SAVE ENERGY BY FOLLOWING LIGHTING REGULATIONS

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Annotation: Rational use of electricity is a way to reduce the consumption of the family budget and the load on the electrical network. In addition, prices for energy resources are steadily increasing. The following article is devoted to reducing electricity consumption by following simple measures.

Key words: Electricity consumption, incandescent light, discharge, fluorescent lamps, LED light sources.

Light sources on the principle of converting electrical energy into light are divided into two groups: temperature (incandescent lamps) and discharge.

Incandescent lamps have a simple switching circuit, which makes them the most reliable light sources; they are practically not critical to changes in environmental conditions, including temperature, but are very sensitive to deviations in the supplied voltage; have a low luminous efficacy (8-20 lm / W) and a short burning time (no more than 2000 hours). The main disadvantage of incandescent lamps is their low efficiency (about 2%). Incandescent lamps are used mainly for emergency lighting, in architectural and street lighting and for lighting administrative premises.

The most commonly used are the following light sources:

• quartz halogen lamps are a type of incandescent lamp; mainly tubular lamps of the KG type are used; lamp power from 1 to 5 kW; an increase in the unit power up to 20 kW is expected;

• gas-discharge lamps have a high luminous efficiency and a long service life in comparison with incandescent lamps; used with control gear (ballast). The main types of discharge lamps are:

- fluorescent lamps are low-pressure discharge lamps, operate at a temperature of 15-25 ° C; the average service life is 10,000 hours; these lamps are smaller than incandescent lamps, react to voltage deviations and at U <UHmi, the lamps are not ignited; fluctuations in the supply voltage have a negative effect on the operation of lamps; the life of the lamps is reduced with a significant decrease in voltage and frequent switching on; the most widely used lamps are 40 and 80 W,compact fluorescent lamps are widespread, have improved economic indicators: energy savings reach 80%; their service life is 8-12 times longer than that of incandescent lamps; operating temperature range is from +20 to +40 ° C; has a high level of color rendering,

-high pressure mercury lamps, among which mercury arc fluorescent lamps (DRL) are most widely used; are the most common light sources; a change in external temperature has practically no effect on these lamps; their average service life is 10,000 hours; for high-precision visual work, these lamps are not recommended,

- tubular xenon lamps, in which the parameters are practically independent of the ambient temperature; have a large unit power and are used to illuminate squares, territories of various objects, etc.,

- metal halide lamps (DRI - mercury arc with additives of metal iodites); have high luminous efficacy and good color rendering; the parameters of the lamps are highly dependent on fluctuations in the mains voltage; the service life of lamps is on average 1000-5000 h, but can be increased to 10000 h,

- high pressure sodium lamps are efficient light sources; they are insensitive to changes in ambient temperature and operate in the range from -60 to +50 ° C; the electrical parameters of the lamps are highly dependent on the mains voltage; have a high luminous efficiency and service life, are promising sources.

Currently, LED light sources are widely used. The experience of using LED sources is in the field of advertising, where they began to be used much earlier than in other areas. For high-power luminaires and spotlights, special LED assemblies have been developed on a massive radiator. LEDs are classified as low voltage devices; in the process of operation, the aging of the LEDs occurs, and, consequently, a decrease in their luminous intensity; the actual lifespan of LEDs ranges from 20,000 to 30,000 hours. LEDs are among the most promising light sources.

The main ways to save electricity in lighting networks are:

1) the use of the most reliable and economical light sources, ballasts, combined lighting systems;

2) rational construction of lighting networks;

3) normalization of voltage modes in lighting networks;
4) the transition, where appropriate and possible, to the power supply of lamps with a voltage of 380 V;
5) the use of rational operating modes of lighting installations;
6) proper operation of lighting networks (periodic cleaning of lamps, replacement of burned out lamps, etc.).
An effective means of saving electricity in lighting networks is the use of rational systems for automatic lighting control during the day and limitation of increased voltage levels at the terminals of the light source. The latter is achieved, for example, by using special thyristor voltage limiters of the TON type.
To automate the control of turning on and off lighting installations, use: photo machines, photo relays, program time relays, etc. However, dimming by shutting down groups of light sources shortens the life of some types of lamps and complicates lighting networks. So, for fluorescent lamps, the service life decreases by 17% in a year with three-shift operation, if we assume that each turn on reduces the lamp life by about 2 hours.
It is known that the operation of gas-discharge lamps is accompanied by the consumption of reactive power from the network. To reduce consumption, instead of throttling ballasts, electronic (in particular, high-frequency) ones are used. However, the main reasons for the transition to new, more modern devices are energy savings in lamps and an increase in the quality of lighting.
A promising way to save electricity in lighting networks is the development and implementation of new highly efficient light sources.
Energy savings for lighting, obtained by replacing old light sources (index 2) with new, highly efficient (index 1), is determined by the formula where Tos is the number of hours of use of the maximum lighting load per year, h; a - coefficient taking into account power losses in networks and starting control equipment (a, - for replacement lamps, a2 - for replacement lamps), equal for incandescent lamps - 1.3; luminescent - 1.23; high pressure gas discharge - 1.13; p is the power of one lamp, W; n is the number of lamps in one lamp; N is the number of luminaires.
Reducing electricity losses in lighting networks
At industrial enterprises, depending on the nature of the technological process, an average of about 10% of the consumed electricity is spent on electric lighting. So, in mechanical engineering, up to 7% is spent on lighting, in light and food industries - up to 10%, in textile - up to 30% of the total .

Reference

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