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Effect of Jumbo Compact Fluorescent Lamp on the Electrical Energy Saving and Harmonics Noise

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Abstract

This paper presents the effect of jumbo compact fluorescent lamp (energy saving lamp) on the electrical energy saving and harmonics noise. The test was set to find public favor in marketto test. The power rate of incandescent lamp are 200 watts, ML are 160 watts and 250 watts and compact fluorescent lamps (energy saving lamps type) are 23 watts, 24 watts (small size), 45 watts, 65 watts and 85 watts (jumbo size). The effect of the lamps on the illuminance efficiency, electrical performance and harmonics noise are compared to verify the effectiveness of each lamps.

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Keywords: Compact fluorescent lamp; Electrical energy saving, Harmonic noise

1. Introduction

The compact fluorescent lamps are becoming a very popular light source used in the house, industry, department store, hospital, university, and so on. Because their merits of energy saving up to 80% over standard incandescent bulbs and long lift time more than conventional incandescent lamp. Which power rate of small size compact fluorescent lamps are 5, 8, 11, 12, 14, 15, 18, 20, 22, 23, and 24 watts. Today, jumbo size compact fluorescent lamps intending is used to replace mercury lamp (ML lamp). Because their merits of energy saving up to 74% over standard mercury lamp and power rate of jumbo compact fluorescent lamps are 45, 65, and 85 watts. However, these jumbo

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compact fluorescent lamps have low power factor and high total harmonic distortion (THD) effect to power quality problem in electrical power system. Due to the non-linear characteristics of electronic ballast, the compact fluorescent lamps will inject harmonic currents into distribution system [1]-[5].

2. Experimentants

The test set was found from public favor and consisted of typical compact fluorescent lamps test voltage and current waveform, power factor, power consumptions, electrical energy saving, and total harmonic distortion. The types of lamp, such as incandescent lamp (200 watt), small size compact fluorescent lamp or energy saving lamp (23, 24, and 45 watts), and jumbo size compact fluorescent lamp (45, 65, and 85 watts). Four case studies are summarized in table 1 and the picture of each lamp and mini street lamp box as shown in figure 1. learn more.



Fig. 1 Incandescent lamp, compact fluorescent lamp, and mercury lamp and mini street lamp box

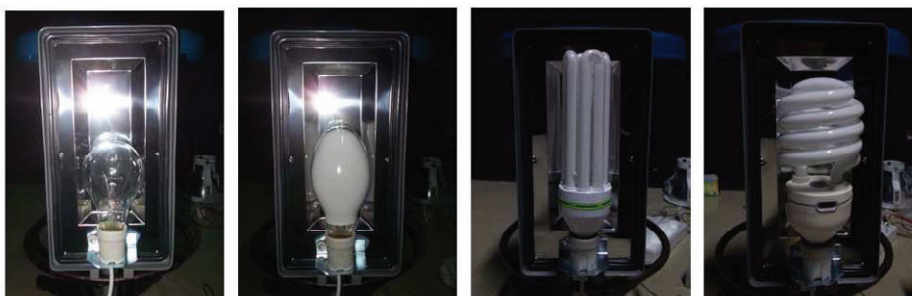


Fig. 2. Mini street lamp box with each lamp (17 cm x 33.5 cm)

Table 1 Measured diagram of electronic ballast

order	type of lamp	power rate (W)	brand	price (Bath)
1	Incand.	200	PL	50
2	CFL-Small size	23	PL-3U	139
3		24	PL-twists	125
4		45	HMC-4U	100
5	CFL-Jumbo size	85	N Sonic-4U	190
6		85	CKL-4U	180
7		45 / ML 160	PL-twists	500
8		65 / ML 250	PL-twists	600
9	ML	160	PL	110
10		250	PL	210

2.1 Experimental of Illuminance

The experimental of illuminance were measured via a lux meter in drak room (4 m. x 6 m.) and reference point is 2 m of each lamp as shown in figure 3.

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