



Tritium Lights

Non-electrical and maintenance free
escape route signs

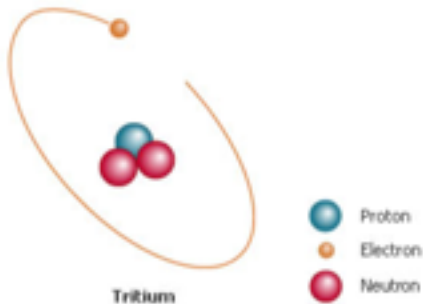
What are Tritium Lights?

- Escape route signs with the name Tritium Lights, for instance for application in places where no electricity is available.
- For internal illumination tritium gas (an isotope of hydrogen) is used as an energy source, which decays from an instable to a stable condition.
- The decay energy is transformed into light by means of a phosphor.



Technology

- Tritium Lights emergency signs are illuminated with light sources that consist of glass tubes, that have been internally coated with phosphor and filled with tritium gas.



- Tritium gas (3H) is an isotope of hydrogen that emits low energy radiation in the form of beta rays, or electrons.
- These electrons stimulate the phosphor coating causing the tubes to continuously emit light.

- The mechanism is exactly the same as an electrical fluorescent lamp with the only exception being that the electrons are provided by the tritium gas rather than by an electric current.
- In this way Tritium Lights emergency signs require no external energy source and, as such, are the most energy efficient lighting products available today.

Meeting Rules & Regulations?

Yes! Tritium Lights are meeting standards such as:

- ANSI N540
- NFPA Life Safety Code 101
- European directive 92/58 EEG, BS-5499 part 2
- NEN-EN 1838
- NEN 6088
- NEN-EN-ISO 7010
- Bouwbesluit (Dutch 'Technical Building Code')

The measured recognition distances are as follows:

- Illuminance of < 1 lux (darkness): 31.8 m.
- Illuminance of approx. 10 lux (emergency lighting): 36.8 m.
- Illuminance of approx. 250 lux (normal interior lighting): 44.4 m.

These recognition distances comply amply with standard NEN 6088:2002 (requiring at least 20 m), which is based on a minimum height of the escape route sign of 100 mm.

The luminous intensity of the tritium gas light source decreases very slowly: after 12.3 years the activity is 50% of the original activity. Actually, the luminous intensity decreases slower than the activity.

Therefore the effective lifetime is 15 years. Tritium Lights complies abundantly with the minimum duration period of one hour (standard NEN-EN 1838).

Are Tritium Lights safe?

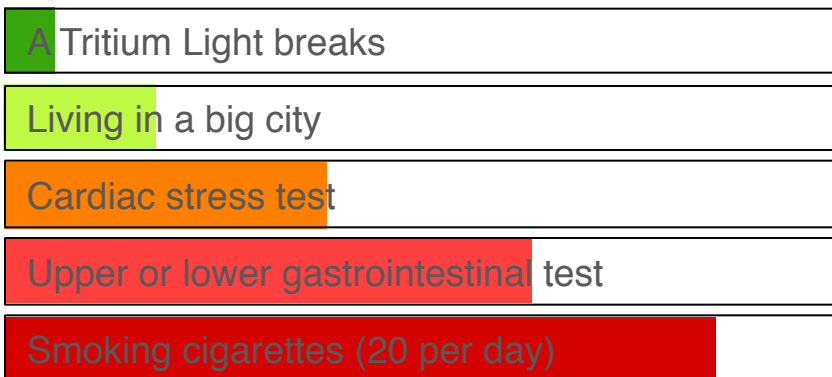
Yes!

The beta particles are completely contained within the glass tubes which are protectively housed within the frame of the sign.

In the Code of Federal Regulations, Title 10, Part 20, the U.S. government has set the acceptable limit for radiation exposure from man-made sources at 300 millirem (= 3 mSv) per year for the general public.

Therefore, as shown in the graph, even in the unlikely event that an a tube or even a sign is broken**, there is no significant health risk.

This chart depicts some of the everyday radiation that we are exposed to in the course of our normal existence.



** We have made very conservative assumptions: a person exposed continuously for one hour in a small closed area (3 x 3 meter) with low ventilation (less than 1 air change per hour). In this scenario the radiation dose to the individual is approximately 30 millirem.

To put this in perspective, this is roughly the equivalent to the radiation exposure received from one dental X-Ray.

In a more realistic situation, the signs will typically be installed in hallways and larger rooms where the ventilation rates would be far higher and the personal exposure would be significantly shorter than that used in the above calculation.

In these real life situations, the radiation exposure would be less than 10 millirem.

* The scale of the chart runs from 0-8700 millirem.

Advantages



- **Self-powered:** Continuous, uninterrupted, high brightness illumination that requires no external energy source.
- **Energy efficient:** Consumes NO electrical energy during their effective life of 15 years.
- **Don't need wiring:** No need to install costly conduit or electrical wiring. Excellent for existing and monumental buildings.
- **Maintenance free:** Simple, one time installation. There are no defective circuits, batteries, or lamps to check or replace. No self-test system required.
- **Explosion proof:** Contains no electrical components. No spark or arcing. Ideal for hazardous locations, e.g. oil platforms, refineries and gas stations.
- **Shockproof:** Unaffected by building or machinery vibrations. Ideal for use in ships and engine rooms.

Advantages

- **Waterproof:** Unaffected by moisture. Ideal for wet or damp locations. Even under water! But also along highways and in tunnels.
- **Temperature-proof:** Unaffected by extreme temperature variations. Tested from -60°C to +80°C. Ideal for cold or freezer applications.
- **EMC-unsensitive:** They do not cause EMC interference and are unaffected by EMC from outside. Perfect for applications in hospitals and airplanes.
- **Very large viewing distance:** They have a viewing distance of 44 meter according to NEN-EN-ISO 7010
- **Very long life:** A minimum duration time of 15 years.



Costs

Cost comparison over 15 years (131,000 hours)

Type	Tritium Lights	Conventional (21 VA)
Power consumption (VA)	0	21
Purchase price ¹⁾	€ 320	€ 200
Labour to mount ²⁾	€ 8	€ 45
Labour to wire	€ 0	€ ??
Subtotal initial cost	€ 328	> € 245
Energy costs ³⁾	€ 0	€ 606
New lamps ⁴⁾	€ 0	€ 112
Labour lamp replacement ⁵⁾	€ 0	€ 157
New batteries ⁶⁾	€ 0	€ 120
Labour battery replacement ⁷⁾	€ 0	€ 67
Subtotal operating cost	€ 0	€ 759
Total cost over 15 years	€ 328	> € 1307

Tritium Light escape signs have the lowest cost of ownership when compared to incandescent, compact fluorescent and LED exit signs over a 15-year period.

Notes:

1. Average list price for a locally maintained escape route sign
2. All-in labour cost € 45,- per hour
3. 1 kWh = € 0,22
4. Annual replacement (14x) à € 8,- / FL-lamp
5. 15 minutes per replacement à € 45,- / hour
6. Replacement of battery every 4 years à € 40,- / battery set
7. 30 minutes per replacement à € 45,- / hour

* Cost comparison is based on Dutch figures, excluding VAT

References



RIJKS MUSEUM



Other references (worldwide)

- Boeing Corporation
- DHL
- Disney Corp.
- Eurocontrol Maastricht Airport
- General Electric Corp.
- Harley Davidson
- Hewlett-Packard
- Hilton Hotels
- IBM Corp.
- Marina Seaport IJmuiden
- Marriot Hotels
- Proctor & Gamble Corp.
- Stanford University
- Tata Steel IJmuiden
- UPS
- and many more such as hospitals, churches, historical and national monument services

Contact



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