Lighting Council New Zealand

Response to request for public comment on Proposed Changes to Clause F8 NZB for DBH

New Zealand regulations governing the performance and maintenance of Emergency Lighting and Escape Route Lighting are comparable to those in other OECD countries but we are at the lower end of average requirements. Whilst there is a need to consider the compliance costs of an emergency lighting installation, we also need to be aware of the continuing research being carried out in other countries with regard to the design and performance requirements of such installations.

Clauses F6 and F8 of the NZBC relate to, and in many cases over-ride, the requirements of emergency lighting installations as set out in the Australian Standard AS2293 Part 1 2005. Parts 2 & 3 on Maintenance and Luminaire design respectively remain as parts of a Joint Standard AS/NZS2293 1995. Our comments here only relate to the implications as set out in Clause F8.

NOTE:-
The current Working Group on LG7, the Joint AS/NZS Committee for Emergency Lighting, has agreed that the next version of Part 2 will be re-jointed and carry the AS/NZS nomenclature in its title.

Comments:-

Clause F8.2

See Comments below on Photoluminescent materials

Photoluminescent Materials.

Clause 3.5.1 of the current version of Clause F8 clearly indicates that although signs can be self luminous, Photoluminescent Signs are not acceptable. We believe there is a place for photoluminescent materials in a Fire Safety specification such as obstruction or equipment marking or escape route delineation (Way Finding). However we do not support the use of such materials in basic signage. Neither should it be considered as a substitute for Emergency Lighting as it cannot under any circumstances provide the visual conditions or illumination levels required in Clause F6 of the NZBC.

We also note that the reference to BS5499-2:19896 that the abstract for the Standard reads as follows:-

Abstract:
British Standard 5499-2:1986 (BS 5499-2:1986) describes specifications for self-luminous fire safety signs. Several committees collaborated on this British Standard including Fire Standards Committee, British Sign Association, Chartered Institution of Building Services' Engineers, Department of Health and Social Security, and several others (which are listed on the front cover of this document). This part of BS 5499 is in compliance with Radiation Protection Standards for Gaseous Tritium Light Devices. The water-soluble tritium content of each gaseous tritium light source is determined using dose rate measurements under guidelines provided by the National Radiological Protection Board. Various precautions are noted and suggested throughout this standard. As part of Identification and Labeling in Section 6, manufacturers are expected to clearly indicate the date of supply, serial number, the word "RADIOACTIVE," the word "TRITIUM," and other safety precautions. In addition, Figures 1 and 2 provide illustrations for a glow-wire with thermocouple and a glow-wire test apparatus, for which both provide supporting information to Appendix B on Flammability Test.

Is it the intention of the DBH to allow the introduction Tritium technology into unlit signage/marking systems? It seems unwise to be referencing a 24yr old standard in an NZS Standard that might be current for another 5+ years for a technology which has been known to have serious application issues.

Low Energy Signage & marking.

Peter Thorby made the statement in his address at the briefing that photoluminescent materials do not require power. In fact they do need power, either in the form of natural daylight or artificial light in order to remain "charged" with photons. They also require a minimum continuous exposure to an illuminance of approximately 100 lux (varying from manufacturer to manufacturer - See NEMA Report) in order to maintain their charge. There are many applications of signage in place today where this is not the case and photoluminescent signs do not meet the minimum luminance requirement. This is particularly evident in older buildings and would be very relevant in Emergency Stair Wells which are frequently devoid of daylight and where passive energy management switching controls the general lighting. It is also highly likely that the required level of illumination will not have been applied to signage during the night leaving the signs well below their maximum charge during the mornings. Moreover, as passive switching generally only controls floors adjacent to the point of detection, the undercharging could easily also occur during times of normal occupation of the building.

Photoluminescent materials require sufficient external illumination be provided to ensure it remains fully charged at all times the building is in use. As daylight is a transient source it should not be considered for this purpose, requiring some clear indication from the lighting designer that adequate provision has been made to provide the required artificial charging illuminance at all times the building is occupied, plus the time required for charging prior to occupation. PLMs will therefore require illumination provided by luminaires on a 24hr circuit that are also capable of notifying a malfunction immediately they cease to radiate light.

The current requirement is for a minimum of 55 lux on an EXIT Sign if it is to be illuminated from external sources. This is unlikely to be sufficient keep a photoluminescent sign in peak charge condition. Australia currently requires 250lux as a minimum for externally lighted signage.

We are also concerned that photoluminescent signage is not required to be subject to the same degree of maintenance as the more common powered EXIT signage. The present code requires powered EXIT signs to be of a minimum luminance at all times of normal occupation of the building, and be tested every 6 months for a specific duration of luminance following a simulated power failure. This is not the case with photoluminescent signage, for which no maintenance regime is specified. We believe the DIN XXXX Standard is the only standard available for such a purpose and this requires PLMs to be tested every 3 months.

The widespread use of Photoluminescent signage has only occurred in the State of New York following the 9/11 attacks. A subsequent building security survey showed there were approximately 180,000 buildings in the State of New York alone which either had no emergency lighting systems or had systems that did not meet their Code. Other States had similar experiences under the same circumstances. In order to reduce short term upgrade costs legislation was introduced in New York State to allow the use of photoluminescent materials for essential signage. These installations quickly came under scrutiny for their effectiveness, with the result that several reports were published criticizing the use of PLM material for this purpose. A copy of the NEMA report on the visibility of PLM signage compared with that of more traditional powered systems is attached with these comments.

In 2004 the New York City Council issued a Notice mandating powered and lit Emergency Exit Signage in their Building Code. (See Appendix A)

That mandate is still in force.

We believe that if photoluminescent signage is approved, New Zealand will be

- Taking a retrograde step by repeating mistakes made by others
- Be operating outside best international practice & standards (See Appendix B)

Clause F8.3.1

See comments on Smoke below.

Smoke.

Smoke in a building will impair visual conditions regardless of the status of the general or emergency lighting.

Although the present version of AS2293 Part 1 does not address the issues surrounding smoke in a building, this is likely to be included in the next edition. We therefore recommend that the revisions to F8 currently under consideration leave room for the provisions of this part of the new standard to be implemented in New Zealand.

Contrary to popular belief smoke does not strictly stratify in normal circumstances. It is stirred by air movement away from heat sources, natural and artificial ventilation and the disturbance of air due to people moving through the space.

The presence of smoke in an emergency situation will have a serious affect on visual conditions, and will impinge on the visibility of EXIT Signage. Veiling brightness is a well recognised visual condition which reduces the eye's ability to perceive objects by virtue of reduced contrast between the object and its background. This effect is commonly encountered in driving conditions in light fog or with a windscreen with a film of dust or raindrops. Smoke will create veiling brightness a in a room where the normal lighting is present or the emergency lighting has been activated by power failure.

There is ample evidence from BRE testing in England that 10% smoke obscuration in a normally lighted building can cause the visibility of a normal 24m sign to be reduced to 10m or less. (See Appendix C)

Of greater concern is that on the assumption that it is a non-maintained sign it can vanish altogether under these conditions.

The commercial reality of EXIT Signage illuminance is such that virtually every EXIT sold in New Zealand today has a face luminance well above the required 8cd/m^2. This is because most are imported from other jurisdictions such as Australia or Europe where requirements are in excess of this figure, and those few that are manufactured in NZ are designed to be suitable for export markets. We therefore have a de-facto situation where in a normal operational scenario there is a large brightness contrast between a maintained and non-maintained EXIT Sign with the non-maintained version (or any other EXIT signage) being required to be lighted to minimum levels by other artificial light sources. This is haphazard and rarely considered as part of the general lighting design. Reliance on daylight is not an option to achieve this due to its intermittent nature.

Dr Peter Boyce (and other researchers) has reported findings that Sign luminances should be in the order of 10/15cd/m^2 in order to be visible in light smoke. The Fire Brigade frequently enter smoked filled buildings and find their first duty is to switch off the power. This indicates that the general lighting could still be on, and non-maintained signage has not been triggered. Smoke on its own is a serious visual hazard but the visual conditions are made far worse if the general lighting is also operating. Should the minimum brightness of EXIT signage remain as is we recommend that when non-maintained EXIT signs are installed in a building they should be triggered by the smoke alarms as well as power failure or the minimum sign luminance be raised at all times to a level of safety under smoke conditions.

We recommend the 250lux level as required in Australia be considered for this purpose. (See F8 Clause 3.5.2 a)

Professional Qualifications.

Qualified professionals would find that the Verification Method utilizes their skills appropriately for more complex work. However, some existing practitioners might need to re-focus their work practice to non-complex buildings within the scope of the Acceptable Solution, or to up-skill. This re-organisation within the sector could lead to additional costs for some practitioners, or to lost business opportunities. Notwithstanding this, the Department considers that specific fire design should be undertaken only by suitably qualified individuals, in the interests of public safety. (From DBH Website Briefing)

We support this statement from the DBH. Lighting design, particularly of the type required for Alternative Solutions is a specialisation not included in the training/education of professionals outside the Electrical, and even more specifically, the Lighting Industry. We therefore contend that whilst tabulated design could be used for F6 AS/1 solutions as a general rule, Alternative Solutions should require the attention of a suitably qualified and experienced Lighting Designer. There are adequate safeguards on the training of designers today to ensure the skills are available and demonstrable. The Illuminating Engineering Society of Australia and New Zealand has a number of Technical Grades and we recommend that a suitably experienced full technical member (MIES) be required to "Sign Off" an Alternative Lighting Solution. This would be particularly pertinent as EL design has strong elements of "Life Safety" in its purpose. There is a precedent in Regulatory Control where a number of lighting disciplines such as public (Street) lighting and those installations which might cause obtrusive light spillage are generally required to be overseen by experienced and qualified designers.