed performance of various lighting systems particularly new lighting technologies be verified through laboratory test before adoption
- Policy recommendations should be based not only on the technical aspect but also on the social and economic impact
- The government should put in place an effective monitoring scheme to ensure compliance of manufacturers, importers and retailers to the energy standards and labeling