

POWERBALL® HCI®



Technical Information

SEE THE WORLD IN A NEW LIGHT

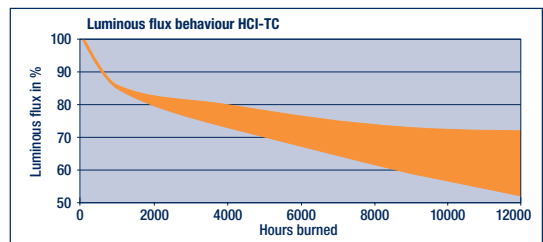
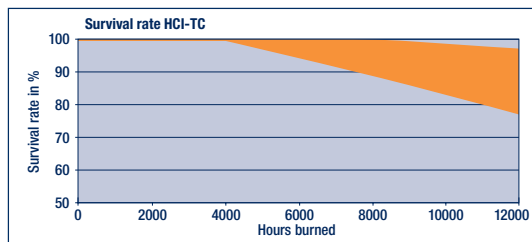
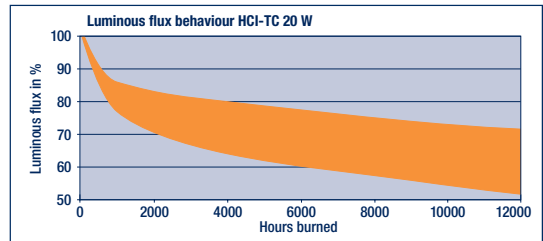
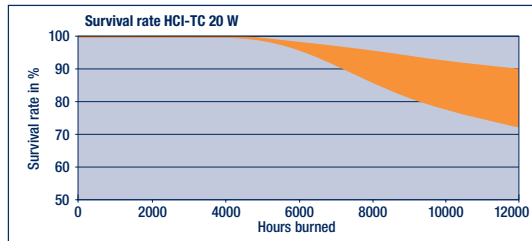
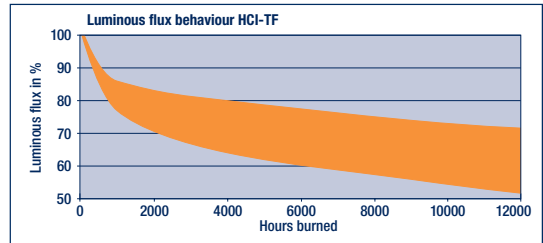
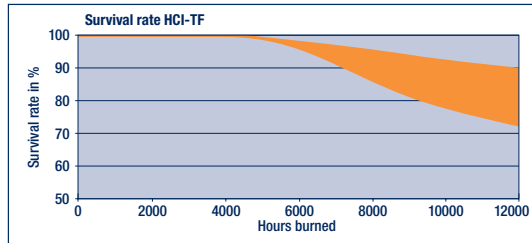
OSRAM



POWERBALL® HCI®-TF, TC



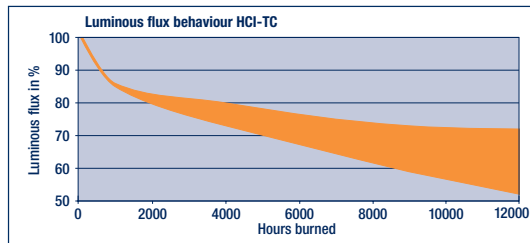
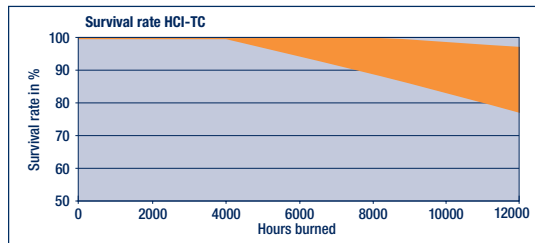
		HCI-TF 20 W New 830 WDL PB	HCI-TC 20 W 830 WDL PB	HCI-TC 35 W 830 WDL PB	HCI-TC 35 W 942 NDL PB
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS		MT/UB-20/30/1B- H/E-GU6.5-13/57	MT/UB-20/30/1B- H/E-G8.5-15/81	MT/UB-35/30/1B- H-G8.5-15/81	MT/UB-35/42/1A- H-G8.5-15/81
Lamp wattage	W	20	20	37	37
Lamp voltage	V	90	100	90	90
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	0.22	0.22	0.5	0.5
Nominal luminous flux	lm	1700	1700	3400	3200
Luminous efficacy	lm/W	85	85	92	86
Light colour/Colour appearance		830 WDL	830 WDL	830 WDL	942 NDL
Colour temperature	K	3000	3000	3000	4200
Colour rendering index	R _a	> 80	82	82	90
NIOSH Skin	h	> 8	> 21	> 21	> 21
ACGIH UV output	mW/m ² · 1000 lx	< 2	< 0.4	< 0.4	< 0.4
Base		GU6.5	G8.5	G8.5	G8.5
Diameter d	mm	13	15	15	15
Length max. l	mm	57	81	81	81
LCL a	mm	31	52	52	52
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	–	400	450	450
Max. perm. base edge temp.	°C	–	280	300	300
PF corr. cap. at 50 Hz	µF	ECG	ECG	6	6
Lamp reference		HCI-TF 20/830 WDL PB	HCI-TC 20/830 WDL PB	HCI-TC 35/830 WDL PB	HCI-TC 35/942 NDL PB
EAN		4008321907615	4008321052216	4050300873763	4050300873725
Standard pack	Qty	12	12	12	12
Figure	No.	1	2	2	2
Circuit (see page 26)	Fig. no.	2	1/2	1/2	1/2



POWERBALL® HCI®-TC

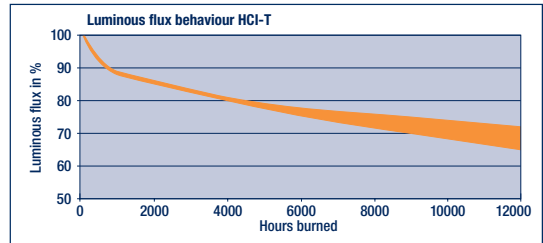
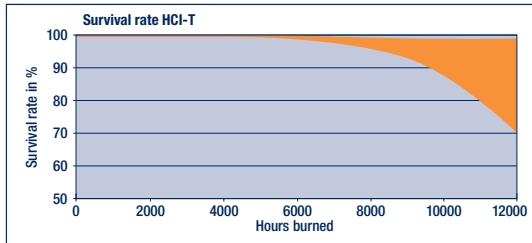


		HCI-TC 70 W	HCI-TC 70 W New	HCI-TC 70 W	HCI-TC 70 W
		830 WDL PB	942 NDL PB	830 WDL	942 NDL
Type		UVS, PB	UVS, PB	UVS	UVS
ILCOS		MT/UB-70/30/1B-H-G8.5-15/81	in development	MT/UB-70/30/1B-H-G8.5-15/81	MT/UB-70/42/1A-H-G8.5-15/81
Lamp wattage	W	72	72	72	72
Lamp voltage	V	90	91	90	91
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/4.5	3.6/5
Lamp current	A	0.96	0.96	0.96	0.96
Nominal luminous flux	lm	6900	6600	6600	6300
Luminous efficacy	lm/W	96	92	92	88
Light colour/Colour appearance		830 WDL	942 NDL	830 WDL	942 NDL
Colour temperature	K	3000	4200	3000	4200
Colour rendering index	Ra	88	94	81	≥ 90
NIOSH Skin	h	> 21	> 8	> 24	> 22
ACGIH UV output	mW/m ² · 1000 lx	< 0.4	< 2	< 0.35	< 0.37
Base		G8.5	G8.5	G8.5	G8.5
Diameter d	mm	15	15	15	15
Length max. l	mm	81	81	81	81
LCL a	mm	52	52	52	52
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	550	550	550	550
Max. perm. base edge temp.	°C	300	300	300	300
PF corr. cap. at 50 Hz	µF	12	12	12	12
Lamp reference		HCI-TC 70/830 WDL PB	HCI-TC 70/942 NDL PB	HCI-TC 70/830 WDL	HCI-TC 70/942 NDL
EAN		4008321907639	4008321907646	4050300873831	4050300873794
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	1
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2





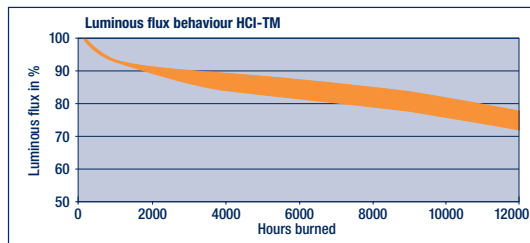
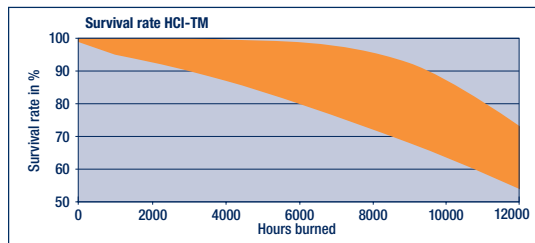
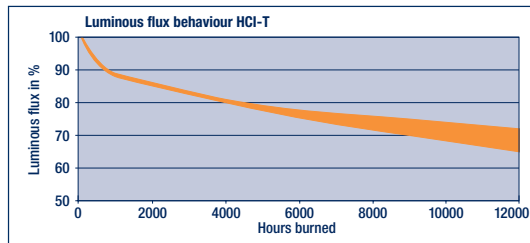
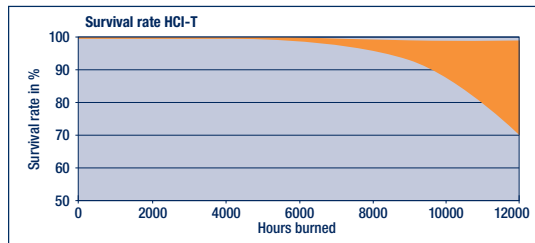
		HCI-T 35 W 830 WDL PB	HCI-T 35 W 942 NDL PB	HCI-T 70 W 830 WDL PB	HCI-T 70 W New 942 NDL PB	HCI-T 100 W New 830 WDL PB
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS		MT/UB-35/30/1B- H-G12-19/100	MT/UB-35/42/1A- H-G12-19/100	MT/UB-70/30/1B- H-G12-19/100	MT/UB-70/42/1A- H-G12-19/100	MT/UB-100/30/1B- H-G12-19/100
Lamp wattage	W	37	37	72	72	100
Lamp voltage	V	90	90	100	90	100
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	0.5	0.5	0.96	0.96	1.2
Nominal luminous flux	lm	3400	3300	7000	6700	9500
Luminous efficacy	lm/W	92	89	97	93	95
Light colour/Colour appearance		830 WDL	942 NDL	830 WDL	942 NDL	830 WDL
Colour temperature	K	3000	4200	3000	4200	3000
Colour rendering index	R _a	84	90	87	93	86
NIOSH Skin	h	> 21	> 21	> 47	> 27	> 8
ACGIH UV output	mW/m ² · 1000 lx	< 0.4	< 0.4	< 0.18	< 0.32	< 2
Base		G12	G12	G12	G12	G12
Diameter d	mm	19	19	19	19	19
Length max. l	mm	100	100	100	100	100
LCL a	mm	56	56	56	56	56
Burning position		universal	universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	450	450	500	500	500
Max. perm. base edge temp.	°C	280	280	280	280	280
PF corr. cap. at 50 Hz	µF	6	6	12	12	16
Lamp reference		HCI-T 35/830 WDL PB	HCI-T 35/942 NDL PB	HCI-T 70/830 WDL PB	HCI-T 70/942 NDL PB	HCI-T 100/830 WDL PB
EAN		4008321005625	4050300873480	4050300873664	4050300873626	4008321907660
Standard pack	Qty	12	12	12	12	12
Figure	No.	1	1	1	1	1
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2	1/2



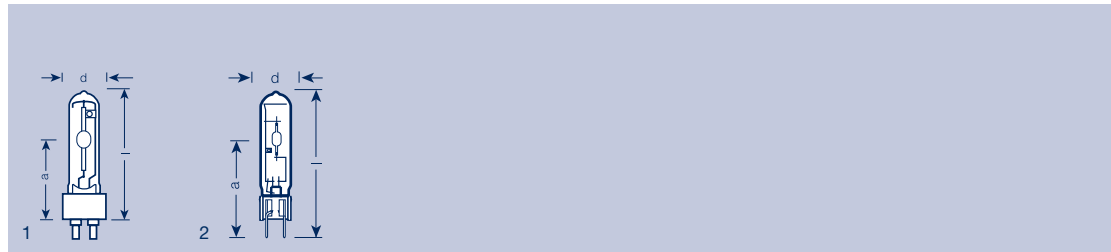
POWERBALL® HCI®-T, TM



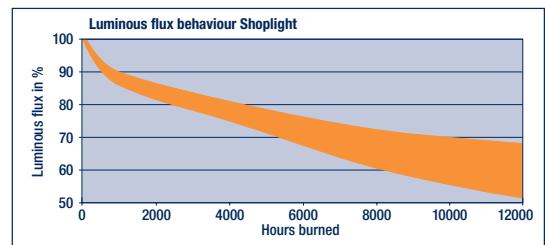
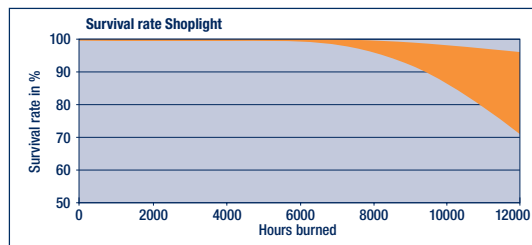
		HCI-T 100 W New 942 NDL PB	HCI-T 150 W 830 WDL PB	HCI-T 150 W 942 NDL PB	HCI-TM 250 W New 830 WDL PB	HCI-TM 250 W New 942 NDL PB
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS		MT/UB-100/42/1A-H-G12-19/100	MT/UB-150/30/1B-H-G12-25/105	MT/UB-150/42/1A-H-G12-25/105	MT/UB-250/30/1B-H-G22-34/175	MT/UB-250/42/1A-H-G22-34/175
Lamp wattage	W	100	145	145	248	249
Lamp voltage	V	100	100	92	101	98
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	1.2	1.8	1.8	2.9	3.0
Nominal luminous flux	lm	9300	15500	14500	26000	25000
Luminous efficacy	lm/W	93	107	100	107	100
Light colour/Colour appearance		942 NDL	830 WDL	942 NDL	830 WDL	942 NDL
Colour temperature	K	4200	3000	4200	3000	4200
Colour rendering index	Ra	> 90	86	96	92	98
NIOSH Skin	h	> 8	> 50	> 50	> 300	> 8
ACGIH UV output	mW/m ² · 1000 lx	< 2	< 0.06	< 0.12	< 0.028	< 2
Base		G12	G12	G12	G22	G22
Diameter d	mm	19	25	25	28	28
Length max. l	mm	100	105	105	175	175
LCL a	mm	56	56	56	90	90
Burning position		universal	universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	500	550	550	580	580
Max. perm. base edge temp.	°C	280	280	280	280	280
PF corr. cap. at 50 Hz	µF	16	20	20	32	32
Lamp reference		HCI-T 100/942 NDL PB	HCI-T 150/830 WDL PB	HCI-T 150/942 NDL PB	HCI-TM 250/830 WDL PB	HCI-TM 250/942 NDL PB
EAN		4008321907677	4050300873435	4050300873336	4050300977263	4008321907684
Standard pack	Qty	12	12	12	10	10
Figure	No.	1	1	1	2	2
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1	1



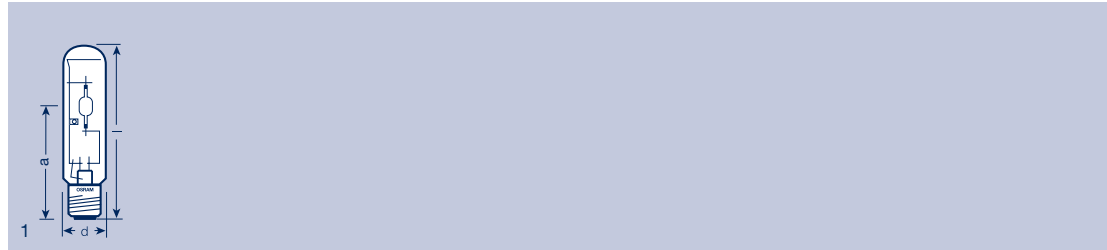
POWERBALL® HCI®-T, TC, Shoplight



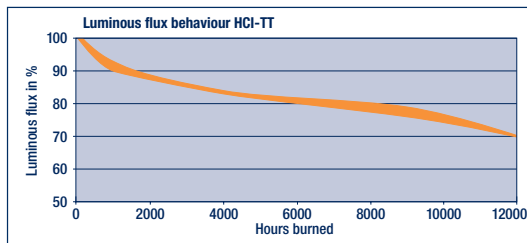
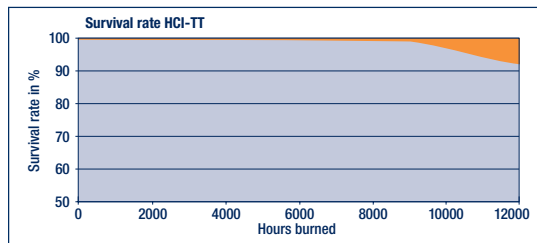
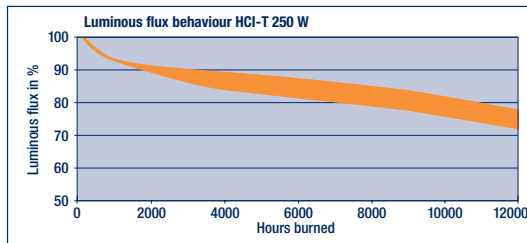
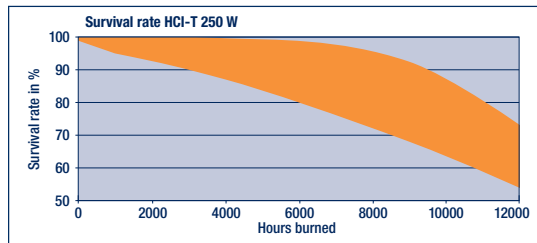
		HCI-T 35 W New 930 WDL PB	HCI-T 70 W 930 WDL PB	HCI-TC 35 W New 930 WDL PB	HCI-TC 70 W 930 WDL PB
Type		UVS, PB, Shoplight	UVS, PB, Shoplight	UVS, PB, Shoplight	UVS, PB, Shoplight
ILCOS		MT/UB-35/30/1A-H-G12-19/100	MT/UB-70/30/1A-H-G12-19/100	MT/UB-35/30/1A-H-G8.5-15/81	MT/UB-70/30/1A-H-G8.5-15/81
Lamp wattage	W	39	73	37	73
Lamp voltage	V	92	90	92	95
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	0.5	0.96	0.5	0.96
Nominal luminous flux	lm	2800	6400	2800	6300
Luminous efficacy	lm/W	79	88	79	86
Light colour/Colour appearance		930 WDL	930 WDL	930 WDL	930 WDL
Colour temperature	K	3000	3000	3000	3000
Colour rendering index	R _a	92	94	92	95
NIOSH Skin	h	> 8	> 21	> 8	> 24
ACGIH UV output	mW/m ² · 1000 lx	< 2	< 0.4	< 2	< 0.35
Base		G12	G12	G8.5	G8.5
Diameter d	mm	19	19	15	15
Length max. l	mm	100	100	81	81
LCL a	mm	56	56	52	52
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	450	550	450	550
Max. perm. base edge temp.	°C	300	300	300	300
PF corr. cap. at 50 Hz	µF	6	12	6	12
Lamp reference		HCI-T 35/930 WDL PB Shop	HCI-T 70/930 WDL PB Shop	HCI-TC 35/930 WDL PB Shop	HCI-TC 70/930 WDL PB Shop
EAN		4008321108166	4050300983134	4008321108142	4050300983110
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	2	2
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2



POWERBALL® HCI®-T, TT



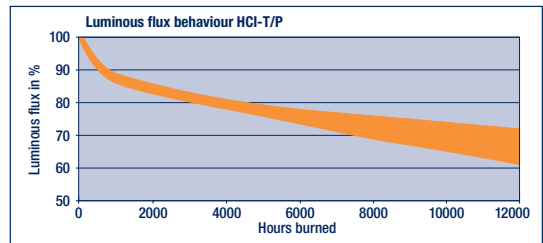
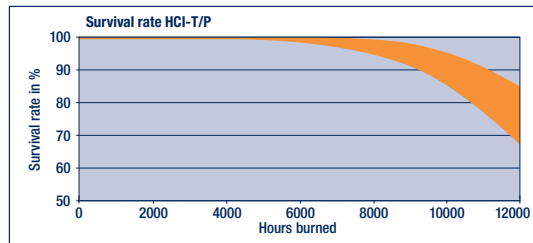
		HCI-T 250 W 830 WDL PB	HCI-T <i>New</i> 250 W 942 NDL PB	HCI-TT 70 W 830 WDL PB	HCI-TT 150 W 830 WDL PB
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS		MT/UB-250/30/1B- H-E40-46/226	MT/UB-250/42/1A- H-E40-46/226	MT/UB-70/30/1B- H-E27-30/150	MT/UB-150/30/1B- H-E40-46/204
Lamp wattage	W	245	250	74	148
Lamp voltage	V	105	100	90	95
Ignition voltage min./max.	kVs	3.6/5	3.6/5	1.8/5	2.75/5
Lamp current	A	2.8	2.8	0.92	1.8
Nominal luminous flux	lm	25800	25000	7000	14500
Luminous efficacy	lm/W	105	100	95	98
Light colour/Colour appearance		830 WDL	942 NDL	830 WDL	830 WDL
Colour temperature	K	3000	4200	3000	3000
Colour rendering index	Ra	87	96	86	83
NIOSH Skin	h	> 50	> 8	> 47	> 50
ACGIH UV output	mW/m ² · 1000 lx	< 0.04	< 2	< 0.18	< 0.04
Base		E40	E40	E27	E40
Diameter d	mm	46	46	30	46
Length max. l	mm	226	226	150	204
LCL a	mm	150	150	102	132
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	15000	15000
Max. perm. outer bulb temp.	°C	500	500	350	400
Max. perm. base edge temp.	°C	250	250	210	210
PF corr. cap. at 50 Hz	µF	32	32	12	20
Lamp reference		HCI-T 250/830 WDL PB	HCI-T 250/942 NDL PB	HCI-TT 70/830 WDL PB	HCI-TT 150/830 WDL PB
EAN		4050300636849	4008321908308	4050300784120	4050300784144
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	1
Circuit (see page 26)	Fig. no.	1	1	1	1



POWERBALL® HCI®-T/P



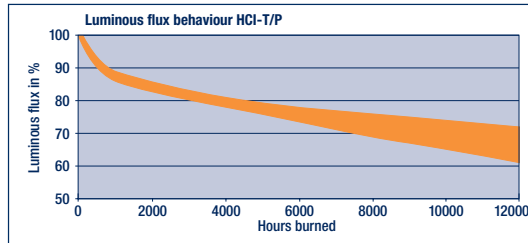
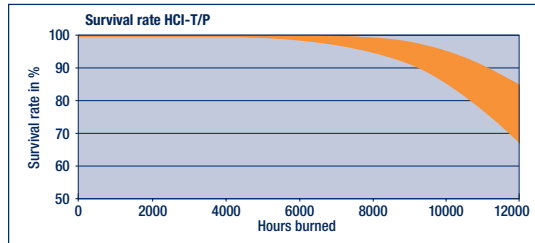
		New	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P
			70 W	70 W	70 W	70 W	100 W	100 W
			830 WDL PB	830 WDL PB	942 NDL PB	942 NDL PB	830 WDL PB	830 WDL PB
			clear	coated	clear	coated	clear	coated
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MTS/UB-70/30/ 1B-H-E27-32/ 125	MTS coated/ UB-70/30/1B- H-E27-32/125	MTS/UB-70/42/ 1A-H-E27-32/ 125	MTS coated/ UB-70/42/1A- H-E27-32/125	MTS/UB-100/30/ 1B-H-E27-40/ 140	MTS coated/ UB-100/30/1B- H-E27-40/140
Lamp wattage	W		73	73	73	73	100	100
Lamp voltage	V		90	90	90	90	95	95
Ignition voltage min./max.	kVs		3.6/5	3.6/5	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A		0.98	0.98	0.98	0.98	1.2	1.2
Nominal luminous flux	lm		6500	6400	6100	6000	9000	8500
Luminous efficacy	lm/W		89	88	84	82	90	85
Light colour/Colour appearance			830 WDL	830 WDL	942 NDL	942 NDL	830 WDL	830 WDL
Colour temperature	K		3000	3000	4200	4200	3000	3000
Colour rendering index	R _a		> 80	> 80	> 90	> 90	> 80	> 80
NIOSH Skin	h		> 47	> 47	> 8	> 8	> 8	> 8
ACGIH UV output	mW/m ² · 1000 lx		< 0.18	< 0.18	< 2	< 2	< 2	< 2
Base			E27	E27	E27	E27	E27	E27
Diameter d	mm		32	32	32	32	40	40
Length max. l	mm		125	125	125	125	140	140
LCL a	mm		89	89	89	89	89	89
Burning position			universal	universal	universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C		330	330	330	330	330	330
Max. perm. base edge temp.	°C		190	190	190	190	190	190
PF corr. cap. at 50 Hz	µF		12	12	12	12	16	16
Lamp reference			HCI-T/P 70/830 WDL PB clear	HCI-T/P 70/830 WDL PB coated	HCI-T/P 70/942 NDL PB clear	HCI-T/P 70/942 NDL PB coated	HCI-T/P 100/830 WDL PB clear	HCI-T/P 100/830 WDL PB coated
EAN			4008321907714	4008321907721	4008321907738	4008321907745	4008321907752	4008321907769
Standard pack	Qty		12	12	12	12	12	12
Figure	No.		1	1	1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	1/2	1/2	1/2	1/2



POWERBALL® HCI®-T/P

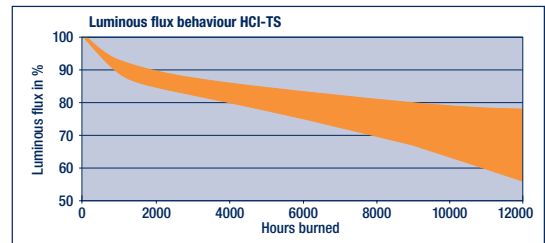
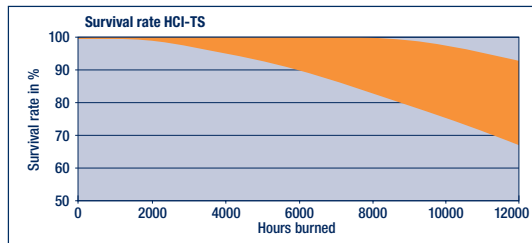


		New	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P
			100 W	100 W	150 W	150 W	150 W	150 W
			942 NDL PB	942 NDL PB	830 WDL PB	830 WDL PB	942 NDL PB	942 NDL PB
			clear	coated	clear	coated	clear	coated
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MTS/UB-100/42/ 1A-H-E27-40/ 140	MTS coated/ UB-100/42/1A- H-E27-40/140	MTS/UB-150/30/ 1B-H-E27-40/ 140	MTS coated/ UB-150/30/1B- H-E27-40/140	MTS/UB-150/42/ 1A-H-E27-40/ 140	MTS coated/ UB-150/42/1A- H-E27-40/140
Lamp wattage	W		100	100	145	145	145	145
Lamp voltage	V		95	95	95	95	95	95
Ignition voltage min./max.	kVs		3.6/5	3.6/5	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A		1.2	1.2	1.8	1.8	1.8	1.8
Nominal luminous flux	lm		8800	8300	14200	14000	14000	13300
Luminous efficacy	lm/W		88	83	98	97	97	92
Light colour/Colour appearance			942 NDL	942 NDL	830 WDL	830 WDL	942 NDL	942 NDL
Colour temperature	K		4200	4200	3000	3000	4200	4200
Colour rendering index	R _a		> 90	> 90	> 80	> 80	> 90	> 90
NIOSH Skin	h		> 8	> 8	> 50	> 50	> 50	> 50
ACGIH UV output	mW/m ² - 1000 lx		< 2	< 2	< 0.06	< 0.06	< 0.12	< 0.12
Base			E27	E27	E27	E27	E27	E27
Diameter d	mm		40	40	40	40	40	40
Length max. l	mm		140	140	140	140	140	140
LCL a	mm		89	89	89	89	89	89
Burning position			universal	universal	universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C		330	330	330	330	330	330
Max. perm. base edge temp.	°C		190	190	190	190	190	190
PF corr. cap. at 50 Hz	µF		16	16	20	20	20	20
Lamp reference			HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P	HCI-T/P
			100/942 NDL PB	100/942 NDL PB	150/830 WDL PB	150/830 WDL PB	150/942 NDL PB	150/942 NDL PB
			clear	coated	clear	coated	clear	coated
EAN			4008321907776	4008321907783	4008321907790	4008321907806	4008321907813	4008321907820
Standard pack	Qty		12	12	12	12	12	12
Figure	No.		1	1	1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	1/2	1/2	1/2	1/2

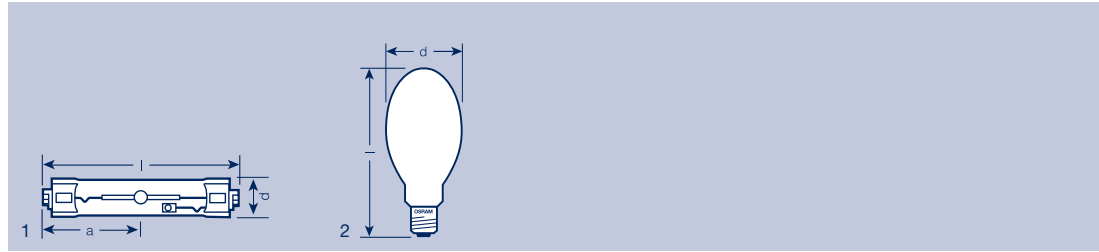




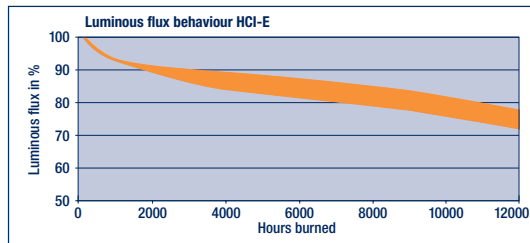
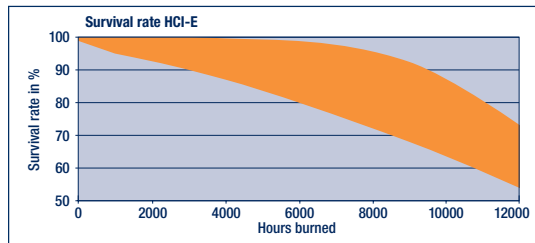
		HCI-TS 70 W 830 WDL PB	HCI-TS 70 W 942 NDL PB	HCI-TS 150 W 830 WDL PB	HCI-TS 150 W 942 NDL PB
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS		MD/UB-70/30/1B- H-RX7s-21/114.2/P45	MD/UB-70/42/1A- H-RX7s-21/114.2/P45	MD/UB-150/30/1B- H-RX7s24-24/132/P45	MD/UB-150/42/1A- H-RX7s24-24/132/P45
Lamp wattage	W	72	74	144	144
Lamp voltage	V	95	94	100	96
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3.6/5	3.6/5
Lamp current	A	0.95	0.98	1.8	1.8
Nominal luminous flux	lm	6900	6700	14800	14200
Luminous efficacy	lm/W	96	91	103	99
Light colour/Colour appearance		830 WDL	942 NDL	830 WDL	942 NDL
Colour temperature	K	3000	4200	3000	4200
Colour rendering index	R _a	88	95	90	97
NIOSH Skin	h	> 18	> 29.7	> 50	> 26
ACGIH UV output	mW/m ² · 1000 lx	< 0.45	< 0.28	< 0.4	< 0.32
Base		RX7s	RX7s	RX7s-24	RX7s-24
Diameter d	mm	21	21	24	24
Length max. l	mm	114.2	114.2	132	132
LCL a	mm	57	57	66	66
Burning position		p 45	p 45	p 45	p 45
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	500	500	650	650
Max. perm. base edge temp.	°C	280	280	280	280
PF corr. cap. at 50 Hz	µF	12	12	20	20
Lamp reference		HCI-TS 70/830 WDL PB	HCI-TS 70/942 NDL PB	HCI-TS 150/830 WDL PB	HCI-TS 150/942 NDL PB
EAN		4050300784069	4050300784106	4050300783987	4050300784007
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	1
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2



POWERBALL® HCI®-TS, E



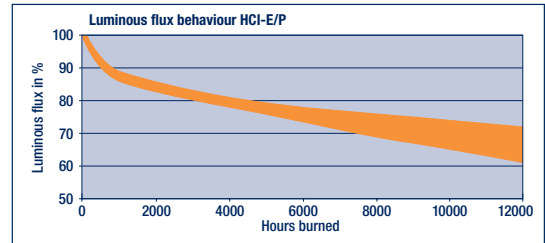
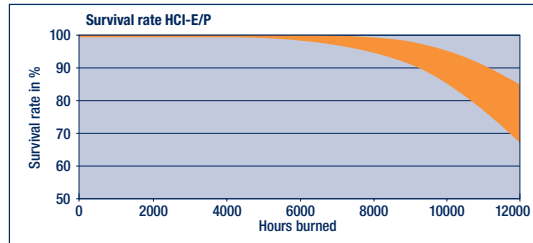
		HCI-TS 250 W 830 WDL PB	HCI-TS New 250 W 942 NDL PB	HCI-E 250 W 830 WDL PB coated	HCI-E New 250 W 942 NDL PB coated
Type	UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCO5	MD/UB-250/30/1B-H-Fc2-25/163/P45	MD/UB-250/42/1A-H-Fc2-25/163/P45	MD/UB-250/42/1A-H-Fc2-25/163/P45	ME/UB-250/30/1B-H-E40-90/226	ME/UB-250/42/1A-H-E40-90/226
Lamp wattage	W	245	245	245	258
Lamp voltage	V	100	100	95	105
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	3.0	3.0	2.9	2.9
Nominal luminous flux	lm	25000	23000	24500	24500
Luminous efficacy	lm/W	102	94	100	100
Light colour/Colour appearance		830 WDL	942 NDL	830 WDL	942 NDL
Colour temperature	K	3000	4200	3000	4200
Colour rendering index	R _a	90	> 90	91	> 90
NIOSH Skin	h	> 50	> 8	> 50	> 8
ACGIH UV output	mW/m ² · 1000 lx	< 0.15	< 2	< 0.1	< 2
Base		Fc2	Fc2	E40	E40
Diameter d	mm	25	25	90	90
Length max. l	mm	163	163	226	226
LCL a	mm	81.5	81.5	-	-
Burning position		p 45	p 45	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	650	650	400	400
Max. perm. base edge temp.	°C	280	280	250	250
PF corr. cap. at 50 Hz	µF	32	32	32	32
Lamp reference		HCI-TS 250/830 WDL PB	HCI-TS 250/942 NDL PB	HCI-E 250/830 WDL PB	HCI-E 250/942 NDL PB
EAN		4050300637730	4008321907707	4050300636825	4008321908315
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	2	2
Circuit (see page 26)	Fig. no.	1	1	1	1



POWERBALL® HCI®-E/P



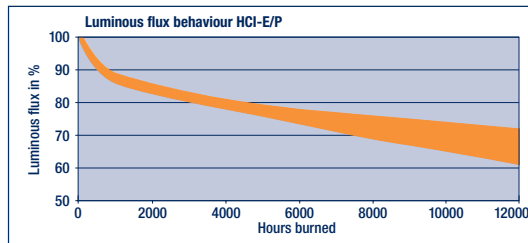
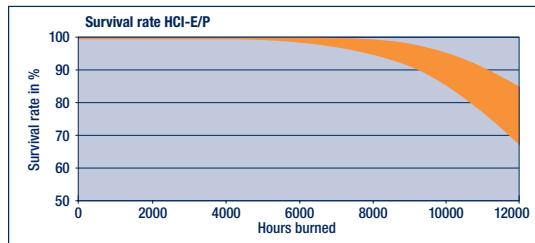
		New	HCI-E/P	HCI-E/P	HCI-E/P	HCI-E/P
			35 W	35 W	35 W	35 W
			830 WDL PB	830 WDL PB	942 NDL PB	942 NDL PB
			clear	coated	clear	coated
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MCS/UB-35/30/1B-H-E27-54/138	MES/UB-35/30/1B-H-E27-54/138	MCS/UB-35/42/1A-H-E27-54/138	MES/UB-35/42/1A-H-E27-54/138
Lamp wattage	W		39	39	39	39
Lamp voltage	V		90	90	90	90
Ignition voltage min./max.	kVs		3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A		0.5	0.5	0.5	0.5
Nominal luminous flux	lm		3000	2850	3000	2850
Luminous efficacy	lm/W		77	73	77	73
Light colour/Colour appearance			830 WDL	830 WDL	942 NDL	942 NDL
Colour temperature	K		3000	3000	4200	4200
Colour rendering index	R _a		> 80	> 80	> 90	> 90
NIOSH Skin	h		> 21	> 21	> 21	> 21
ACGIH UV output	mW/m ² · 1000 lx		< 0.4	< 0.4	< 0.4	< 0.4
Base			E27	E27	E27	E27
Diameter d	mm		54	54	54	54
Length max. l	mm		138	138	138	138
LCL a	mm		86	—	86	—
Burning position			universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000
Max. perm. outer bulb temp.	°C		330	330	330	330
Max. perm. base edge temp.	°C		190	190	190	190
PF corr. cap. at 50 Hz	µF		6	6	6	6
Lamp reference			HCI-E/P	HCI-E/P	HCI-E/P	HCI-E/P
			35/830 WDL PB clear	35/830 WDL PB coated	35/942 NDL PB clear	35/942 NDL PB coated
EAN			4008321907837	4008321907844	4008321907851	4008321907868
Standard pack	Qty		12	12	12	12
Figure	No.		1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	1/2	1/2



POWERBALL® HCI®-E/P



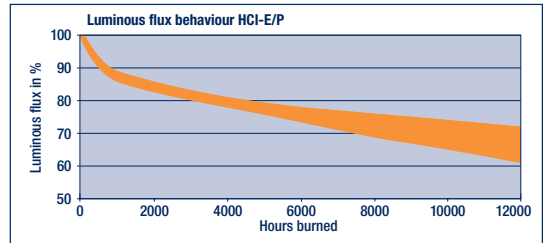
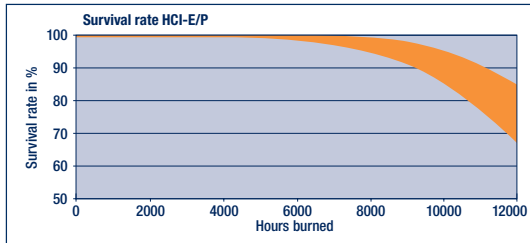
		HCI-E/P 70 W 830 WDL PB clear	HCI-E/P 70 W 830 WDL PB coated	HCI-E/P 70 W 942 NDL PB clear	HCI-E/P 70 W 942 NDL PB coated
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS		MCS/UB-70/30/1B-H-E27-54/138	MES/UB-70/30/1B-H-E27-54/138	MCS/UB-70/42/1A-H-E27-54/138	MES/UB-70/42/1A-H-E27-54/138
Lamp wattage	W	73	73	73	73
Lamp voltage	V	90	90	100	100
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	0.98	0.98	0.98	0.98
Nominal luminous flux	lm	6500	6400	6100	6000
Luminous efficacy	lm/W	89	88	84	82
Light colour/Colour appearance		830 WDL	830 WDL	942 NDL	942 NDL
Colour temperature	K	3000	3000	4200	4200
Colour rendering index	R _a	87	87	> 90	> 90
NIOSH Skin	h	> 47	> 47	> 26	> 26
ACGIH UV output	mW/m ² · 1000 lx	< 0.18	< 0.18	< 0.32	< 0.32
Base		E27	E27	E27	E27
Diameter d	mm	54	54	54	54
Length max. l	mm	138	138	138	138
LCL a	mm	86	—	86	—
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	330	330	330	330
Max. perm. base edge temp.	°C	190	190	190	190
PF corr. cap. at 50 Hz	µF	12	12	12	12
Lamp reference		HCI-E/P 70/830 WDL PB clear	HCI-E/P 70/830 WDL PB coated	HCI-E/P 70/942 NDL PB clear	HCI-E/P 70/942 NDL PB coated
EAN		4008321907875	4008321907882	4008321907899	4008321907905
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	1
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2



POWERBALL® HCI®-E/P



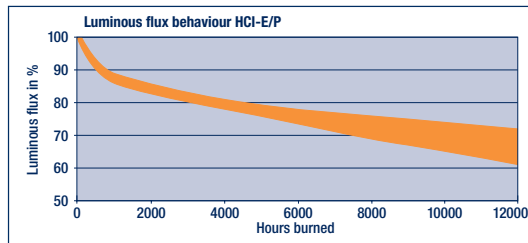
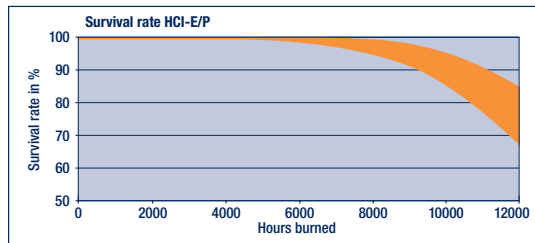
		New	HCI-E/P	HCI-E/P	HCI-E/P	HCI-E/P
			100 W	100 W	100 W	100 W
			830 WDL PB	830 WDL PB	942 NDL PB	942 NDL PB
			clear	coated	clear	coated
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MCS/UB-100/30/1B-H-E27-54/138	MES/UB-100/30/1B-H-E27-54/138	MCS/UB-100/42/1A-H-E27-54/138	MES/UB-100/42/1A-H-E27-54/138
Lamp wattage	W		100	100	100	100
Lamp voltage	V		100	100	100	100
Ignition voltage min./max.	kVs		3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A		1.2	1.2	1.2	1.2
Nominal luminous flux	lm		9000	8500	8800	8300
Luminous efficacy	lm/W		90	85	88	83
Light colour/Colour appearance			830 WDL	830 WDL	942 NDL	942 NDL
Colour temperature	K		3000	3000	4200	4200
Colour rendering index	R _a		> 80	> 80	> 90	> 90
NIOSH Skin	h		> 50	> 50	> 8	> 8
ACGIH UV output	mW/m ² · 1000 lx		< 0.02	< 0.02	< 2	< 2
Base			E27	E27	E27	E27
Diameter d	mm		54	54	54	54
Length max. l	mm		138	138	138	138
LCL a	mm		86	—	86	—
Burning position			universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000
Max. perm. outer bulb temp.	°C		330	330	330	330
Max. perm. base edge temp.	°C		190	190	190	190
PF corr. cap. at 50 Hz	µF		16	16	16	16
Lamp reference			HCI-E/P	HCI-E/P	HCI-E/P	HCI-E/P
			100/830 WDL PB clear	100/830 WDL PB coated	100/942 NDL PB clear	100/942 NDL PB coated
EAN			4008321907912	4008321907929	4008321907936	4008321907943
Standard pack	Qty		12	12	12	12
Figure	No.		1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	1/2	1/2



POWERBALL® HCI®-E/P



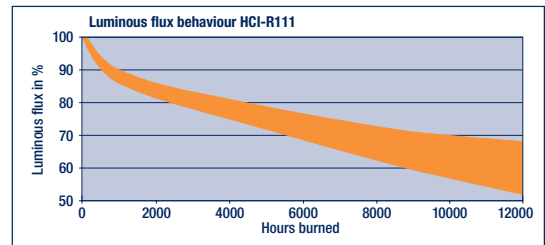
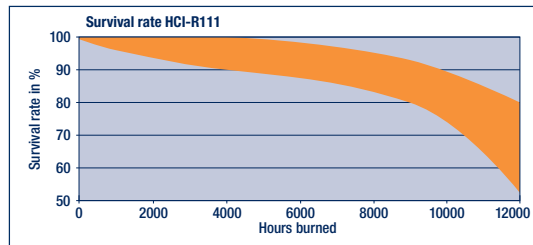
		HCI-E/P 150 W 830 WDL PB clear	HCI-E/P 150 W 830 WDL PB coated	HCI-E/P 150 W 942 ND L PB clear	HCI-E/P 150 W 942 ND L PB coated
Type		UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCO S		MCS/UB-150/30/1B-H-E27-54/138	MES/UB-150/30/1B-H-E27-54/138	MCS/UB-150/42/1A-H-E27-54/138	MES/UB-150/42/1A-H-E27-54/138
Lamp wattage	W	150	150	150	150
Lamp voltage	V	95	95	91	91
Ignition voltage min./max.	kVs	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A	1.8	1.8	1.8	1.8
Nominal luminous flux	lm	14000	13300	14000	13300
Luminous efficacy	lm/W	93	89	93	89
Light colour/Colour appearance		830 WDL	830 WDL	942 ND L	942 ND L
Colour temperature	K	3000	3000	4200	4200
Colour rendering index	R _a	90	90	> 95	> 95
NIOSH Skin	h	> 50	> 50	> 50	> 50
ACGIH UV output	mW/m ² · 1000 lx	< 0.12	< 0.12	< 0.17	< 0.17
Base		E27	E27	E27	E27
Diameter d	mm	54	54	54	54
Length max. l	mm	138	138	138	138
LCL a	mm	86	—	86	—
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	330	330	330	330
Max. perm. base edge temp.	°C	190	190	190	190
PF corr. cap. at 50 Hz	µF	20	20	20	20
Lamp reference		HCI-E/P 150/830 WDL PB clear	HCI-E/P 150/830 WDL PB coated	HCI-E/P 150/942 ND L PB clear	HCI-E/P 150/942 ND L PB coated
EAN		4008321907950	4008321907967	4008321907974	4008321907981
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	1
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2



POWERBALL® HCI®-R111



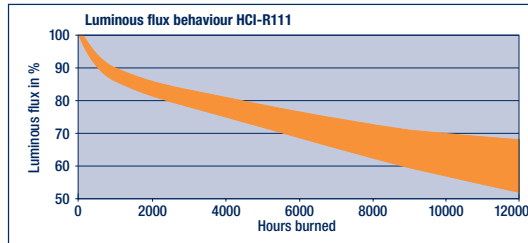
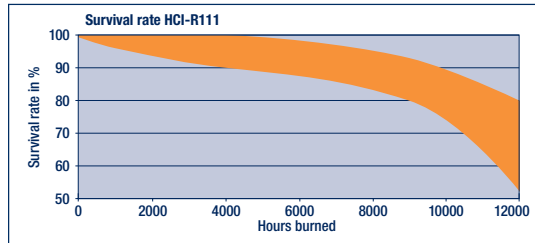
		New	HCI-R111	HCI-R111	HCI-R111	HCI-R111	HCI-R111	HCI-R111
			20 W	20 W	20 W	35 W	35 W	35 W
			830 WDL PB	830 WDL PB	830 WDL PB	830 WDL PB	830 WDL PB	830 WDL PB
			10D	24D	40D	10D	24D	40D
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MRS/UB-20/30/ 1B-H-GX8.5- 111/95/10	MRS/UB-20/30/ 1B-H-GX8.5- 111/95/24	MRS/UB-20/30/ 1B-H-GX8.5- 111/95/40	MRS/UB-35/30/ 1B-H-GX8.5- 111/95/10	MRS/UB-35/30/ 1B-H-GX8.5- 111/95/24	MRS/UB-35/30/ 1B-H-GX8.5- 111/95/40
Lamp wattage	W		20	20	20	39	39	39
Lamp voltage	V		100	100	100	90	90	90
Ignition voltage min./max.	kVs		3.6/5	3.6/5	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A		0.22	0.22	0.22	0.5	0.5	0.5
Axial luminous intensity	cd		17000	4200	2000	35000	8500	4000
Beam angle	°		10	24	40	10	24	40
Light colour/Colour appearance			830 WDL	830 WDL	830 WDL	830 WDL	830 WDL	830 WDL
Colour temperature	K		3000	3000	3000	3000	3000	3000
Colour rendering index	R _a		> 80	> 80	> 80	> 80	> 80	> 80
NIOSH Skin	h		> 8	> 8	> 8	> 8	> 8	> 8
ACGIH UV output	mW/m ² · 1000 lx		< 2	< 2	< 2	< 2	< 2	< 2
Base			GX8.5	GX8.5	GX8.5	GX8.5	GX8.5	GX8.5
Diameter d	mm		111	111	111	111	111	111
Length max. l	mm		95	95	95	95	95	95
Burning position			universal	universal	universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000	12000	12000
PF corr. cap. at 50 Hz	µF		ECG	ECG	ECG	6	6	6
Lamp reference			HCI-R111 20/830 WDL PB 10D	HCI-R111 20/830 WDL PB 24D	HCI-R111 20/830 WDL PB 40D	HCI-R111 35/830 WDL PB 10D	HCI-R111 35/830 WDL PB 24D	HCI-R111 35/830 WDL PB 40D
EAN			4008321907998	4008321908001	4008321908018	4008321908025	4008321908032	4008321908049
Standard pack	Qty		6	6	6	6	6	6
Figure	No.		1	1	1	1	1	1
Circuit (see page 26)	Fig. no.		2	2	2	1/2	1/2	1/2



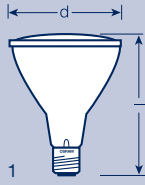
POWERBALL® HCI®-R111



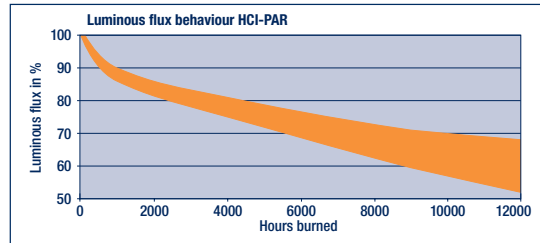
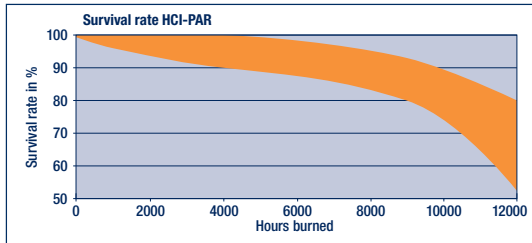
		New	HCI-R111	HCI-R111	HCI-R111	HCI-R111	HCI-R111	HCI-R111
			35 W	35 W	35 W	70 W	70 W	70 W
			942 NDL PB	942 NDL PB	942 NDL PB	830 WDL PB	830 WDL PB	830 WDL PB
			10D	24D	40D	10D	24D	40D
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MRS/UB-35/42/ 1A-H-GX8.5- 111/95/10	MRS/UB-35/42/ 1A-H-GX8.5- 111/95/24	MRS/UB-35/42/ 1A-H-GX8.5- 111/95/40	MRS/UB-70/30/ 1B-H-GX8.5- 111/95/10	MRS/UB-70/30/ 1B-H-GX8.5- 111/95/24	MRS/UB-70/30/ 1B-H-GX8.5- 111/95/40
Lamp wattage	W		39	39	39	72	72	72
Lamp voltage	V		90	90	90	90	90	90
Ignition voltage min./max.	kVs		3.6/5	3.6/5	3.6/5	3.6/5	3.6/5	3.6/5
Lamp current	A		0.5	0.5	0.5	0.98	0.98	0.98
Axial luminous intensity	cd		35000	8500	4000	55000	15000	9000
Beam angle	°		10	24	40	10	24	40
Light colour/Colour appearance			942 NDL	942 NDL	942 NDL	830 WDL	830 WDL	830 WDL
Colour temperature	K		4200	4200	4200	3000	3000	3000
Colour rendering index	R _a		> 90	> 90	> 90	> 80	> 80	> 80
NIOSH Skin	h		> 8	> 8	> 8	> 8	> 8	> 8
ACGIH UV output	mW/m ² - 1000 lx		< 2	< 2	< 2	< 2	< 2	< 2
Base			GX8.5	GX8.5	GX8.5	GX8.5	GX8.5	GX8.5
Diameter d	mm		111	111	111	111	111	111
Length max. l	mm		95	95	95	95	95	95
Burning position			universal	universal	universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000	12000	12000
PF corr. cap. at 50 Hz	µF		6	6	6	12	12	12
Lamp reference			HCI-R111 35/942 NDL PB 10D	HCI-R111 35/942 NDL PB 24D	HCI-R111 35/942 NDL PB 40D	HCI-R111 70/830 WDL PB 10D	HCI-R111 70/830 WDL PB 24D	HCI-R111 70/830 WDL PB 40D
EAN			4008321908056	4008321908063	4008321908070	4008321908087	4008321908094	4008321908100
Standard pack	Qty		6	6	6	6	6	6
Figure	No.		1	1	1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	1/2	1/2	1/2	1/2



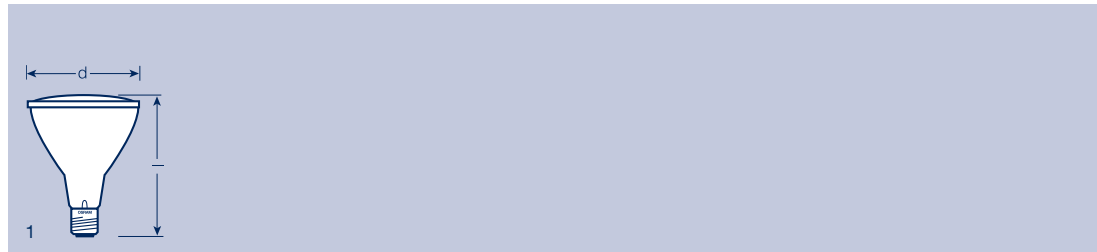
POWERBALL® HCI®-PAR 20, 30



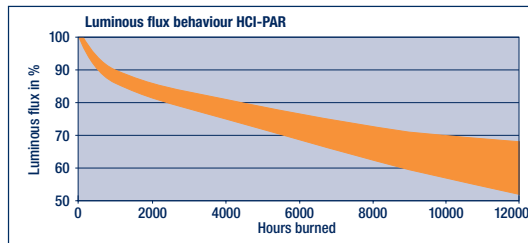
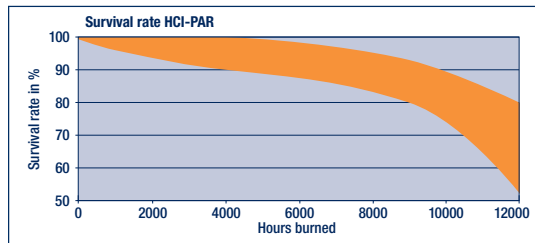
		New	HCI-PAR 20	HCI-PAR 20	HCI-PAR 30	HCI-PAR 30
			35 W	35 W	20 W	20 W
			830 WDL PB SP	830 WDL PB FL	830 WDL PB SP	830 WDL PB FL
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MRS/UB-35/30/1B-H-E27-65/95/10	MRS/UB-35/30/1B-H-E27-65/95/30	MRS/UB-20/30/1B-H-E27-97/125/10	MRS/UB-20/30/1B-H-E27-97/125/30
Lamp wattage	W		39	39	20	20
Lamp voltage	V		90	90	90	90
Ignition voltage min./max.	kVs		3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A		0.5	0.5	0.22	0.22
Axial luminous intensity	cd		24000	5500	24000	4000
Beam angle	°		10	30	10	30
Light colour/Colour appearance			830 WDL	830 WDL	830 WDL	830 WDL
Colour temperature	K		3000	3000	3000	3000
Colour rendering index	R _a		> 80	> 80	> 80	> 80
NIOSH Skin	h		> 22	> 22	> 22	> 22
ACGIH UV output	mW/m ² · 1000 lx		< 0.37	< 0.37	< 0.37	< 0.37
Base			E27	E27	E27	E27
Diameter d	mm		65	65	97	97
Length max. l	mm		95	95	125	125
Burning position			universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000
Max. perm. outer bulb temp.	°C		300	300	300	300
Max. perm. base edge temp.	°C		210	210	210	210
PF corr. cap. at 50 Hz	µF		6	6	ECG	ECG
Lamp reference			HCI-PAR 20 35/830 WDL PB SP	HCI-PAR 20 35/830 WDL PB FL	HCI-PAR 30 20/830 WDL PB SP	HCI-PAR 30 20/830 WDL PB FL
EAN			4008321908162	4008321908179	4008321908148	4008321908155
Standard pack	Qty		12	12	6	6
Figure	No.		1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	2	2



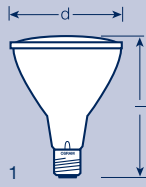
POWERBALL® HCI®-PAR 30



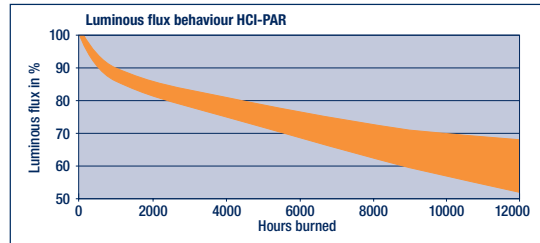
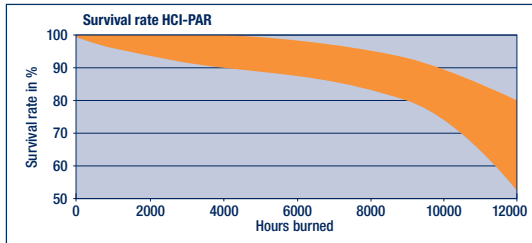
		New	HCI-PAR 30	HCI-PAR 30	HCI-PAR 30	HCI-PAR 30	HCI-PAR 30
			35 W	35 W	70 W	70 W	70 W
			830 WDL PB SP	830 WDL PB FL	830 WDL PB SP	830 WDL PB FL	830 WDL PB 40D
Type			UVS, PB	UVS, PB	UVS, PB	UVS, PB	UVS, PB
ILCOS			MRS/UB-35/30/ 1B-H-E27- 97/125/10	MRS/UB-35/30/ 1B-H-E27- 97/125/30	MRS/UB-70/30/ 1B-H-E27- 97/125/10	MRS/UB-70/30/ 1B-H-E27- 97/125/30	MRS/UB-70/30/ 1B-H-E27- 97/125/40
Lamp wattage	W		39	39	73	73	73
Lamp voltage	V		90	90	90	90	90
Ignition voltage min./max.	kVs		3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A		0.5	0.5	0.98	0.98	0.98
Axial luminous intensity	cd		46000	8500	70000	14000	12000
Beam angle	°		10	30	10	30	40
Light colour/Colour appearance			830 WDL	830 WDL	830 WDL	830 WDL	830 WDL
Colour temperature	K		3000	3000	3000	3000	3000
Colour rendering index	R _a		> 80	> 80	> 80	> 80	> 80
NIOSH Skin	h		> 22	> 22	> 22	> 22	> 22
ACGIH UV output	mW/m ² · 1000 lx		< 0.37	< 0.37	< 0.37	< 0.37	< 0.37
Base			E27	E27	E27	E27	E27
Diameter d	mm		97	97	97	97	97
Length max. l	mm		125	125	125	125	125
Burning position			universal	universal	universal	universal	universal
Average lamp life	h		12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C		300	300	300	300	300
Max. perm. base edge temp.	°C		210	210	210	210	210
PF corr. cap. at 50 Hz	µF		6	6	12	12	12
Lamp reference			HCI-PAR 30 35/830 WDL PB SP	HCI-PAR 30 35/830 WDL PB FL	HCI-PAR 30 70/830 WDL PB SP	HCI-PAR 30 70/830 WDL PB FL	HCI-PAR 30 70/830 WDL PB 40 D
EAN			4008321908209	4008321908216	4008321908247	4008321908254	4008321908261
Standard pack	Qty		6	6	6	6	6
Figure	No.		1	1	1	1	1
Circuit (see page 26)	Fig. no.		1/2	1/2	1/2	1/2	1/2



POWERSTAR® HCI®-PAR 20, 30



		HCI-PAR 20 35 W 830 WDL SP	HCI-PAR 20 35 W 830 WDL FL	HCI-PAR 30 35 W 830 WDL SP	HCI-PAR 30 35 W 830 WDL FL	HCI-PAR 30 70 W 830 WDL SP	HCI-PAR 30 70 W 830 WDL FL
Type		Spot 10°, UVS	Flood 30°, UVS	Spot 10°, UVS	Flood 30°, UVS	Spot 10°, UVS	Flood 30°, UVS
ILCOS		MRS/UB-35/30/ 1B-H-E27-65/ 95/10	MRS/UB-35/30/ 1B-H-E27-65/ 95/30	MRS/UB-35/30/ 1B-H-E27-97/ 125/10	MRS/UB-35/30/ 1B-H-E27-97/ 125/30	MRS/UB-70/30/ 1B-H-E27-97/ 125/10	MRS/UB-70/30/ 1B-H-E27-97/ 125/30
Lamp wattage	W	38	38	38	38	73	73
Lamp voltage	V	90	90	90	90	90	90
Ignition voltage min./max.	kVs	3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A	0.5	0.5	0.5	0.5	0.97	0.97
Axial luminous intensity	cd	22000	5000	37000	7000	55000	10000
Beam angle	°	10	30	10	30	10	30
Light colour/Colour appearance		830 WDL	830 WDL	830 WDL	830 WDL	830 WDL	830 WDL
Colour temperature	K	3000	3000	3000	3000	3000	3000
Colour rendering index	R _a	> 80	> 80	> 80	> 80	> 80	> 80
NIOSH Skin	h	> 22	> 22	> 22	> 22	> 22	> 22
ACGIH UV output	mW/m ² · 1000 lx	< 0.37	< 0.37	< 0.37	< 0.37	< 0.37	< 0.37
Base		E27	E27	E27	E27	E27	E27
Diameter d	mm	65	65	97	97	97	97
Length max. l	mm	95	95	125	125	125	125
Burning position		universal	universal	universal	universal	universal	universal
Average lamp life	h	9000	9000	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	300	300	300	300	300	300
Max. perm. base edge temp.	°C	210	210	210	210	210	210
PF corr. cap. at 50 Hz	µF	6	6	6	6	12	12
Lamp reference		HCI-PAR 20 35/830 WDL SP	HCI-PAR 20 35/830 WDL FL	HCI-PAR 30 35/830 WDL SP	HCI-PAR 30 35/830 WDL FL	HCI-PAR 30 70/830 WDL SP	HCI-PAR 30 70/830 WDL FL
EAN		4050300941936	4050300941950	4050300941974	4050300941998	4050300942018	4050300942032
Standard pack	Qty	12	12	6	6	6	6
Figure	No.	1	1	1	1	1	1
Circuit (see page 26)	Fig. no.	1/2	1/2	1/2	1/2	1/2	1/2



Please note:

The values and curves published in this document are for guidance only. The basic data was determined under controlled laboratory conditions for a switching cycle of 11 h on/1 h off.

There may be considerable differences in actual practice. The highlighted areas around the curves represent a 90% confidence range based on our test conditions.

NIOSH threshold and ACGIH UV output:

The radiated energy of a lamp is indicated by the defined NIOSH curve.

The NIOSH effective radiated output calculated from this is converted into permitted exposure times with defined limit values.

The ACGIH UV output value correlates directly with the NIOSH value and represents the current required value for UV exposure.

PF correction capacitor:

The pf correction capacitors are designed so that $\cos \varphi \geq 0.9$ is achieved at rated voltage.

Operating instructions

Supply voltage:

The lamps must be connected via suitable control gear. A 240 V / 50 Hz ac supply is generally required. If a different supply voltage is used (e.g. 400 V / 50 Hz) control gear with appropriate taps must be used.

Permitted mains voltage deviation: $\pm 3\%$

Sudden fluctuations in mains voltage of more than 10% may cause the lamps to go out. If the deviation from rated supply voltage (230 V or 400 V) is permanent, high-pressure discharge lamps may exhibit changes in colour or luminous flux. Lamp life may also be reduced.

Control gear:

Conventional control gear: Choke, igniter and pf correction capacitor.

The right igniter for the particular lamp type must be used to ensure reliable and safe ignition. Igniters must always be installed close to the lamp. The choke may be installed any distance from the lamp, provided the permissible voltage drop is not exceeded.

For power supplies with a neutral conductor the choke should be connected to the live conductor. In the case of luminaires in which there are no lamps installed, the ignition equipment (igniter, ignition pulser) must be disabled when voltage is applied otherwise the igniters may produce radio interference.

The chokes and pf correction capacitors generally needed for operating discharge lamps may, under certain conditions, create oscillating circuits. These circuits may then produce excessive currents and voltages, which in turn can destroy the lamps, ballasts and capacitors. Such resonance phenomena must be avoided by appropriate circuits and fuses.

When high-pressure discharge lamps come to the end of their lives a rectifier effect may occur (see IEC 62035). This is not manufacturer-specific. Because of the excessive dc current components the ballasts and igniters may become overheated. High-pressure discharge lamps should therefore only be operated with control gear with thermal protection. This applies also to control gear with the option of power reduction.

Suitable igniters and control gear for POWERBALL® HCl® are available from the electrical industry.

Operating temperatures:

Only high-pressure discharge lamps with external igniters are suitable for low-temperature applications down to $-50\text{ }^{\circ}\text{C}$. Such applications call for special (heatable) igniters such as MZN 400 SU-LT from BAG Turgi (for lamps from 100 to 400 W).

Power factor:

CCG: Because of the series connected choke this is around 0.5 to 0.7 (without compensation)
ECG: If **POWERTRONIC®** is used the power factor is greater than 0.96. Compensation is therefore not needed here.

Switching on:

Full luminous flux is reached only a few minutes after the lamp is switched on. The start-up current may be up to twice the operating current depending on the control gear. (See also the graphs on p. 25)

Fusing:

HCl® lamps must be protected by slow acting fuses. If fuse wire is used it is sufficient for it to be rated at twice the rated current of the lamp. If automatic cutouts are used they should have characteristic "C". If adjusted to the upper limit value of 10 x rated current there will be no triggering if fuse protection is at twice the rated lamp current.

Restarting:

The lamps will restart only after they have cooled down for 2 to 15 minutes.

Lampholders:

Because of the high voltages involved in ignition the lampholders must be designed for these high voltages. Lampholders that meet these requirements are available from appropriate manufacturers.

Dimming:

In principle, dimming of HCl® POWERBALL® is technically feasible, but **OSRAM does not recommend it** for the lamps currently available on the market, because the typical characteristics of HCl® POWERBALL® change when dimmed. The higher thermal load capacity of the round ceramic burner offers better dimming behavior in terms of luminous efficacy and color rendering compared to metal halide lamps with quartz burners or standard cylindrical ceramic burners. As before, however, dimming does lead to a change in the chromaticity coordinates. Lamps operated at dimmed settings suffer a greater loss of luminous flux and a greater color shift over their lifetime.

Because there are many different methods of dimming and the effects on the physics of the lamps are highly complex there is as yet no statistically sound information on the performance of the lamps over their lifetime.

In addition, there is still no standardized dimming cycle by which the lamps can be reliably tested.

The warranted product characteristics cannot therefore be guaranteed for lamps operated at dimmed settings.

The operation of OSRAM HCl® POWERBALL® lamps at dimmed settings is not permitted as this results in significant color shifts, bad lumen maintenance and shorter lifetime.

End of life:

To protect the control gear and to avoid radio interference, high-pressure discharge lamps must be replaced as soon as they come to the end of their life.

These lamps reach their end of life when

- the light colour of the lamp changes dramatically
- there is a significant loss of brightness
- the lamp no longer ignites
- the lamp starts to cycle (periodically goes out and ignites again).

As a lamp reaches the end of its life the risk of bursting increases. This phenomenon is caused by effects not connected with the manufacturer, such as the rectifying effect mentioned earlier. Because of this we strongly recommend changing the lamp no later than when it reaches its average life or if one of the above effects occurs.

Notes on disposal:

All metal halide lamps contain small quantities of mercury. If they break, poisonous mercury vapour may be released. The lamps must be treated as waste requiring special supervision with EEC code **20 01 21** for waste or residue containing mercury and should be passed to a relevant collection or recycling company.

Guarantee:

A guarantee can only be made if suitable control gear is used and the defined operating conditions are met.

Safety:

OSRAM high-pressure lamps meet the safety requirements defined in IEC 62035.

All HCl® lamps are of UV-reduced design.

Because of their high operating pressure the following lamps may only be used in fully enclosed luminaires designed to take them:

- All HCl®-TS
- All HCl®-T, all HCl®-TT
- All HCl®-TC
- All HCl®-E ≥ 250 W
- All HCl®-TF
- All HCl®-TM

As we cannot completely rule out the possibility of the bulb bursting, luminaires for the lamps mentioned above must be equipped with sealed shatter-proof shields that can withstand wide fluctuations in temperature.

Operating lamps with a damaged outer bulb is dangerous and therefore not permitted.

Lamp operation:

Operating high-pressure lamps for short periods in combination with frequent on/off switching will shorten their life. This applies to both cold starting and hot restarts.

The following lamps are suitable for open luminaires:

- All HCl®-T/P
- All HCl®-E/P
- All HCl®-R111
- All HCl®-PAR

The use of shields should be considered for safety reasons in each case.

HCl® lamps for outdoor applications and damp locations may only be operated in luminaires approved for the purpose.

Luminaire design:

Luminaire design (thermal design and fuse protection) should be based on the EN 60598-1 standard.

Photometric and electrical data:

All lamp-specific electrical and photometric data is measured after 100 hours of operation under laboratory conditions on reference equipment.

The measurement switching cycle is 11 hours on/1 hour off. Unless otherwise indicated, the data relates to the horizontal burning position for TS types and to the base up burning position for other types.

The graphs for survival rates and luminous flux behaviour are average values for all wattages and light colours of lamps identical in construction.

The spread of the average values has not been taken into account. For detailed information on particular lamp types please contact OSRAM.

The luminous flux is virtually unaffected by the ambient temperature outside the luminaire. At low ambient temperatures down to around – 50 C° special igniters are needed.

Detailed information on heat accumulation tubes (luminaire simulators) for determining lamp data for HCl®-TS is given in IEC 61167, clause 1.7.

Colour deviations:

With all metal halide lamps there may be differences in colour from one lamp to the next due to external factors such as mains voltage, type of control gear used, burning position and luminaire design.

Lamp life

There are a confusing number of definitions for lamp life, and these differ from one region to the next and from one application to the next. The basic definitions for the most common types are given below.

This document refers explicitly only to the **average life**.

Average life:

Average number of hours burned over several groups in which in the group in question half the lamps have failed as the result of a defect (corresponds to 50% failure).

Survival rate:

Quantity of working lamps of a group of lamps after a defined number of burning hours.
Average value of some groups.

Minimum life:

Minimum period of time in which a lamp remains in operation under laboratory conditions.

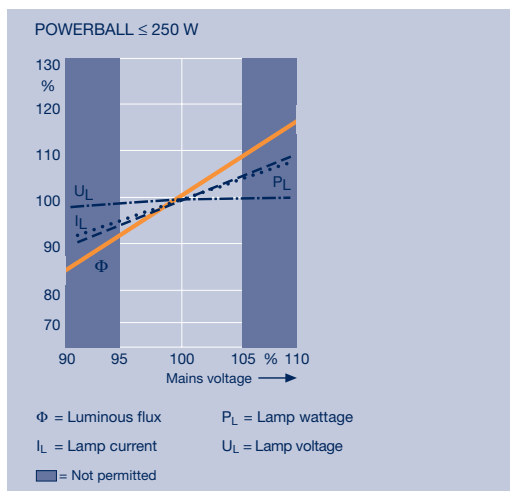
Economical life:

Period of time between group relamping of an installation under the condition that operating costs are minimised and the installation luminous flux does not fall below a particular value. This will vary according to the application.

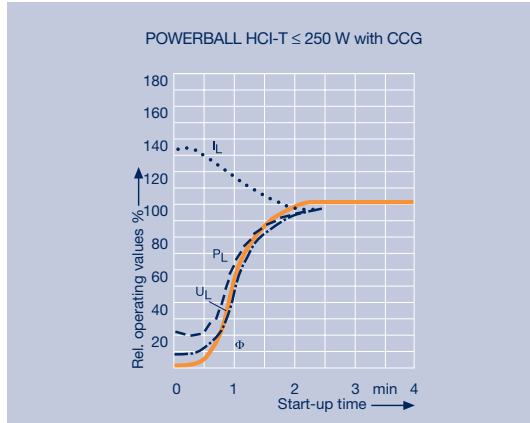
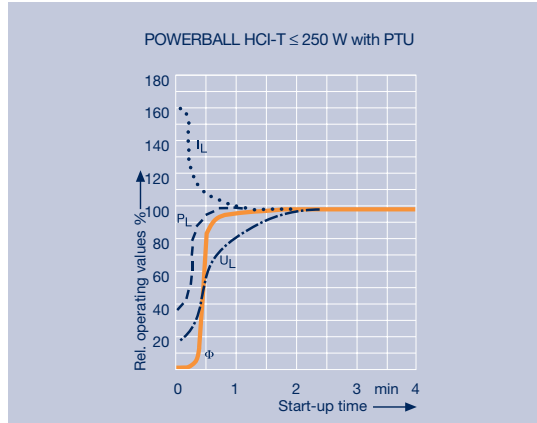
Service life:

Simplified practical view of the economical life. This is the operating time after which the installation luminous flux (the product of the relative luminous flux and the lamps still in operation) is still around 70% (sometimes 80%).

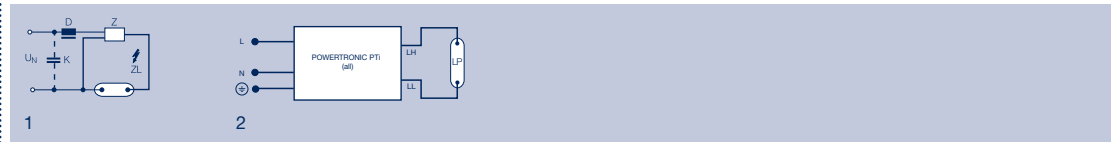
Operating characteristics in relation to the supply voltage



Start-up behaviour (average value)



Circuit diagrams

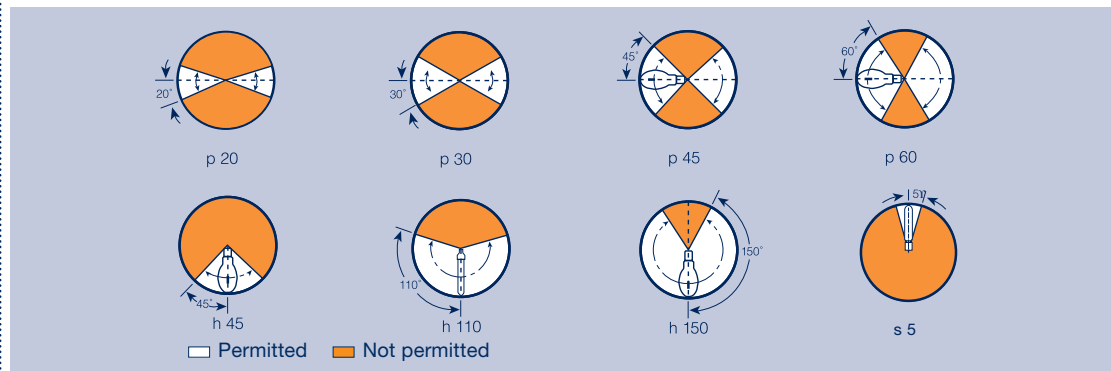


D = Choke
K = PF correction capacitor
LP = Lamp
U_N = 230 V ac mains voltage (for 2000 W = 400 V ac)

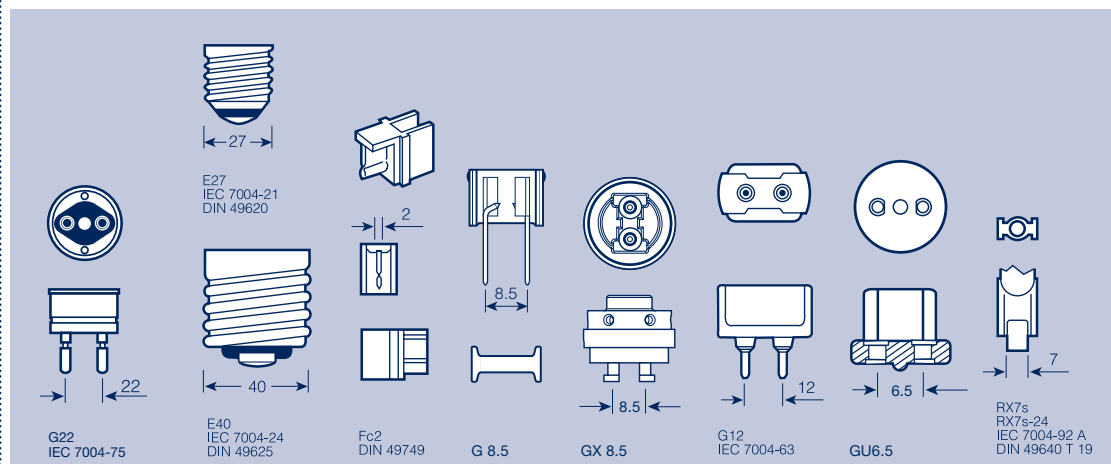
Z = Igniter to be installed near the lamp
ZL = HF igniter lead to contact plate of lamp

For power supplies with a neutral conductor the choke should be connected to the live conductor.
 The right igniter for the particular lamp type must be used to ensure reliable and safe ignition.
 Chokes, holder, capacitors and igniters are available from electrical suppliers.

Burning positions

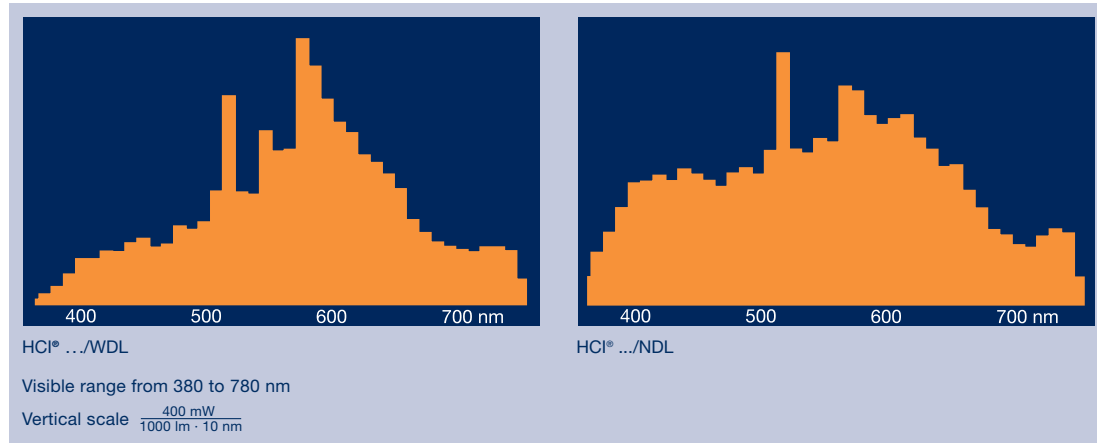


Base

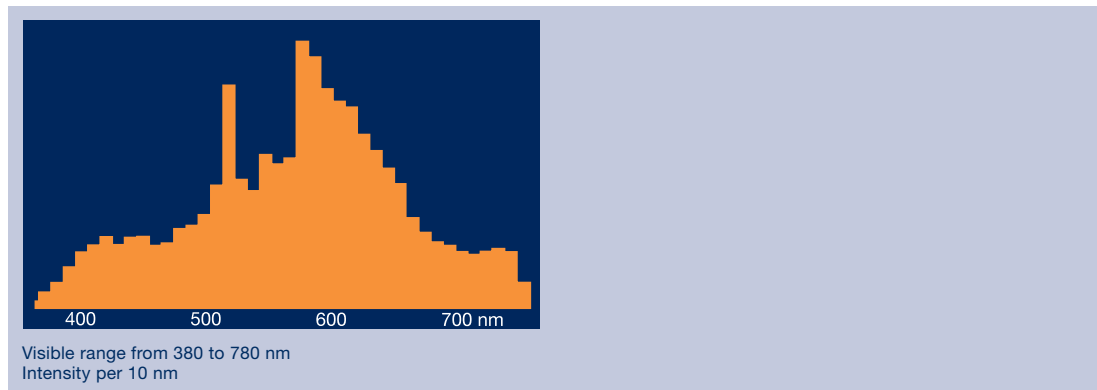


Spectral power distribution of discharge lamps

POWERBALL®



POWERBALL® SHOPLIGHT



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OSRAM supplies customers in around 150 countries.

- 65 companies and sales offices for 100 countries
- 48 countries served by local agents or OSRAM GmbH, Munich

OSRAM associated companies and support centres.

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Canada	Philippines
Chile	Poland
China	Portugal
Columbia	Rumania
Croatia	Russia
Czech Republic	Serbia-Montenegro
Denmark	Singapore
Ecuador	Slovakia
Egypt	South Africa
Estonia	South Korea
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