Fluorescent Lamps and Striation

A White Paper: Investigating the Phenomena of Lamp Striation

Fluorescent lamps can provide an energy efficient light source in many applications; however, under certain conditions, they can also produce an undesirable visual effect, commonly known as "striations." Striations are a series of bright and dim areas in a fluorescent lamp, sometimes moving down the length of the lamp and sometimes taking the appearance of a standing wave. Striations are determined by lamp physics.

Striations are common in lamps made with heavy fill gases such as Krypton. This phenomenon is exacerbated when these lamps are operated at low temperatures, either due to a low overall ambient temperature or more localized air blowing across the lamp. Although striations are much more commonly experienced with energy saving lamps, they can also occur in full wattage lamps. While this condition is not desired, it is an aesthetic condition and is not an indication that the ballast or lamp is operating incorrectly. Striations should have no long-term effect on lamp performance or life.

Fluorescent lamp striations have been experienced for as long as fluorescent lamps have been in existence. For a better understanding of this condition and possible corrections, it is best to divide the applications into those involving full wattage lamps and those involving energy saving lamps, as discussed below. It is also important to understand that lamps are rated for use in certain temperature ranges. In general, full wattage lamps can be operated at much lower temperatures than energy saving lamps. Typically, energy saving lamps have a minimum operating temperature of 60°F, or in some cases even higher temperatures may be recommended. We recommend verification with the particular lamp manufacturer to insure proper application temperatures for the given fluorescent lamp type chosen.

Full Wattage Lamps - example F32T8 (32 watt)

Although less likely, striations can occur with full wattage (non-energy saving) fluorescent lamps. When full wattage lamps exhibit striations, it is usually the result of one or both of the following conditions:

1. Low lamp currents - If the lamps currents get too low (i.e. deep dim operations), striations can occur. In dimming ballasts, this is typically overcome by additional circuitry.

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2. Temperature and environment - The light output of a fluorescent lamp is directly related to its bulb wall temperature and operating environment, and specifically its ambient temperature. Two situations can create the environment for striations to occur:

a) Airflow across the lamp(s) - Often, airflow across alamp will produce lamp striations. This is commonly experienced where the lamp is in close proximity to an air vent. Typically, shielding or deflecting the flow of air to the lamp will rectify this condition.

b) Ambient Temperature - Fluorescent lamp output is directly proportional to its bulb wall temperature. Every lamp has its optimum temperature for maximum light output. If extreme cold ambient temperatures exist, the light levels will be visually lower and lamp striations may occur. It may be possible to reduce or eliminate this condition by using lamp tube guards or by utilizing a luminaire that retains more heat in the lamp compartment. Please contact the lamp manufacturer for information regarding the use of tube guards with their lamps.

Energy Saving Lamps - example F32T8 (30), (28), or (25) watt

With the introduction of a host of new energy saving fluorescent lamps in the market, especially versions of the energy saving F32T8 model that contain Krypton, there is a greater possibility of lamp striation occurrences. Overall, energy saving lamps are more temperature sensitive than their full wattage counterparts. Again, it is recommended to verify with the desired lamp manufacturer whether the use of energy saving lamps is appropriate for the application. Energy saving lamps are not typically rated for use below 60°F, nor with dimming ballasts.

If striations are experienced with energy saving lamps, it is first recommended to verify whether the striations are occurring due to cool air blowing across the lamps or ambient temperatures that are too low (as discussed in the previous section covering the occurrence of striations with full wattage lamps).

If ambient temperature conditions are in the proper range and the conditions mentioned above are not the cause, then the lamp striations could be attributed to lamp characteristics. When these energy saving T8 lamps are utilized with electronic ballasts, especially those with reduced light output, this condition could occur. It is not an indication that the ballast is at fault, that the lamps will fail prematurely, or that overall performance will suffer. It is a "cosmetic" effect, one which may or may not be objectionable.

As ballast technology has continued to evolve, manufacturers have developed electronic ballasts that can reduce or eliminate lamp striations with energy saving F32T8 lamps. Ballasts that incorporate such anti-striation technology (including Philips Advance's Optanium® series of high-efficiency electronic ballasts) can remedy lamp striations with energy saving T8 lamps. Lamp striations may occur with electronic ballasts that do not incorporate anti-striation technology when they are used in conjunction with energy saving F32T8 lamps such as 30W, 28W, or 25W models.

It is important to understand that ballasts with anti-striation circuitry cannot always remedy lamp striations in applications where airflow or colder temperatures are the cause. It is also important to remember that striations, although sometimes a visual nuisance, will have no lasting effect on lamp performance or life. In addition, striations will not typically influence light levels on the work plane of normal fluorescent lamp applications and are generally only perceivable when looking directly at the lamp.

A leader in the ballast industry for over 60 years, Philips Lighting Electronics, based in Rosemont, Illinois, offers a full line of Philips Advance branded ballasts and drivers for fluorescent, HID, and LED light sources to the market's broad range of lighting fixture manufacturers and electrical distributors. For more information on Philips Lighting Electronics' complete product line and range of Smart Solutions™, visit our website at www. philips.com/advance or call us at (800) 322-2086.

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