

EXIT SIGNS OVERVIEW

& PICTOGRAM



EXIT & PICTOGRAM SIGNS

Electrical Signs (connected to a source of power) differ from battery units in that they shall be illuminated at all times during normal AC operation, and not only upon loss of AC power. This has a direct impact on the admissible energy consumption referenced in government regulations (National Resources Canada NRCan, CSA C22.2 No. 141), which is a maximum of 5W per legend single or double face. A legend is defined as a single word, either “SORTIE” or “EXIT” or “PICTOGRAM” There are also bilingual Exit Signs with: “SORTIE EXIT” or “EXIT SORTIE”, quite common in applications such as airports or federal buildings. A bilingual Exit Sign is acceptable up to a maximum of 10W. The legend must also meet visibility standards including: dimensions, average brightness, uniformity, background contrast ratio. The most popular light source is based upon solid state LED technology, which is capable of meeting both lumen output and energy efficiency requirements.

BACK-LIT AND EDGE-LIT EXIT SIGNS

Two different methods are used to illuminate the legend. The most common is found in back-lit signs, which use a light source located behind the legend, illuminated through a diffuser panel. The other method uses a clear, white or mirrored plastic (acrylic) face panel on which the legend is etched or silkscreened or a film into a clear panel. The light source is installed in the top portion of the panel. Light is transmitted from the top edge of the panel, which is where the “Edge-Lit” Sign gets its name from. In general, back-lit Signs are more economical and provide more uniform illumination of the legend. On the other hand, acrylic Edge-Lit Signs are considered more high-end, elegant fixtures.

BATTERY, REMOTE, AC AND OTHER POWER SOURCES

Three types of fixtures are available for emergency lighting applications. The first type is the Self-Powered Sign, with a rechargeable battery for emergency mode operation. Next is the Remote Sign, or AC/DC Sign: in addition to a normal AC power supply, it includes a DC input (6VDC, 12VDC, etc.) for remote power supplied by from a separate battery backup. Installation of such Signs requires DC wiring between both fixtures. Finally, the AC-only Signs are for applications where emergency power is supplied from an AC Central System. A variation on Sign design uses photo-luminescent materials for the legend (letters and/or background). **According to the National Building Code, photo-luminescent Signs must be continuously illuminated by a dedicated light source connected to an emergency power supply.**

In addition to electrical Signs, there are power free, self-luminous

signs, incorporate radioactive materials such as tritium gas as a light source. Their brightness level is very low, that is 2-3% of the minimum level required for an electrical sign. However, they are safer and easier to install in hazardous/explosion-proof environments such as coal mines, natural gas installations, etc. As these signs are not electrical signs, they are not subject to CSA standards such as C22.2 No. 141.

COMBINATION UNITS

A well established fixture type, the combination unit or “combo”, includes both a small battery-powered Emergency Lighting unit and an AC/DC Sign. An economical and easy to install alternative (installs to a single electrical box), the combo offers both a Sign indicating the direction of egress as well as emergency lighting on the path of egress.

EXPLOSION-PROOF ENVIRONMENT SIGNS

Does CSA C860 standard apply to all Signs, and in all applications? Actually, there are no exceptions. Compliance is required in all cases, even though the solution may be hard to find. For example, equipment for use in hazardous locations, such as areas classified under Class I, Division 1 (or Class I, Zones 0 and 1), defined as locations where flammable gases, vapors or liquids are present frequently or under normal operating conditions.

Required luminaires are designed specifically to meet CSA standards for explosion-proof equipment. The heavy-duty luminaires are rated for lamp wattages ranging from 50-250W. Constructed of die-cast aluminum, the units feature a resistant prismatic glass globe providing hemispherical light distribution. Until now, because of these characteristics, traditional Signs were using 15-25W incandescent lamps in order to provide sufficient illumination of the legend. Conversely, an LED Sign is typically rectangular and relatively thin (4-8cm) with an axial light source consisting of a line of LEDs to provide indirect illumination of the legend through multiple reflections. So, how is it possible to develop an LED Sign that meets NRCan/C22.2 No. 141 using a bulky heavy-duty luminaire dedicated to hazardous locations Class I, Division 1?

The Thomas & Betts R&D group has found a solution and developed a special LED lamp series that is easy to install in the lamp base of explosion-proof type luminaires. This special LED lamp consumes less than 5W in either AC or DC current of high performance LEDs configured in a unique pattern. Horizontal distribution is 360 degrees radially and vertical distribution is directly focused on the sign legend. This innovative design meets the visibility criteria on standard size legends, while limiting power consumption to between 3 to 4.7W per Sign.



LED lamps are dedicated to various voltage ratings: 6V, 12V, 24V or 120V and operate on DC and AC, supplying power to the Sign from emergency lighting unit equipment or central AC or DC systems. Lamps are listed/certified CSA C-US to CSA T.I.L. B-69 and UL1993 standards for LED technology based lamps or lamps with integral ballast. This further reinforces the assurance of performance and safety of the Signs using these lamps. The new Sign series from Thomas & Betts includes fixtures designed for installation in all hazardous location classifications: Class I Divisions 1 and 2, Groups A, B, C and D; Class II Divisions 1 and 2, Groups E, F, and G; Class III Divisions 1 and 2. Specifiers specialized in industrial lighting are now assured that they can specify certified hazardous location equipment also approved and compliant to NRCan/CSA C22.2 No. 141 standards. The new technology also significantly improves the maintained light output of the LED by utilizing materials that operate at lower temperatures than the previous generation of LEDs.

Following the requirements of the National Building Code, the new generation of exit signs has replaced the text legend (EXIT, SORTIE) with a pictogram legend featuring a green running silhouette on a white illuminated background. As a consequence the legend is now illuminated by white LEDs, which replace the traditional monochrome red or green LEDs. Due to different manufacturing technologies the utilization of white LED has raised awareness about their life expectancy in continuous operation.

White LEDs are increasingly being used in the lighting industry. Their operational life is defined by industry standards like LM80, as the time elapsed until the LED luminous flux decreases to 70% of the initial value (life definition: L70). Following the minimum requirements of the LM80 standard, LED manufacturers usually test their products for 6,000 hours (little longer than 8 months) and then predict the total operational life based on statistical methods and extrapolation. To insure the quality and long-life of pictogram signs the design and engineering team of Thomas & Betts has carefully selected the LED technology for their products. The LED chip is based on a compound of three elements: Indium, Gallium and Nitrogen (InGaN) and generates a mono-chrome light wave of royal-blue color. The white light emission is obtained by covering the chip with a layer containing mainly phosphor and three other elements: Yttrium, Aluminum and Garnet silicate minerals (YAG). The InGaN-YAG technology has an estimated operational life of minimum 50,000 hours before the light output decreases to 70% of initial level.

Furthermore, the LEDs are powered by a T&B-patented electronic circuit for constant direct current (CDC), specially designed to drive the LEDs for an extended operational life.

To validate the design: in-house LED life tests commenced early in 2009, one year ahead of the adoption of the pictogram exit sign by the National Building Code. Data collected during 45,000 hours (five years+) of continuous operation indicate that LED light depreciation is less than 5% of the initial levels in 2009. This enables us to raise our statistical prediction of our LED life to at least 90,000 hours (10 years) of continuous operation to the L70 level.

The outstanding test results with the InGaN-YAG technology and patented LED drivers have allowed Thomas & Betts to manufacture pictogram signs with maintained lighting performance. By design, the initial luminance levels of the legend exceed by 50% to 100% the minimum requirements of standard CSA C22.2 No.141-15. As a consequence: even after 10 years of continuous use the projected luminance levels of the pictogram legend will still be compliant with the CSA standard of visibility.

First in the industry with proven long-life test results, Thomas & Betts manufactures pictogram exit signs with ten years+ of CSA photometric compliance.