Maintenance factor of LED products

Maintenance Factor % (MF)

TYPE OF LUMINAIRE	APPLICATION	DISTINCTION	25,000 h	50,000 h
D1 / D2 / D3	OFFICE	-	85%	80%
D42	OFFICE	-	88%	88%
D9	OFFICE	-	87%	86%
E1	INDUSTRY	-	83%	81%
E1 renovation	INDUSTRY	-		68%
E2	INDUSTRY	-	83%	81%
E4	INDUSTRY	E4.0./	84%	83%
		E4.1./	83%	80%
E5M - E3M	INDUSTRY	E5M.0./	84%	83%
		E5M.1./	81%	78%
E6	INDUSTRY	-	78%	72%
E7	INDUSTRY	E7.1./ (1 ROW LEDS)	83%	81%
		E7.2./ (2 ROW LEDS)	82%	79%
E8	INDUSTRY	-	81%	78%
FLARE	OFFICE	-	87%	85%
RD16	OFFICE	-		63%
R2	OFFICE	-	88%	88%
R7	OFFICE	without uplight	88%	88%
		with uplight	88%	86%
		mini	87%	84%
R8	OFFICE	-	88%	86%
U2	OFFICE	-	88%	88%
U7	OFFICE	standard modulations	88%	87%
		mini	87%	84%
US	OFFICE	US./LED.25 - /LED.30 (square)	87%	84%
		US./LED.35 - /LED.40 (square)	84%	79%
		US21.0/LED.25 (linear)	88%	88%
		US21.0/LED.40 (linear)	87%	85%
UW	OFFICE	-	86%	84%
V2M11	OFFICE	-	88%	88%
V2M17	OFFICE	-	86%	84%
V2M1F / J	OFFICE	-	88%	85%
W1	OFFICE	-		71%

Informative - conditions

- All performance figures for ambient temperature Tamb = 25°C
- MF mentioned above is an indicative value: changes with different dust pollution level or cleaning interval.
- MF = LLMF * LSF * LMF * RMF
  (CIE97: publication for interior lighting)
  LLMF: Lamp Lumen Maintenance Factor
  LSF: Lamp Survival Factor
  LMF: Luminaire Maintenance Factor
  RMF: Room Maintenance Factor
- The above calculation of the maintenance factor is based on the following data:
  LSF = 1 ("spot replacement": in case of full LED failure, driver or luminaire are replaced)
  LMF = 0.95 for clean office environments; 0.89 for normal industrial environments
  RMF = 0.94 for clean office environments (reflection factor 70/50/20) or 0.95 for normal industrial environments (reflection factor 50/30/20), subject to three-yearly cleaning. According to CIE 97 2005.
- LLMF based on LM80(1)/TM21(2)

LLMF (%)

TYPE OF LUMINAIRE	DISTINCTION	25,000 h	50,000 h
D1 / D2 / D3	-	95%	90%
D42	-	99%	98%
D9	-	98%	96%
E1	-	98%	96%
E1 renovation	-		80%
E2	-	98%	96%
E4	E4.0./	99%	98%
	E4.1./	98%	95%
E5M – E3M	E5M.0./	99%	98%
	E5M.1./	96%	92%
D6	-	92%	85%
E7	E7.1./ (1 row LEDs)	98%	96%
	E7.2./ (2 row LEDs)	97%	94%
E8	-	96%	92%
FLARE	-	97%	95%
RD16	-		70%(3)
R2		99%	98%
R7	without uplight	99%	98%
	with uplight	98%	96%
	mini	97%	94%
R8	-	99%	97%
U2	-	99%	98%
U7	standard modulations	99%	97%
	mini	97%	94%
US	US./LED.25 - /LED.30 (square)	97%	94%
	US./LED.35 - /LED.40 (square)	94%	89%
	US21.0/LED.25 (linear)	99%	98%
	US21.0/LED.40 (linear)	97%	95%
UW	-	96%	94%
V2M11	-	99%	99%
V2M17	-	96%	94%
V2M1F / J	-	98%	95%
W1	-		80%

(1) IES LM-80-08: approved method for lumen maintenance testing of LED light sources
(2) IES TM-21-11: projecting long term lumen maintenance of LED light sources
(3) Source: Philips