

Electricity deficiency energy savings –the use of electric security halogen lamps

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Abstract. The problem of energy saving resources is now very urgent. Reducing the lighting electricity consumption through the introduction of advanced technologies is one of the most effective ways. The main method - the replacement of incandescent lamps with LED lamps, since the light output of the latter is 5-8 times higher. However, LED bulbs are only becoming widespread, as most products entering the Ukrainian market are of low quality and of high cost. Also, the frequent phenomenon is the submission by producers of false information about the characteristics of the lamps. Therefore, we decided to experiment with the light bulbs available in the market of the western Ukraine.

The article presents the results of the modern light sources characteristics studying using halogen lamps as the example.

Many people think about changing the traditional incandescent lamp-lamp to some thing more perfect, since the prices for electricity are constantly growing, because their efficiency is very low and is only 5%. Among alternative way so flighting, halogen lamps are one of the options.

Key words: halogen lamps, light output, lighting.

FORMULATION OF THE PROBLEM

Saving electric energy is the current task of our time. Lighting constitutes the greater part of the total electricity consumption, so the requirements for modern light sources in terms of their cost-effectiveness are high.

ANALYSIS OF RECENT STUDIES AND PUBLICATIONS

Thermographic comparison of the work of various light sources indicates that a conventional incandescent lamp converts 95% of electricity into heat and only 5% - into light. To increase the light output, the lamps are filled with an inert gas - a mixture of azotane and argon or krypton, and sometimes halogens (halogen lamps) are added to the inert gas. Addition of halogens (most often iodine or bromine) provides a slow evaporation of the filament. Halogen lamps have a high luminous efficiency and a long service life in comparison with vacuum incandescent lamps, and is a cheap substitute for them. Nevertheless, the Ukrainian market is filled with low quality lamps. Therefore, we decided to experimentally investigate the

characteristics of halogen lamps available in the market of western Ukraine.

The task of the research is to investigate the real characteristics of halogen lamps that enter the Ukrainian market and assess their compliance with the declared data.

SUMMARY OF THE MAIN MATERIAL

We investigated halogen lamps of trade marks "Lightferon" and "Delux" for compliance with the declared lighting and electrical engineering parameters.

Manufacturers have submitted the characteristics of the light sources, which are given below.

Table 1. Characteristics of lamps, provided by manufacturers

Manufacturer	Power	Term of work, hours	Price
Lightferon	20 W	3000	0,53 €
Lightferon	35 W	3000	0,53 €
Lightferon	50 W	3000	0,53 €
Delux	35 W	3000	0,47 €
Delux	50 W	3000	0,47€

The value of the measurement results for the light and electrical parameters of halogen lamps of various trademarks is given in Table. 2.

Table 2. The results of halogen lamps parameters measurement

Lamytype	Parameter	U, V			
		190	200	210	220
«Lightferon», 20Watt	I,A	0,122	0,124	0,128	0,1305
	E, Lux	2300	2840	3440	4430
	S, Watt	23,18	24,8	26,88	28,71
	F,Lm/Watt	99,22	114,52	127,98	154,3
«Lightferon», 35Watt	I,A	0,166	0,17	0,175	0,1775
	E, Lux	2030	2530	2990	3670
	S, Watt	31,54	34	36,75	39,05
	F,Lm/Watt	64,36	74,412	81,361	93,98
«Lightferon», 50Watt	I,A	0,162	0,166	0,17	0,173
	E, Lux	2460	2880	3340	3910
	S, Watt	30,78	33,2	35,7	38,06
	F,Lm/Watt	79,92	86,75	93,56	102,7
«Delux», 35Watt	I,A	0,143	0,146	0,15	0,15
	E, Lux	2140	2530	2910	3640
	S, Watt	27,17	29,2	31,5	33,04
	F,Lm/Watt	78,76	86,644	92,381	110,2
«Delux», 50Watt	I,A	0,2	0,205	0,2125	0,218
	E, Lux	3640	4300	5010	5685
	S, Watt	38	41	44,625	47,85
	F,Lm/Watt	95,79	104,88	112,27	118,8

Having carried out the experiments, we obtained indicators of active power when operatin gat a nominal voltage of 220 V, which are given below.

Table 3. Comparison of the stated and measured power values

Manufacturer	Power, watt	Rated power, watt	The difference between the actual and declarative power, %
<i>Delux</i>	35	33,044	-5,91938022
<i>Delux</i>	50	47,85	-4,493207941
<i>Lightferon</i>	20	28,71	+30,33786137
<i>Lightferon</i>	35	39,05	+10,37131882
<i>Lightferon</i>	50	38,06	-31,37151865

These data indicate that the halogen lamps "Delux" correspond to the parameters declared by the manufacturer (with in 6%). Butt he lamps "Lightferon" have deviations of more than 30%.

Below are graphs of the dependence of illumination (lightflux) to the voltage of the brand "Lightferon" and "Delux".

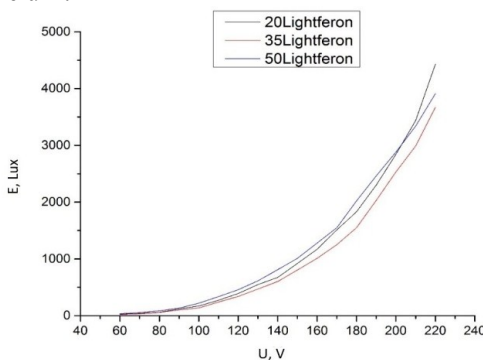


Fig. 1. Graphical depending of the lamps «Lightferon» various capacities

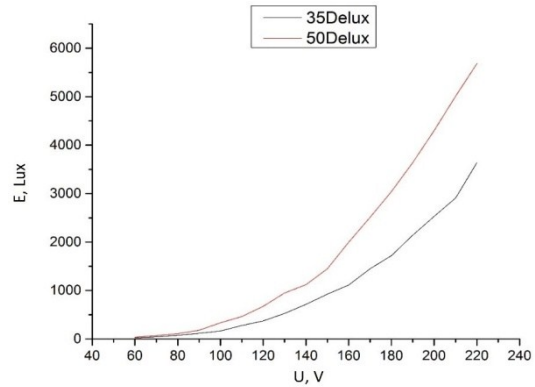


Fig. 2. Graphical depending of the lamps «Delux» various capacities

These graphs show that the illumination of Lighferon lamps of different capacities is almost the same. We also learned that a 20 Watt lampis stronger than a 50 Watt lamp. In the lamps "Delux" this is not observed.

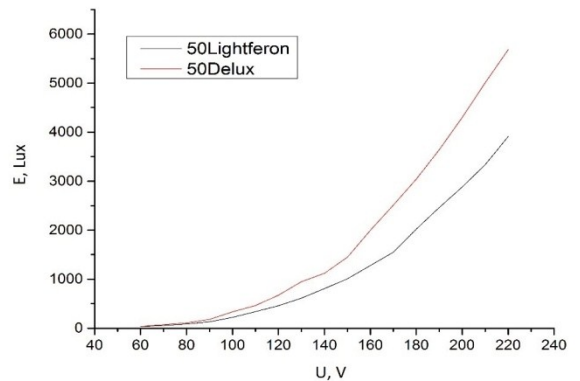


Fig. 3. Comparison of the illumination for lamps with the same capacity

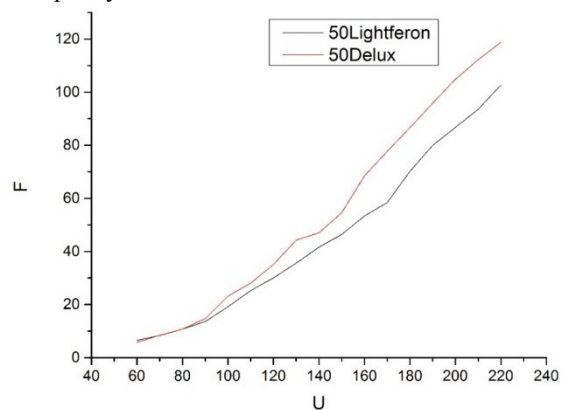


Fig. 4. Comparison of the luminous fluxof the same lamp power

The "Delux" lamphas a greater illumination and luminous flux than a lamp with the same parameters of the "Lightferon" brand.

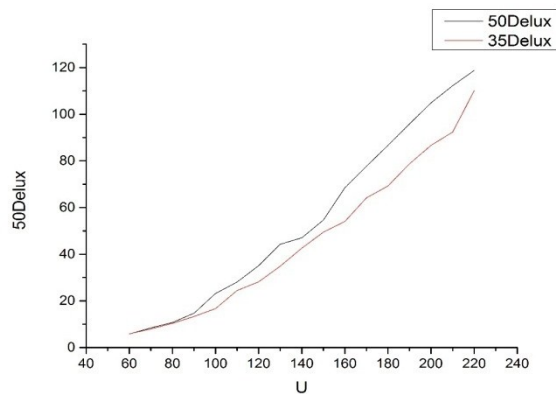


Fig. 5. Comparison of illumination, «Delux» lamps

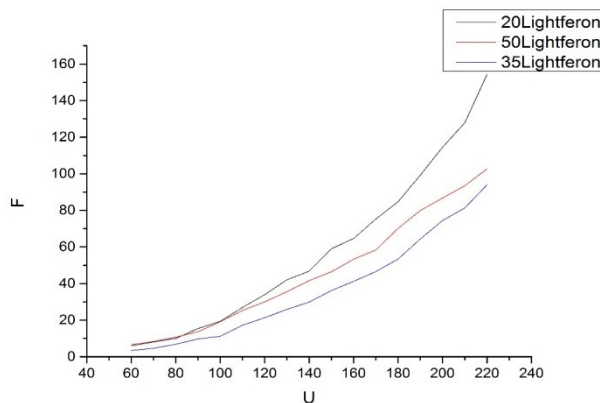


Fig. 6. Comparison of illumination, «Lightferon» lamps

CONCLUSIONS

Many people think about changing the traditional incandescent lamp-lamp to some thing more perfect, since the prices for electricity are constantly growing, because their efficiency is very low and is only 5%. Among alternative way so flighting, halogen lamps are one of the options.

However, our experiments show that many halogen lamps are substandard, and do not always correspond to the characteristics specified by the manufacturer. Thus, we have seen the fact that the illumination of the Lighferon lamps is almost the same, more over, the 20 Watt lamp is stronger than the 50 Watt lamp.

However, the low cost of halogen lamps makes them a good low-cost alternative to simple lam-filamentin can descent lamps.

REFERENCES

1. **Goshko M. O., Kryzhak S., Chaban A. 2010.** Electromechanical transformation of energy in multi-machine systems with asynchronous actuators. Machine Science. Vol. №9. 14-16.
2. **Goshko M., Kryzhak S., Stolyarchuk R., Sumner O., Chaban A. 2010.** Mathematical modeling of electromechanical torsional oscillations in a trisomatic asynchronous electric drive. Technical reports. - 1 (31), 2 (32). 8-10.
3. **Goshko M.O., Drobot I.M. 2011.** Ways of reducing electric power consumption of electric drives on the example of the technological process of feed milling.

Motrol. Motorization and power industry in agriculture. – Lublin. Vvol. 13D. 50-56.

4. **Goshko M.O., Goshko T., Golodnyak R., Panasyk S. 2011.** Human resource policy in the agrarian sector of economy. Bulletin of the Kamyanets-Podilsky National University named after Ivan Ogienko. Economic sciences. Issue 4. – Kamyanets-Podilsky: FOP Sysin O. V. .414-416. (in Ukrainian).
5. **Goshko M.O. Goshko T. 2011.** Stimulation of personnel in the agroindustrial complex due to the increase in wages. Visnyk of the Lviv National Agrarian University: Economics of Agroindustrial Complex No. 18 (1). – Lviv: LNAU. 386-389. (in Ukrainian).
6. **Goshko M. O., Yakymets V.T., Drobot I. M., Bubnjak T. I. 2012.** Protection of AC machines. Motrol. Motorization and power industry in agriculture. - Lublin, - Vol. 16. 25-29.
7. **Goshko M. O, Vasiliev K. M., Drobot I. M., Khimka S. M. 2012.** Research of the characteristics of modern electric light sources. Visnyk of Lviv National Agrarian University "Agroengineering Research". - Lviv: Lviv. LNAU. Vol. - No. 16. 6-13. (in Ukrainian).
8. **Goshko M. O, Khimka S M., Drobot I. M. 2012.** The rationale for choosing a circuit for electromagnetic vibroplugator for an electric drive of vibrating machines. Visnyk of Lviv National Agrarian University: agroengineering research. Vol. No. 16. 36-45. (in Ukrainian).
9. **Goshko M.O., Goshko T. D., Khimka S.M., Bruh O.O., Golodnyak R.I. 2013.** Choosing a financial strategy as a direction of enterprise development // Bulletin of the Kamyanets-Podilsky National University. Ivan Ogienko: Economic Sciences. - Kamyanets-Podilsky: Abetka. Issue 8. 123-125. (in Ukrainian).
10. **Goshko M.O., Goshko T. D., Drobot I.M., Biilek I.I. 2013.** Migration Policy in the Agrarian Sector of Economics. Visnyk of Lviv National Agrarian University "Agroengineering Research: Economics of AIC" - Lviv: LNAU. Vol. No. 20 (1) - 420-423. (in Ukrainian).
11. **Goshko M. O, Vasiliv K. M., Hermann A. F., Yatsikov M. M., Levonyuk V. R. 2013.** Mathematical model of a three-phase single-phase voltage modulator of a noncontact excitation system of an asynchronous generator. Bulletin Lviv National Agrarian University "Agroengineering Research:". – Lviv: LNAU, Vol. No. 17. 10-16. (in Ukrainian).
12. **Hoshko M. 2014.** The Quality Characteristics of Electrical Illuminants // IOSR Journal of Humanities and Social Sciences. Vol. 19, Issue 1.
13. **Goshko M.O., Khimka S.M., Syrotyuk V.M.** Results of the experimental study of the energy saving dosage of drinking fees.// MOTROL Motoryzacja i energetyka rolnictwa. - Lublin, 2015 - No. 16D. from 148-156
14. **Chervinsky L.S. 2005.** Optical technologies in livestock. – Kyiv: Naukova Dumka. 230. (in Ukrainian).
15. **Dambrauskas S.G., Ivanov V.V., Klopovskyy K.S., Krylov E.A., Rakhimov T.V., Saenko V.B. 2002.**

Investigation of the processes that determine the effective efficiency of a wide source of VUV radiation initiated matrix micro discharges. Moscow. – Preprint MSU.

16. **Haysak M., Hnatiuk M., Fedorniyak Yu. 2011.** *Binding energy of the singlet and triplet states of negative mioniy ions.* Uzhgorod. - 240-245. (in Ukrainian).

17. Internet resources: <http://www.alkor.net/alkorru/FusedSilica1.html> - *Optical kvarts Glass.*

18. Internet resources: <https://www.gov.uk/government/publications/-/Total-Energy>

19. **Kaganov I.L. 1972.** *Ion devices.* Moscow. "Energy". – 528. (in Ukrainian).

20. **Kaptsov N.A. 1954.** *"Electronics".* Moscow. "Hostehizdat". – 470. (in Ukrainian).

21. **Korchemnyy M., Fedoreyko V., V. Shcherban. 2001.** *Energysaving in agroindustrial complex.* Ternopil: Textbooks and manuals. – 976. (in Ukrainian).

22. **Kovalyshyn B. 2012.** *Theoretical and experimental ground of the fuel energy efficiency rising by activating of burning reaction molecules-reagents.* – J. Econ-techmod. Lublin-Lviv-Cracow, Vol. I, №1, – P.63-66.

23. **Kovalyshyn B.M. 2012.** *Justification energy efficiency fuel plants through activation molecules reaction*

reagents incineration. – Praci TDAU.-Melitopol, Vol. 12, v. 2. 157-164. (in Ukrainian).

24. **Lopatinsky I.E., Zachek I.R., Ilchuk G.A., Romanyshyn B.M. 2005.** *Physics.*–Lviv: Poster. – 386. (in Ukrainian).

25. **Oryr J. 1981.** *Fyzyka.*– Moscow: Mir. – 336 p. (in Ukrainian).

26. Patent №37572 Ukraine, INC F23C 99/00 / *Method fuel efficiency installations on hydrocarbon fuels and device for its implementation* / BM Kovalyshyn (Ukraine) / Zayav.28.07.2006; publ. 10.12.2008. Bull. №23, 2008. (in Ukrainian).

27. *Physical Chemistry* (editor C.S. Krasnov).– Moscow: High School, 2001, 512 p. (in Ukrainian).

28. **Prakhovnik A.V., Rosen V.P., Razumovsky A.V. and et. 1999.** *Power Management: Aid train.* – Kyiv: Kyivska Not. f-ca. – 184. (in Ukrainian).

29. **Yariv A. 1982.** *An Introduction to Theory and Applications of Quantum Mechanics.* California Institute of Technology. – 185. (in Ukrainian).

30. **Zeidel A.P., Prokofiev V.P., Raysky S.M., Slyty V.A., Shreyder E.Y. 1977.** *Tables of spectral lines.* Moscow: Nauka. (in Ukrainian).