Battery Units

Battery Units in a few words:

EMERGENCY ILLUMINATION: OVERVIEW OF EQUIPMENT AVAILABLE

Emergency Lighting, as part of the Life Safety Equipment, is one of the key elements to ensure public safety within buildings. In the event of failure of the normal power supply, self-contained units automatically provide the illumination required to evacuate the building in safe conditions.

STANDARDS AND CODES

Considering its importance, installation of such equipment as well as the level and duration of the emergency lighting required in a building are established by national standards: the National Building Code of Canada (CNBC-2005), the Canadian Electrical Code (CEC), and the National Fire Code of Canada (NFC-2005). Concerning the equipment, performance is established by the Canadian Standards Association (CSA), for example: C141.1, C860, etc.

TYPES OF EQUIPMENT: SELF-CONTAINED EMERGENCY LIGHTING

Emergency lighting equipment is divided in two main categories: self-contained emergency lighting equipment, also referred to as “unit equipment for emergency lighting”, and central emergency power systems (separate emergency electrical power supply).

SELF-CONTAINED (OR SELF-POWERED) EQUIPMENT

The most common self-contained unit consists of 6V lead battery and two lamp heads, also referred to as emergency lights, each with a 6V, 9W incandescent lamp. Lamps are normally off; the storage battery has sufficient capacity to actuate and maintain the emergency lighting during at least 30 minutes in the event of a power failure. In some applications described in the National Building Code of Canada, the minimum emergency lighting period can reach 60 minutes, even 120 minutes. This will require battery units of a greater capacity. Once normal AC power supply is restored, heads turn off (if they were still on), the fixture recharges the batteries to full capacity within 24 hours, then returns to the stand-by mode.

BATTERY UNITS AND REMOTE HEADS

Another self-contained type of equipment exists, it contains batteries which will supply power to several remote emergency lights, of different wattages (12W, 20W, 50W, etc.). In this case, remote emergency lights (also referred to as heads or remote heads) are installed in rooms and corridors, connected by wiring installed inside the walls. Some 6V self-contained fixtures can

assume a total emergency lighting load up to 150W – 180W. At this level, the battery current (25A to 30A) begins to generate significant losses in the external wiring. For this reason, there are battery units of higher voltages, 12V and 24V, which can respectively supply power to remote heads totalling up to 360W and 720W.

CENTRAL SYSTEMS

Are there higher wattage capacity types of equipment ?
Yes, but in this case the battery unit is replaced with another type of equipment: the Central System. In the event of a utility power failure, Central Systems continue to supply power to the emergency lighting equipment as well as other critical loads. They are classified under a special category: Emergency Power Systems. To summarize, there are two types of Central Systems: the Direct Current Central System (DC System) and the Alternating Current Central System (AC inverter, UPS or Uninterruptible Power Supply/System). The electric power supplied by these equipments can vary from a few KVAs to several hundred KVAs.

OTHER EQUIPMENT

Besides self-contained inverters, another type of inverter is available in the market, the AC/DC inverter. Instead of batteries, these inverters use a DC Input (6V, 12V, etc.) and power is supplied from a remote battery unit.

EMERGENCY LIGHTING ENCLOSURES

Construction of the emergency lighting fixtures depends on the location where the equipment is to be installed.

Of all the components, the enclosure (box or housing) is probably the most affected by the type of environment where it is located.

The enclosure plays many roles: it provides the fixture with a degree of protection against the environmental conditions, while meeting technical, aesthetic and functional requirements.
Of course, cost can also be a deciding factor when selecting a fixture.

In general, non-residential lighting is divided in three market segments: commercial, institutional and industrial. This market segmentation still applies in the case of emergency lighting. Typically, the commercial and institutional sectors are more sensitive to costs and aesthetics, whereas the industrial sector is more influenced by the technical aspects (fixture durability, etc.).

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COMMERCIAL AND INSTITUTIONAL ENVIRONMENTS

Commercial spaces (stores, restaurants, movie theatres, hotels etc.) as well as institutions are generally air conditioned: the equipment operates in normal temperature and humidity conditions. Generally, the main selection criteria is total lighting costs, which include equipment and installation. The most economical design for self-contained units uses sheet metal housings of a neutral color: white or beige. For the most part, Exit signs are housed in a rectangular box fabricated of steel (sheet metal) or extruded aluminum, and illuminated from a light source contained within the assembly (back-lit). Some molded plastic housings also exist (less expensive material, but also less rigid than metal) – mostly used for small battery units (lower wattages) and EXIT signs in anglophone provinces.

Even if aesthetics is a secondary criteria, manufacturers continue to develop products which offer a more contemporary look.

AESTHETICS AND ARCHITECTURE

Fortunately, price isn't everything in the buying decision process. Some hotel chains, high-end stores and corporate headquarters are excellent examples. In these situations, the architect and the lighting designer have a great influence in specifying emergency lighting fixtures. The question becomes – what will the architect prefer, a more decorative or a more unobtrusive, discrete look ?

Battery units are becoming increasingly discrete. The specifier can opt for a higher capacity unit (ie : 24V, 720W or a central DC System) installed in a hidden location, and supplying power to remote heads distributed throughout the building. Another option would be to install recessed self-contained units, concealed in the ceiling (T-bar), each with two lamp heads and additional capacity for remote heads. There are also single-lamp battery units (MR16 or PAR36), recessed in the ceiling. As for the remote heads, they are generally fabricated of forged aluminum and contain halogen MR16 lamps. It is also possible to conceal the battery units as well as the lamp heads entirely. For example, both the lamp heads and the housing of the PHANTOM™ self-contained unit are concealed in the wall or ceiling cavity, behind its door, which rotates 180°. Upon a power failure, an electromechanical device opens the door, and exposes the emergency lamp heads to illuminate the path to safety. At the end of the power failure, this same device retracts the heads and closes the door.

To address the specifiers' needs for aesthetics, manufacturers have developped new products for high end emergency lighting: dual-function (some multi-function) decorative luminaires providing both normal lighting and emergency lighting. The same lamps are energized by one of the two independent electrical circuits:

AC circuit for normal lighting (including the wall switch), and an uninterrupted AC circuit for the battery charger and control of the emergency lighting. The normal lighting levels being higher than those required for emergency lighting, manufacturers also offer the same type of luminaire for normal lighting only. This option provides the final user with the possibility of alternating self-contained units with standard lighting fixtures, while maintaining consistency of design.

INDUSTRIAL ENVIRONMENT

The industrial environment is the most severe in terms of housing and exit sign construction. It is defined by a number of parameters specific to various technical processes within the industry: temperature range, degree of humidity, degree of protection against water and dust, resistance to corrosive chemicals, presence of flammable gases and vapors or combustible particles, etc.

An important performance factor is the degree of protection against solid particles (dust, etc.) and liquids. This rating is generally defined and measured as established by the American standard NEMA 250-2003 from the National Electrical Manufacturers Association, or, alternately, the European IP (ingress protection) code of the International Electrotechnical Commission (IEC 60529 standard). In Canada, there are standards issued by EEMAC (Electrical Equipment Manufacturers Association of Canada), which also plays an active role in the harmonization of existing standards.

To accomplish the required degree of protection and resistance to corrosive agents, emergency lighting fixtures are designed/fabricated with gasketed, rugged, polycarbonate or fiberglass housings.

A special category exists covering hazardous areas, defined by technological processes generating (or susceptible to generate) in the atmosphere flammable gases, vapors, flammable liquids or combustible dust particles in explosive concentrations.

Hydrogen or acetylene plants, gasoline and natural gas refineries, coal or magnesium mines, flour mills, textile factories, are some examples. For more details on definitions and classifications of hazardous areas, consult the Canadian Electrical Code (CSA C22. 1-06).

Considering the risks of explosion or fire, all equipment dedicated to hazardous areas must meet, in addition to standards specific to emergency lighting, special standards such as: CSA C22.2 No. 30-M1986, No. 137-M1981, No. 213-M1987, etc. Based on each respective classification (Class, Division, Group), enclosures and remote heads for hazardous areas are fabricated of materials which must meet stringent requirements (pure forged aluminum, fiberglass, etc.) and may require specific components, such as seals, valves, gasketing, etc. In view of all these additional specific characteristics, it can be expected that emergency lighting equipment approved for hazardous areas will cost more than fixtures classified for general industrial applications.