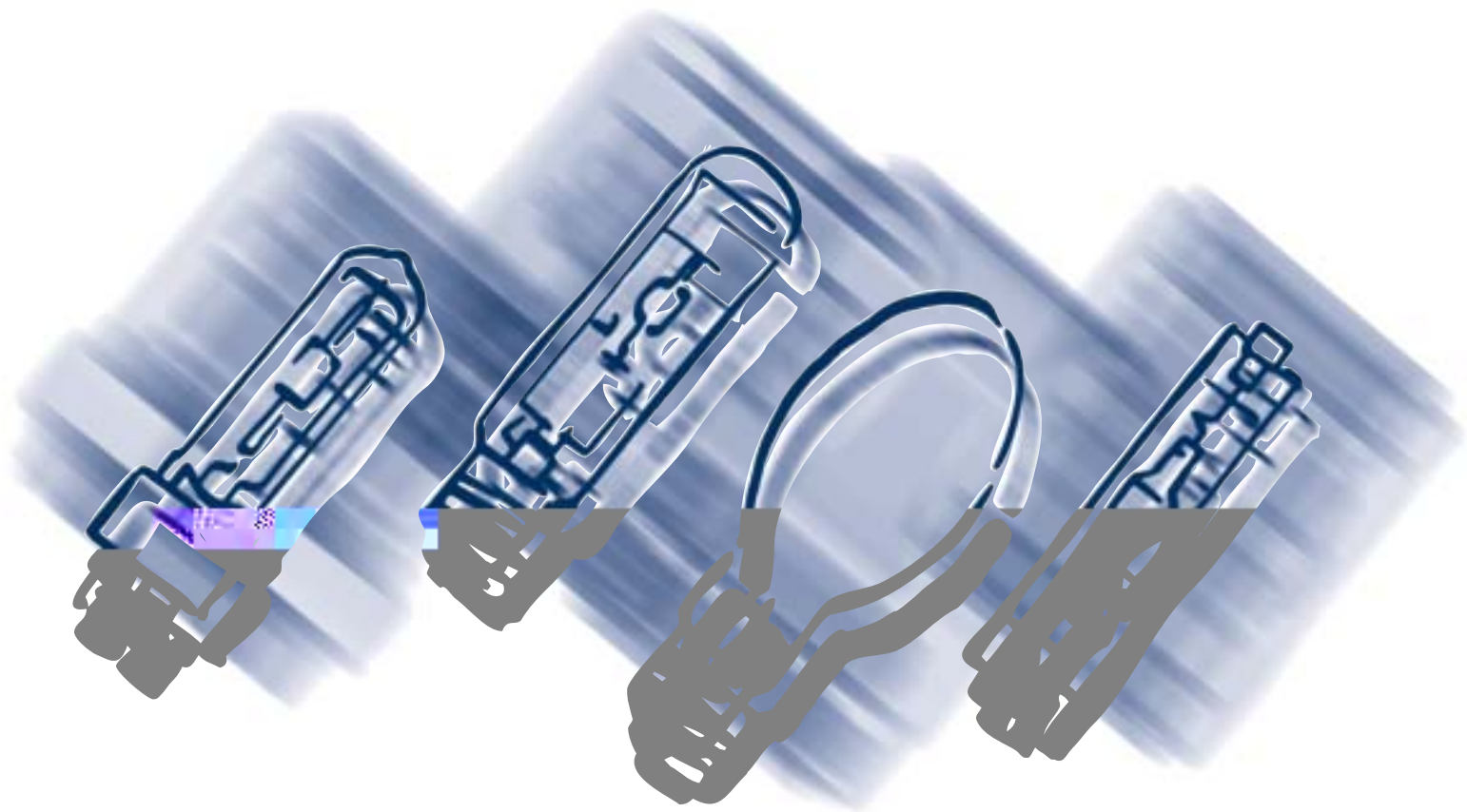


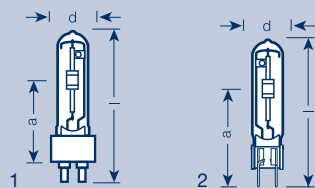


POWERSTAR HQI/HCI
POWERBALL HCI

EW LIGHT

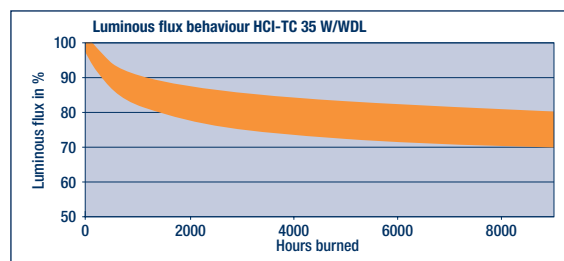
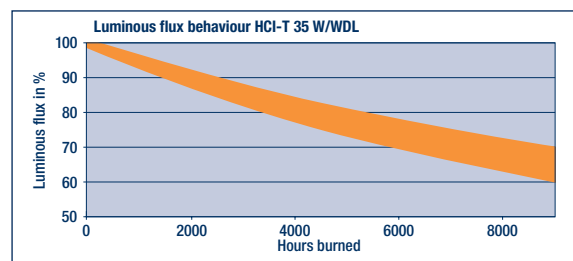
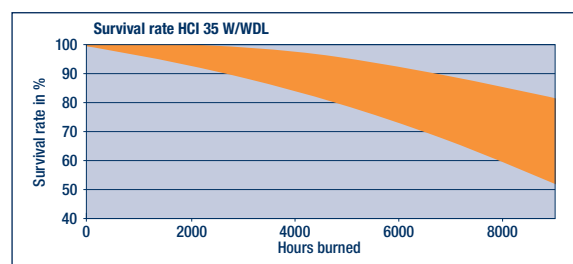
OSRAM

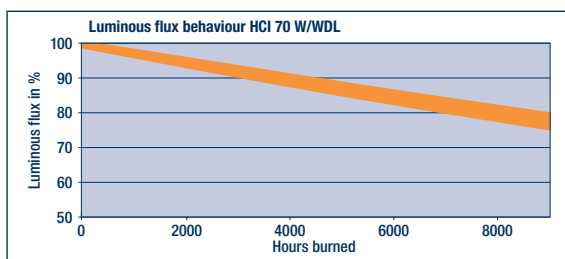
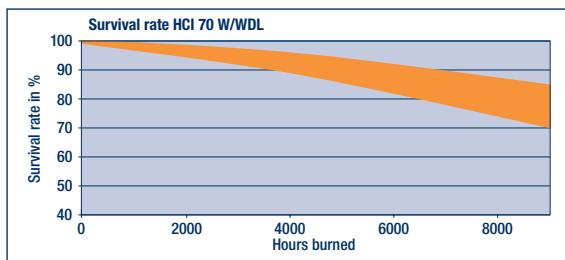
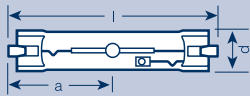
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HCI 35 W

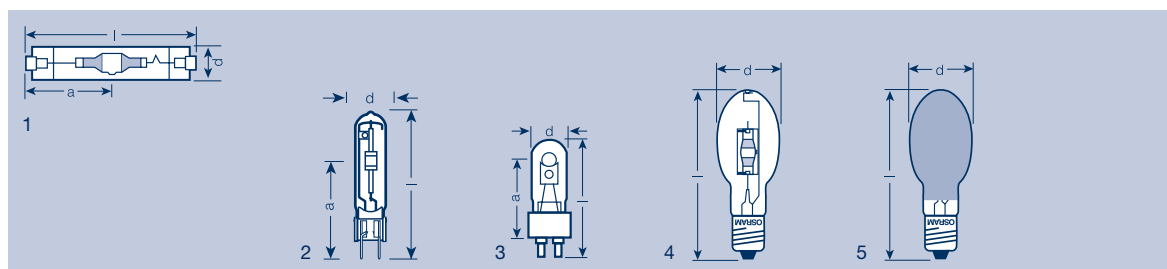
		WDL	TC
		T	UVS
Type		UVS	UVS
ILCOS		MT-35/30/1B-H 90/S-G12-20/100	MT-35/30/1B-H 90/S-G8.5-15/81
Lamp wattage	W	39	39
Lamp voltage	V	90	90
Ignition voltage min./max.	kVs	3.6/5	3.6/4.5
Lamp current	A	0.5	0.5
Nominal luminous flux	lm	3300	3300
Luminous efficacy	[lm/W]	85	85
Average luminance	cd/cm ²	—	—
Light colour/Colour appearance		WDL	WDL
Colour temperature	K	3000	3000
Colour rendering index	R _a	81	81
NIOSH Skin	h	> 21	> 21
ACGIH UV output	mW	< 0.4	< 0.4
Base		G12	G8.5
Diameter d	mm	19	15
Length max. l	mm	100	81
LCL a	mm	56	52
Burning position		universal	universal
Average lamp life	h	9000	9000
Max. perm. outer bulb temp.	°C	450	450
Max. perm. base edge temp.	°C	280	280
PF corr. cap. at 50 Hz	µF	6	6
Lamp reference		HCI-T 35/WDL	HCI-TC 35/WDL
EAN 4050300		468013	581378
Standard pack	Qty	12	12
Figure	No.	1	2
Circuit (see page 28)	Fig. no.	2/5	2/5



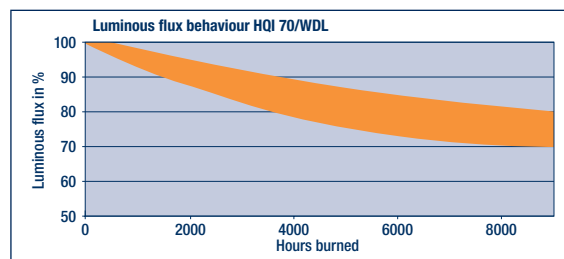
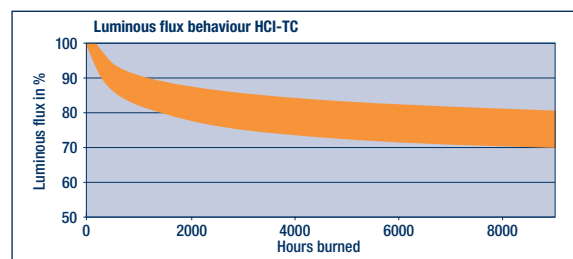
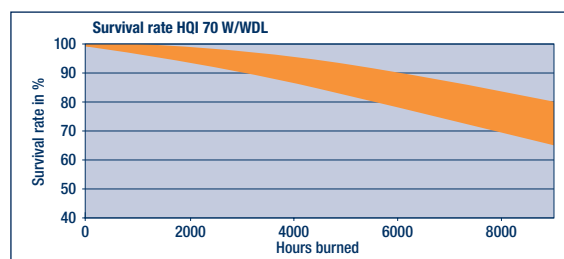
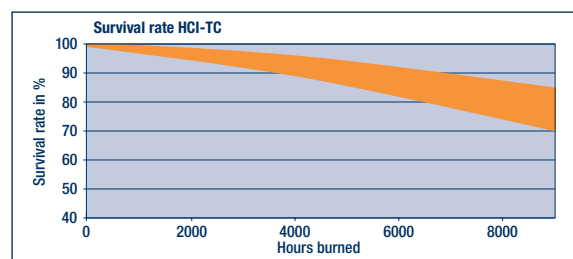


POWERSTAR® HCI®

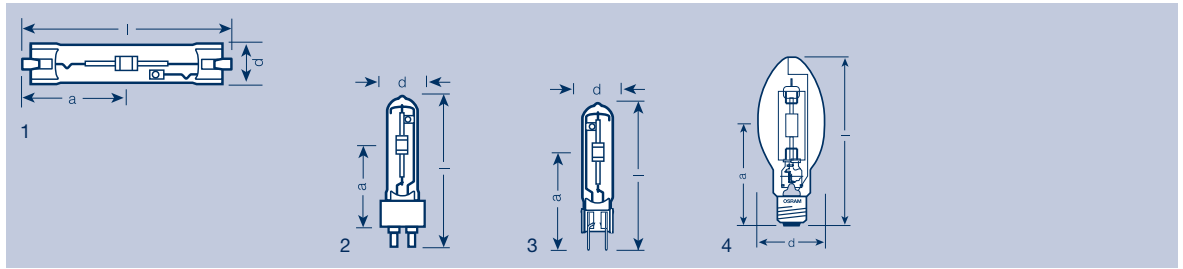
POWERSTAR® HQI®



		HCI 70 W	HQI 70 W	HQI 70 W	HQI 70 W	HQI 70 W
		WDL	TS	T	E clear	E coated
Type		UVS	UVS	UVS		
ILCOS		MT-70/30/1B-H 90/S-G8.5- 15/82	MD-70/30/1B-H 97/S-RX7s-20/ 114.2/P 45	MT-70/30/1B-H 95/S-G12-25/84	MCS-70/32/1B-H 98/S-E27-55/144	MES-70/31/1B-H 98/S-E27-55/144
Lamp wattage	W	72	75	75	73	73
Lamp voltage	V	90	95	95	95	95
Ignition voltage min./max.	kVs	3.6/4.5	3.6/4.5	3.6/5	3.6/4.5	3.6/4.5
Lamp current	A	1	1	1	0.95	0.95
Nominal luminous flux	lm	6600	5000	5200	4700	4900
Luminous efficacy	lm/W	92	64	69	64	67
Average luminance	cd/cm ²	—	1500	1500	1500	21
Light colour/Colour appearance		WDL	WDL	WDL	WDL	WDL
Colour temperature	K	3000	3000	3000	3200	3100
Colour rendering index	R _a	81	76	76	70	70
NIOSH	h	> 24	> 23	> 17.3	> 134	> 150
ACGIH UV output	mW	< 0.35	< 0.36	< 0.48	< 0.06	< 0.06
Base		G8.5	RX7s	G12	E27	E27
Diameter d	mm	15	20	25	55	55
Length max. l	mm	81	114.2	84	144	144
LCL a	mm	52	57	56	92	—
Burning position		universal	p 45	universal	universal	universal
Average lamp life	h	9000	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	450	500	500	275	275
Max. perm. base edge temp.	°C	300	280	280	190	190
PF corr. cap. at 50 Hz	µF	12	12	12	12	12
Lamp reference		HCI-TC 70/WDL UVS	HQI-TS 70/WDL UVS	HQI-T 70/WDL UVS	HQI-E 70/WDL clear	HQI-E 70/WDL coated
EAN 4050300		581392	412955	412993	397788	397801
Standard pack	Qty	12	12	12	20	20
Figure	No.	2	1	3	4	5
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5	2/5

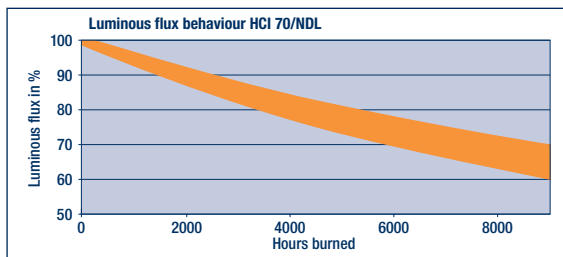
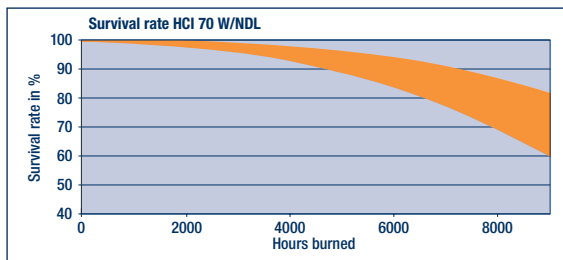


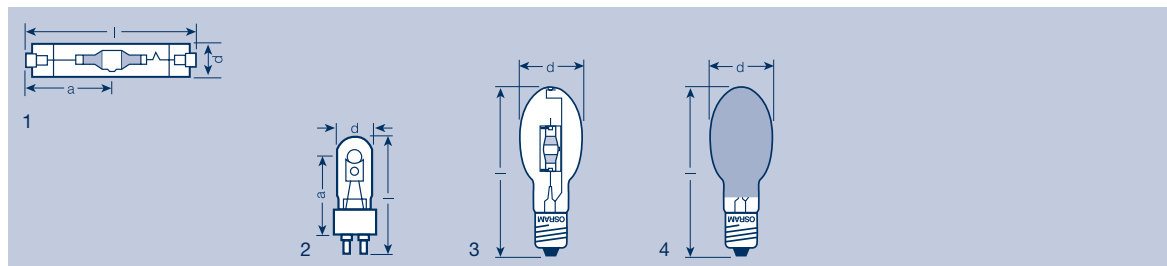
POWERSTAR® HCI®



HCI 70 W

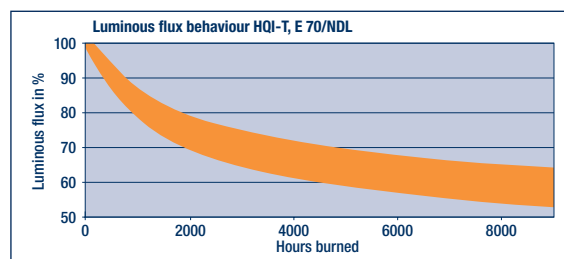
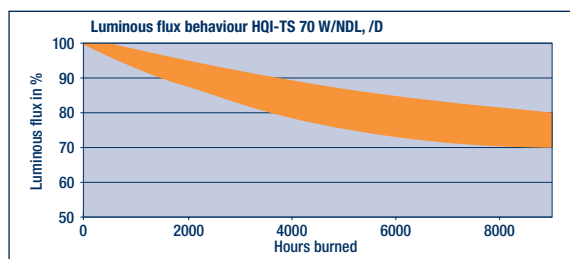
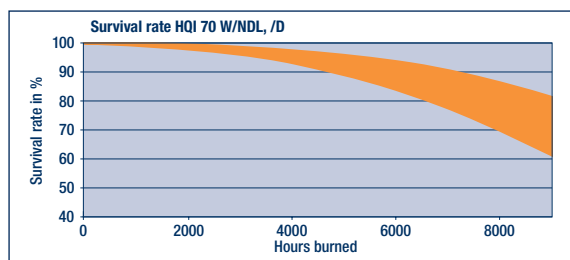
		NDL	T	TC	E/P clear	E/P coated
		TS	T	TC	E/P clear	E/P coated
Type		UVS	UVS	UVS		
ILCOS		MD-70/42/1A-H 90/S-RX7s- 21/114/P 45	MT-70/42/1A-H 90/S-G12-20/100	MT-70/42/1A-H 90/S-G8.5-15/81	MCS-70/42/1A-H 90/S-E27-54/138	MES-70/42/1A-H 99/S-E27-54/138
Lamp wattage	W	72	72	72	72	72
Lamp voltage	V	95	90	90	100	100
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A	0.95	1	0.95	0.98	0.98
Nominal luminous flux	lm	5700	5800	6000	5400	5200
Luminous efficacy	lm/W	79	81	84	75	72
Average luminance	cd/cm ²	—	—	—	—	—
Light colour/Colour appearance		NDL	NDL	NDL	NDL	NDL
Colour temperature	K	4200	4200	4200	4200	4200
Colour rendering index	R _a	92	92	94	90	90
NIOSH	h	> 29.7	> 27	> 22	—	—
ACGIH UV output	mW	< 0.28	< 0.31	< 0.37	—	—
Base		RX7s	G12	G8.5	E27	E27
Diameter d	mm	21	19	15	54	54
Length max. l	mm	114.2	100	81	138	138
LCL a	mm	57	56	52	86	—
Burning position		p 45	universal	universal	universal	universal
Average lamp life	h	9000	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	500	500	450	275	275
Max. perm. base edge temp.	°C	280	280	300	190	190
PF corr. cap. at 50 Hz	µF	12	12	12	12	12
Lamp reference		HCI-TS 70/NDL	HCI-TS 70/NDL	HCI-TC 70/NDL	HCI-E/P 70/NDL clear	HCI-E/P 70/NDL coated
EAN 4050300		467917	467832	637693	637556	637631
Standard pack	Qty	12	12	12	12	12
Figure	No.	1	2	3	4	4
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5	2/5





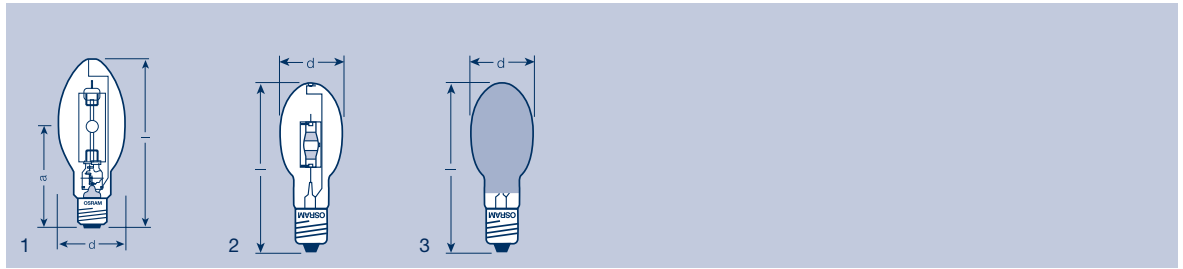
HQI 70 W

Type		NDL	T	E clear	E coated	D
		TS				TS
ILCOS		UVS	UVS			UVS
		MD-70/42/1B-H 85/S-RX7s- 20/114.2/P 45	MT-70/42/1B-H 95/S-G12-25/84	MCS-70/40/1B-H 85/S-E27-55/144	MES-70/38/1B-H 85/S-E27-55/144	MD-70/52/1B-H 95/S-RX7s- 20/114.2/P 45
Lamp wattage	W	73	75	73	73	75
Lamp voltage	V	85	100	90	90	110
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A	1	1	1	1	1
Nominal luminous flux	lm	5500	5500	5200	4900	5000
Luminous efficacy	lm/W	75	73	71	67	67
Average luminance	cd/cm ²	1650	—	1600	25	1500
Light colour/Colour appearance		NDL	NDL	NDL	NDL	D
Colour temperature	K	4000	4200	4000	3800	5200
Colour rendering index	R _a	83	84	70	70	85
NIOSH	h	> 7	> 58	> 179	> 179	> 16
ACGIH UV output	mW	< 1.26	< 0.14	< 0.05	< 0.05	< 0.52
Base		RX7s	G12	E27	E27	RX7s
Diameter d	mm	20	25	55	55	20
Length max. l	mm	114.2	84	144	144	114.2
LCL a	mm	57	56	92	—	57
Burning position		p 45	universal	universal	universal	p 45
Average lamp life	h	9000	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	500	500	275	275	500
Max. perm. base edge temp.	°C	280	280	190	190	280
PF corr. cap. at 50 Hz	µF	12	12	12	12	12
Lamp reference		HQI-TS 70/NDL UVS	HQI-T 70/NDL UVS	HQI-E 70/NDL clear	HQI-E 70/NDL coated	HQI-TS 70/D UVS
EAN 4050300		421931	488424	397825	397849	437521
Standard pack	Qty	12	12	20	20	12
Figure	No.	1	2	3	4	1
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5	2/5

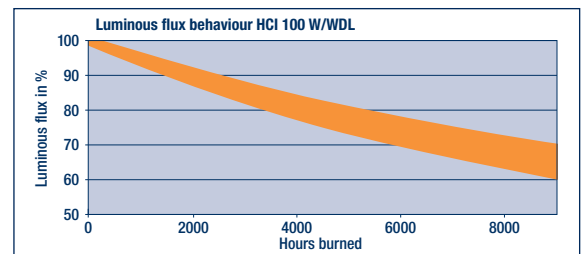
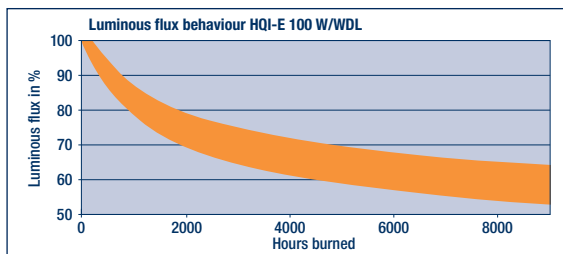
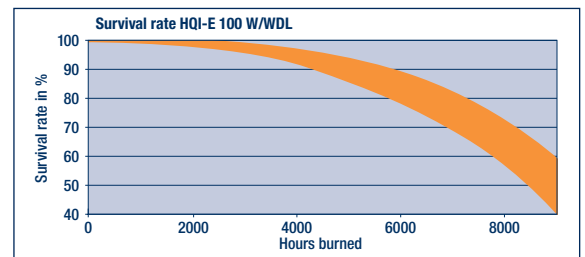
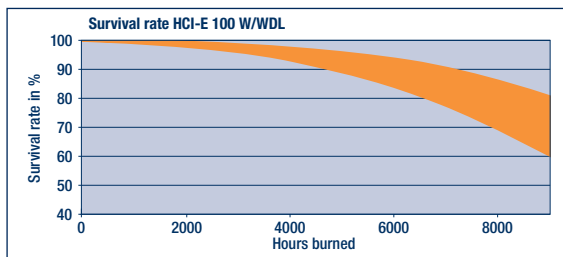


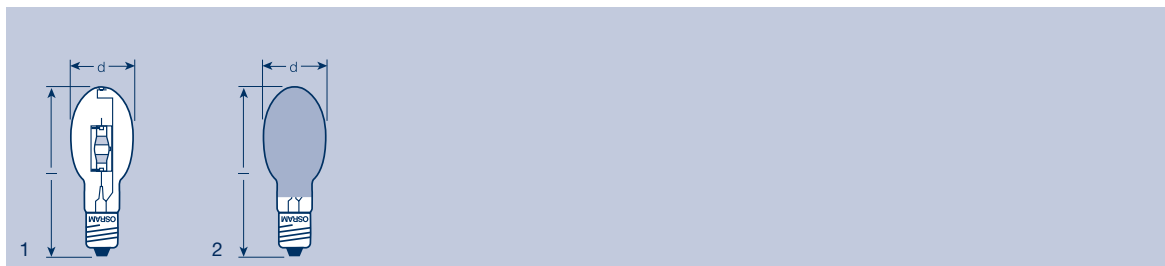
POWERBALL® HCI®

POWERSTAR® HQI®



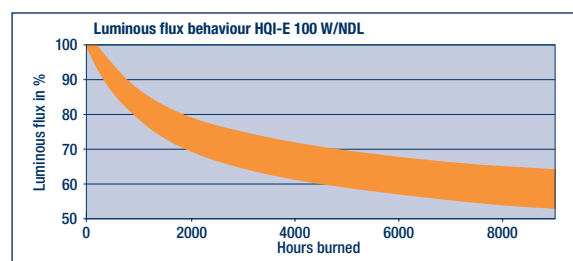
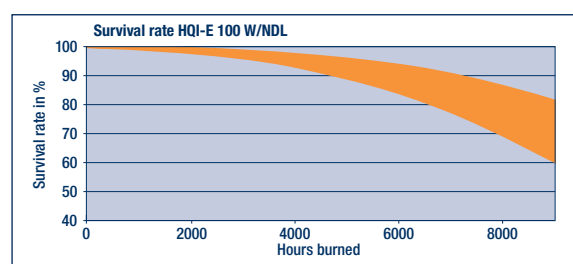
		HCI 100 W		HQI 100 W	
		WDL		WDL	
Type		E/P clear NEW	E/P coated NEW	E clear	E coated
		PB	PB		
ILCOS		MCS-100/30/1B-H 100/S-E27-54/141	MES-100/30/1B-H 100/S-E27-54/141	MCS-100/30/1B-H 100/S-E27-55/144	MES-100/29/1B-H 100/S-E27-55/144
Lamp wattage	W	100	100	100	100
Lamp voltage	V	100	100	95	95
Ignition voltage min./max.	kVs	3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A	1.1	1.1	1.1	1.1
Nominal luminous flux	lm	9000	8600	8500	8000
Luminous efficacy	lm/W	90	86	85	80
Average luminance	cd/cm ²	—	—	1700	28
Light colour/Colour appearance		WDL	WDL	WDL	WDL
Colour temperature	K	3000	3000	3000	2900
Colour rendering index	R _a	90	86	85	80
NIOSH	h	> 500	> 500	> 231	> 231
ACGIH UV output	mW	< 0.02	< 0.02	< 0.04	< 0.04
Base		E27	E27	E27	E27
Diameter d	mm	54	54	55	55
Length max. l	mm	141	141	144	144
LCL a	mm	92	—	92	—
Burning position		universal	universal	universal	universal
Average lamp life	h	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	275	275	275	275
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 100/WDL PB clear	HCI-E/P 100/WDL PB coated	HQI-E 100/WDL clear	HQI-E 100/WDL coated
EAN 4050300		941875	941899	351537	351551
Standard pack	Qty	12	12	20	20
Figure	No.	1	1	2	3
Circuit (see page 28)	Fig. no.	2	2	2	2



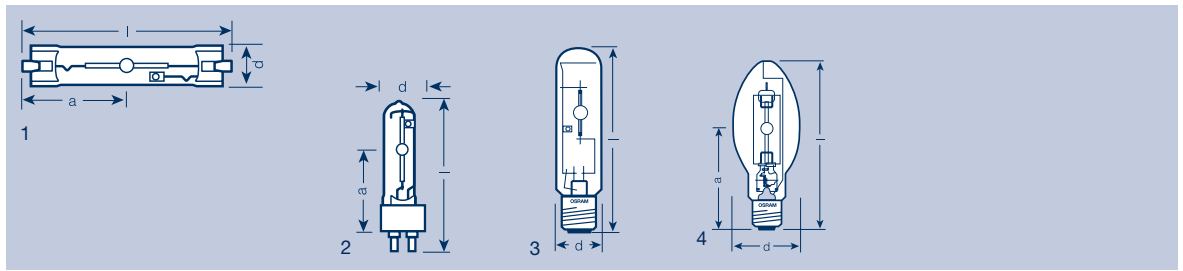


HQI 100 W

		NDL	
		E clear	E coated
Type			
ILCOS		MCS-100/40/1B-H	MES-100/38/1B-H
		115/S-E27-55/144	115/S-E27-55/144
Lamp wattage	W	100	100
Lamp voltage	V	95	95
Ignition voltage min./max.	kVs	3.6/4.5	3.6/4.5
Lamp current	A	1.1	1.1
Nominal luminous flux	lm	7800	7300
Luminous efficacy	lm/W	78	73
Average luminance	cd/cm ²	1800	30
Light colour/Colour appearance		NDL	NDL
Colour temperature	K	4000	3800
Colour rendering index	R _a	70	70
NIOSH	h	> 305	> 306
ACGIH UV output	mW	< 0.03	< 0.04
Base		E27	E27
Diameter d	mm	55	55
Length max. l	mm	144	144
LCL a	mm	92	—
Burning position		universal	universal
Average lamp life	h	9000	9000
Max. perm. outer bulb temp.	°C	275	275
Max. perm. base edge temp.	°C	190	190
PF corr. cap. at 50 Hz	μF	16	16
Lamp reference		HQI-E 100/NDL clear	HQI-E 100/NDL coated
EAN 4050300		345871	345833
Standard pack	Qty	20	20
Figure	No.	1	2
Circuit (see page 28)	Fig. no.	2	2

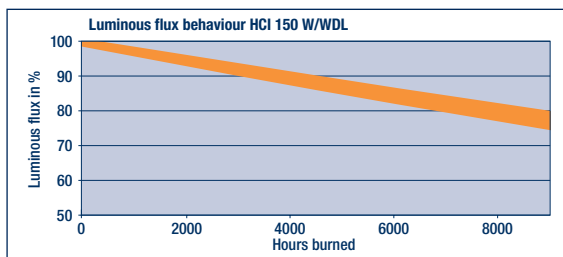
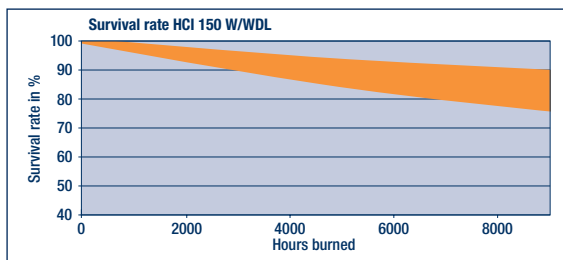


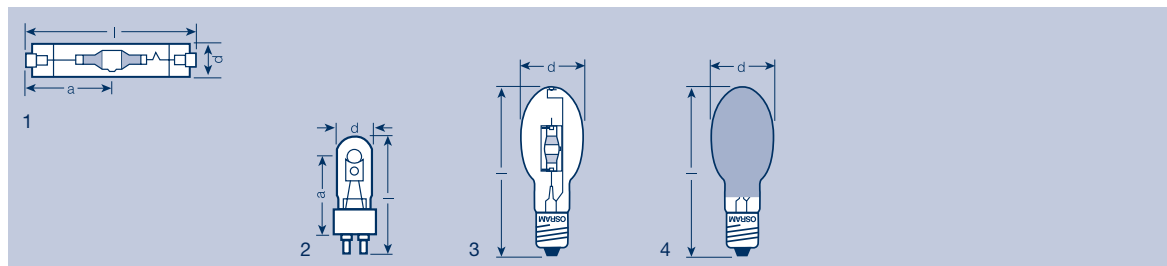
POWERBALL® HCl®



HCl 150 W

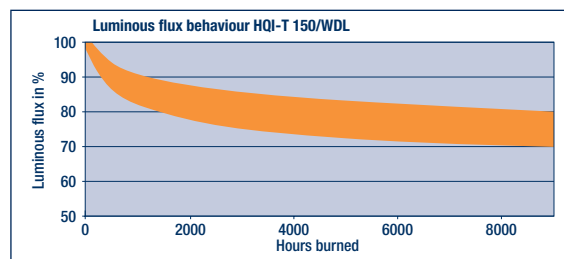
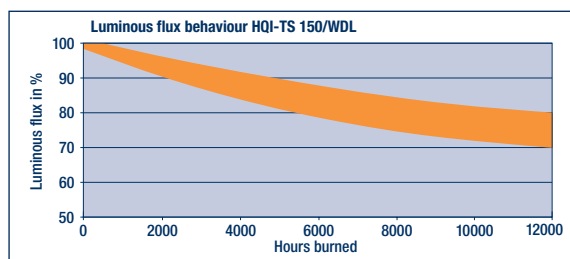
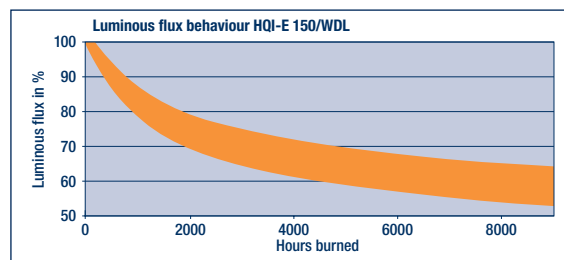
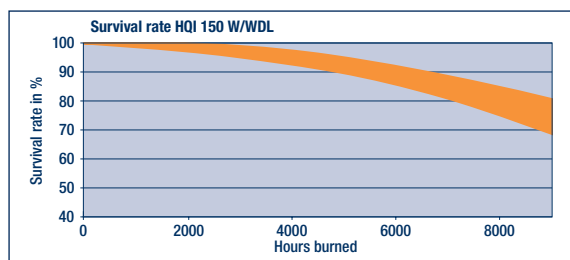
Type		WDL				
		TS ^{New}	T ^{New}	TT ^{New}	E/P clear ^{New}	E/P coated ^{New}
		UVS, PB	UVS, PB	PB	UVS, PB	UVS, PB
ILCOS		MD-150/30/1B-H 100/S-RX7s-24- 24/132/P 45	MT-150/30/1B-H 100/S-G12-20/105	MT-150/30/1B-H 97/S-E40-46/204	MCS-150/30/1B-H 109/S-E27-54/138	MES-150/30/1B-H 109/S-E27-54/138
Lamp wattage	W	147	147	145	145	145
Lamp voltage	V	100	100	95	95	95
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3/4.5	3.6/4.5	3.6/4.5
Lamp current	A	1.8	1.8	1.8	1.8	1.8
Nominal luminous flux	lm	14800	14500	14500	13500	13000
Luminous efficacy	lm/W	100	99	100	93	90
Average luminance	cd/cm ²	—	—	—	—	—
Light colour/Colour appearance		WDL	WDL	WDL	WDL	WDL
Colour temperature	K	3000	3000	3000	3000	3000
Colour rendering index	R _a	91	89	90	90	90
NIOSH	h	> 238	> 138	> 208	—	—
ACGIH UV output	mW	< 0.4	< 0.06	< 0.04	—	—
Base		R7s-24	G12	E40	E27	E27
Diameter d	mm	23	23	46	54	54
Length max. l	mm	132	105	204	138	138
LCL a	mm	66	56	132	86	—
Burning position		universal	universal	universal	universal	universal
Average lamp life	h	9000	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	650	650	310	300	300
Max. perm. base edge temp.	°C	280	280	210	190	190
PF corr. cap. at 50 Hz	µF	20	20	20	20	20
Lamp reference		HCl-TS 150/WDL PB	HCl-T 150/WDL PB	HCl-TT 150/WDL PB	HCl-E/P 150/WDL PB clear	HCl-E/P 150/WDL PB coated
EAN 4050300		783987	783949	784144	780870	781846
Standard pack	Qty	12	12	12	12	12
Figure	No.	1	2	3	4	4
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5	2/5



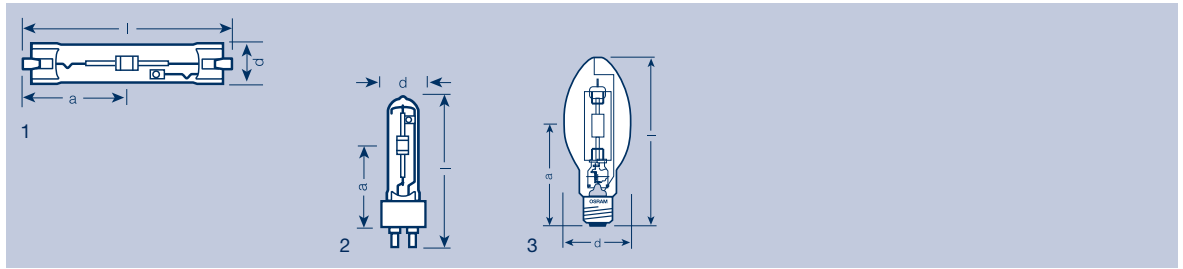


HQI 150 W

		WDL			
		TS	T	E clear	E coated
Type		UVS	UVS		
ILCOS		MD-150/30/1B-H 95/S-RX7s-24- 23/132/P 45	MT-150/30/1B-H 100/S-G12-25/84	MCS-150/29/1B-H 100/S-E27-54/141	MES-150/29/1B-H 100/S-E27-55/144
Lamp wattage	W	150	150	150	150
Lamp voltage	V	95	100	95	95
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3.6/4.5	3.6/4.5
Lamp current	A	1.8	1.8	1.8	1.8
Nominal luminous flux	lm	11000	13000	12000	12000
Luminous efficacy	lm/W	73	87	80	80
Average luminance	cd/cm ²	2400	—	—	—
Light colour/Colour appearance		WDL	WDL	WDL	WDL
Colour temperature	K	3000	3000	2900	2900
Colour rendering index	R _a	76	77	70	70
NIOSH	h	> 41	> 22	> 50	> 50
ACGIH UV output	mW	< 0.2	< 0.4	< 0.17	< 0.17
Base		RX7s-24	G12	E27	E27
Diameter d	mm	23	25	55	55
Length max. l	mm	132	84	144	144
LCL a	mm	66	56	92	—
Burning position		p 45	universal	universal	universal
Average lamp life	h	12000	9000	9000	9000
Max. perm. outer bulb temp.	°C	650	550	275	275
Max. perm. base edge temp.	°C	280	280	140	140
PF corr. cap. at 50 Hz	µF	20	20	20	20
Lamp reference		HQI-TS 150/WDL UVS	HQI-T 150/WDL UVS	HQI-E 150/WDL clear	HQI-E 150/WDL coated
EAN 4050300		412979	413013	433974	433998
Standard pack	Qty	12	12	20	20
Figure	No.	1	2	3	4
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5

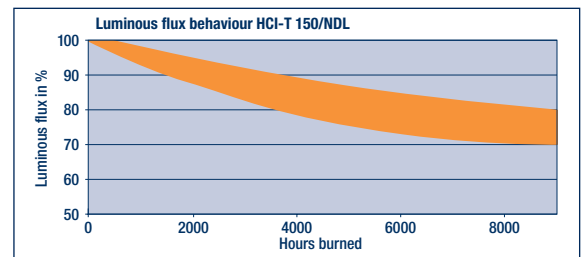
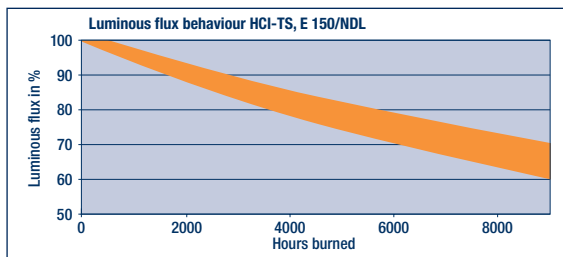
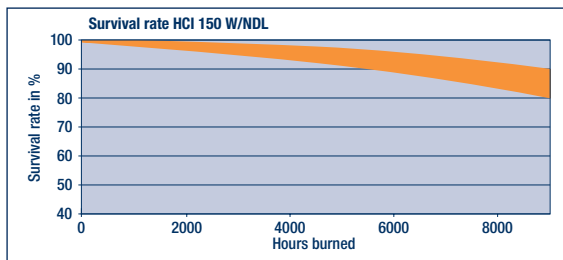


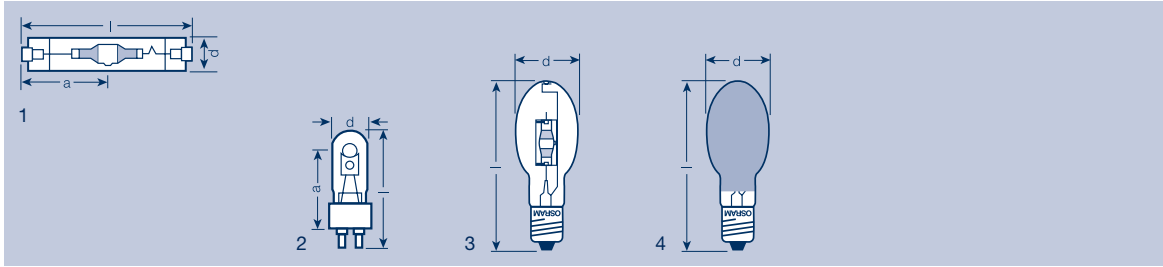
POWERSTAR® HCI®



HCI 150 W

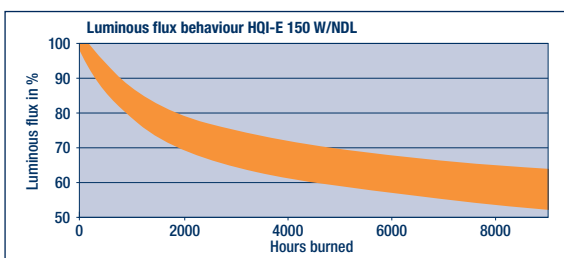
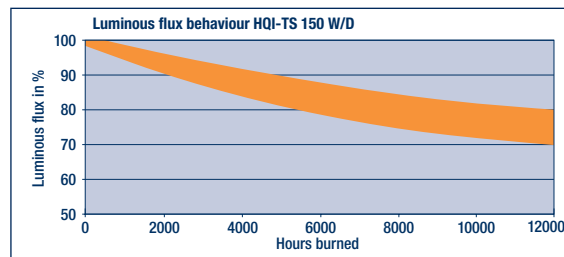
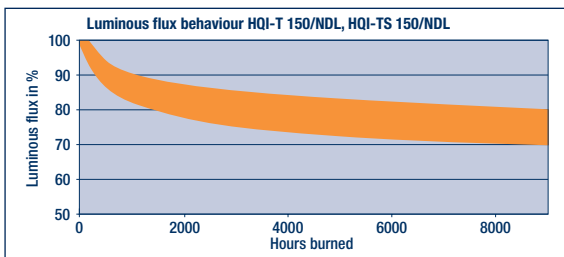
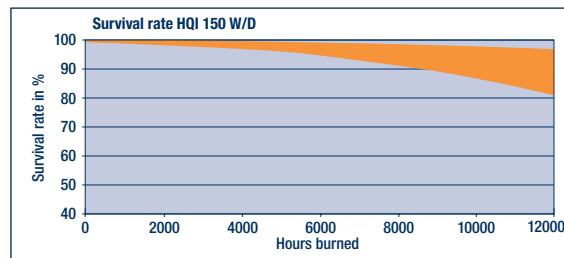
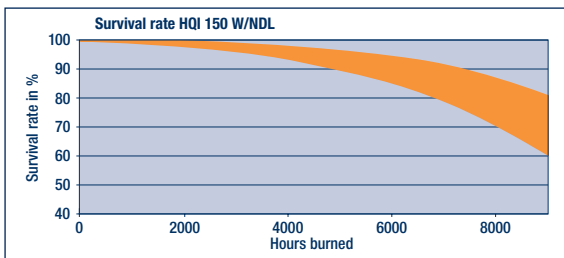
		NDL			
		TS	T	E/P clear	E/P coated
Type		UVS	UVS	UVS	UVS
ILCOS		MD-150/42/1A-H 100/S-RX7s-24/ 24/132/P 45	MT-150/42/1A-H 100/S-G12-20/105	MCS-150/42/1A-H 95/S-E27-54/138	MES-150/42/1A-H 95/S-E27-54/138
Lamp wattage	W	147	147	150	150
Lamp voltage	V	100	100	100	100
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3.6/4.5	3.6/4.5
Lamp current	A	1.8	1.8	1.8	1.8
Nominal luminous flux	lm	13400	12700	12500	12000
Luminous efficacy	lm/W	91	86	83	83
Average luminance	cd/cm ²	—	—	—	—
Light colour/Colour appearance		NDL	NDL	NDL	NDL
Colour temperature	K	4200	4200	4200	4200
Colour rendering index	R _a	91	88	97	97
NIOSH	h	> 26	> 70	> 50	> 50
ACGIH UV output	mW	< 0.32	< 0.12	< 0.17	< 0.17
Base		RX7s-24	G12	E27	E27
Diameter d	mm	24	19	54	54
Length max. l	mm	132	105	138	138
LCL a	mm	66	56	86	—
Burning position		p 45	universal	universal	universal
Average lamp life	h	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	650	550	300	300
Max. perm. base edge temp.	°C	280	280	190	190
PF corr. cap. at 50 Hz	µF	20	20	20	20
Lamp reference		HCI-TS 150/NDL	HCI-T 150/NDL	HCI-E/P 150/NDL clear	HCI-E/P 150/NDL coated
EAN 4050300		467979	467870	637594	637679
Standard pack	Qty	12	12	12	12
Figure	No.	1	2	3	3
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5





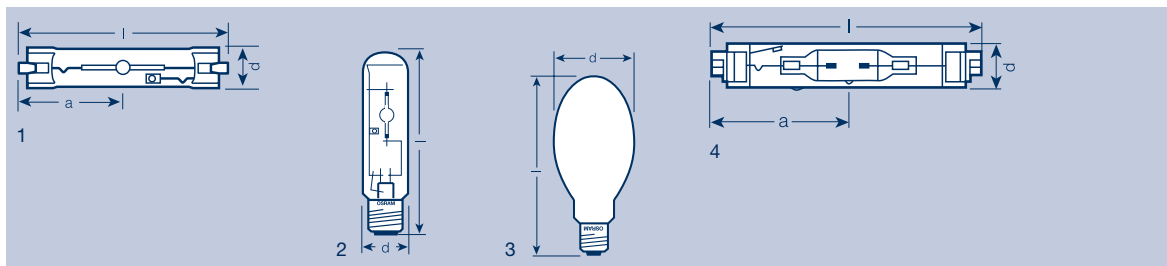
HQI 150 W

		NDL		E clear	E coated	D
		TS	T			TS
Type		UVS	UVS			UVS
ILCOS		MD-150/42/1B-H 90/S-RX7s-24- 23/132/P 45	MT-150/42/1B-H 95/S-G12-25/84	MCS-150/40/1B-H 100/S-E27-55/144	MES-150/38/1B-H 100/S-E27-55/144	MD-150/52/1B-H 100/S-RX7s-24- 23/132/P 45
Lamp wattage	W	150	150	150	150	150
Lamp voltage	V	90	100	85	85	100
Ignition voltage min./max.	kVs	3.6/4.5	3.6/5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A	1.8	1.8	1.8	1.8	1.8
Nominal luminous flux	lm	11250	13000	11400	10500	11000
Luminous efficacy	lm/W	75	87	76	70	73
Average luminance	cd/cm ²	1500	—	—	—	1500
Light colour/Colour appearance		NDL	NDL	NDL	NDL	D
Colour temperature	K	4200	4200	4000	3800	5200
Colour rendering index	R _a	85	85	80	86	88
NIOSH	h	> 10.2	> 17	> 50	> 247	> 11.7
ACGIH UV output	mW	< 0.8	< 0.5	< 0.17	< 0.03	< 0.7
Base		RX7s-24	G12	E27	E27	RX7s-24
Diameter d	mm	23	25	55	55	23
Length max. l	mm	132	84	144	144	132
LCL a	mm	66	56	92	—	66
Burning position		p 45	universal	universal	universal	p 45
Average lamp life	h	12000	9000	9000	9000	12000
Max. perm. outer bulb temp.	°C	650	550	275	275	650
Max. perm. base edge temp.	°C	280	280	190	190	280
PF corr. cap. at 50 Hz	µF	20	20	20	20	20
Lamp reference		HQI-TS 150/NDL UVS	HQI-T 150/NDL UVS	HQI-E 150/NDL clear	HQI-E 150/NDL coated	HQI-TS 150/D UVS
EAN 4050300		362380	488448	434018	434032	437545
Standard pack	Qty	12	12	20	20	12
Figure	No.	1	2	3	4	1
Circuit (see page 28)	Fig. no.	2/5	2/5	2/5	2/5	2/5

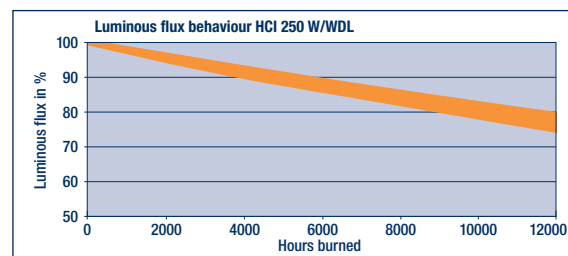
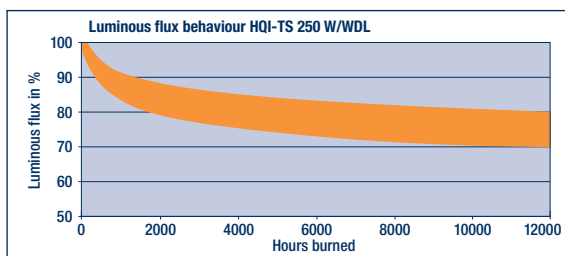
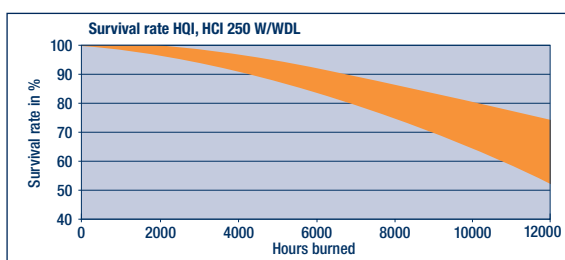


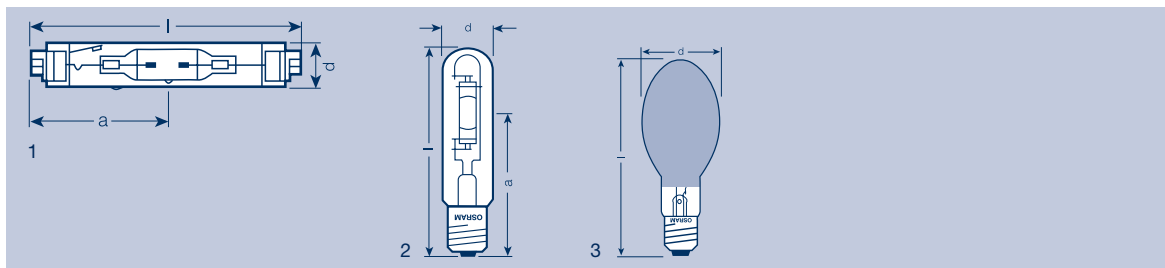
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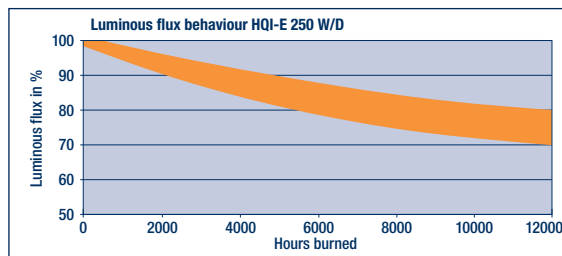
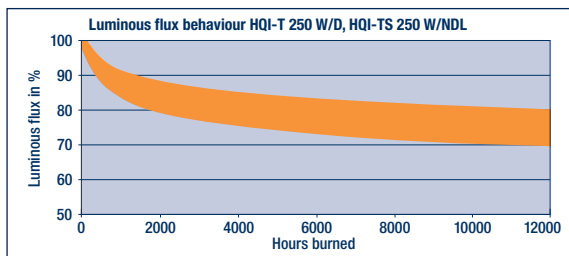
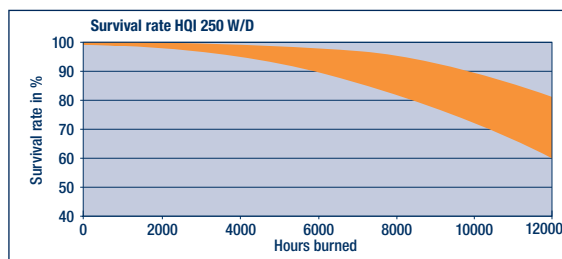
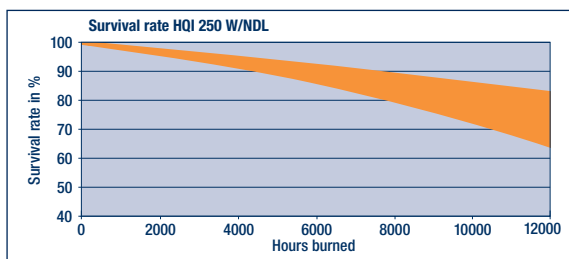
		HCI 250 W			HQI 250 W
		WDL			
		TS ^{New}	T ^{New}	E coated ^{New}	TS
Type		PB	PB	PB	PB
ILCOS		MD-250/30/1B-H 102/S-Fc2- 25/163	MT-250/30/1B-H 110/S-E40- 46/226	ME-250/30/1B-H 100/S-E40- 90/226	MD-250/32/1B-H 104/S-Fc2- 25/163/P 45
Lamp wattage	W	242	248	241	250
Lamp voltage	V	100	105	95	110
Ignition voltage min./max.	kVs	3.6/4.5	3.6/4.5	3.6/4.5	3.6/4.5
Lamp current	A	2.9	2.9	2.9	2.8
Nominal luminous flux	lm	24200	25800	24100	22000
Luminous efficacy	lm/W	100	104	100	88
Average luminance	cd/cm ²	—	—	—	1600
Light colour/Colour appearance		WDL	WDL	WDL	WDL
Colour temperature	K	3000	3000	3000	3200
Colour rendering index	R _a	91	89	88	80
NIOSH	h	> 56	> 193	> 81	> 12
ACGIH UV output	mW	< 0.15	< 0.04	< 0.1	< 0.68
Base		Fc2	E40	E40	Fc2
Diameter d	mm	25	46	90	25
Length max. l	mm	163	226	226	163
LCL a	mm	81.5	150	—	81.5
Burning position		universal	universal	universal	p 45
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	650	500	400	650
Max. perm. base edge temp.	°C	300	250	250	300
PF corr. cap. at 50 Hz	µF	32	32	32	32
Lamp reference		HCI-TS 250/WDL PB	HCI-T 250/WDL PB	HCI-E 250/WDL PB	HCI-TS 250/WDL
EAN 4050300		637730	636849	636825	436012
Standard pack	Qty	12	12	12	12
Figure	No.	1	2	3	4
Circuit (see page 28)	Fig. no.	2/5	2/5	2	2



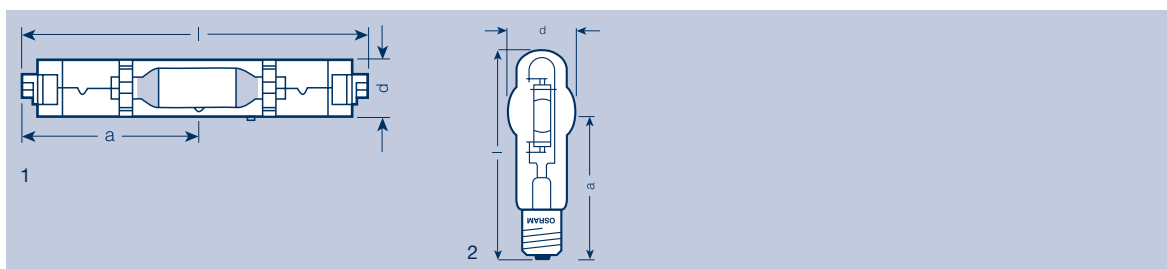


HQI 250 W

Type		NDL	D	T	E coated	E/P coated
		TS UVS	TS UVS			
ILCOS		MD-250/42/1B-H 100/S-Fc2- 25/163/P 45	MD-250/51/1A-H 100/S-Fc2- 25/163/P 45	MT-250/53/1A-H 100/S-E40- 40/225	ME-250/52/1A-H 100/S-E40- 90/226	MES-250/60/1A-H 98/S-E40- 90/226
Lamp wattage	W	250	250	250	250	250
Lamp voltage	V	100	100	100	100	100
Ignition voltage min./max.	kVs	3.6/4.5	3/4.5	3/4.5	3/4.5	3/4.5
Lamp current	A	3	3	3	3	3
Nominal luminous flux	lm	20000	20000	20000	19000	17000
Luminous efficacy	lm/W	80	80	80	76	71
Average luminance	cd/cm ²	1350	1500	1100	20	—
Light colour/Colour appearance		NDL	D	D	D	D
Colour temperature	K	4200	5100	5300	5200	6000
Colour rendering index	R _a	88	93	90	90	90
NIOSH	h	> 12	> 18	> 107	> 27	> 69
ACGIH UV output	mW	< 0.71	< 0.46	< 0.08	< 0.31	< 0.12
Base		Fc2	Fc2	E40	E40	E40
Diameter d	mm	25	25	46	90	90
Length max. l	mm	163	163	225	226	226
LCL a	mm	81.5	81.5	150	—	—
Burning position		p 45	p 45	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	650	650	500	400	400
Max. perm. base edge temp.	°C	300	300	250	250	250
PF corr. cap. at 50 Hz	µF	32	32	32	32	32
Lamp reference		HQI-TS 250/NDL	HQI-TS 250/D	HQI-T 250/D	HQI-E 250/D	HQI-E/P 250/D
EAN 4050300		436036	436050	015293	015248	637457
Standard pack	Qty	12	12	12	12	12
Figure	No.	1	1	2	3	3
Circuit (see page 28)	Fig. no.	2/3	2	2	2	2

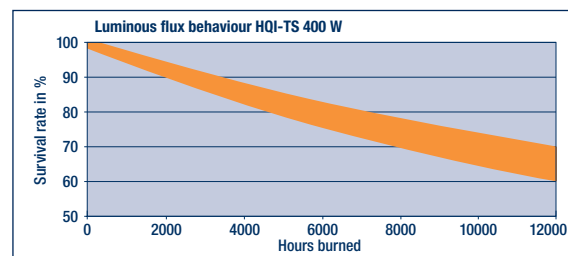
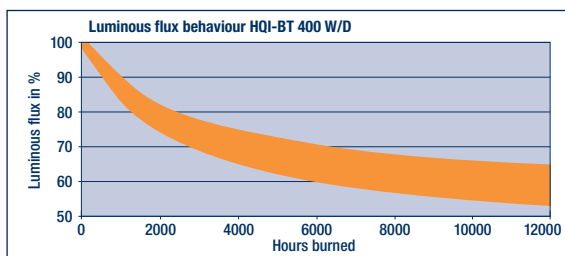
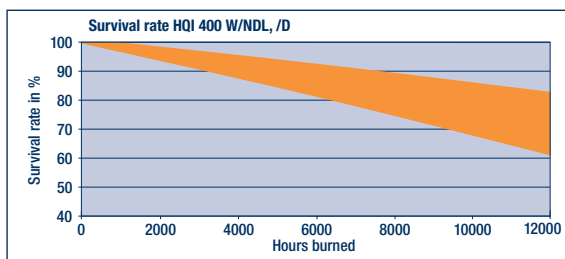


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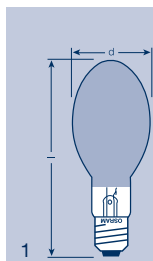


HQI 400 W

		NDL	D		
		TS	TS	BT	BT
Type			NAV-VG	HQI-VG	HQI-VG
ILCOS		MD-400/42/1B-H 118/S-Fc2- 31/206/P 45	MD-400/52/1A-H 128/S-Fc2- 31/206/P 45	MD-400/56/1A-H 120/S-Fc2- 31/206/H 45	MT-400/61/1A-H 122/S-E40- 62/285
Lamp wattage	W	400	400	350	420
Lamp voltage	V	120	125	120	120
Ignition voltage min./max.	kVs	3/4.5	3/4.5	3/4.5	3/4.5
Lamp current	A	4.1 ¹⁾	4.1	3.6	4
Nominal luminous flux	lm	35000	36000	28000	32000
Luminous efficacy	lm/W	88	90	80	76
Average luminance	cd/cm ²	1200	1400	1100	1400
Light colour/Colour appearance		NDL	D	D	D
Colour temperature	K	4200	5200	5600	5200
Colour rendering index	R _a	85	93	90	90
NIOSH	h	> 11 min	> 11 min	> 11 min	> 136
ACGIH UV output	mW	< 47	< 46	< 46	< 0.06
Base		Fc2	Fc2	Fc2	E40
Diameter d	mm	31	31	31	62
Length max. l	mm	206	206	206	285
LCL a	mm	103	103	103	175
Burning position		p 45	p 45	p 45	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	650	650	650	500
Max. perm. base edge temp.	°C	300	300	300	250
PF corr. cap. at 50 Hz	µF	45	45	35	45
Lamp reference		HQI-TS 400/NDL	HQI-TS 400/D	HQI-TS 400/D	HQI-BT 400/D
EAN 4050300		304090	015385	015385	468471
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	2
Circuit (see page 28)	Fig. no.	2	2	2	2

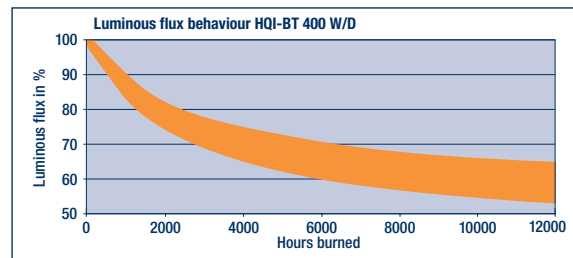
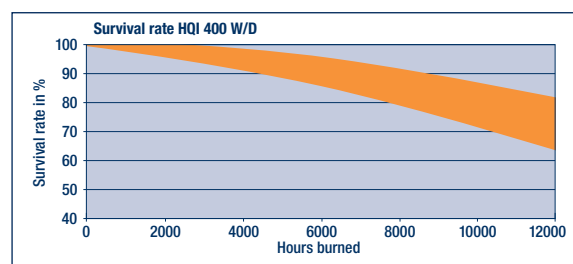


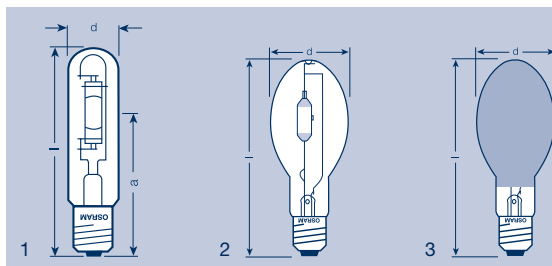
1) Operate only with NAV control gear



HQI 400 W

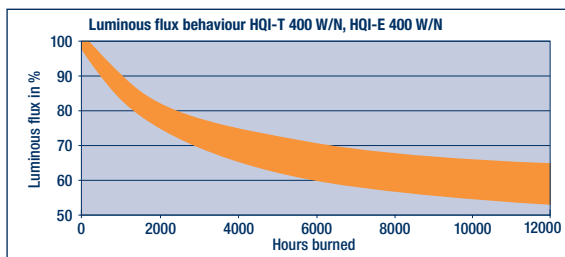
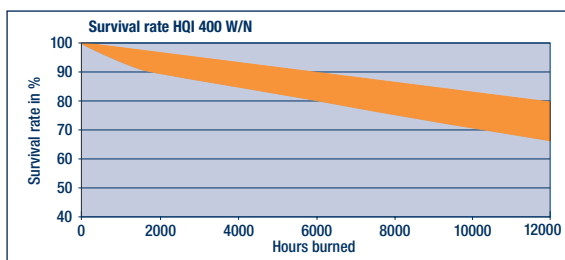
		D			
		E coated	E coated	E/P coated	E/P coated
Type		NAV-VG	HQI-VG	NAV-VG	HQI-VG
ILCOS		ME-400/59/1A-H 130/S-E40-120/290	ME-400/59/1A-H 110/S-E40-120/290	MES-400/45/1A-H 110/S-E40-120/290	MES-400/45/1A-H 115/S-E40-120/290
Lamp wattage	W	460	400	400	400
Lamp voltage	V	130	110	110	115
Ignition voltage min./max.	kVs	3/4.5	3/4.5	3/4.5	3/4.5
Lamp current	A	3.8	3.6	3.8	3.5
Nominal luminous flux	lm	30000	26000	27000	23000
Luminous efficacy	lm/W	76	72	68	67
Average luminance	cd/cm ²	17	10	—	—
Light colour/Colour appearance		D	D	D	D
Colour temperature	K	5900	5800	4500	5000
Colour rendering index	R _a	90	90	90	90
NIOSH	h	> 18	> 18	> 79	> 79
ACGIH UV output	mW	< 0.46	< 0.46	< 0.11	< 0.11
Base		E40	E40	E40	E40
Diameter d	mm	120	120	120	120
Length max. l	mm	290	290	290	290
LCL a	mm	—	—	—	—
Burning position		universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	400	400	400	400
Max. perm. base edge temp.	°C	250	250	250	250
PF corr. cap. at 50 Hz	µF	45	35	45	35
Lamp reference		HQI-E 400/D	HQI-E 400/D	HQI-E/P 400/D	HQI-E/P 400/D
EAN 4050300		019727	019727	637433	637433
Standard pack	Qty	12	12	12	12
Figure	No.	1	1	1	1
Circuit (see page 28)	Fig. no.	2	2	2	2





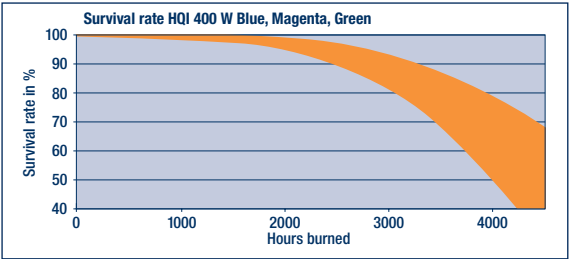
HQI 400 W

		N					
		T	T	E clear	E clear	E coated	E coated
Type		NAV-VG	HQI-VG	NAV-VG	HQI-VG	NAV-VG	HQI-VG
ILCOS		MT-400/37/2B-H 124/S-E40- 46/275/P 45	MT-400/38/2B-H 120/S-E40- 46/285/H 45	MC-400/38/2A-H 115/S-E40- 120/290	MC-400/36/2A-H 115/S-E40- 120/290	ME-400/40/2A-H 115/S-E40- 120/290	ME-400/38/2A-H 115/S-E40- 120/290
Lamp wattage	W	420	380	420	420	460	460
Lamp voltage	V	125	120	125	120	125	120
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	4.1	3.6	4.2	3.5	4.2	3.5
Nominal luminous flux	lm	42000	34000	45000	36000	43000	34000
Luminous efficacy	lm/W	100	89	112	97	107	92
Average luminance	cd/cm ²	—	—	—	—	—	—
Light colour/Colour appearance	N	N	N	N	N	N	N
Colour temperature	K	3700	3800	4000	3600	4000	3600
Colour rendering index	R _a	65	65	70	65	70	65
NIOSH	h	—	—	—	—	—	—
ACGIH UV output	mW	—	—	—	—	—	—
Base		E40	E40	E40	E40	E40	E40
Diameter d	mm	46	46	120	120	120	120
Length max. l	mm	275	275	290	290	290	290
LCL a	mm	175	175	198	198	—	—
Burning position	p 45	p 45	p 45	universal	universal	universal	universal
Average lamp life	h	12000	12000	12000	12000	12000	12000
Max. perm. outer bulb temp.	°C	500	500	500	500	500	500
Max. perm. base edge temp.	°C	250	250	250	250	250	250
PF corr. cap. at 50 Hz	µF	45	35	45	35	45	35
Lamp reference		HQI-T 400/N	HQI-T 400/N	HQI-E 400/N clear	HQI-E 400/N clear	HQI-E 400/N	HQI-E 400/N
EAN 4050300		324647	624647	292632	292632	305431	305431
Standard pack	Qty	12	12	12	12	12	12
Figure	No.	1	1	2	2	3	3
Circuit (see page 28)	Fig. no.	2	2	2	2	2	2

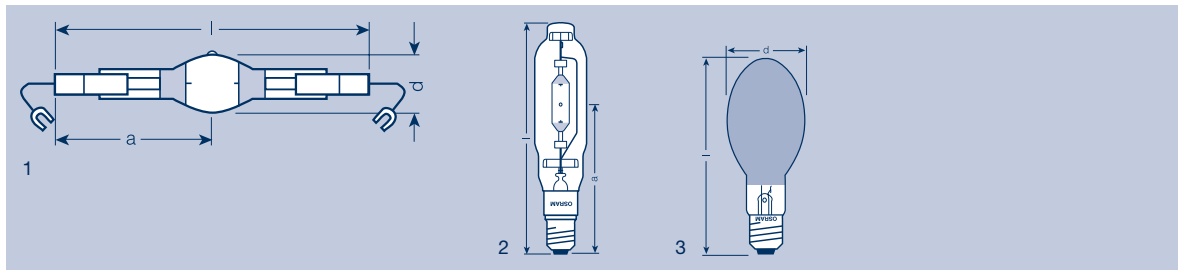




HQI 400 W				
		BLUE	GREEN	MAGENTA
		T	T	T
Type				
ILCOS		–	–	–
Lamp wattage	W	360	360	440
Lamp voltage	V	120	120	120
Ignition voltage min./max.	kVs	3/4.5	3/4.5	4/4.5
Lamp current	A	3.6	3.6	4.6
Nominal luminous flux	lm	uncertain	uncertain	uncertain
Luminous efficacy	lm/W	uncertain	uncertain	uncertain
Average luminance	cd/cm ²	–	–	–
Light colour/Colour appearance				
Colour temperature	K	monochr.	monochr.	monochr.
Colour rendering index	R _a	–	–	–
NIOSH	h	–	–	–
ACGIH UV output	mW	–	–	–
Base		E40	E40	E40
Diameter d	mm	46	46	46
Length max. l	mm	260	260	273
LCL a	mm	175	175	175
Burning position		universal	universal	p 30
Average lamp life	h	–	–	–
Max. perm. outer bulb temp.	°C	500	500	500
Max. perm. base edge temp.	°C	250	250	250
PF corr. cap. at 50 Hz	µF	45	45	45
Lamp reference		HQI-T 400 BLUE	HQI-T 400 GREEN	HQI-T 400 MAGENTA
EAN 4050300		258300	258287	649535
Standard pack	Qty	12	12	12
Figure	No.	1	1	1
Circuit (see page 28)	Fig. no.	2	2	2

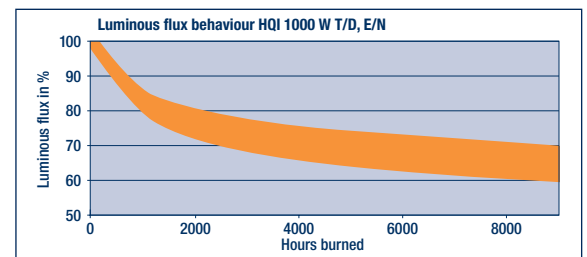
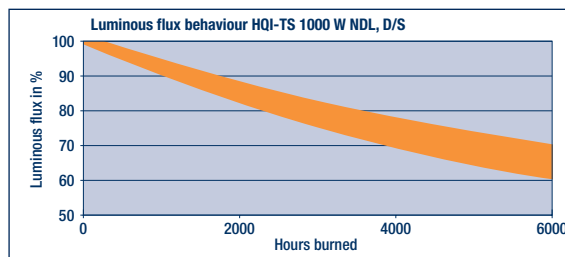
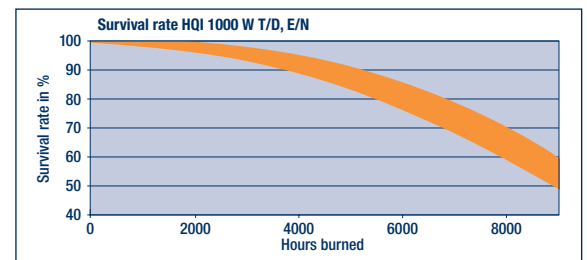
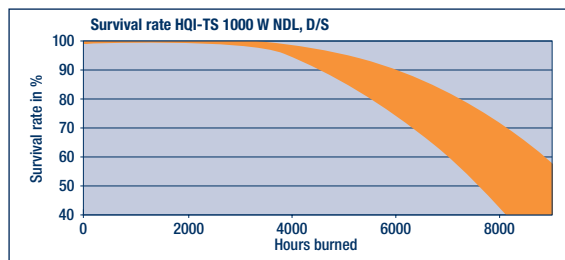


POWERSTAR® HQI®

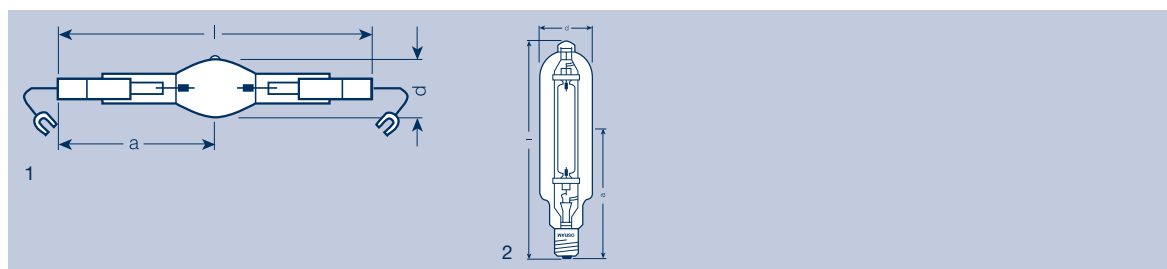


HQI 1000 W

		NDL	D	N	
		TS	TS	T	E coated
		/S	/S		
Type					
ILCOS		MN-1000/42/1B-H 120/S-cable lug- 36/187/P 15	MN-1000/59/1A-H 120/S-cable lug- 36/187/P 15	MT-1000/60/1A-H 125/S-E40- 76/340/P 60	ME-1000/39/2B-H 120/S-E40- 165/380/H 45
Lamp wattage	W	1000	1000	1000	1000
Lamp voltage	V	120	120	130	130
Ignition voltage min./max.	kVs	4/5	4/5	4/5	4/5
Lamp current	A	9.6	9.6	9.5	9.5
Nominal luminous flux	lm	90000	90000	80000	100000
Luminous efficacy	lm/W	90	90	80	100
Average luminance	cd/cm ²	–	2600	810	23
Light colour/Colour appearance		NDL	D	D	N
Colour temperature	K	4400	5900	6000	3750
Colour rendering index	R _a	≥ 85	≥ 90	90	65
NIOSH	h	> 15 min	> 5.5 min	> 25	> 15
ACGIH UV output	mW	< 34	< 92	< 0.33	< 0.56
Base		cable	cable	E40	E40
Diameter d	mm	36	36	76	165
Length max. l	mm	187	187	340	380
LCL a	mm	93	93	220	–
Burning position		p 15	p 15	p 60	h 45
Average lamp life	h	6000	6000	9000	9000
Max. perm. outer bulb temp.	°C	950	950	550	400
Max. perm. base edge temp.	°C	390	390	250	250
PF corr. cap. at 50 Hz	µF	85	85	85	85
Lamp reference		HQI-TS 1000/NDL/S	HQI-TS 1000/D/S	HQI-T 1000/D	HQI-E 1000/N
EAN 4050300		349916	300092	015323	015279
Standard pack	Qty	10	10	6	6
Figure	No.	1	1	2	3
Circuit (see page 28)	Fig. no.	2	2	2	2

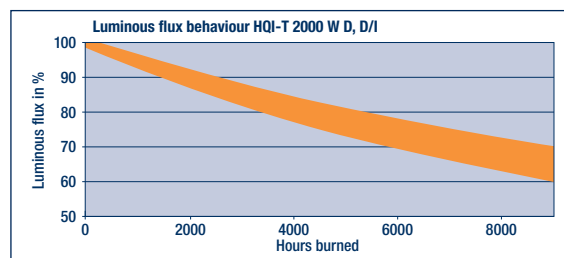
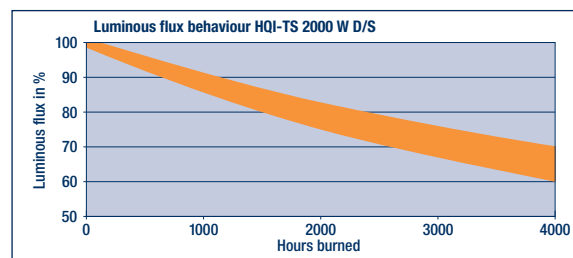
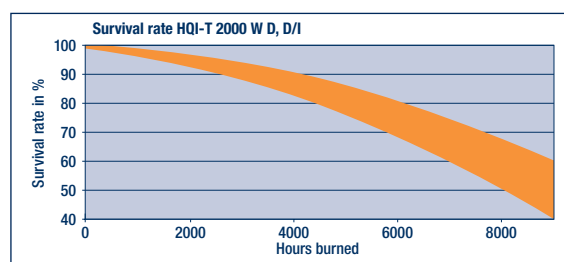
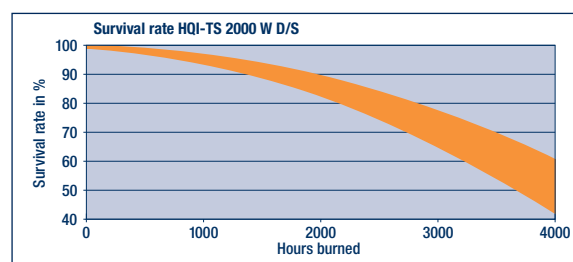


POWERSTAR® HQI®



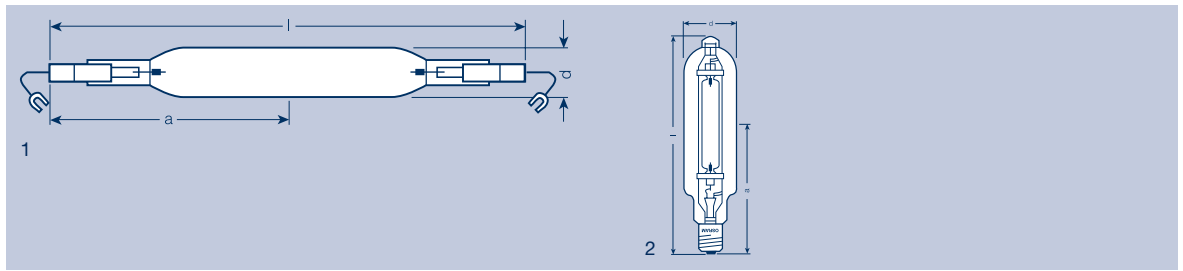
HQI 2000 W

		D	T	T
		TS		
		/S		/I
Type				
ILCOS		MN-2000/58/1A-E 205/S-cable lug-36/187/P 15	MT-2000/60/1A-E 230/I-E40-100/430/P 60	MT-2000/60/1A-E 230/I-E40-100/430/P 60
Lamp wattage	W	1950	2000	2000
Lamp voltage	V	205	230	230
Ignition voltage min./max.	kVs	4/5	4/5	not reqd.
Lamp current	A	11.3 ¹⁾	10.3	10.3
Nominal luminous flux	lm	200000	180000	180000
Luminous efficacy	lm/W	100	90	90
Average luminance	cd/cm ²	7000	920	920
Light colour/Colour appearance		D	D	D
Colour temperature	K	5800	6000	6000
Colour rendering index	R _a	≥ 90	90	90
NIOSH	h	> 15 min	> 56	> 42
ACGIH UV output	mW	< 33	< 0.15	< 0.2
Base		205/S-cable lug-36/187/P 15	E40	E40
Diameter d	mm	36	100	100
Length max. l	mm	187	430	430
LCL a	mm	93	265	265
Burning position		p 15	p 60	p 60
Average lamp life	h	4000	9000	9000
Max. perm. outer bulb temp.	°C	950	550	500
Max. perm. base edge temp.	°C	390	250	250
PF corr. cap. at 50 Hz	µF	60	60	60
Lamp reference		HQI-TS 2000/D/S	HQI-T 2000/D	HQI-T 2000/D/I
EAN 4050300		271682	015330	015446
Standard pack	Qty	10	4	4
Figure	No.	1	2	2
Circuit (see page 28)	Fig. no.	2/4	2	1



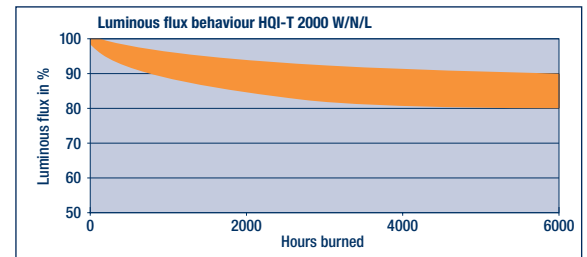
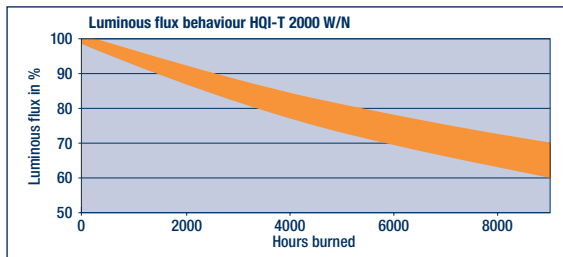
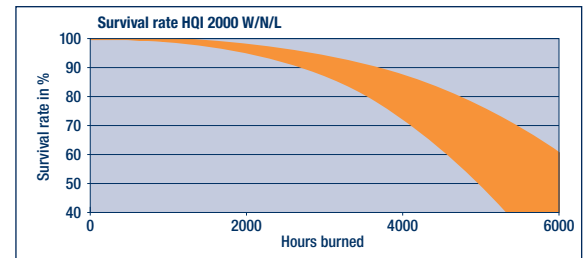
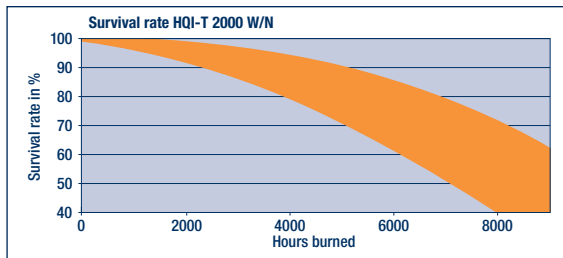
1) Lamps may only be operated on 10.3 A chokes

POWERSTAR® HQI®



HQI 2000 W

		N				
		TS	T	T	T	T
		/L	/E Super	/SN Super	/230 V	/without igniter
Type						
ILCOS		MN-2000/42/2B-E 234/S-cable lug- 32/275/P 15	MT-2000/40/2B-E 220/S-E40- 100/430/P 30	MT-2000/40/2B-E 220/E-E40- 100/430/P 30	MT-2000/45/2B-E 230/S-E40- 100/430/P 30	MT-2000/45/2B-E 220/S-E40- 100/430
Lamp wattage	W	2100	2000	2000	2000	2000
Lamp voltage	V	220	220	220	120	245
Ignition voltage min./max.	kVs	4/5	4/5	0.9/1.3	4/5	not reqd.
Lamp current	A	10.7	8.8	8.8	16.5	8.8
Nominal luminous flux	lm	225000	240000	240000	190000	200000
Luminous efficacy	lm/W	107	120	120	95	100
Average luminance	cd/cm²	530	800	800	530	530
Light colour/Colour appearance		N	N	N	N	N
Colour temperature	K	4100	4000	4000	4400	4500
Colour rendering index	R _a	≥ 62	65	65	65	65
NIOSH	h	> 3.4 min	—	—	—	—
ACGIH UV output	mW	< 148	—	—	—	—
Base		cable	E40	E40	E40	E40
Diameter d	mm	32	100	100	100	100
Length max. l	mm	268	430	430	430	430
LCL a	mm	134	265	265	265	265
Burning position		p 15	p 30	p 30	p 30	universal ¹⁾
Average lamp life	h	6000	9000	9000	9000	9000
Max. perm. outer bulb temp.	°C	950	500	500	500	500
Max. perm. base edge temp.	°C	390	250	250	250	250
PF corr. cap. at 50 Hz	µF	60	37	37	125	37
Lamp reference		HQI-TS 2000/N/L	HQI-T 2000/N/E SUPER	HQI-T 2000/N/SN SUPER	HQI-T 2000/N/230 V	HQI-T 2000/N
EAN 4050300		607344	301860	348629	421582	015347
Standard pack	Qty	10	4	4	4	4
Figure	No.	1	2	2	2	2
Circuit (see page 28)	Fig. no.	2/4	2	2	2	1



1) p 30 recommended

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.

The following lamps with integrated igniters will start on mains voltage:

- HQI®-T 2000 /D/I
- HQI®-T 2000 /N

The lamps must not be operated with integrated igniters in luminaires equipped with igniters.

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

In the case of igniters equipped with OSRAM switching element SE 600 (built-in spark gap), SE 600 must be replaced each time the lamp is replaced.

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. 27)

Fusing:

HCI® and HQI® 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.

For POWERSTAR® HQI®-TS = 1000 W and HQI®-TS 2000 /D/S, instant restarting is possible with suitable igniters. The necessary surge voltage is 25 to 60 KV_s.

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.

Power reduction:

Dimming metal halide lamps is not recommended. **OSRAM cannot provide a guarantee for dimmed lamps.** Dimming adversely affects colour rendering. The colour location shifts towards colder light colours and the colour spread increases. Dimmed lamps also tend to flicker. Luminous flux maintenance is significantly worse as a result of dimming. Dimming can shorten the life of the lamps.

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).

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 HQI/HCI lamps up to 400 W are of UV-reduced design. The only exception at present in the HQI-TS 400 W. The lamp packaging will indicate this fact until there is any change.

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

- All HCI®-TS and HQI®-TS
- All HCI®-T, all HCI®-TT and HQI®-T
- All HCI®-TC
- All HCI®-E $\geq$ 250 W and HQI®-E $\geq$ 250 W

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. Exception: HQI®-TS ... without an outer bulb.

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 lamps should be operated for at least 3 hours and should remain off for at least 30 minutes. This applies in particular to HQI® = 1000 W.

The following lamps **are suitable for open luminaires:**

- All HQI®-E 70 W to 150 W
- All HQI®-E/P and HCI®-E/P

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

Luminaire design:

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

HQI® 1000 W to 2000 W lamps should be held without pressure or by means of a lamp support close to the base-free end.

Photometric and electrical data:

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

Unless otherwise indicated, the data relates to the horizontal burning position for T and TS types and to the base up burning position for E types. If different burning positions are used in actual practice there may be considerable changes in the lamp data, particularly with regard to luminous flux, colour temperature and lamp life.

The luminous flux is virtually unaffected by the ambient temperature outside the luminaire. At low ambient temperatures down to around $-50\text{ }^{\circ}\text{C}$ special igniters are needed.

Detailed information on heat accumulation tubes (luminaire simulators) for determining lamp data for HQI®-TS and HCI®-TS is given in DIN 5032, Part 2, Section 3.3.3.3.

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 (50% failure).

Minimum life:

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

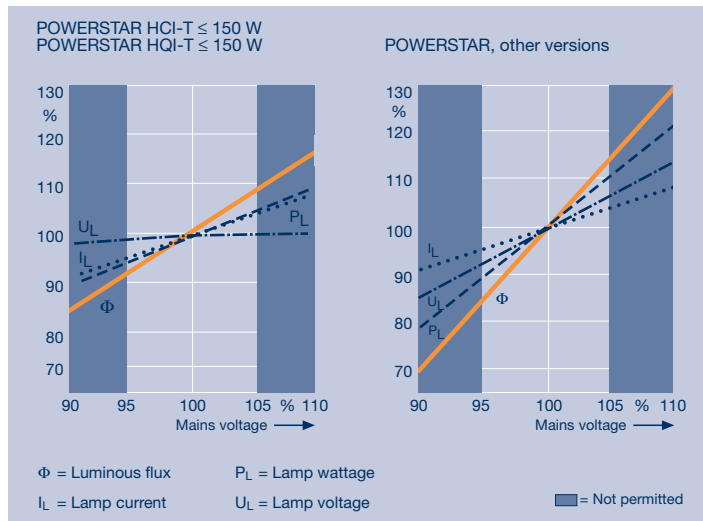
Economical life:

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.

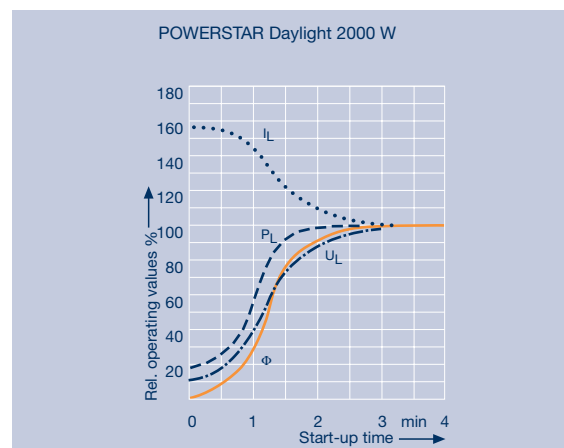
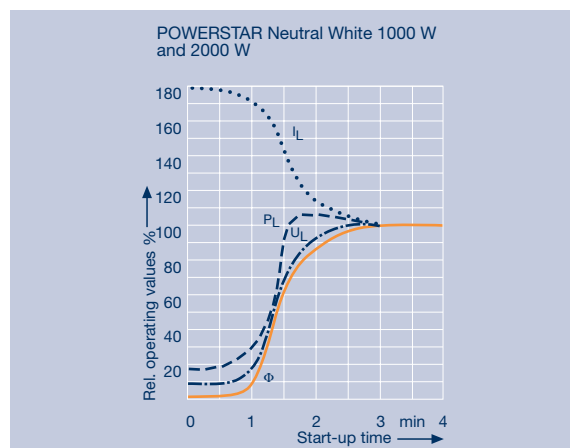
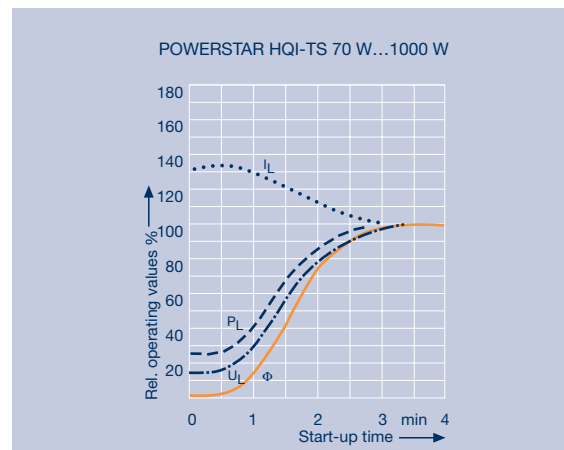
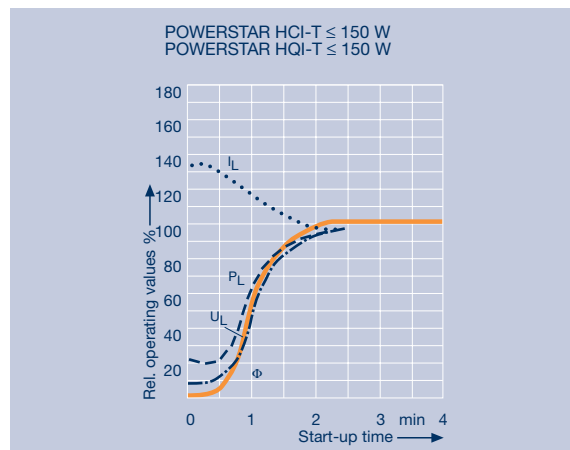
Service life:

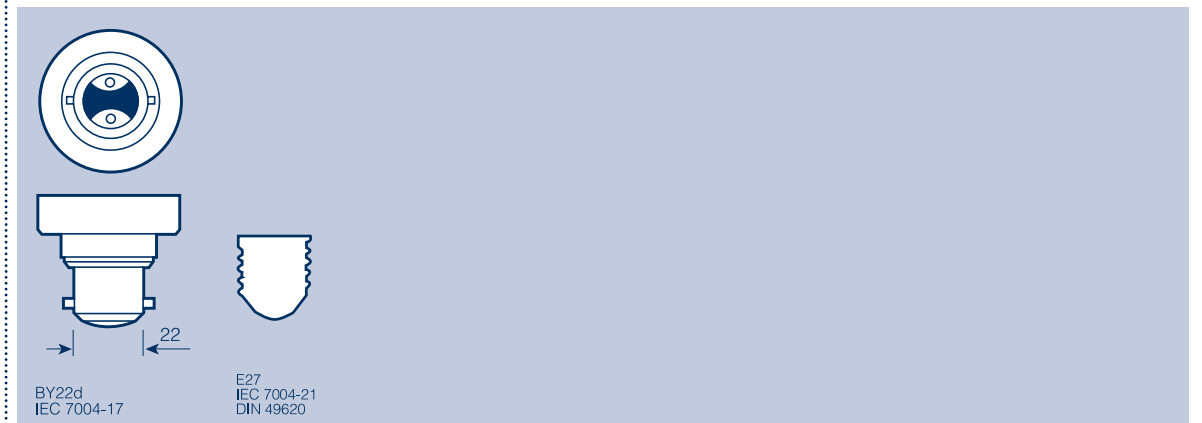
Simplified practical view of the economical life. This is the operating time after which the installation luminous flux (the product of the relative luminous flux and the lamps still in operation) is still around 70% (sometimes 80%).

Operating characteristics in relation to the supply voltage



Start-up behaviour (average value)





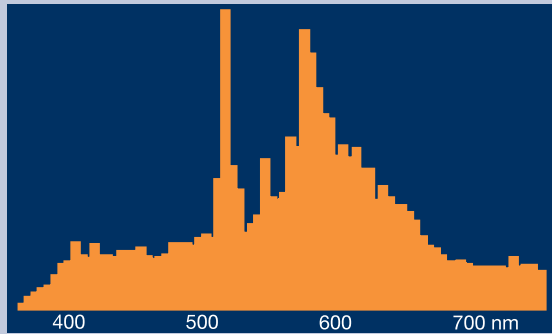
Spectral power distribution of discharge lamps

Visible range from 380 to 780 nm

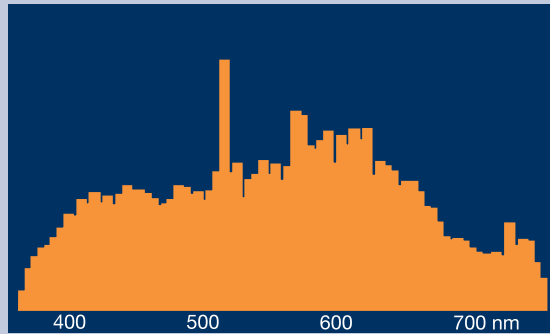
Vertical scale $\frac{400 \text{ mW}}{1000 \text{ lm} \cdot 10 \text{ nm}}$

POWERBALL®

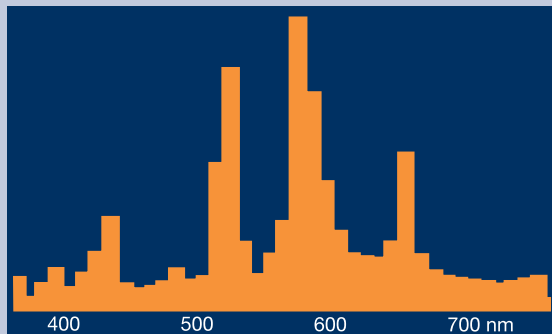
POWERSTAR®



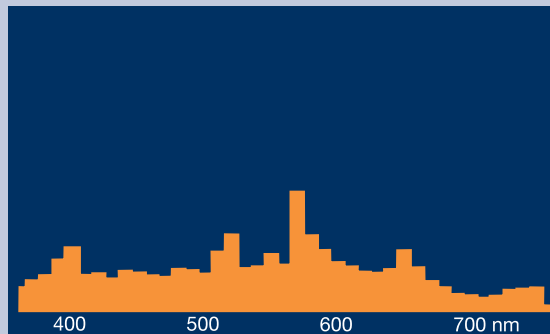
HCL® .../WDL



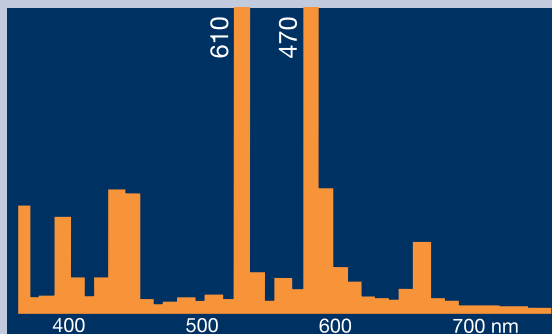
HCL® .../NDL



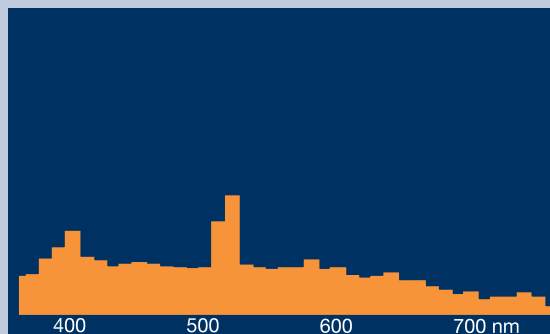
HQI® .../WDL



HQI® .../NDL



HQI® .../N



HQI® .../D

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