

FLASH LAMP WITH ELECTRODE PIN PRE-JOINED TO DISC

5 [0001] The present application relates to a photo flash lamp and, in particular, to the photo flash lamp with a glass body being fused to pre-joined electrodes, which comprise an electrode pin and a solderable metal disc joined together before the fusing.

10 [0002] A flash lamp is a discharge lamp that produces highly intensive light with very short duration. The flash lamp is used extensively in a wide variety of applications, including photography.

15 [0003] A conventional photo flash lamp includes a sealed cylindrical glass tube that contains an excitable gas mixture, typically consisting of noble gas, for example Xenon, a cathode and an anode formed at both end of the tube. The electrode pin is joined to a solderable metal, normally in a cylindrical form. The cross-section area of the solderable metal is less than 40% of the end area of the glass body. When it is soldered to lead wires, the surface area could be too small to be soldered easily when the solderable length is short. One way to overcome this problem is to increase the
20 solderable length, but that will increase the total length of the lamp, which is not desirable. Another problem with a conventional photo flash lamp is that it is difficult to differentiate anode from cathode. That could cause wrong connection of polarity in the lamp application.

25 [0004] A photo flash lamp with solderable metal disc at both ends, to have large soldering surface (greater than 40% of glass body end surface) without increase the length of lamp, is achieved by fusing the glass body to pre-joined electrodes — the electrode pin is joined electrical conductively to a solderable metal disc before lamp fusing process. A layer of solder material could be coated to the solderable metal disc
30 after the glass fusing process so that the lamp can be soldered to lead wire easily. The disc, together with the coated solder material, can be made in different shapes and/or colors, helping to give unique appearance for ease of polarity identification.

35 [0005] The accompanying figures illustrate disclosed embodiment(s) and serve to explain principles of the disclosed embodiment(s). It is to be understood, however,

that these drawings are presented for purposes of illustration only, and not for defining limits of the application.

[0006] Figure 1 is the cross-section view of one end of an exemplary embodiment of the present application.

[0007] Figure 2 is the cross-section view of the pre-joined electrode.

[0008] Figure 3 is some exemplary shape and pattern of solderable metal disc.

[0009] Figure 4 shows the relationship between glass body end area and disc area.

[0010] Exemplary, non-limiting embodiments of the present application will now be described with references to the above-mentioned figures.

[0011] Figure 1 is a sectional view of one end of photo flash lamp, in which the glass body 1, filled with noble gas 2, Xenon, for example, is fused to electrode pin 4 at both ends. Firstly, a small glass tube 3 is inserted into the electrode pin 4, which is pre-joined to a solderable metal 5. Then the small glass tube 3 is fused both to the glass body 1 and the electrode pin 4 with noble gas 2 inside. The small glass tube 3 can be fused to the pin 4 first before fused to the glass body or be fused to both pin 4 and glass body 1 at the same time. The electrode comprises an electrode pin 4, first layer of solderable metal disc 5 and second layer of soft solder material 6. To reduce thermal stress between glass body 1 and the disc 5, and prevent bulging of glass due to higher inner pressure when glass being fused onto the disc surface, a gap 7, 0.01mm or above is introduced between the solderable metal disc 5 and the enclosed glass body 1.

[0012] Electrode pin 4 is made of refractory metal, for example, tungsten or its alloys. The disc 5 can be made of any soldering materials, such as, nickel, copper, silver or alloys of any one of them. The second layer is made of any soft solder material, for example, tin or its alloys.

[0013] Figure 2 shows the pre-joined electrode pin 4, in which the electrode pin 4 is electrical conductively joined to the disc 5 before being fused to the glass 1. The pin 4 could be joined onto the surface of the disc 5 (Figure 2, a), embedded into the disc 5 (Figure 2, b) or even penetrated through it (Figure 2 c). The pin 4 can be joined to the

disc 5 without extra hard solder materials, such as resistance welding or with extra hard solder material 8 as shown in Figure 2 d.

5 [0014] Since the disc 5 has large surface area, it makes soldering in lamp application assembly process more easily without increase the total length of the lamp. On the other hand, the geometry shape of the disc 5, such as round or polygon, could be used to differentiate anode from cathode. This helps to reduce the failure of wrong polarity connection when the lamp is being assembled in its application.

10 [0015] Figure 3 shows exemplary embodiments of the shape of the disc 5, rectangle (Figure 3 a), cross (Figure 3 b), round (Figure 3 c) and hexagon (Figure 3 d). For example, a rectangle disc 5 could be used for cathode (negative) side and cross shape for anode (positive) side. In that case, the polarity of the lamp could be recognized by the appearance of the disc 5. Some other patterns, such as disc with
15 patterned surface (Figure 3 e) or with flat surface (Figure 3 f) could also be utilized for polarity identification purpose. Moreover, the polarity identification can be achieved with materials with different colors for the disc or the soft solder. An alternative method for polarity identification is to use materials with different magnetic properties for cathode (negative) side and anode (positive) side. For example, with nickel, a
20 ferromagnetic material, being used for cathode (negative) side and copper, a non-ferromagnetic material, being used for anode (positive) side, polarity can easily identified with help of a piece of magnet.

[0016] Figure 4 shows the relationship between a glass body end area A 9 and a disc
25 area B 10. Since sufficient soldering area is important for the soldering in the lamp application assembling process, with solderable material covering more than 40% of the glass body end area, ease of lamp connection can be obtained (i.e. $B > 40\%(A+B)$).

[0017] In the application, unless specified otherwise, the terms "comprising",
30 "comprise", and grammatical variants thereof, intended to represent "open" or "inclusive" language such that they include recited elements but also permit inclusion of additional, non-explicitly recited elements.

[0018] As used herein, the term "about", in the context of concentrations of
35 components of the formulations, typically means $\pm 5\%$ of the stated value, more

typically +/- 4% of the stated value, more typically +/- 3% of the stated value, more typically, +/- 2% of the stated value, even more typically +/- 1% of the stated value, and even more typically +/- 0.5% of the stated value.

- 5 [0019] Throughout this disclosure, certain embodiments may be disclosed in a range format. The description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the disclosed ranges. Accordingly, the description of a range should be considered to have specifically disclosed all the possible sub-ranges as well as individual numerical
- 10 values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed sub-ranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

15

[0020] It will be apparent that various other modifications and adaptations of the application will be apparent to the person skilled in the art after reading the foregoing disclosure without departing from the spirit and scope of the application and it is intended that all such modifications and adaptations come within the scope of the

20 appended claims.

9201100004

Reference Numerals

- | | | |
|----|----|-----------------------|
| | 1 | glass body |
| | 2 | noble gas |
| 5 | 3 | small glass tube |
| | 4 | electrode pin |
| | 5 | solderable metal disc |
| | 6 | soft colder |
| | 7 | gap |
| 10 | 8 | hard solder |
| | 9 | glass body area A |
| | 10 | disc area B |

Claims

1. A flash lamp comprising:
 - an enclosed glass body filled with noble gas, for example, Xenon;
 - Electrodes each comprised of an electrode pin, made of refractory metal, such as tungsten, and a solderable metal disc and soft solder material;
 - the disc further comprises, at least, a first layer of solderable metal at the two ends of lamps and the first layer of solderable metal may be coated with second layer of soft solder material; and
 - a gap, at least 0.01mm thick, is introduced between glass body and the disc to reduce thermal stress and, meanwhile, to prevent glass bulging during fusing processes.
2. The electrode pin and disc in claim 1, especially the first layer metal, are joined together before fusing of the lamp. The pin is joined to the disc electrical conductively, for example, through resistance welding.
3. The first layer of metal in claim 1 can be any metal solderable, for example, copper, silver, nickel or alloys of any one of them.
4. The second layer of metal in claim 1 can be any soft solder material, for example, tin and its alloys.
5. The first layer solderable metal, as well as the second layer, in claim 1 could be made in different geometry shapes, for example, round or polygon, and its surface can be flat or patterned for polarity identification.
6. The disc, especially the solder material in the second layer, in claim 1 can also be made of different metals or alloys, with no limitation on shapes and/or color, at anode and cathode side, served as means to differentiate one electrode from another.
7. The area of the disc in claim 1 should be greater than 40% of the flat end of glass body.