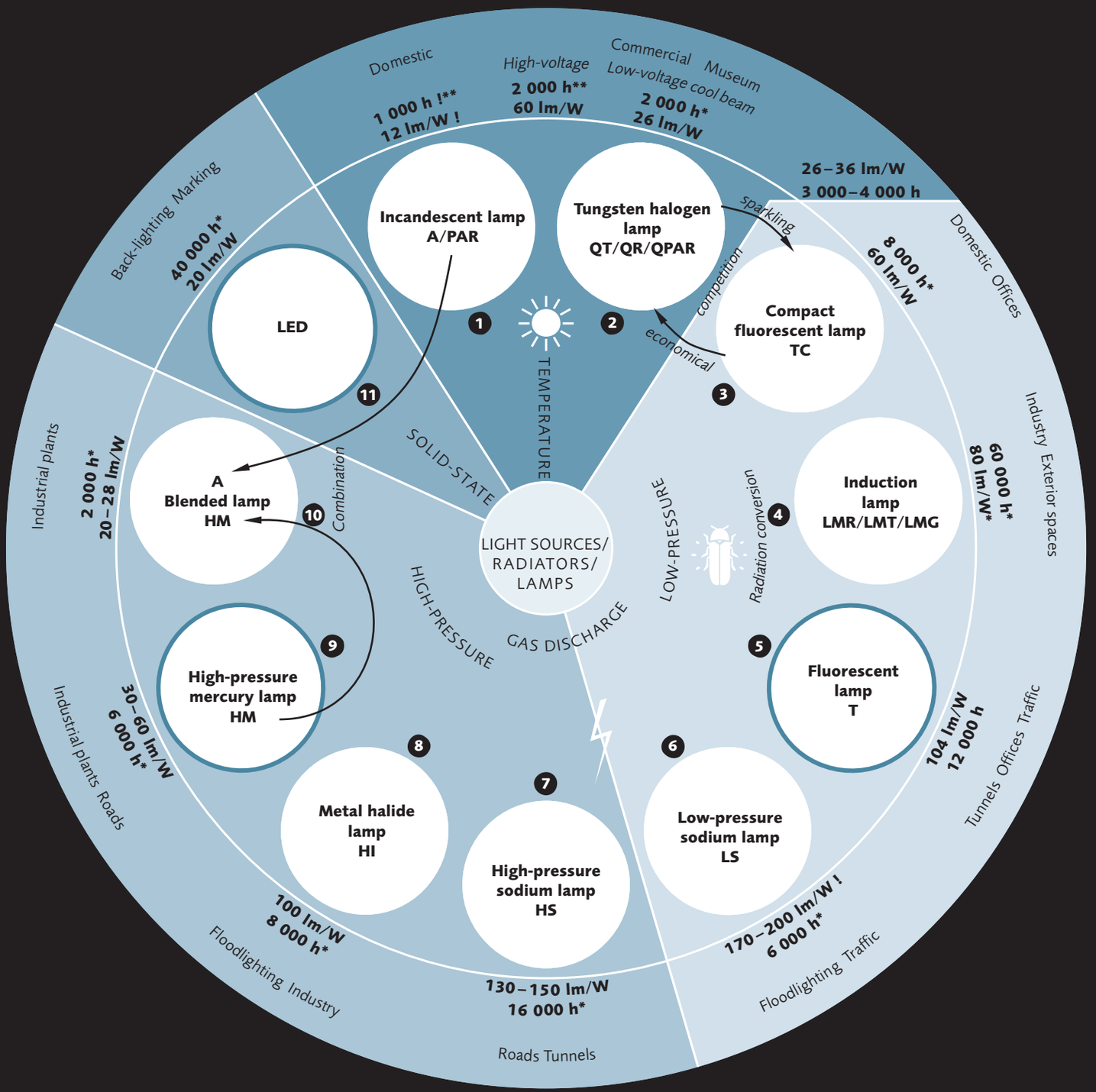
Series (1):

Lamp types



* lamp life ati 5% failure rate
** average lamp life =
lamp life at 50% failure rate

Series (1): Lamp types

The central section of the diagram shows the physical principles of how light is generated through thermal radiation and gas discharge, further depicted by natural examples of the sun, lightning and glow worms. Surrounding the centre, eleven different lamp types are highlighted by a circle and laid out in a ring. They are arranged in a specific order for reasons of similarity and according to their physical properties.

The incandescent lamp (1) has been developed to become the tungsten halogen lamp (2) whose spectral sparkle provides competition for the compact fluorescent lamp (3) and the fluorescent lamp (5). The low-voltage cool-beam halogen lamp has numerous technical advantages and is indispensable for display lighting (museum and shop window). Working round the diagram anti-clockwise we find the incandescent lamp (1) in combination with the high-pressure mercury lamp (9) in the form of a blended lamp (10), whereby the incandescent lamp performs as the ballast.

The metal halide lamp (8) and the high-pressure sodium lamp (7) are further developments of the high-pressure mercury lamp (9). The common factor of lamps (6) and (7) is the sodium, the difference is the pressure.

The light emitting diode: LED (11) is not a thermal radiator and can only be considered as a solid-state light source. White LED light is generated through the conversion of blue radiation to white light by fluorescence.

The concentric ring that runs around the lamp symbols contains economical factors, such as lm/W and lamp life in hours. In the case of incandescent lamps and energy saving lamps (1 - 3) the "average lamp life" is quoted, i.e. 50 per cent failure rate. For fluorescent lamps (5) the "operating life" applies, i.e. defective and exhausted lamps provide 80 per cent of the initial performance. Maintenance is required once this value is reached.

Having classified the lamps in groups and arranged them according to degree of similarity, reading clockwise from (1) to (6) and anti-clockwise from (1) to (7), luminous efficacy and lamp life increase practically continuously. The transition of electrons between the silicone layers of LEDs (11) and magnetic induction in the case of the induction lamp (4) are completely non-thermal processes. Thermal load shortens lamp life, which is the reason why these light sources have such long service lives. The outer concentric ring contains application examples that are not to be viewed as absolute. Incandescent lamps are directly dimmable, fluorescent lamps require a dimmable electronic ballast, high-pressure discharge lamps are generally not dimmable.

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