

21.7.1 Lamp lumen maintenance factor (LLMF)

The luminous flux from all electric light sources reduces with time of operation. The rate of decline varies for different light sources so it is essential to consult manufacturers' data. From such data it is possible to obtain the lamp lumen maintenance factor for a specific number of hours of operation. The lamp lumen maintenance factor is the proportion of the initial light output that is produced after a specified time. Where the decline in light output is regular, LLMF may be quoted as a percentage reduction per thousand hours of operation.

Manufacturers' data will normally be based on British Standards test procedures which specify the ambient temperature in which the lamp will be tested, with a regulated voltage applied to the lamp and, if appropriate, a reference set of control gear. If any of the aspects of the proposed design are unusual, e.g. high ambient temperature, vibration, switching cycle, operating attitude etc., the manufacturer should be made aware of the conditions and will advise if they affect the life and/or light output of the lamp.

Typical values of LLMF after a range of operating times, for some commonly used discharge light sources are given in Table 21.2.

Table 21.2 Typical values of lamp lumen maintenance factor (LLMF) for some commonly used discharge light sources after a range of hours of use

Light source	Hours of use (thousands)										
	0.1	0.5	1.0	1.5	2	4	6	8	10	12	14
Triphosphor/multiphosphor fluorescent	1	0.98	0.96	0.95	0.94	0.91	0.87	0.86	0.85	0.84	0.83
Halophosphor fluorescent	1	0.97	0.94	0.91	0.89	0.83	0.80	0.78	0.76	0.74	0.72
Mercury	1	0.99	0.97	0.95	0.93	0.87	0.80	0.76	0.72	0.68	0.64
High pressure sodium	1	1	0.98	0.97	0.96	0.93	0.91	0.89	0.88	0.87	0.86
Improved colour high pressure sodium	1	0.99	0.97	0.95	0.94	0.89	0.84	0.81	0.79	0.78	-
Low pressure sodium	1	1	0.99	0.98	0.98	0.98	0.97	0.97	0.96	0.96	0.96

21.7.2 Lamp survival factor (LSF)

Lamp survival factor is defined as the proportion of lamps of a specific type that are expected to be emitting light after a number of hours of operation. Lamp survival factor should only be used in the calculation of maintenance factor when group lamp replacement, without spot replacement, is to be done.

As with lamp lumen maintenance factor it is essential to consult manufacturers' data. These data will be based on assumptions such as switching cycle, supply voltage and control gear. If the expected operating conditions depart from these assumptions, manufacturers should be informed and asked for advice on how the actual conditions might affect lamp survival. Typical values of LSF after a range of operating times, for some commonly used discharge light sources are given in Table 21.3.