

THE IMPACT OF NEON GAS IN THE MANUFACTURE OF LOW ENERGY SAVING

i ketut wijaya

udayana university, faculty of engineering department of electrical engineering, faculty of engineering department of electrical engineering, bukit jimbaran, bali, indonesia

home address: jalan gunung batukaru 42 a denpasar, po box 80119, bali indonesia

email : wijaya@ee.unud.ac.id

ABSTRACT

Electric power is a major factor in life both day and night because without electricity life has begun to be rather difficult. Electric power must be good enough to be used because it can damage the equipment used in the home industry economy industry. Electric power through light intensity plays many things and still needs to be increased to produce more lighting products. To produce lighting products, research is needed by giving code M (machine) and K (glass / tube), each will be carried out with K (glass) replacement according to the research.

. From the changes in K and M produces the light intensity that will be obtained for later analysis. The results obtained indicate that if M5 from K5 starts to be replaced with K8, K11, K18, K23 it produces a significant increase in electric current in the value of light intensity. The effect of fluorescent gases on a lamp can be used on a small electric current to produce optimal light intensity. Fluorescent gas can be used in making billboard lights for the purpose of introducing industrial results. Designed advertising boards must meet ergonomic requirements.

Keywords: Electric Power, Lights, Light Intensity And Ergonomic

INTRODUCTION

Electricity (electric power) is the most important part of human life, as evidenced without electricity (electric power), human life begins to be disrupted. Electricity (electricity) is needed in daily life and electricity is absolutely necessary in the daily life of humans. Electricity (electricity) has entered almost every life and human civilization. Electricity (electricity) is needed for every level of importance, from basic things to bigger things. Finally electricity controls all conditions created by the community and without electricity activities cannot function properly. Electricity is now the main ingredient for the benefit of life because electricity is used by people to live and support all interests.

Electricity through the intensity of lighting in human life must be a tool to make people feel comfortable when using it. Many supporting facilities are made, but there are still many things that cannot be expected, such as lights that are wasteful in the use of electricity, cause fires and perishable lights. Electricity must be developed more based on functionality, which must be adapted to the needs and abilities of humans as users. There are many different facilities for lamps that function the same for lighting and beauty. In addition to the function of lights as lighting also has a function for beauty so that human life feels pleasant. Lights are also made according to their functions and lights must function economically in life. The lamps have been made economically with various energy saving lamps (Philips) and other types of LED lamps with various types of brands. Energy-saving lamps use fluorescent gas as a means to provide a flame to other parts so that the lights can be lit. The use of fluorescent gas to fill glass tubes needs to be considered, with light from lamps of various brands having different lighting even with the same electric power (watts) due to electricity and neon gas used. Fluorescent gas in the lamp provides a function as a successor to light from one side to another. Fluorescent gas is widely used as a lamp filler on billboards and also lamps for home lighting. The function of neon gas (neon) needs to be considered for the development of its use through research. Neon gas (neon) is a very light gas after helium. Because it is lighter than other gases after helium, fluorescent gas (neon) is widely used as a lighting tool (characteristic of neon gas). The function of neon gas is to give a reddish white color and

reduce heat on the lamp. If the neon gas increases in charge, the light is brighter and if the neon gas decreases, the light will be less bright (dim). The use of neon gas also functions as an important means in the industrial world. Fluorescent gas can be made for billboards in introducing industrial results that are installed in strategic places. Fluorescent gas is formed in such a way and with a combination of colors, neon gas is very attractive to be used in the design of the required lamps. At present, billboards that use fluorescent gas lamps are very much made to introduce industrial products that are installed on the strategic side of the road. The selection of billboards for the benefit of the industry is much cheaper than the television media. The selection of billboards is the choice for most of the industrial products to be introduced. Billboards which are a means of introducing industrial results must be based on ergonomic principles because they will relate to humans.

Fluorescent gas is analyzed to determine the effect of neon gas on light intensity, and the ability of neon gas and its function in design for the benefit of introducing industrial results with billboards.

RESEARCH OBJECTIVES

1. To find out the extent of the influence of neon gas on the intensity of the emitted light.
2. To determine the condition of the lamp if the neon gas will be changed.
3. To find out the use of neon gas in relation to the development of other lamps with the intensity of the light produced.
4. To find out the change in electric current in energy saving lamps with different glass tubes (K).
5. To find out the development of billboards with non-gas lamps for industrial purposes.
6. To determine the efficiency of light intensity on changes in neon gas.
7. To find out ergonomic analysis

RESEARCH BENEFITS

1. Fluorescent gas is expected to be used for smaller electric power sources in larger glass tubes.
2. Fluorescent gas is expected through this research to be able to introduce the nature of fluorescent gas as a gas

that is able to provide a large enough light intensity for good lighting.

MATERIALS AND METHODS

MATERIAL LIGHTING

Lighting or so-called light intensity is very important and needs attention because it is in direct contact with humans. The intensity of light is needed when humans perform activities at night. During the day it is also not uncommon to use lights because they have not used sunlight in the design of space. Ultra Violet radiation from neon lights can cause eye strain, migraines, and dizziness. But the effect can be reduced by placing neon lights at least 1 to 2 feet [7]. Especially if working under the light for hours will make the body become stressed and cause health problems, such as sleep disorders, cancer and migraines. Light sensitivity can also cause headaches because of its brightness.

HEALTH PROBLEMS

Physical symptoms due to fluorescent lights can develop over several minutes of exposure. These symptoms include eye pain, inflammation of the eye or pain, difficulty reading and focusing, blurred vision or visual disturbances, headaches, dizziness, nausea, shortness of breath, depressed mood in sleep disorders. Neon is a chemical element in the periodic tables that have the symbol Ne and atomic number 10. Neon is included in the noble gas group which is colorless and inert. This fluorescent gas gives a distinctive reddish light when used in vacuum tubes and fluorescent lamps. In this life, we can hardly escape from light. The lamp is considered a basic requirement. However, users often do not understand that the lights they have do not yet support the Go Green concept. Anger can have a bad impact on children, namely to reduce IQ and IQ decline, of course, greatly affects old age. Neon gas is a chemical substance and is included in the periodic table with the symbol Ne and has an atomic number that belongs to the group of colorless noble gases. Fluorescent gas if inhaled can cause shortness of breath if there is not enough oxygen to breathe.

Characteristics

Fluorescent gas provides reddish light when used in vacuum tubes and used in fluorescent lamps. The nature of this neon gas makes it widely used as a material for making signs. Environmentally friendly fluorescent gases and fluorescents can emit ionized light and can pass through smog. Fluorescent gas is lighter than air which is a monatomic gas which is mostly made of nitrogen (N₂). Neon gas can fill air balloons so that air balloons can rise into the air. Non density is 0.9 * 10⁻³ g / cm³ at 200 C with melting point -2490 C and boiling point -2490 C. This condition allows neon gas to be used in various forms and can be processed as desired and Neon as a liquid or gas , relatively more expensive - for small amounts. The price of liquid fluorescent gas can be more than 55 times that of liquid helium.

BENEFITS OF NEON GAS.

In addition to lighting in fluorescent lighting houses are widely used for lazer-neon, vacuum tubes, lightning rods, high voltage indicators and billboards. Another use of neon is that neon gas is 40 times more effective as a refrigerant than liquid helium and 3 times better than liquid hydrogen because of its high cooling capacity. Fluorescent gas (liquid), which is a liquid that can be used in cryonic to freeze corpses.

LIGHTING FORMULA

In the installation or design must meet the requirements and criteria for existing room conditions. It is hoped that the lamp will not often cause problems and the lamp can help provide optimal lighting. The theory of electricity can provide direction to recognize the lights needed:

$$\phi = E \times A \text{ (lumen)(1)}$$

Where:

- E is the light intensity (lux)
- A is the area of work area (m²)
- φ is light fluctuation (lumens)

No less important is the armature that can make lighting emit better light intensity. Armature efficiency must also be known because it will determine the amount of light emitted depending on the material and shape of the armature. Armature gives focus to light intensity.

$$v = \frac{\text{fluk of light emitted by the armature (light fittings)}}{\text{fluk of light emitted by light source}} \text{(2)}$$

In this research we will use PHILIPS brand lamps in the market. Philips lamps are lamps that have good standards and quality. The PHILIPS lamp used is an essential type of lamp with energy saving conditions and has no heat properties. The PHILIPS lamp used is with a capacity of 5 watts, 8 watts, 11 watts, 18 watts, and 23 watts.

THE USE OF ELECTRONIC MATERIALS IN ENERGY SAVING LAMPS.

a. Capacitors

The general function of a capacitor is as a store of electrical current to balance the circuit conditions. Capacitors can provide electricity in case of an electric current imbalance.

b. Resistance (ohms)

Resistance functions as a barrier to the electric current that passes through the circuit so that there is no excess electricity.

c. Diode

The diode functions as a rectifier for the passing electric current. The diode directs an electric current that flows from AC to DC.

d. Transistor

The transistor functions as an amplifier, controller, rectifier, oscillator and modulator. In lamps, the transistor functions as an electrical amplifier that passes through.

e. Inductor

Inductor is a coil of wire that functions as energy storage in a magnetic field caused by an electric current.

f. Transformer

The transformer serves as the main line for the entry of electric power. Transformers have the property of raising and lowering the voltage. In energy saving lamps, the transformer functions as a voltage reducer so that it can be used in a series of lamps.

Nowadays electronic materials become the basis for producing energy saving lamps with all the benefits of electronic materials making the light industry world develop very rapidly. The development of the electronic world affects other fields that make it alive and utilizes electronic developments to develop. Today the world is full

of electronic materials, so everything is electronic. The development of the electronic world affects other fields that make it alive and utilizes electronic developments to develop. Today the world is full of electronic materials, so everything is electronic. Utilizing electronic materials can simplify life and make human life more comfortable.

The function of electronic materials is very important because the nature and characteristics of electronic devices can function as needed. The electronic devices needed must be able to work in accordance with the functions and tasks. Energy-saving lamps require electronic devices to adjust the incoming electrical power to provide electrical power input so that the energy-saving lamp can light properly. Energy saving lamps consist of 2 (two) parts according to their function, one as an engine (M) and as a tube in which there is a neon gas (K). These two parts have different functions, namely as an energy supplier (M) and which has the property of giving light is a tube (K). The circuit on the engine (M) is a closed circuit that provides electricity to the tube (K).

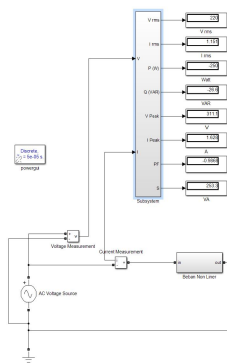


Figure 1. Energy Saving Light Image.

METHOD

The method in this discussion is to use a method of finding data through measurements and the data obtained are analyzed. Analysis is done with the help of software

HOW TO DO RESEARCH

RESEARCH CARRIED OUT BY:

1. Prepare a research tool
2. Install research tools
3. Conduct research by installing lights and replacing them alternately until completion
4. Take data by measuring all light conditions to get light intensity with a lux meter (SANWA: LX.3131)
5. Electric current data retrieval on the lamp using a digital clamp meter (KEW2117R)
6. Record the results of research
7. Analysis

RESULTS AND ANALYSIS

RESEARCH RESULTS

4.1.1 The results of the study were obtained from measuring the number of M (machines according to the magnitude in watts) and K (tubes).

The results of lamp studies using lux meters get light intensity values.

Table 1. Light Intensity Measurement Results (Lux)¹.

	K5 (watts)	K8 (watts)	K11 (watts)	K18 (watts)	K23 (watts)
M5 (watts)	50	75	85	120	145
M8	70	95	115	140	150

(watts)					
M11 (watts)	80	85	110	195	205
M18 (watts)	115	135	145	200	225
M23 (watts)	120	185	195	240	250

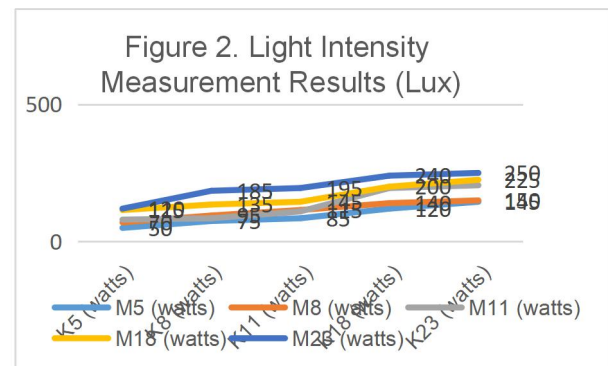
Information:

M = Engine

K = Glass with neon gas

The terms M and K mean that M is a lamp machine which is then replaced by K (glass) containing neon gas according to the wishes of the researcher. The results of this study were carried out by replacing glass containing neon gas to obtain data values with lux measurements. The intensity of the light obtained is done on one machine with various kinds of glass being measured. In Table 1. the results are visible light intensity on each machine with a variety of glass with different amounts of fluorescent gas. Looking at Table 1. and in Figure 2. in general it can be seen that there is an increase in neon gas that can provide periodic increases in light intensity.

Viewing pictures 1. In general it can be seen that there is an increase in the intensity of light periodically in conditions where there is an increase in the use of neon gas.



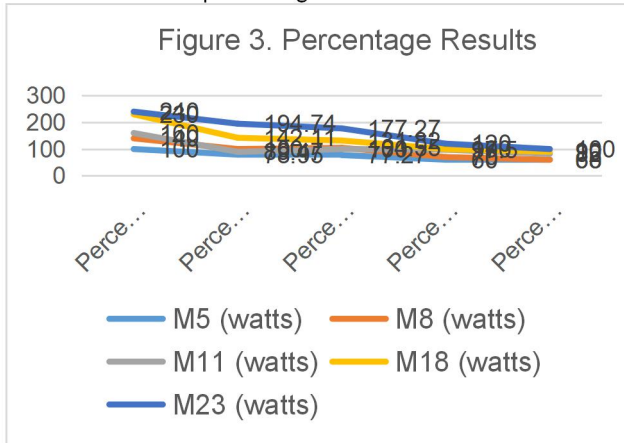
PERCENTAGE OF RESEARCH RESULTS

The percentage of the results of the study was intentionally sought to obtain the difference from each measurement in terms of the value of the magnitude of M and the conditions of the magnitude of K that were different. Large values that are different, M and K will be used as a model in determining appropriate research conditions, so that the results of the study will be seen the difference.

Table 2. Percentage of Results of Research Analysis.

	Percent of K5	Percent of K8	Percent of K11	Percent of K18	Percent of K23
M5 (watts)	100.00	78.95	77.27	60.00	58.00
M8 (watts)	140.00	100.00	104.55	70.00	60.00
M11 (watts)	160.00	89.47	100.00	97.50	82.00
M18 (watts)	230.00	142.11	131.82	100.00	90.00
M23	240.00	194.74	177.27	120.00	100.00

(watts)
Looking at Figure 3. which shows the percentage, it appears that the percentage results indicate a decrease in the value of the percentage.



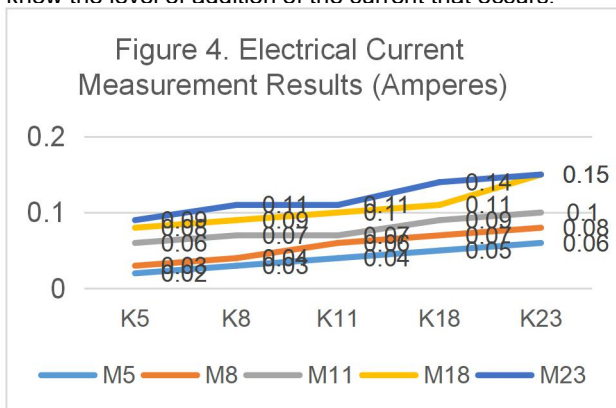
ELECTRICAL CURRENT MEASUREMENT RESULTS

The measurement results table is used to find the amount of current in each condition when the engine (M) is installed in a tube (K) containing different fluorescent gases.

Table 3. Electrical Current Measurement Results (Amperes).

	K5	K8	K11	K18	K23
M5	0.02	0.03	0.04	0.05	0.06
M8	0.03	0.04	0.06	0.07	0.08
M11	0.06	0.07	0.07	0.09	0.10
M18	0.08	0.09	0.10	0.11	0.15
M23	0.09	0.11	0.11	0.14	0.15

Figure 4. Shows that the results of the electric current measurement show there is an increase in current in each condition. The results in Figure 4. It is needed to know the level of addition of the current that occurs.



4.1.4 Safety and comfort measurement results

The results of safety and comfort measurements are very important to look for because until now the installation of billboards is still a problem for people who pass near the billboards especially when it is windy rain. The results of data from safety and comfort measurements were obtained from conducting questionnaires to people who passed around the billboard.

Table 4. Security Questionnaire Results

Data	Mean	N	Std. Deviation	Beda	Std. Deviation	p
Secur2	34,636	33	3,090	9,455	3,717	0,000
Secur1	25,182	33	2,592			

The results of the analysis in Table 4 on the security of people passing around the place showed quite good results where after improvements were made there was an increase in the security process at that place.

Table 5. Results of the Comfort Questionnaire

Data	Mean	N	Std. Deviation	Beda	Std. Deviation	p
Comf 2	31,939	33	2,749	11,061	5,722	0,000
Comf 1	20,879	33	4,174			

The results of the analysis of comfort in Table 5 shows an improvement in comfort when people pass by the billboard.

THE RESULTS OF THE CALCULATION OF LIGHT INTENSITY OF BILLBOARDS

On the installation of billboards with a length of 3 meters, width 2.5 meters, with a thickness of 30 cm. The formula used:

$$k = \frac{pxl}{h(p+l)} \dots \dots \dots (3)$$

$$= \frac{3x2}{0,3x3+2,25} = 3,81$$

For k= 3 = 0,63
For k= 4 = 0,66

$$\rho = 0,63 + \frac{3,81-3}{4-3} (0,66 - 0,63) = 0,65$$

$$n = \frac{ExA}{\phi_{armatur} \times \rho \times d} \dots \dots \dots (4)$$

- n = lots of lights
- E = light intensity (lux)
- A = area (m2)
- φarmatur = large of lumen of the armature used
- ρ = lighting efficiency
- d = depression factor

Provisions :
φarmature = 1500 lumens

$$n = \frac{Ex7,5}{4x1500x0,65x0,8}$$

$$4 = \frac{7,5E}{3120}$$

E 4 lamps = 1664.00 lux
For one lamp = 416.00 lux

So the intensity of the lights mounted on the billboards each amounted to 416 lux.

ANALYSIS RESULTS EFFECT OF NEON GAS ON LIGHT INTENSITY (LUX)

The results of the study in Table 1. sees produced a large value of light intensity with a significant increase. The magnitude of the results of research has shown that neon gas can be used in the smallest electric currents, even though more neon gas (because it has a low melting and boiling point). In Table 1. in M5, even though K (the tube) is switched from K5 to K23, the light is

still on, this proves that fluorescent gas is suitable for small electric capacity. If seen in Figure 1. there is an increase in the intensity of the light which, although exchanged to a fairly high level. This shows fluorescent gas can be used for energy saving lamps. In Table 1 it can be seen that the results of the M8 study were installed on K5, M11, M18 to M23, which means that they still experienced a fairly bright flame. M11, M18 and M23 also experienced the same thing as M8 and the results were also the same, which happened bright enough lights. So that fluorescent gas (neon) is suitable for making billboards that require a small electric current with well-lit lighting. The use of fluorescent gas is currently being developed in the manufacture of household lamps with high light levels and low electric currents. Because of the features and characteristics of fluorescent gases, development is underway to get energy efficient lighting. Nowadays energy saving lamps can be accepted by the public as lamps that are suitable for use because electricity is getting more expensive.

Reasons for using energy saving lamps.

1. Save costs and electricity bills per month, the intensity of the light emitted is brighter than the electricity used.
2. Save monthly expenses, seen from the use of lights, because there is no need to have to buy a bulb every month.
3. The color is whiter, good lights are white which is almost the same as sunlight so that at night you can see colors more clearly.
4. The movement, which is called Go Green, means that the use of energy-saving lamps does not often buy lamps by reducing lamp production so the factory reduces its production. With a little factory production, factory smoke can be reduced.

Other things that inhibit the use of fluorescent gas in energy-saving lamps such as health effects on humans. To reduce health effects on humans is to place lights as far as 1 to 2 feet from where we are.

CHANGES IN LAMP LIGHT INTENSITY WITH DIFFERENCES IN FLUORESCENT GASES.

The results of the study in Table 1. these are the results of data that can show that fluorescent gas can be used for the smallest source of electricity as needed. By providing fluorescent (neon) gas a different electric power can still continue the light from the burning wire to be transmitted to the entire vacuum tube. It is proven that electric power from M5 can still provide the intensity of light in the vacuum tube on K23. For M23 to K5, the power will turn on but it is still in critical condition (the light is red enough, the K5 lamp will go out). While for M8, M11, M18, and M23 paired with different K, there is no problem.

In Table 2. shows there is a change in the intensity of the light emitted at each K (glass tube). Although given different electric power, but K still lights up even though the intensity of the light emitted is somewhat reduced. If seen from Figure 2. can be clearly seen a decrease in the level of light intensity emitted from each K (glass). In Table 2. it can be seen more clearly the percentage decrease in light intensity which is a condition of fluorescent gas (neon) in connection with its use as a lighting device that is good enough to be used as lighting or as decoration. because neon gas has a white color and can even be colored as desired. Fluorescent gas greatly contributes that neon gas provides cooling to the heat that occurs due to heating due to the filament's flame.

THE USE OF NEON GAS IN RELATION TO THE DEVELOPMENT OF OTHER LAMPS WITH THE INTENSITY OF THE LIGHT PRODUCED

It is important to conduct research on the relationship between neon gas and light intensity. It is important to make changes so that there are energy-saving lamps at lower prices. The existence of energy saving lamps other than the Philip brand shows that the use of neon gas can be used properly. Judging from the results of measurements obtained that the lights of other brands have light intensity far below the light intensity of the PHILIPS brand. The light intensity of other brands with 7 watts of electricity has a light intensity of 37.5 lux, and with 18 watts of electricity has a light intensity of 75 watts. If two lamps from this other brand are crossed (exchanged for glasses containing fluorescent gas) then M7 with K18 produces a light intensity of 50 lux and if M18 with K7 produces a light intensity of 62.5 lux. So the light intensity of other brand lights has a light intensity far below the PHILIPS brand lights.

The conclusion that can be drawn is that art and creativity can produce new products. New products have emerged using neon gas as a commodity to produce new economic products.

CHANGES IN ELECTRIC CURRENT

In Table 3. shows the current changes that occur in the condition of the engine (M) with changes in the tube containing neon gas (K) used. This change is in accordance with changes in the fluorescent gas tubes used. This change shows that there is a change in the intensity of light that occurs followed by changes in the use of electric current. The greater the intensity of the light that occurs also requires greater changes in electric current. The conclusion that can be drawn is that making lamps that use fluorescent gas must be adjusted to the level of electric current used (in Table 1. and Table 3. can be compared). This means that it is related to the engine (M) that will be designed according to the needs of the neon gas cylinder that will be made as needed. For the manufacture of billboards using neon gas designs must pay attention to the design of the engine (M) in adjusting the tubes used so that the lights can be lit according to the design. This means that an increase in the use of neon gas shows an increase in the electric current used. If designing lamps using fluorescent gas must use an electric current design that is adapted to the use of neon gas.

MANUFACTURE OF BILLBOARDS WITH NON-GAS LAMPS FOR INDUSTRIAL USE.

Billboards are a tool used as a tool for the purpose of introducing industry results. The results of industry produced must be known by the general public that a certain product has been produced for certain needs as well. Seeing from the present condition the results of industry produced from factories are very numerous and varied. So the rapid expenditure of industrial products produced is very necessary to make alternative choices for introducing industry results to be selected and known by the public. This alternative is needed because introducing industrial results via television is very expensive. Through billboards introducing industry results can be minimized again through the use of electric current used (Table 3). See Table 3. Utilization of electric current by using fluorescent gas can be done to a certain extent in accordance with the design of the electronic equipment used. The electronic equipment used must be based on calculations to be able to pass the required electric current. In accordance with the measurement results obtained (Table 3.), it is very necessary provisions in the table to apply to the design of billboard lights to be made. See

Table 3. it is certain that the manufacture of lamps with neon gas can be made minimally by minimizing electric current. Making of lights on the billboards plus an automatic tool to turn on and turn off automatically at certain hours.

EFFICIENT LIGHT INTENSITY ON CHANGES IN FLUORESCENT GAS

From the efficiency of the light intensity obtained, it can be interpreted that any addition or increase in the use of neon gas will also be adjusted to the use of the electric current used. The making of billboards must be based on Table 4. Figure that can predict the minimum value of the use of electronic current. To manufacture an electric current source by assembling electronic devices must calculate the electronic devices used to be able to flow out of electronic devices can be used to make fluorescent gas ignite. So every addition of neon gas can certainly increase the electric current periodically. The use of electric current can be reduced according to the benefits and functions of the billboards made (Table 1.). Although the use of neon gas is related to electric current, in making billboards the use of electric current can be reduced because billboards don't have to have optimal intensity. The use of fluorescent gas lamps in the manufacture of billboards to use more neon gas and reduce electric current even efficiency can certainly be reduced. The purpose of the search for efficiency is to get the usage limit of the use of electric current and neon gas to get the minimum value of the analysis between the use of electric current and neon gas.

ERGONOMIC REVIEW

a. Requirements for displaying billboards.

The laying of the billboard must also meet the criteria of ergonomics because it must be seen by the general public. Billboards must be well made:

- From the angle of placing the billboard, it is easy to be seen by people who go through the street corner.
- The height of the billboards must also receive attention so that they can be seen immediately to reduce the risk of road accidents.
- The intensity of the light emitted by the billboard must also be bright enough so that the eye can see perfectly, by measuring the height of the passing human to be able to comfortably determine the height of the billboard.
- Limitation of the power of the eyes of the general public who pass by to see the billboard is very sensitive and the billboard does not cause glare.
- Billboards should use the intensity of the colored lights to reduce glare, although using white lights should not be too direct because it can create glare.
- The billboard must pay attention to the condition of the road and the people who pass the road properly and whether or not a billboard will be installed.
- Billboards must meet the view of seeing from the public with at least a straight-ahead view with eyes able to look up, down, to the left and right, that is, at a maximum angle of 30°.

b. The design of the billboards must match the building work

The design of the billboard is the most important thing from the installation of the billboard.

- Billboards are installed from hollow steel with sufficient thickness to be resistant to shocks caused by wind and earthquakes.
- Billboards are installed with no obstruction from trees or obstruction of the house.
- Iron billboards that are planted below are connected to

connect at the top so that they are truly permanent and strong, because this is the part that most often experiences problems.

- Billboards must be made of very light material and are resistant to heat and wind.

c. Security due to billboards

Conditions for the safety of the installation of billboards are also based on the safety of the surrounding community who pass the billboards during extreme weather conditions must be the calculation of the installers of the billboards. Billboards must be able to make something that does not make a disaster at any time if through the road that contains a billboard. The results of the questionnaire obtained based on random conducted is to say that the billboard if during extreme weather must be shunned because it often falls down because the iron buffer is not strong. Installation of billboards must withstand the harsh wind season when the wind blows hard. Based on this experience it is very necessary to find a solution for how to get answers to problems in the installation of this billboard. A questionnaire was conducted for people who passed around the area of the billboard. The results of the Questionnaire in Table 4. conducted in the area of the installation of billboards get results before improvement is $25,182 \pm 2,592$ of the 40 highest values. This means that the results of the questionnaire showed considerable concern for security when passing the billboard because the billboard is very large and wide. After repairs to the billboard by:

- Billboards are made perforated so that the wind can pass into the billboards so as to reduce wind gusts through the billboards.
- Billboard support is made of iron with sufficient thickness.
- Billboards are made of lightweight materials such as cloth and so on.

The results of the analysis in Table 4. Shows the results of the added security of the feelings of the people passing by around the billboards. The results of the questionnaire in Table 4 were $34,636 \pm 3,090$ with a sample of 33 people who passed through about the billboards.

d. Comfort due to billboards

Every design that will be installed is required to have high comfort requirements, so that after installation it does not interfere and does not cause casualties to other equipment or the road user community. Comfort must be given to the community to be able to use the road freely in their activities. Comfort is the main thing besides the safety factor because in the billboard there is electricity that is used to turn on the lights. The lights that are installed must be really with the best installation so that the possibility of disaster is very small. Every time the conditions associated with lights must be checked for small repairs or large repairs.

The results of the analysis of the comfort of people passing by around the billboards are seen in Table 5. shows a very great concern in the condition of the billboards which is shown from the large value of the results of the analysis of $20,887 \pm 4,174$ of the 40 highest values. After improvement, there was an increase in comfort value, $31,939 \pm 2,749$.

Thus the safety value and convenience value depend on how the billboards are designed so that the billboards really become a means of introducing industrial products that are safe and comfortable to look at.

e. Determination of the intensity of the lights installed on billboards

The magnitude of the light intensity on the billboard is based on the calculation of the manufacture of billboards. Billboards installed and to beautify the appearance must be designed with a variety of display colors and lights of various colors as well. The color of the billboard display becomes a major factor in the billboard so that people see it becomes interesting. Billboards with a length of 3 meters, 2.5 meters with a thickness of 30 cm, according to calculations have 4 lamps with each light intensity of 416.00 lux. There are 4 lights installed on the billboard with each light intensity of 416.00 lux. So the billboard has a total light intensity of 1664.00 lux for 4 lamps. With a light intensity of 1664, lux is enough to provide brighter light on the billboard. The lighting problem is the duty of the billboard designer to provide lighting with this type of lamp, provided the total intensity of the light provided is around 1664.00 lux which is adjusted to market conditions.

UPDATES FROM RESEARCH

The research is expected to make a platform for the development of general lighting that can use fluorescent gas as a base material to make lamps that aim to make other types of lamps as well as the development of energy saving lamps. Fluorescent gas as a base material can still be developed in connection with the manufacture of different billboards and energy saving lamps after seeing the results of this study.

CONCLUSION

Conclusions that can be conveyed from the discussion of this study:

From the research results and discussion results it was found that the effect of neon gas on light intensity produces significant changes in light intensity. If the effect of fluorescent gas is sought on light intensity, it can be concluded to produce and show that fluorescent gas can be used in the smallest electric current source as needed (because the neon density is $0.9 \times 10^{-3} \text{ g / cm}^3$ at 200C with melting point -2490C and point boiling -2490C). By providing a different electric current, fluorescent gas can still continue the intensity of the light from the burning wire to be transmitted throughout the vacuum tube. At present there has been an encouraging development of energy saving lamps in addition to the PHILIPS brand. Through this research, it is hoped that more lamp models will be produced as energy-efficient lamps to enliven the economic market. The making of billboards is now also very developed so it is necessary to create a means to introduce industrial output. In addition to energy saving lamps, fluorescent gas can also be used to produce lamps on billboards, which are used as a means to introduce industrial products that are manufactured in factories with various designs.

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