

Lighting System Design of PEFP According to the Energy-Saving Scheme

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1. Introduction

Because of the development of modern information and communication industry, industrial upgrading, due to the use of high-tech electronic products, the amount of electricity consumption increases each year. Thus, government of Korea introduced Energy Saving Scheme to make the attempt to save energy consumption for building construction. Public institutions must observe energy saving scheme, that is, design standards should be accordance with the instructions specified in the energy saving scheme.

According to energy saving scheme, construction and mechanical/electrical equipment was design. In this paper, we described lighting system design according to the energy saving scheme.

2. Lighting System of PEFP (LED Lights)

2.1 Introduction of LED Lights

LED lights consume less electric power than conventional lighting as low as less than half as large energy savings. Moreover, easy maintenance because of its lifetime is five times or more longer than conventional lights. (more than 50,000 hours).

Table 1 describes the amount of electric power savings when LED lights are replaced bulbs, halogen lamps and fluorescents.

Table 1 Electric Power Consumption of each Lighting

	Conventional	LED Lights	Energy saved(%)
Bulbs	100W	12W	88%
Halogen lamp	50W	10W	80%
Fluorescent	32W	24W	25%

As described in Table 1, electric power consumption of LED lights is about 88% power consumption compared to incandescent bulbs, 80% of halogen bulbs, 25% of fluorescents.

2.2 LED lights introduction according to the Energy Saving Scheme

Proton Accelerator Research Center of PEFP installed LED lights for over 30% of the total lighting load in each building, which is described in Table 2.

Table 2 LED lights installation changes in Proton Accelerator Research Center of PEFP

Building	Conventional			Changed		
	Power Consumption (W)	LED Power Consumption (W)	EPI (%)	Power Consumption (W)	LED Power Consumption (W)	EPI (%)
Acc. BLDG	145,306	11,367	7.82	115,86	35,786	30.89
Utility BLDG	49,713	2,625	5.28	30,705	11,529	37.55
Power System BLDG	10,892	408	3.75	9,004	5,839	64.86
LED lights (%)			9.25			34.2

Total electric load of every building before the application of LED lighting is approximately 206kW, especially load of the accelerator & beam application building is about 145kW (70%), utility building is about 50kW (24%) and Power system Building is about 11kW (5%). If you calculate electric power consumption by applying LED lighting, total power consumption is 156kW, compared to conventional lights, reduction of electric power consumption of about 25% occurs. (116kW (20% reduction) in Accelerator Building, 31kW (38% reduction) in Utility Building, and 9kW (10% reduction) in Power system Building

Fig. 1 described LED lights installed area of the 1st floor of the Accelerator & Beam Application Research Building of PEFP.

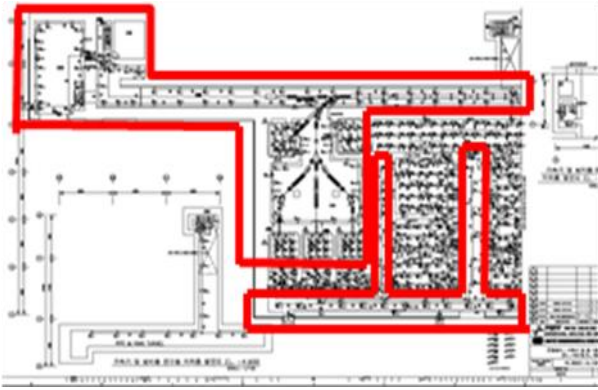


Fig 1. LED lights Installed area of Accelerator & Beam Application Research Building of PEFP

As described in Fig. 1, we installed LED lights in corridor and accelerator tunnel.

3. Conclusions

In this paper, according to government policies, for 30% of the total lighting load, LED lights are replaced by conventional facilities (bulbs, halogen lamps, and fluorescents). Because LED lights consumes less power than conventional lighting, its energy consumption is less than half as large as than that of conventional lightings while its lifetime is 5 times more than conventional lightings. Moreover, energy savings by replacing LED lights are 25% of total energy consumption by lighting load.

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REFERENCES

- [1] Energy Saving Scheme of PEFP, 2010.