

### 3.9 Summary of Lamp Characteristics

Summary of the key characteristics of the main lamp families:

Lamp name	Output range (lm)	Power range (W)	Efficacy (lm/W)	Control gear	Colour temp (K)	Colour rendering (Ra)	Run-up time	Dimming	Life (h) <sup>(1)</sup>
<b>Incandescent</b>									
GLS	5-12000	1-1000	8-14	No	2500-2700	100	Instant	Easy to 0%	1000
TH	40-50000	4-2000	15-25	No <sup>(2)</sup>	2700-3200	100 <sup>(3)</sup>	Instant	Easy to 0%	1500-5000
<b>Fluorescent</b>									
T12 <sup>(4)</sup>	1000-10500	25-140	50-80	Yes	3000-6500	50-90	30 sec	Limited to 25%	8000-12000
T8	650-6200	13-70	50-96	Yes	2700-17000	50-98	30 sec	Easy to 2%	8000-17000 <sup>(5)</sup>
T5	120-8850	6-120	20-93 <sup>(6)</sup>	Yes	2700-17000	82-95	30 sec	Easy to 2%	8000-19000 <sup>(5)</sup>
Compact CFL									
CFLni (Non integral control gear)	250-9000	8-120	30-70	Yes	2700-6500	85-90	15-90 sec	Some types to 5%	Up to 15000 <sup>(5)</sup>
CFLi (Integral control gear)	100-1500	5-30	20-50	No	2700	>80	60 sec	Some types to 20%	5000-15000
<b>High pressure mercury</b>									
MBF/HPL	2000-58500	60-1040	33-57	Yes	3200-3900	40-50	4 min	No	8000-10000
<b>Metal halide lamps</b>									
Quartz tube	5200-200000	85-2050	60-98	Yes	3000-6000	60-90	1-8 min	No	2000-7000 <sup>(5)</sup>
Ceramic tube	1600-26000	20-250	65-97	Yes	3000-4400	78-93	2 min	Limited <sup>(7)</sup>	6000-10000 <sup>(5)</sup>
<b>Low pressure sodium</b>									
SOX SOX-E	1800-32000	26-200	70-180	Yes	N/A	N/A	10-20 min	No	15,000-20,000
<b>High pressure sodium</b>									
Std SON	4300-130000	85-1040	53-142	Yes	1900-2100	19-25	3-7 min	Limited to 25%	10000-20000 <sup>(5)</sup>
Delux SON	12500-37000	165-430	75-86	Yes	2150	65	5 min	Limited to 25%	10000-14000
White SON	1800-5000	45-115	40-44	Yes	2500	83	2 min	No	6000-9000
<b>Induction</b>									
	2600-12000	55-165	47-80	Yes	2550-4000	80	1 min	No	60000+
<b>LEDs<sup>(8)</sup></b>									
Values given representing the net chip performance. Depending on manufacturer and type the performance may vary.	10-300 <sup>(9)</sup>	1-10	20-150 <sup>(8)</sup>	Yes	single chip: 2685-6500 and RGB+W multi chip: 2600-6500 and RGB+W	40-95	Instant	Easy to 0%	15000-60000 <sup>(5)</sup>

<sup>(1)</sup> Economic lamp life may be limited by lumen depreciation.

<sup>(2)</sup> A lot of TH types are designed to run on low voltages and thus need a transformer or other device to supply the necessary voltage.

<sup>(3)</sup> Some lamps with dichroic reflectors have part of the red end of the spectrum missing and thus do not have a colour rendering index of 100, information from lamp makers on this topic is

<sup>(4)</sup> T12 lamps are not generally used in new installations as T5 and T8 types are more efficient.

<sup>(5)</sup> Lamps also available with exceedingly long lamp lives of e.g. 30,000 hours and 60,000 hours.

<sup>(6)</sup> Most T5 lamps are optimised to give maximum light output at 35°C. The figures in this table are based upon their output at 25°C. As in most luminaires the lamp runs close to 35°C then the apparent

<sup>(7)</sup> Most manufacturers are working on dimming control gear for this sort of lamp, but most products released onto the market so far have had major problems.

<sup>(8)</sup> The LEDs can be integrated within the LED lamp, LED module or LED luminaire. The values represent the values of the LED alone of current technology Jan 2013 and two points should be noted:

- thermal, driver and optical losses (potentially 50%), will reduce these lumen output and efficiency values, when built into a luminaire.
- the lumen output and efficiency development curves are much steeper than existing other lamp technologies.

lm/W values are based on laboratory conditions. for real values refer to data sheets of manufacturer.

<sup>(9)</sup> For lamp life both electrical failures and lumen maintenance should be considered to measurement standards e.g. B10/L70 (10% electrical failures and 70% lumen depreciation at lamp life).

Table 5  
Summary of lamp characteristics.