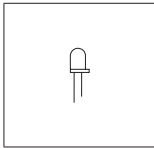
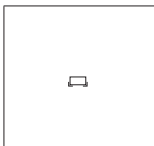


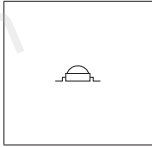
Lamp index Light Emitting Diode

Abbreviation ZVEI	Symbol	Power P(W)	Module current I(mA)	Voltage U(V)	Luminous flux Φ (lm)	Light colour	Colour temperature (K)
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LED		0,3	-	-	-	amber/green	-
		0,3	-	-	-	blue/green	-
		0,5	-	-	-	amber	-
		0,5	-	-	-	blue	-
		0,5	-	-	-	daylight white	-
		0,5	-	-	-	green	-
		0,9	-	-	-	amber/green	-
		0,9	-	-	-	blue/green	-
		0,9	-	-	-	daylight white	-
		0,9	-	-	-	white/green	-
		1,0	-	-	-	-	-
		0,3	-	2	-	amber	-
		0,3	-	2	-	green/red	-
		0,9	-	2	-	amber	-
		0,3	-	3	-	green	-
		0,3	-	3	-	white/green	-
		0,5	-	3	-	blue	-
		0,9	-	3	-	green	-
0,9	-	3	-	green/red	-		
0,3	-	4	-	blue	-		
0,3	-	4	-	daylight white	-		
0,9	-	4	-	blue	-		

LED		1,5	-	-	-	red, green, blue	-
		1,7	-	-	25	warm white	3500
		3,3	-	-	-	red, green, blue	-
		2,6	-	24	30	red, green, blue	-
		1,7	-	230	35	daylight white	5500

Lamp index Light Emitting Diode

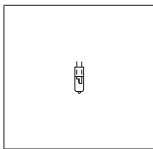
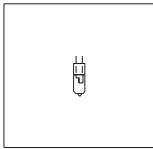
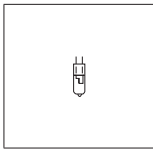
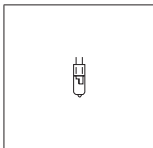
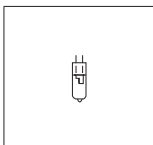
Abbreviation ZVEI	Symbol	Power P(W)	Module current I(mA)	Voltage U(V)	Luminous flux Φ(lm)	Light colour	Colour temperature (K)
LED		3,6	350	-	90	warm white	-
		3,6	350	-	135	daylight white	-
		7,1	350	-	270	daylight white	5500
		8,3	350	-	245	warm white	3500
		9,5	350	-	360	daylight white	5500
		10	350	-	290	red, green, blue	-
		13	350	-	390	red, green, blue	-
		20	350	-	580	red, green, blue	-
		10	700	-	320	warm white	3500
		10	700	-	420	daylight white	5500

All data is provided for guidance only. Manufacturers' current published data must be used.

Note:


Due to the various LED manufacturing processes, the stated typical values of the LED parameters represent statistical values only. Deviations across the range of typical values for LEDs are possible. Operation in direct sunlight must be avoided. No other heat sources should be in the immediate vicinity of the installed luminaire, e.g. heating pipes.

Lamp index Low-voltage halogen lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Luminous flux Φ (lm)	Diameter D(mm)	Length L(mm)
QT9-ax		20	12	G4	320	9	33
QT12-ax		50	12	GY6.35	950	12	44
		90	12	GY6.35	1800	12	44
QT12-ax-LP		50	12	GY6.35	950	12	44
		75	12	GY6.35	1575	12	44
		90	12	GY6.35	1800	12	44
		100	12	GY6.35	2200	12	44
QT12-ax-RE		50	12	GY6.35	1250	12	44
QT16-ax		150	24	GY6.35	3200	16	50

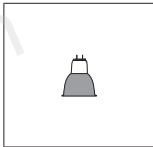
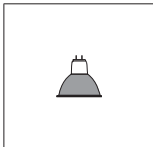

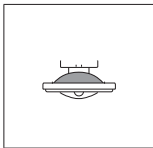
All data is provided for guidance only. Manufacturers' current published data must be used.

Safety distance

The sign  on the luminaire indicates the safety distance required in the direction of the beam.


This safety distance must be observed.

Lamp index Low-voltage halogen reflector lamps

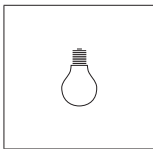
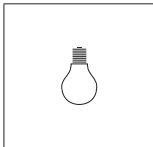
Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Light intensity I(cd)	Half peak value \sphericalangle (°)	Diameter D(mm)	Length L(mm)
QR-CBC35		20	12	GU4	700	38	35	37
		20	12	GU4	4500	10	35	37
QR-CBC51		35	12	GU5.3	700	60	51	45
		35	12	GU5.3	1500	36	51	45
		35	12	GU5.3	8000	10	51	45
		50	12	GU5.3	1100	60	51	45
		50	12	GU5.3	2200	36	51	45
		50	12	GU5.3	4400	24	51	45
		50	12	GU5.3	13000	10	51	45
QR-CBC51-RE		35	12	GU5.3	1100	60	51	45
		35	12	GU5.3	12500	10	51	45
		50	12	GU5.3	1430	60	51	45
		50	12	GU5.3	15000	10	51	45
QR-LP111		50	12	G53	4000	24	111	63
		50	12	G53	23000	8	111	63
		50	12	G53	40000	4	111	63
		75	12	G53	1900	45	111	63
		75	12	G53	30000	8	111	63
		100	12	G53	2800	45	111	63
		100	12	G53	48000	8	111	63

All data is provided for guidance only. Manufacturers' current published data must be used.

Safety distance

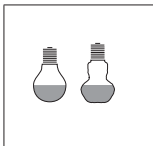
The sign  on the luminaire indicates the safety distance required in the direction of the beam. This safety distance must be observed.

Lamp index General service lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Luminous flux Φ (lm)	Diameter D(mm)	Length L(mm)
A60		100	230	E27	1380	60	105
A65		150	230	E27	2220	65	120

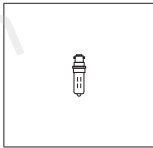
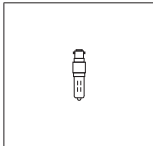
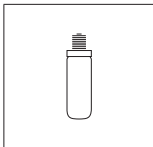
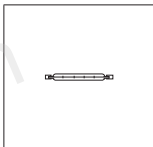
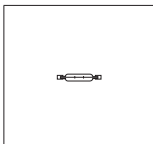
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Crown-silvered lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Luminous flux Φ (lm)	Diameter D(mm)	Length L(mm)
A65-CS		100	230	E27	1000	65	123

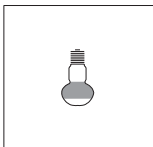
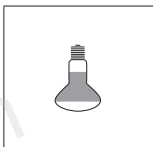
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Tungsten halogen lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Luminous flux Φ (lm)	Diameter D(mm)	Length L(mm)
QT18		60	230	B15d	820	18	67
QT18		75	230	B15d	1100	18	86
		100	230	B15d	1500	18	86
		150	230	B15d	2500	18	86
QT32		100	230	E27	1470	32	105
		150	230	E27	2400	32	105
		230	230	E27	4210	32	105
		230	230	E27	4350	32	105
QT-DE12		150	230	R7s	2400	12	114
		300	230	R7s	5300	12	114
		500	230	R7s	9500	12	114
		1000	230	R7s	22000	12	186
QT-DE12		100	230	R7s	1600	12	75
		150	230	R7s	2550	12	75

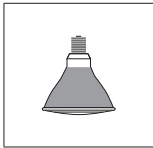
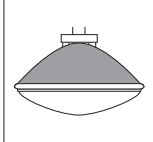
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Reflector lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Light intensity I(cd)	Half peak value \sphericalangle (°)	Diameter D(mm)	Length L(mm)
R63		60	230	E27	960	30	63	105
R95		100	230	E27	1350	35	95	140

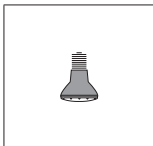
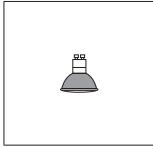
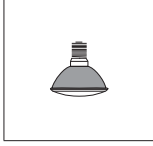
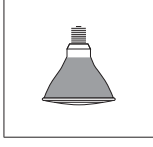
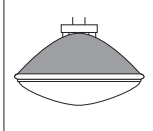
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Parabolic aluminised reflector lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Light intensity I(cd)	Half peak value \sphericalangle (°)	Diameter D(mm)	Length L(mm)
PAR38		120	230	E27	3100	30	122	136
		120	230	E27	9300	12	122	136
PAR56		300	230	GX16d	9000	16/40	179	127
		300	230	GX16d	40000	9/15	179	127

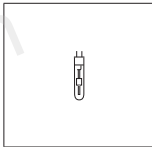
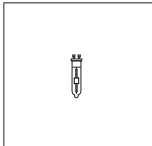
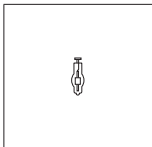
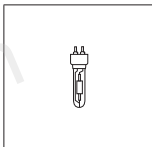
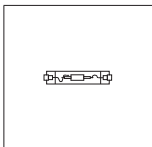
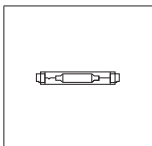
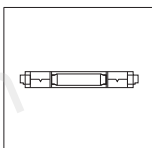
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Halogen parabolic reflector lamps

Abbreviation ZVEI	Symbol	Power P(W)	Voltage U(V)	Lampholder	Light intensity I(cd)	Half peak value \sphericalangle (°)	Diameter D(mm)	Length L(mm)
QPAR20		50	230	E27	1000	30	64	91
		50	230	E27	3200	10	64	91
QPAR-CB20		75	230	GZ10	2500	25	64	64
QPAR30		75	230	E27	2400	30	97	90
		75	230	E27	7500	10	97	90
		100	230	E27	3000	30	97	90
		100	230	E27	9000	10	97	90
QPAR38		100	230	E27	10000	12	122	136
		250	120	E26	9000	30	122	140
		250	120	E26	40000	10	122	140
QPAR56		500	120	GX16d	19000	44/22	179	127
		500	120	GX16d	43000	26/10	179	127
		500	120	GX16d	96000	13/8	179	127

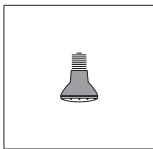
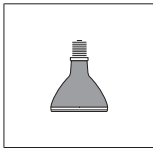
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Metal halide lamps

Abbreviation ZVEI	Symbol	Power P(W)	Lampholder	Luminous flux Φ(lm)	Colour temperature (K)	Colour rendition index	Diameter D(mm)	Length L(mm)
HIT-TC-CE		20	G8.5	1700	3000	80	14	85
		35	G8.5	3300	3000	80	14	85
		70	G8.5	6600	3000	83	14	85
HIT-TC-CE		20	GU6.5	1615	3000	80	13	52
HIT-TC-CE		20	PGJ5	1650	3050	85	17	45
HIT-CE		35	G12	3300	3000	81	20	100
		70	G12	6600	3000	83	20	100
		150	G12	14000	3000	85	20	110
HIT-DE-CE		70	RX7s	6500	3000	82	22	114
		150	RX7s	14200	3000	88	25	132
HIT-DE		250	Fc2	20000	-	-	25	163
HIT-DE		400	Fc2	35000	4200	85	31	206

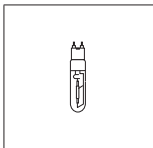
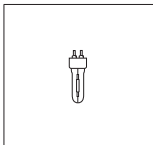
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index Metal halide reflector lamps

Abbreviation ZVEI	Symbol	Power	Lampholder	Light intensity	Half peak value	Colour temperature	Colour rendition index	Diameter	Length
		P(W)		I(cd)	α (°)			(K)	D(mm)
HIPAR20		35	E27	5000	30	3000	81	65	95
		35	E27	23000	10	3000	81	65	95
HIPAR-L30		35	E27	7400	30	3000	81	97	125
		35	E27	44000	10	3000	81	97	125
		70	E27	10000	40	3000	83	97	125
		70	E27	68000	10	3000	83	97	125

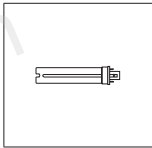
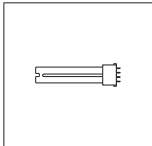
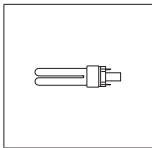
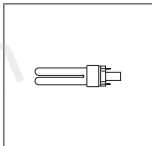
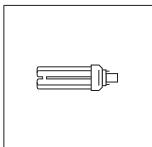
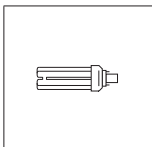
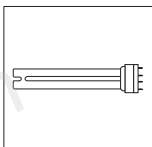
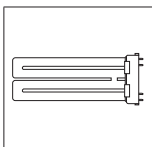
All data is provided for guidance only. Manufacturers' current published data must be used.

Lamp index High-pressure sodium vapour lamps

Abbreviation ZVEI	Symbol	Power	Lampholder	Luminous flux	Colour temperature	Colour rendition index	Diameter	Length
		P(W)		Φ (lm)			(K)	D(mm)
HST		100	PG12	5000	2550	83	32	149
HST		50	GX12-1	2400	2550	83	20	103
		100	GX12-1	4900	2550	83	20	110

All data is provided for guidance only. Manufacturers' current published data must be used.

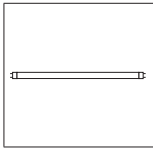
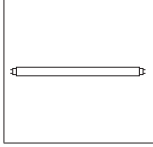
Lamp index Compact fluorescent lamps

Abbreviation ZVEI	Symbol	Power P(W)	Lampholder	Luminous flux Φ(lm)	Light colour	Colour temperature (K)	Colour rendition index	Length L(mm)
TC-S		9,0	G23	200	blue	-	-	167
		9,0	G23	400	red	-	-	167
		9,0	G23	800	green	-	-	167
TC-SEL		9,0	2G7	600	-	4000	80	144
TC-D		18	G24d-2	1200	-	4000	80	153
		26	G24d-3	1800	-	4000	80	172
TC-DEL		10	G24q-1	600	-	4000	80	103
		13	G24q-1	900	-	4000	80	131
		18	G24q-2	1200	-	4000	80	146
		26	G24q-3	1800	-	4000	80	165
TC-T		18	GX24d-2	1200	-	4000	80	123
		26	GX24d-3	1800	-	4000	80	138
TC-TEL		18	GX24q-2	1200	-	4000	82	112
		26	GX24q-3	1800	-	4000	80	127
		32	GX24q-3	2400	-	4000	80	139
		42	GX24q-4	3200	-	4000	80	161
TC-L		18	2G11	1200	-	4000	80	225
		36	2G11	2900	-	-	-	415
		36	2G11	2900	-	4000	80	415
		55	2G11	4800	-	4000	80	535
TC-F		36	2G10	2800	-	-	-	217

All data is provided for guidance only. Manufacturers' current published data must be used.

TC-T, TC-TEL: Lamps which are longer or have different lamp caps, such as GE Lighting, cannot be used in some luminaires.

Lamp index Fluorescent lamps

Abbreviation ZVEI	Symbol	Power P(W)	Lampholder	Luminous flux Φ(lm)	Light colour	Colour temperature (K)	Colour rendition index	Diameter D(mm)	Length L(mm)
T16		24	G5	1750	-	4000	89	16	549
		28	G5	700	blue	-	-	16	1149
		28	G5	2100	red	-	-	16	1149
		28	G5	2600	-	4000	89	16	1149
		28	G5	3500	green	-	-	16	1149
		35	G5	3300	-	4000	89	16	1449
		54	G5	4450	-	4000	89	16	1149
T26		58	G13	5200	-	4000	80	26	1500

All data is provided for guidance only. Manufacturers' current published data must be used.

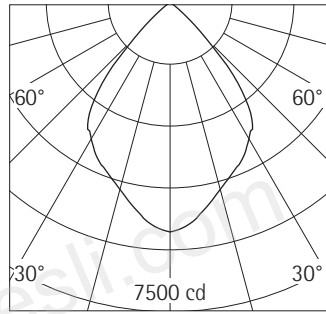
Photometric data from ERCO

Light intensity distribution

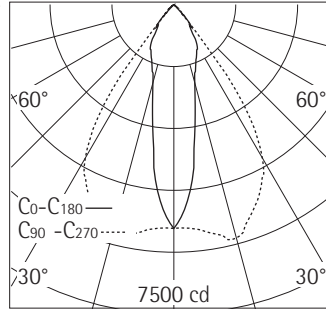
The spatial distribution of the lamp lumens results in a 3-dimensional body of light intensity distribution. A longitudinal or transverse section through this body results in a 2-dimensional light intensity distribution curve that indicates the light intensity of a luminaire for all angles of this plane.

Usually, this is displayed in a polar coordinate diagram from which the main direction of the beam is recognisable, e.g. direct or indirect emission. The unit of light intensity is Candela (cd).

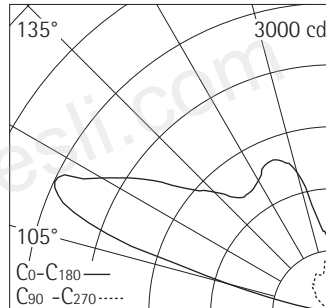
The light intensity distribution of rotationally symmetrical luminaires is characterised by one symmetrical curve.



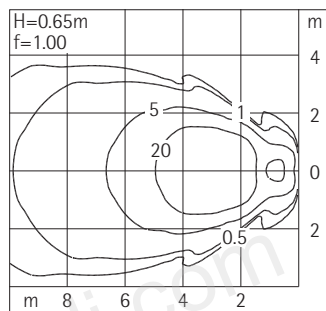
Axially symmetrical light sources need two curves, displaying the two main planes $C_0 - C_{180}$ (at right angles to the lamp position) and $C_{90} - C_{270}$ (parallel to the lamp).



Asymmetrical distributions, mostly of wallwashers, are usually shown in the main curve $C_0 - C_{180}$.



Isolux curves represent the illuminance distribution in a defined situation. The illuminance values are shown without regard to any maintained values. The letter H refers to the height of the front lens above the working plane.



With luminaires for reflector lamps, the light intensity distribution curves are shown in the documents for both the narrow-beam lamp and the maximum permitted wide-beam lamp.

Photometric data from ERCO

Illuminance and light beam diameter

The tables usually shown next to the light intensity distribution comprise the illuminance values $E(\text{lx})$ and the light beam diameter $D(\text{m})$ resulting from the half peak value against the distance or height $h(\text{m})$. Illuminance values relate to the axial intensity. The table data for reflector lamps corresponds to the pertinent polar coordinate diagrams.

Example of a rotationally symmetrical downlight.
The illuminance values are given in increments of 1m.

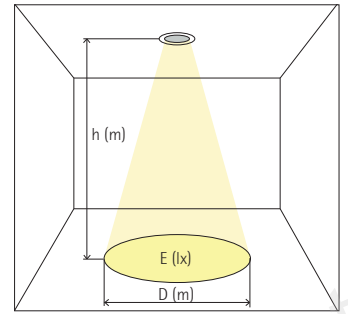
h(m)	E (lx)	D(m)
		60°
1	1100	1.15
2	275	2.31
3	122	3.46
4	69	4.62
5	44	5.77

Example of an axially symmetrical projector
Where illuminances are high, the values are given in increments of 2m.

h(m)	E (lx)	D(m)	CO	C90
			9°	15°
2	8620	0.31	0.53	
4	2155	0.63	1.05	
6	958	0.94	1.58	
8	539	1.26	2.11	
10	345	1.57	2.63	

Example of an uplight with indirect emission
The table data for recessed floor luminaires shows the beam direction values, i.e. from bottom to top.

h(m)	E (lx)	D(m)
		12°
5	4	2.10
4	63	1.68
3	111	1.26
2	250	0.84
1	1000	0.12



Light output ratio

According to DIN/EN 13032/2, the light output ratio, previously " η_{LB} ", is now abbreviated "LOR".

Light output ratio of a luminaire with direct emission

LOR 0.54

Luminaires with direct/indirect emission also specify the "DLOR" (Downward Light Output Ratio) as additional components. These indicate the light intensity distribution of a luminaire in the lower and upper parts of the room.

Light output ratio of a luminaire with direct/indirect emission

LOR 0.54
DLOR 0.40
ULOR 0.14

The calculation of the maintenance factor is described in a separate chapter. This also contains all relevant information and tables. In the catalogue, the classification for the "maintenance factor according to CIE" is shown next to the product and printed below the light output ratio. This appendix comprising photometric data also contains all other tables. The product data sheets relate the relevant data and tables directly to the pertinent products.

LMF C

Glare evaluation according to UGR

The UGR method – Unified Glare Rating according to CIE 117 – is used to evaluate and limit the psychological direct glare from luminaires. Contrary to the previous methods, where the glare was rated using the luminance values of a single luminaire, this method calculates the glare of the entire lighting installation at a defined observer position.

According to DIN EN 12464, the UGR reference value is provided for a standard room.

An exact calculation of the UGR value at a defined observer position in a room is possible with modern lighting design programs such as DIALux.

Where the luminance is $< 1000 \text{ cd/m}^2$, additional data is provided on the elevation angle, either 55°, 65°, or 75°. This is the critical angle above which the luminaire has an all-round luminance of $< 1000 \text{ cd/m}^2$.

The UGR reference value for a standard room

With symmetrical light distribution

UGR: 19.0
65° $< 1000 \text{ cd/m}^2$

With axially symmetrical light distribution

This specifies the values for a line of vision at right angles (C_0-C_{180}) and parallel ($C_{90}-C_{270}$) to the lamp.

UGR C_0 19.0
UGR C_{90} 18.3
65° $< 1000 \text{ cd/m}^2$

ERCO planning data

Maintained value of illuminance

On publication of DIN EN 12464-1, the luminous intensities it recommends are "maintained values of illuminance". These must not at any time be lower than indicated. Instead of using the maintenance factor and the light loss factor as influencing variables in the lighting design, the new term now introduced is "maintenance factor". The new value for the illuminance of an installation is calculated from the maintained value of illuminance and the maintenance factor.

E_n	New value of a lighting installation
E_m	Maintained value of illuminance
MF	Maintenance Factor
$E_n =$	E_m / MF
New value =	Maintained value / Maintenance Factor

According to DIN EN 12464-1, one of the components required in lighting design is a maintenance plan specifying the cleaning frequency of the luminaires and the room and the lamp replacement.

The photometric planning data from ERCO is published on the basis of the "new value of illuminance". The maintained value of illuminance can be determined by way of a maintenance factor.

The maintenance factor is calculated on the basis of separate tables or in computer calculations such as DIALux from version 4.0. The maintenance factor is calculated using the following formula:

$$MF = LMF \cdot RSMF \cdot LLMF \cdot LSF$$

MF Maintenance Factor

LMF Luminaire Maintenance Factor

RSMF Room Surface Maintenance Factor

LLMF Lamp Lumen Maintenance Factor

LSF Lamp Survival Factor

LMF
Luminaire Maintenance Factor

The luminaire maintenance factor LMF takes into account the reduction of luminous flux due to the soiling of the luminaire. It signifies the ratio of a luminaire's light output ratios before and after cleaning. The LMF depends on the version of the luminaire and the related possibility of soiling. The LMF classifica-

tion is indicated next to the product. The LMF values ensue from the attached tables. At this point, the optimal cleaning frequency must be defined for the maintenance plan.

RSMF
Room Surface Maintenance Factor

The room surface maintenance factor RSMF takes into account the reduction of luminous flux due to the soiling of the room surfaces. It signifies the ratio of the room surface reflectances before and after cleaning. The RSMF depends on the degree of soiling of the room or the ambient conditions of a room and the specified cleaning frequency. Further influencing factors are the

size of the room and the type of lighting (direct to indirect emission). The table provides 4 classifications for Environmental Conditions: P pure (very clean room), C clean (clean room), N normal (average conditions) and D dirty (dirty room)

LLMF
Lamp Lumen Maintenance Factor

The lamp lumen maintenance factor LLMF takes into account the reduction of luminous flux due to the ageing of the lamp. It signifies the ratio of the lamp lumens at a

specific time and the new value. The current data provided by the lamp manufacturers must be taken into account here.

LSF Lamp Survival Factor

The lamp survival factor LSF takes into account the variation of the life of individual lamps from the mean life of the lamps. The LSF depends on the service life of the lamp. The latest data provided by the lamp manufacturers must be taken into account here. If defective lamps are replaced immediately, the lamp survival factor applied is LSF = 1.

The maintenance plan for a lighting installation must also specify the optimal lamp replacement frequency. This depends on the degree of use of the lamp and is determined by analysing the period of illumination in the room and the mean service life of the specific lamps.

ERCO planning data

LMF Luminaire Maintenance Factors

Classification	Luminaire type
A	Open luminaires (not from ERCO)
B	Open-top reflectors (not from ERCO)
C	Closed-top reflectors
D	Closed reflectors
E	Dustproof luminaires
F	Luminaires with indirect emission

Examples of ERCO LMF luminaire maintenance factors

Classification C:
Closed-top reflectors

Recessed luminaires for compact fluorescent lamps, e.g. Lightcast Downlight, 22216.000

Surface-mounted downlights without cover glass, e.g. Cylinder surface-mounted downlight QT32, 85201.000

Pendant luminaires, e.g. Parabelle pendant downlight for metal halide lamps, 87610.000

T16 Light structure, direct emission, 13602.000

Classification D:
Closed reflectors

Protective glass and diffusers in front of low-voltage halogen lamps and high-pressure discharge lamps reduce the convection and dust collection on the lamp or near the reflector. Sculpture lenses and spread lenses also prevent a soiling of the lamp and provide a cover for the optical system.

Recessed luminaires with cover glass for high-pressure discharge lamps and low-voltage halogen lamps such as Skim Downlight 23002.000

Surface-mounted downlights with cover glass, e.g. Panarc Downlight, 85588.000

Task lights with cover glass, e.g. Lucy, 33176.000

Pendant luminaires with cover glass, e.g. Parabelle pendant luminaire, 87626.000

Spotlights with lens, e.g. Optec Wallwasher, 72022.000

Classification E:
Dustproof luminaires

Aside from exterior luminaires with a protection mode above IP6x, reflector lamps are also considered closed due to their design.

All exterior luminaires

Recessed luminaires, e.g. Quadra Directional spotlight for low-voltage halogen reflector lamps, 88045.000

Classification F:
Luminaires with indirect emission

Wall-mounted downlights, e.g. Trion Uplight, 33440.000

Light structures, e.g. T16 direct/indirect emission, 13612.000

ERCO planning data

Calculation of Maintenance Factor

LMF Luminaire Maintenance Factor	Cleaning frequency (a) Environmental conditions	1				2				3			
		P	C	N	D	P	C	N	D	P	C	N	D
	A Open luminaires	0.96	0.93	0.89	0.83	0.93	0.89	0.84	0.78	0.91	0.85	0.79	0.73
	B Open-top reflectors	0.95	0.90	0.86	0.83	0.92	0.84	0.80	0.75	0.89	0.79	0.74	0.68
	C Closed-top reflectors	0.94	0.89	0.81	0.75	0.91	0.80	0.69	0.59	0.87	0.74	0.61	0.52
	D Closed reflectors	0.94	0.88	0.82	0.77	0.91	0.83	0.77	0.71	0.89	0.79	0.73	0.65
	E Dustproof luminaires	0.96	0.94	0.90	0.86	0.93	0.91	0.86	0.81	0.92	0.90	0.84	0.79
	F Luminaires with indirect emission	0.93	0.86	0.81	0.74	0.88	0.77	0.66	0.57	0.85	0.70	0.55	0.45

RSMF Room Surface Maintenance Factor	Cleaning frequency (a) Environmental conditions	1				2				3			
		P	C	N	D	P	C	N	D	P	C	N	D
	Direct emission	0.96	0.92	0.87	0.81	0.96	0.92	0.87	0.81	0.96	0.92	0.87	0.81
	Direct/indirect emission	0.94	0.89	0.80	0.69	0.93	0.88	0.79	0.69	0.93	0.88	0.79	0.69
	Indirect emission	0.91	0.83	0.68	0.51	0.90	0.81	0.67	0.50	0.90	0.81	0.67	0.50

Classification of Environmental Conditions

- P (very clean room) pure
- C (clean room) clean
- N (average conditions) normal
- D (dirty room) dirty

LLMF Lamp Lumen Maintenance Factor	Hours of operation (h)	2000	4000	6000	8000	10000	12000	14000	16000	18000	20000
		Tungsten halogen lamps/ low-voltage	0.97	0.88	--	--	--	--	--	--	--
Metal halide lamps	0.94	0.89	0.83	0.80	0.76	--	--	--	--	--	--
High-pressure sodium vapour lamps	0.99	0.98	0.98	0.97	0.97	0.96	0.96	0.95	0.95	0.94	
Compact fluorescent lamps Fluorescent lamps	0.94	0.91	0.89	0.87	0.85	--	--	--	--	--	
		0.96	0.95	0.94	0.93	0.92	0.91	0.91	0.89	0.88	0.88

LSF
Lamp Survival Factor

If defective lamps are replaced immediately, the lamp survival factor applied is LSF = 1.

ERCO planning data

Example Lightcast Downlight
22225.000

Clean room with little deterioration

Annual cleaning of the luminaire
Improvement of the room reflectance factor every 3 years, e.g. by cleaning the room surfaces

Lamp replacement after
10,000 hours

Immediate replacement in case of
lamp failure

LMF
Luminaire Maintenance Factor

Cleaning frequency (a)
Ambient conditions
Closed-top reflectors

1				2				3			
P	C	N	D	P	C	N	D	P	C	N	D
0.94	0.89	0.81	0.72	0.88	0.80	0.69	0.59	0.84	0.74	0.61	0.52

RSMF
Room Surface Maintenance Factor

Cleaning frequency (a)
Ambient conditions
Direct emission

1				2				3			
P	C	N	D	P	C	N	D	P	C	N	D
0.99	0.98	0.96	0.95	0.97	0.96	0.95	0.94	0.96	0.96	0.95	0.94

LLMF
Lamp Lumen Maintenance Factor

Hours of operation (h)
Compact fluorescent lamps

2000	4000	6000	8000	10000	12000	14000	16000	18000	20000
0.92	0.88	0.85	0.83	0.85	--	--	--	--	--

LSF
Lamp Survival Factor

LSF = 1

If all the individual maintenance factors are known, these can simply be inserted into the formula. Where individual parameters change, the maintenance factor must be recalculated.

Luminaire Maintenance Factor
MF = LMF · RSMF · LLMF · LSF
MF = 0.94 · 0.96 · 0.85 · 1
MF = 0.76

New value of the lighting installation

$$E_n = E_m / MF$$

$$E_n = 500lx / 0.76$$

$$E_n = 652$$

The reference maintenance factors

In cases where the maintenance factor cannot be calculated on the basis of definite assumptions, the following reference maintenance factors are recommended:

Reference maintenance factor	Reference new value factor	Example
0.80	1.25	Clean room, little use
0.67	1.50	Clean room, 3-year maintenance cycle
0.57	1.75	Interior and exterior, average conditions, 3-year maintenance cycle
0.50	2.00	Interior and exterior, severe deterioration, 3-year maintenance cycle

ERCO planning data

Planning data in the ERCO catalogue

The "planning data" provided includes P*, the "connected load per m² and 100lx" and n*, the "number of luminaires per 100lx". In practice, these must be converted using the maintenance factors determined separately.

22411.000
Connected load of one luminaire
Connected load per 100lx
Number of luminaires per 100lx

QT12-ax 100W/12V GY6.35 2200lm
P: 100W
P*: 6.41W/m²
n*: 6.41 1/100m²

"Guide values" are used to plan the approximate lighting requirement. These are small tables including the "number of luminaires per 100m²" and the "illuminance values for luminaire modules". In practice, the guide values must also be converted using the maintenance factors determined separately.

Number of luminaires per 100m ²		100lx	200lx	300lx	500lx
85888.000	2x26W	5	9	14	23
Illuminance (lx) for module (m)		1.2x1.8	1.8x1.8	1.8x2.4	2.4x2.4
85888.000	2x26W	1047	698	524	393

To determine the illuminance, the maintenance factor must be taken into account along with the geometry of the room to be planned and its reflection capacity. To do so, the correction factor f is taken from the correction table. The correction table itself can be found on the product specification sheet. The correction table also provides the required factors to be applied for room data other than k = 2.5 (approx. 100m²) and reflectances other than 0.7/0.5/0.2.

Correction table					
Ceiling	0.7	0.7	0.7	0.5	0
Wall	0.7	0.5	0.2	0.2	0
Floor	0.5	0.2	0.2	0.1	0
k0.6	90	73	67	66	64
k1.0	106	85	79	77	74
k1.5	118	94	89	86	83
k2.5	128	100	96	91	88
k3.0	131	102	99	93	90

Tables with illuminance values of wallwashers are based on calculations with a reasonable offset from the wall/luminaire spacing and help decide on the right wallwashers and their optimal positioning. Here, too, the values must, in practice, be converted using the maintenance factors determined separately. In order to evaluate the illuminance distribution, we recommend that the detailed tables provided in the product data sheets be used. Over and above this though, the planning and design of individual, project-specific lighting installations should always be based on accurate photometric data.

77757.000 Mean illuminances E _v (lx) Specifications: Number of luminaires n>5 without indirect component without peripheral area					
Wall height (m)	3.00				
Offset from wall (m)	1.00	1.00	1.25	1.25	
Luminaire spacing (m)	1.00	1.25	1.25	1.50	
Illuminance	324	265	221	186	

ERCO planning data

Planning data in product data sheet

Product data sheets comprise all photometric data required for a detailed lighting design.

Along with the catalogue data, they also provide the correction tables to be used for the guide values. The correction factor f takes into account the geometry of the room to be planned and its reflection capacity.

The correction table also provides the required factors to be applied for room data other than $k = 2.5$ (approx. 100m²) and reflectances other than 0.7/0.5/0.2.

Correction table					
Ceiling	0.7	0.7	0.7	0.5	0
Wall	0.7	0.5	0.2	0.2	0
Floor	0.5	0.2	0.2	0.1	0
k0.6	90	73	67	66	64
k1.0	106	85	79	77	74
k1.5	118	94	89	86	83
k2.5	128	100	96	91	88
k3.0	131	102	99	93	90

Tables comprising comprehensive data are provided for wallwashers. For an arrangement of 5 wallwashers with different offsets from the wall/luminaire spacings, point illuminances from the ceiling to the floor are available that enable a detailed assessment of the illuminance distribution on a wall.

77757.000
Illuminances E_n (lx)
Specifications:
Number of luminaires >5
Wall height 3m

Offset from wall (m)	1.00		1.00		1.25		1.25	
	Luminaire spacing (m)		1.25		1.25		1.50	
	Below luminaire	Between luminaires	Below luminaire	Between luminaires	Below luminaire	Between luminaires	Below luminaire	Between luminaires
0.25	384	366	318	283	239	227	206	185
0.50	386	386	320	303	252	247	216	201
0.75	363	356	298	289	247	241	207	201
1.00	351	334	285	269	229	225	196	189
1.25	336	327	281	261	225	213	191	179
1.50	336	330	277	263	215	212	186	174
1.75	331	329	274	263	214	209	184	174
2.00	314	318	259	254	216	212	184	177
2.25	288	289	233	233	210	211	181	174
2.50	256	248	208	211	201	204	172	169
2.75	218	212	182	181	187	190	158	158

All illuminances are new values. In practice, these must be converted using the maintenance factors determined separately.

ERCO planning data

Planning example

Abbreviations:

E_m (lx)	Maintained value of illuminance
E_n (lx)	Illuminance taken from the Guide values table
n	Number of luminaires
P (W)	Connected load of one luminaire incl. control gear
P^* (W/m ²)	Connected load per 100lx
n^* (1/100 m ²)	Number of luminaires per 100lx
f	Factor taken from the correction table, depending on reflectances and room index k
k	Room index
a (m)	Length of room
b (m)	Width of room
h (m)	Luminaire height above working plane

Requirements:

The guide values E (lx), P^* (W/m²) and n^* (1/100 m²) have been calculated for a room $k=2.5$, working plane 0.75 m and reflectances of ceilings = 0.7, walls = 0.5 and floors = 0.2. They include the light loss factor of 1.0. They are valid for a regular module and in practice they also apply to asymmetric modules.

For room conditions other than 0.7/0.5/0.2 and $k = 2.5$ the appropriate correction factor f is to be applied. For other luminous fluxes and connected loads the values are to be converted proportionally.

Room data: $H = 2.90$ m
 $a = 12.00$ m
 $b = 14.00$ m
 $h = 2.15$ m

Room index: $k = \frac{a \cdot b}{h(a + b)}$
 $k = 3.0$

Reflectances: ϕ_D Ceiling = 0.5
 ϕ_W Walls = 0.2
 ϕ_B Floor = 0.1

	0.7	0.7	0.5	0
Ceiling	0.7	0.7	0.5	0
Wall	0.7	0.5	0.2	0.2
Floor	0.5	0.2	0.2	0.1
k 0.6	77	58	49	45
k 1.0	100	77	69	63
k 1.5	116	91	84	70
k 2.5	129	100	95	86
k 3.0	133	103	99	89

Correction factor $f = 93\%$

Calculation example using ERCO guide values

Calculation example using ERCO guide values.
The following can be used as guide values:

1. Calculation of the number of luminaires with specified maintained value E_m (from table)
2. Calculation of the maintained value E_m with specified luminaire module (from table)
3. Calculation of the number of luminaires n for specified maintained value E_m (with P^* or n^*)
4. Calculation of the maintained value E_m for specified number of luminaires n (with P^*)

1. Calculation of the number of luminaires n for specified illuminance E_n 500lx

Specifications
Lightcast Downlight 22227.000
 E_n New value of the illuminance
 f Correction factor from separate correction table 0.93
MF Maintenance factor, reference value 0.80

Number of luminaires per 100 m ² for illuminance E_n		100lx	200lx	300lx	500lx
22227.000	66W	5	9	13	22

Example

$$n = \frac{n}{f \cdot MF}$$

$$n = \frac{22}{0.93 \cdot 0.80}$$

$$n = 30$$

2. Calculation of the illuminance (maintained value) E_m with specified luminaire module 1.8 x 1.8

Specifications
Lightcast Downlight 22227.000
 E_n Illuminance from ERCO table
 E_m Maintained value of illuminance DIN EN 12464
 f Correction factor from separate correction table 0.93
MF Maintenance factor, reference value 0.80

Illuminance E_n (lx) for luminaire module (m)		1.2x1.8	1.8x1.8	1.8x2.4	2.4x2.4
22227.000	66W	1089	726	544	408

Example

$$E_m = E_n \cdot f \cdot MF$$

$$E_m = 726 \text{lx} \cdot 0.93 \cdot 0.80$$

$$E_m = 541 \text{lx}$$

3. Calculation of the number of luminaires n for specified illuminance (maintained value) E_m 500lx

Specifications
 22227.000
 Connected load of one luminaire
 P : 66.0 W
 Connected load per 100lx
 P^* : 2.81 W/m²
 E_m Maintained value of illuminance
 DIN EN 12464
 f Correction factor from separate
 correction table 0.93
 MF Maintenance factor, reference
 value 0.80

Example with P^*

$$n = \frac{E_m \cdot a \cdot b \cdot P^*}{P \cdot f \cdot MF}$$

$$n = \frac{500lx \cdot 12m \cdot 14m \cdot 2.81W/m^2}{66W \cdot 0.93 \cdot 0.81 \cdot 100lx}$$

$n = 48$

Specifications
 22227.000
 Number of luminaires per 100lx
 n^* : 4.25 1/100m²
 E_m Number of luminaires per
 NEN EN 12464
 f Correction factor from separate
 correction table 0.93
 MF Maintenance factor, reference
 value 0.80

Example with n^*

$$n = \frac{n^* \cdot E_m \cdot a \cdot b}{f \cdot MF}$$

$$n = \frac{4.25 \cdot 500lx \cdot 12m \cdot 14m}{100m^2 \cdot 100lx \cdot 0.93 \cdot 0.80}$$

$n = 48$

4. Calculation of the illuminance (maintained value) E_m for specified number of luminaires n

Specifications
 22227.000
 Connected load of one luminaire
 P : 66.0 W
 Connected load per 100lx
 P^* : 2.81 W/m²
 E_m Maintained value of illuminance
 DIN EN 12464
 f Correction factor from separate
 correction table 0.93
 MF Maintenance factor, reference
 value 0.80

Example with P^*

$$E_m = \frac{n \cdot P \cdot f \cdot MF}{a \cdot b \cdot P^*}$$

$$E_m = \frac{48 \cdot 66W \cdot 0.93 \cdot 0.80 \cdot 100lx}{12m \cdot 14m \cdot 2.81W/m^2}$$

$E_m = 499$

General Information

This catalogue supersedes all previous issues. We reserve the right to make technical and formal alterations to improve our products or to meet modified statutory requirements. Current data will be supplied on request.

Our continually updated product documentation can be accessed at www.ercos.com.

Many products are protected by industrial patent rights.

Unless specifically indicated, all luminaires will be supplied without lamps.

Voltages given in this catalogue refer to a mains frequency of 50/60 Hz.

All electrical equipment is to be installed in accordance with IEC regulations and local authority requirements. The local authority should be consulted if further information is required. In accordance with the British Health and Safety at Work Act 1974, Section VI, products supplied by ERCO contain safety instructions and information pertaining to the correct usage and installation of products. The act imposes upon the users of the products the obligation to ensure that all personnel involved in the installation, handling, use and disposal of these products are acquainted with the information provided, and made fully aware of the precautions that need to be taken. As the responsibility for correct installation lies with the user, ERCO are to be contacted directly prior to the installation for any further information or explanation which may be required.

To assist with the identification and differentiation of products, the colours are usually quoted after the article numbers. With recessed luminaires this generally applies to the reflector colour. For all other products the housing colour is indicated. Colours are not specified for recessed luminaires without reflector, accessories, etc.

The standard finish of our products is specified in the product description. The products can also be produced at extra charge in the following colours: white RAL 9002, white RAL 9010, silver RAL 9006 and black RAL 9011. Prices and delivery times for other RAL or BS colours are available on request.

Illuminance levels and light beam diameters of narrow beam and maximum allowed wide beam reflector lamps are provided next to each product. For further lamp options, refer to the lamp index.

The abbreviated lamp references use the ZVEI lamp designation system.

ERCO luminaires are designed, manufactured and tested to the applicable standards and technical regulations of the VDE. Technical testing is conducted at an ambient temperature of 25°C, as per IEC 60598.

The luminous flux values and other photometric data also relate to an ambient temperature of 25°C. At other temperatures, deviations from the values stated in the catalogue are possible.



DIN EN ISO 9001-2000

The ERCO Quality Management System has been organised in accordance with DIN EN ISO 9001-2000. This was acknowledged by the DQS (Deutsche Gesellschaft zur Zertifizierung von Managementsystemen) and validated by licence no. 1151. The system includes: design/development, production, assembly, sales and service. All ERCO sales organisations in Germany and abroad are included in the system through matrix certification.

Replaceable LED modules of varychrome luminaires and Light Clients (DALI-compatible luminaires from ERCO)

The LED modules of varychrome luminaires can be exchanged at the end of their working life. The control gear of colour compensated luminaires not only contains the DALI Light Client encoding but also the compensation values for the luminous flux values for the dominant wavelengths of the RGB colours. These relate to the particular LED module used. The result is that the LED module and the control gear form a unit. When replacing the module, it is therefore also necessary to exchange the control gear. The replacement of LED module and control gear is to be carried out in the factory.

Retrofitting varychrome luminaires

When retrofitting an existing lighting installation with colour compensated luminaires, it is good practice to order luminaires which have the same version number. To do this, it is necessary to quote both the version number stated on the type label of the luminaire and the article number.

Symbols and abbreviations

- Luminaires and accessories bearing this sign meet the requirements of the LUM agreement.
- KEMA test mark
- VDE test mark
- SEMKO test mark
- NEMKO test mark
- Luminaires bearing this sign are VDE approved.
- China Compulsory Product Certification, Safety
- China Compulsory Product Certification, Safety & EMC
- All articles delivered to Russia (to the Russian Federation) are GOST-R approved/certified and identified.
- Class I luminaires have an earth conductor and therefore are not marked.
- Class II luminaires
- Class III luminaires
- IP20 All luminaires meet the requirements of protection mode IP20 and are not marked. Other protection modes are specified for each product.
- Protection mode IP44 Splash-proof protection against splashes from all directions.
- Protection mode IP65 Protection against dust and strong jets of water from all directions.
- Protection mode IP67 Protection against dust and against the results of temporary immersion.
- Protection mode IP68xm Protection against dust and against the results of continuous submersion up to a depth of xm.
- Suitable lamps only are to be used in open luminaires.
- Not suitable for coolbeam lamps.
- All luminaires meet the F requirements in accordance with EN 60598-1 and are suitable for mounting on normal inflammable mounting surfaces (housing parts).
- Luminaires which are not suitable for mounting on or in inflammable mounting surfaces.
- Short-circuit-tested transformer in accordance with EN 61558
- Encapsulated safety transformer EN 61347

- Self-contained control gear in accordance with EN 60598
- Protected low-voltage according to EN 61558
- Identification marks for devices with limited surface temperature for installation in furnishings, ceilings and walls with unknown inflammability characteristics.
- Federal Communications Commission
- LON is a registered trademark of the Echelon Corporation
- Windows is a registered trademark of the Microsoft Corporation in the USA and other countries.
- All products subject to EMC guideline 89/336 (electromagnetic compatibility) and guideline 73/23 (low-voltage) meet the requirements therein and bear the CE symbol on their packaging.
- Products with discharge lamps and electronic components in accordance with the valid EN standard, which is the basis of EMC guideline 89/336 (electromagnetic compatibility) do not cause interference.
- = Low-loss control gear
- = Electronic control gear unit
- = Length
- = Total Length
- = Width
- = Height
- = Depth
- = Light beam diameter
- = Ceiling aperture
- = Recess depth
- = Diameter
- = Quadra
- = Maximum
- = Approximate weight with lamp

All dimensions are in millimetres.

General Information



Information on high-power LEDs

Due to the production process of LEDs, the specified typical LED parameters show statistical values only. There can be variations in the range typical for LEDs. The service life of an LED refers to the period after which the intensity of emission has fallen to half its initial value, given a constant conducting-state current. The functional life, however, largely depends on the ambient temperatures. Therefore, the luminaires should not be installed near other sources of heat such as heating pipes, etc. Furthermore, these luminaires should not be operated when exposed to direct sunlight. As a result of innovative heat management, ERCO luminaires with high-power LEDs reach the rated life specified by the manufacturers.



DALI (Digital Addressable Lighting Interface)

DALI, i.e. the digital interface protocol, identifies the way in which the ECG are controlled, not the system or system components. ERCO's Light System DALI automatically controls the DALI ECG fitted in the luminaires.

These, in turn, are based on a common platform for the control of dimmable ECG.

When installed in the luminaire, each DALI ECG saves luminaire data. Once the luminaire is fitted in the lighting system, the luminaire is then given an address. The DALI Light Studio software provides the user with specific luminaire data and installation information in a comprehensible and user-friendly format.

The central control unit, the DALI light server, controls or dims up to 64 ECGs via a two-wire control line.

The control signal can also be carried by the two normally unused conductors in a 5-core high-voltage connection cable. In this case, there is no need for an additional control line.

Potentiometer for dimming low-voltage halogen lamps

Some transadapters or transformer housings of spotlights using low-voltage halogen lamps contain electronic transformers 230/12V, 50W or 100W. These spotlights can additionally be dimmed on 1-circuit or 3-circuit tracks.

The integral potentiometer can be used to dim the lamp lumens continuously down to 10%. A light-emitting diode is provided to monitor the function.

When using additional external trailing edge dimmers, the potentiometer must be set to the highest setting to prevent flickering.



Overvoltage protection for electronic control gear

When switching off inductive loads, e.g. fluorescent lamps, high pressure discharge lamps, motors, etc., spikes (high voltage peaks) may occur which can be so severe that the electronic control gear's integrated safety device, and the control gear itself, can be destroyed. To protect electronic control gear from such spikes, separate overvoltage protection units, e.g. 83819.000, should be installed in parallel, on the input side.

Use of infrared-reflecting low-voltage halogen lamps (QR-CBC-RE)

In this technology, the halogen lamps are designed with a special infrared-reflecting coating on the outside of the bulb to ensure that the infrared (IR) radiation of the lamp is reflected back to the lamp filament.

Fitted in ERCO luminaires, these lamps are thermally safe. For photometric data, refer to the manufacturers' specifications.



Dimming of metal halide lamps

Due to their unique innovative design, metal halide lamps are increasingly used in lighting installations. On the one hand, this results from the objective of creating ever smaller lamps, and the development of lower wattages make it easier to select the correct power level.

On the other hand, while the dimming of metal halide lamps may be possible from a technical point of view, the negative effects on the colour temperature and the colour rendition do not make this a viable option. Furthermore, there is inadequate data available on the effects of dimming on the life of the lamps. Always refer to the lamp and control gear manufacturers' specifications.

Photometric and lighting design data of luminaires for metal halide lamps

The photometric and lighting design data identified and published by ERCO are based on the use of metal halide lamps with cylindrical discharge tubes. The use of any other lamps may result in deviations, although these may only be minor.

Depending on the manufacturer, the discharge tubes of metal halide lamps are usually made of a ceramic body of various shapes and sizes. This results in differences in the performance of the lamps themselves. Further variations may be the result of lamp production tolerances. Additionally, there will be tolerances in the positioning of the lamp within the reflector systems of the luminaires. While these are usually minor, they are still detectable.

It must also be taken into account that differences in the size of the discharge tube can lead to differences in the beam angle and the light intensity.

Electronic control gear for metal halide lamps in 3-circuit installations

To avoid damaging the electronic control gear, the neutral conductor of control gears in 3-circuit installations must never be disconnected.



Replacing high-pressure discharge lamps

High-pressure discharge lamps must be immediately replaced at the end of their service life. The end of their service life is reached when:

1. the colour of the light changes,
 2. the lamp glass shows dark discoloration,
 3. periodic stopping and starting occurs,
 4. the lamp no longer ignites.
- The lamp manufacturer's instructions must be observed.

These luminaires are equipped with protection systems in the control gear to switch the lamp off at the end of its service life. This minimises the likelihood of damage to the control gear.

In a few cases, if the lamp is not replaced on time, the control gear used can be destroyed. Hot materials can be emitted from the luminaire and cause damage. Consequential damage may result.



Electronic control gear units

Non-dimmable ECG have established themselves on the market since they achieve greater lamp luminous efficiency than conventional control gear. They also extend the lamp life up to 20,000h by using so-called "soft-start", achieve low power losses of only 10% of the total lamp power, and provide improved visual comfort due to their flicker-free operation. Dimming increases both visual comfort and efficiency.



Dimming of fluorescent lamps

Dimming is often used with compact fluorescent lamps and fluorescent lamps and increased visual comfort.

In general, lamps require special control gear for dimming, the varying dimensions of which have to be taken into account when designing the luminaires.

1V-10V control voltage

Besides a special ECG with an input for the 1V-10V control voltage, dimming in a 10V installation only requires a potentiometer or an interface to other control systems, which can be connected to the 1V-10V control voltage. Examples include programmable lighting control systems such as ERCO Area Net or connection to EIB actuators and building control systems.

To create light scenes or for luminaire operation using the ERCO Area Net lighting control system, additional D/A modules (digital/analogue modules) are required. These D/A modules are digitally controllable output devices. One D/A module can control up to eight luminaire groups or circuits. Depending on the ECG manufacturer's specification, the control range can go from approximately 1% to 10%.



Dimming of compact fluorescent lamps (TC)

Conventional TC, TC-D, and TC-T lamps are equipped with integral starters that cannot be dimmed due to the high-frequency starting pulse of electronic components.

Special TC-EL, TC-DEL and TC-TEL lamps are available for dimming. They generally have four contact pins.

TC-L lamps are operated with a separate starter, TC-F lamps are operated with ECG and can be dimmed in ECG mode without restriction.

Note

For a good control response, all compact fluorescent lamps must be run at full output for approximately the first 100 hours of operation, subject to the manufacturer's specification.

Ultrasonic cleaning of reflectors

The ERCO Cleanmobil, a transportable ultrasonic cleaning system is available for extensive reflector cleaning. The Cleanmobil consists of an ultrasonic cleansing basin for a water and cleaning agent mixture, and a rinsing basin for softened water.

Bath dimensions:
L 0.70m, B 0.30m, H 1.00m

Total dimensions:

L 1.40m, B 0.90m, H 1.30m

5-pole CEE plug: 14kVA, 16A

Fresh water and waste water connections required

Corrosion protection for outdoor luminaires

1. Instructions on mounting the luminaires are included with each product. Furthermore, the national regulations on installation and accident prevention must be observed.
2. Luminaire housings and parts for in-ground installation are made of a low-copper aluminium alloy or of stainless steel. When handled correctly, both materials provide reliable protection against corrosion.
3. When mounting and maintaining the luminaires, take particular care not to damage the powder coating. In aggressive environments, both the mounting and the maintenance of all components require appropriate safety measures to be applied.
4. The luminaires must be cleaned regularly. The required interval and method depends on the site, situation of mounting and environmental conditions.
5. Recessed floor luminaires must be installed so that water can drain off the surface of the luminaire. When directly installed in the ground or when used in recessed housing, an additional drainage system, e.g. a gravel base, must be provided.

General Information



Disposing of lamps

From 2005 onwards, the EU environmental guidelines (Waste Electrical and Electronic Equipment) and the RoHS (Restrictions on the use of certain Hazardous Substances in electrical and electronic equipment) will apply. These guidelines regulate the waste processing of electrical and electronic products and the limitation of the harmful substances they contain. According to category 5 of the EU environmental guidelines, the provisions of WEEE and RoHS also include lamps.

Disposing of luminaires

The guideline stipulates that all relevant products must bear the symbol of the crossed-out bin from August 2005. The aim is to include luminaires for return and recycling of component materials. Furthermore, it outlines specific guidelines on the proportion of usable and recyclable material. At the same time, it furnishes specifics on the proportion of usable and recyclable materials.

Since August 2005, ERCO has marked all electric luminaires with the symbol of the crossed-out bin.

Technical luminaires present no problems with regard to disposal. Spotlights, downlights, and louvered luminaires essentially consist of cast aluminium, sheet-steel and aluminium sheet. All these materials can be recycled as scrap. Aluminium darklight reflectors with super purity grade are particularly suitable for recycling. Even plastics can be recycled using a variety of processes.

Disposing of discharge lamps

For physical reasons, low-pressure discharge lamps (fluorescent lamps) and high-pressure discharge lamps contain small quantities of mercury and other trace elements. Discharge lamps must therefore be treated as special waste. For this reason, they cannot be disposed of with household waste. According to the Waste Disposal Law, the owner is obliged to arrange for proper disposal of waste. Discharge lamps can be disposed of intact by bringing them to special waste disposal sites or by being recycled.

There are a number of companies specialising in the disposal of discharge lamps.

Disposal process

EU and non-EU countries operate national or specific cross-sector collection and recycling systems. Information on disposal options are available from the national, local and district authorities, and from the manufacturers.

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06110.000	66	13400.000	98	22127.000	400	22471.000	336	33216.000	625	33440.000	540	33718.000	750	33906.000	722
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06113.000	65	13403.000	99	22132.000	394	22474.000	340	33219.000	624	33451.000	682	33722.000	747	33925.000	723
06114.000	67	13404.000	99	22134.000	396	22531.000	351	33220.000	624	33452.000	682	33723.000	749	33926.000	723
06120.000	67	13408.000	99	22135.000	396	22533.000	353	33221.000	624	33453.000	681	33724.000	749	33940.000	724
06121.000	68	13409.000	99	22137.000	397	22535.000	351	33222.000	625	33454.000	681	33725.000	751	33941.000	724
06122.000	73	13413.000	100	22138.000	398	22617.000	358	33223.000	625	33455.000	683	33726.000	751	33945.000	724
06124.000	66	13418.000	100	22139.000	450	22618.000	381	33226.000	626	33456.000	684	33727.000	752	33946.000	724
06139.000	69	13420.000	102	22140.000	397	22625.000	361	33227.000	626	33457.000	684	33729.000	749	33950.000	754
06142.000	69	13421.000	102	22141.000	450	22627.000	382	33228.000	626	33458.000	684	33732.000	649	33951.000	754
06146.000	72	13422.000	102	22143.000	398	22629.000	359	33229.000	626	33459.000	684	33733.000	648	33952.000	754
06151.000	72	13423.000	102	22144.000	399	22633.000	358	33240.000	617	33460.000	686	33734.000	755	33953.000	754
06152.000	72	13440.000	98	22145.000	450	22635.000	358	33241.000	622	33461.000	686	33739.000	751	33954.000	754
06153.000	68	13441.000	98	22148.000	451	22645.000	361	33242.000	623	33462.000	686	33750.000	648	33955.000	754
06154.000	72	13442.000	98	22151.000	451	22649.000	361	33243.000	624	33463.000	687	33751.000	648	33956.000	754
06156.000	68	13460.000	101	22164.000	450	22651.000	360	33244.000	625	33464.000	687	33760.000	761	33957.000	754
06159.000	69	13461.000	101	22166.000	450	22661.000	359	33245.000	624	33465.000	687	33761.000	761	33958.000	744
06162.000	73	13465.000	101	22167.000	451	22663.000	362	33246.000	624	33466.000	682	33762.000	761	33959.000	744
06165.000	67	13466.000	101	22173.000	450	22664.000	367	33247.000	625	33467.000	683	33763.000	761	33960.000	755
06190.000	73	13470.000	101	22174.000	451	22665.000	360	33249.000	626	33468.000	683	33764.000	761	33961.000	755
06203.000	70	13471.000	101	22176.000	400	22666.000	368	33250.000	626	33469.000	685	33765.000	761	33962.000	755
06204.000	70	13475.000	101	22177.000	400	22677.000	367	33270.000	619	33470.000	685	33766.000	761	33963.000	755
06205.000	70	13476.000	101	22178.000	400	22678.000	367	33271.000	629	33471.000	685	33767.000	761	33965.000	725
06209.000	71	13480.000	101	22201.000	391	22686.000	369	33273.000	629	33482.000	543	33768.000	763	33966.000	725
06213.000	70	13481.000	101	22203.000	391	22687.000	369	33274.000	630	33483.000	543	33769.000	763	33967.000	725
06215.000	71	13485.000	101	22205.000	391	22690.000	370	33276.000	630	33485.000	542	33770.000	763	33970.000	655
06217.000	71	13486.000	101	22207.000	399	22691.000	375	33278.000	630	33486.000	541	33771.000	763	33971.000	655
06300.000	72	13490.000	102	22209.000	392	22692.000	368	33279.000	631	33487.000	541	33777.000	762	33972.000	655
06651.000	58	13491.000	102	22211.000	400	22693.000	374	33280.000	631	33488.000	542	33778.000	762	33973.000	579
06652.000	57	13492.000	102	22216.000	393	22694.000	377	33281.000	632	33489.000	541	33779.000	762	33974.000	587
06653.000	60	13500.000	101	22217.000	400	22695.000	380	33282.000	632	33491.000	542	33780.000	762	33975.000	593
06655.000	58	13501.000	101	22222.000	394	22696.000	380	33290.000	622	33494.000	541	33781.000	762	33976.000	655
06656.000	58	13540.000	100	22224.000	396	22698.000	371	33291.000	623	33495.000	542	33782.000	762	33977.000	655
06657.000	60	13602.000	106	22225.000	396	22699.000	371	33300.000	653	33496.000	539	33783.000	762	33978.000	655
06658.000	59	13603.000	106	22227.000	397			33301.000	654	33497.000	539	33784.000	762	33979.000	587
06659.000	59	13606.000	106	22228.000	398	23000.000	420	33302.000	653	33498.000	539	33785.000	762	33980.000	593
06660.000	57	13607.000	106	22230.000	397	23002.000	420	33303.000	655	33499.000	539	33786.000	565	33981.000	587
06665.000	59	13612.000	107	22233.000	398	23004.000	425	33304.000	654	33510.000	548	33787.000	565	33982.000	587
06666.000	59	13613.000	107	22234.000	399	23006.000	427	33305.000	654	33511.000	548	33788.000	570	33983.000	643
06667.000	60	13616.000	107	22254.000	449	23012.000	421	33306.000	653	33512.000	548	33789.000	570		
		13617.000	107	22256.000	449	23014.000	421	33311.000	656	33513.000	549	33790.000	761	34000.000	583
		13622.000	108	22257.000	451	23016.000	422	33312.000	656	33514.000	549	33791.000	761	34001.000	583
12031.000	115	13623.000	108	22263.000	449	23020.000	424	33313.000	657	33515.000	549	33792.000	761	34003.000	583
12032.000	115	13626.000	108	22264.000	451	23022.000	426	33314.000	657	33516.000	550	33793.000	761	34004.000	584
12033.000	115	13627.000	108	22267.000	393	23024.000	427	33315.000	657	33517.000	550	33799.000	565	34005.000	584
12034.000	115	13630.000	108	22268.000	393	23026.000	427	33329.000	642	33518.000	550	33801.000	563	34007.000	584
12037.000	115	13631.000	108	22270.000	394	23027.000	422	33332.000	642	33519.000	642	33802.000	561	34008.000	585
12083.000	120	13632.000	108	22271.000	394	23028.000	428	33333.000	664	33520.000	644	33803.000	562	34009.000	585
12099.000	120	13633.000	108	22273.000	401	23029.000	423	33334.000	662	33524.000	642	33804.000	561	34010.000	585
12271.000	120	13639.000	109	22274.000	401	23045.000	423	33337.000	665	33525.000	643	33809.000	564	34021.000	577
12404.000	116	13650.000	109	22275.000	395	23046.000	424	33338.000	663	33526.000	642	33811.000	562	34022.000	578
12406.000	116	13651.000	109	22276.000	395	23047.000	425	33339.000	665	33670.000	742	33812.000	561	34023.000	578
12412.000	117	13652.000	110	22277.000	401	23048.000	426	33342.000	663	33671.000	738	33813.000	563	34024.000	578
12414.000	117	13653.000	110	22278.000	401	23049.000	428	33343.000	664	33672.000	739	33814.000	566	34025.000	578
12440.000	86	13654.000	109	22280.000	401	23056.000	470	33344.000	662	33673.000	742	33816.000	568	34026.000	578
12445.000	88	13655.000	109	22281.000	401	23057.000	470	33345.000	669	33674.000	742	33817.000	568	34027.000	578
12446.000	88	13656.000	109	22282.000	402	23058.000	475	33347.000	670	33675.000	738	33818.000	569	34028.000	578
12447.000	102	13657.000	109	22283.000	402	23059.000	476	33348.000	670	33676.000	738	33819.000	565	34029.000	577
12482.000	119	13658.000	109	22286.000	402	23060.000	470	33349.000	669	33677.000	740	33823.000	568	34050.000	588
12499.000	120	13659.000	109	22287.000	402	23061.000	477	33351.000	670	33678.000	740	33824.000	567	34051.000	588
12502.000	119	13660.000	109	22401.000	330	23062.000	474	33352.000	671	33679.000	743	33825.000	570	34053.000	588
12503.000	121	13661.000	109	22403.000	331	23063.000	474	33353.000	671	33680.000	743	33826.000	570	34055.000	589
12512.000	119	13662.000	109	22405.000	331	23065.000	472	33354.000	671	33682.000	739	33827.000	570	34058.000	589
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34153.000	606	65040.000	490	72030.000	263	73048.000	216	73601.000	286	74429.000	246	75373.000	196	75697.000	132
34154.000	606	65041.000	491	72031.000	263	73049.000	216	73605.000	286	74430.000	220	75375.000	196	75793.000	221
34155.000	606	65042.000	491	72035.000	263	73053.000	223	73606.000	286	74431.000	146	75376.000	196	75794.000	221
34156.000	606	65043.000	512	72036.000	264	73054.000	223	73611.000	295	74432.000	146	75378.000	196	75795.000	221
34157.000	606	65044.000	512	72037.000	272	73063.000	223	73612.000	295	74433.000	146	75380.000	199	75796.000	221
34158.000	607	65045.000	512	72038.000	263	73064.000	223	73615.000	295	74434.000	146	75381.000	199	75800.000	140
34159.000	607	65046.000	543	72039.000	263	73077.000	217	73616.000	295	74435.000	252	75382.000	199	75801.000	140
34160.000	607	65048.000	543	72040.000	265	73078.000	217	73621.000	285	74436.000	252	75383.000	199	75825.000	140
34161.000	608	65049.000	485	72041.000	265	73079.000	218	73622.000	285	74437.000	587	75600.000	135	75830.000	140
34162.000	608	65059.000	492	72042.000	263	73080.000	218	73623.000	290	74438.000	587	75601.000	135	75831.000	140
34163.000	609			72043.000	263	73081.000	218	73624.000	290	74439.000	587	75602.000	135	75857.000	288
34164.000	609			72044.000	263	73082.000	218	73625.000	293	74442.000	267	75603.000	135	75858.000	288
34170.000	702	70313.000	211	72045.000	263	73083.000	223	73626.000	293	74443.000	193	75604.000	141	75859.000	288
34171.000	702	70322.000	211	72046.000	272	73084.000	223	73709.000	227	74447.000	139	75605.000	135	75860.000	288
34900.000	604	70500.000	207	72047.000	272	73103.000	215	73711.000	244	74448.000	139	75606.000	135	75861.000	288
34901.000	604	70501.000	207	72048.000	260	73104.000	215	73712.000	244	74449.000	140	75607.000	135	75904.000	198
34902.000	604	70505.000	207	72049.000	260	73113.000	214	73719.000	227	74450.000	140	75608.000	135	75905.000	140
34903.000	604	70506.000	207	72050.000	262	73114.000	214	73729.000	227	74451.000	139	75609.000	141	75906.000	140
34910.000	604	70515.000	207	72051.000	262	73118.000	214	73739.000	227	74452.000	139	75610.000	136	75909.000	198
34911.000	604	70516.000	207	72052.000	262	73119.000	214	73741.000	247	74453.000	140	75611.000	136	75926.000	171
34912.000	604	70520.000	207	72053.000	262	73151.000	221	73742.000	247	74454.000	140	75612.000	136	75927.000	171
34913.000	604	70521.000	207	72054.000	271	73152.000	221	73749.000	228	74455.000	146	75613.000	136	75928.000	171
34914.000	604	70525.000	207	72055.000	271	73153.000	214	73750.000	237	74456.000	146	75614.000	142	75929.000	171
34915.000	604	70526.000	207	72056.000	271	73154.000	214	73751.000	237	74457.000	146	75615.000	136	75930.000	171
34920.000	604	70530.000	207	72057.000	271	73156.000	221	73752.000	237	74458.000	146	75616.000	136	75931.000	171
34921.000	604	70531.000	207	72058.000	261	73157.000	221	73753.000	237	74459.000	288	75617.000	136	75935.000	140
34922.000	604	70541.000	207	72059.000	261	73158.000	214	73754.000	241	74460.000	288	75618.000	136	75940.000	140
34923.000	604	70542.000	207	72060.000	264	73159.000	214	73755.000	241	74461.000	288	75619.000	142	75941.000	140
34924.000	604	70543.000	207	72061.000	264	73163.000	216	73756.000	237	74462.000	288	75620.000	136	75942.000	288
34925.000	604	70544.000	207	72062.000	264	73164.000	216	73758.000	237	74463.000	288	75621.000	136	75943.000	288
34930.000	604	70551.000	207	72063.000	264	73165.000	216	73759.000	237	74464.000	288	75622.000	136		
34931.000	604	70552.000	207	72064.000	264	73166.000	216	73768.000	274	74465.000	288	75623.000	136	76400.000	156
34932.000	604	70553.000	207	72065.000	264	73168.000	215	73769.000	228	74466.000	288	75624.000	142	76401.000	156
34933.000	604	70554.000	207	72066.000	272	73169.000	215	73773.000	274	74468.000	288	75625.000	136	76403.000	156
34934.000	604	70555.000	207	72067.000	272	73173.000	222	73789.000	228	74469.000	288	75626.000	136	76404.000	156
34935.000	604	70556.000	207	72068.000	264	73174.000	222	73799.000	228	74471.000	288	75627.000	136	76406.000	156
34940.000	604	70557.000	207	72069.000	264	73178.000	215	73800.000	246	74472.000	288	75628.000	136	76407.000	156
34941.000	604	70685.000	344	72070.000	264	73179.000	215	73801.000	246	74473.000	288	75629.000	142	76409.000	173
34942.000	604	70688.000	146	72071.000	264	73183.000	215	73802.000	246	74474.000	288	75640.000	137	76410.000	173
34943.000	604	70689.000	146	72072.000	264	73184.000	215	73803.000	246	74475.000	288	75641.000	137	76412.000	156
34944.000	604	70692.000	190	72073.000	264	73188.000	222	73804.000	232	74476.000	288	75642.000	137	76413.000	156
34945.000	604	70757.000	233	72074.000	273	73189.000	222	73805.000	232	74477.000	288	75643.000	137	76415.000	156
34949.000	579	70758.000	233	72075.000	273	73220.000	255	73806.000	232	74478.000	288	75644.000	142	76416.000	156
34950.000	593	70759.000	233	72100.000	183	73233.000	524	73807.000	232	74479.000	288	75645.000	137	76418.000	156
34957.000	593	70760.000	233	72101.000	183	73242.000	245	73808.000	229	74480.000	288	75646.000	137	76419.000	156
34958.000	593	70761.000	233	72102.000	185	73243.000	245	73809.000	229	74481.000	288	75647.000	137	76421.000	156
34959.000	593	70762.000	233	72103.000	191	73254.000	247	73810.000	229	74482.000	146	75648.000	137	76422.000	156
34960.000	593	70944.000	207	72105.000	187	73255.000	247	73811.000	229	74483.000	146	75649.000	142	76424.000	173
34961.000	593	70946.000	207	72106.000	188	73256.000	244	73812.000	245	74484.000	139	75650.000	132	76425.000	173
34962.000	593	70956.000	139	72107.000	192	73257.000	244	73813.000	245	74485.000	139	75651.000	132	76427.000	153
34963.000	593	70957.000	139	72110.000	183	73270.000	524	73814.000	245	74486.000	139	75652.000	133	76428.000	153
34964.000	592	70958.000	139	72111.000	183	73271.000	244	73815.000	245	74487.000	139	75653.000	133	76430.000	153
34965.000	593	70959.000	139	72112.000	186	73272.000	244	73816.000	230	74488.000	146	75654.000	133	76431.000	153
34990.000	579	70960.000	139	72113.000	191	73273.000	255	73818.000	230	74489.000	146	75656.000	140	76433.000	153
34991.000	587	70966.000	139	72115.000	187	73274.000	255	73821.000	238	74492.000	587	75657.000	133	76434.000	153
34994.000	732	70967.000	139	72116.000	188	73275.000	524	73822.000	238	74493.000	587	75658.000	133	76436.000	172
34995.000	597	70968.000	139	72117.000	193	73460.000	250	73824.000	238	74494.000	587	75659.000	133	76437.000	172
		70969.000	139	72118.000	189	73461.000	250	73825.000	238	74495.000	587	75661.000	140	76439.000	157
		70970.000	139	72120.000	184	73462.000	250	73830.000	241	74496.000	587	75662.000	133	76440.000	157
		70981.000	160	72121.000	184	73463.000	250	73831.000	241	74497.000	587	75663.000	133	76442.000	157
44517.000	707	70982.000	160	72122.000	186	73464.000	250	73836.000	240	74498.000	587	75664.000	134	76443.000	157
44518.000	706	70983.000	160	72123.000	191	73465.000	250	73837.000	247	74499.000	587	75665.000	134	76445.000	157
44519.000	705	70983.000	160	72123.000	191	73465.000	250	73837.000	247	74499.000	587	75665.000	134	76445.000	157
44522.000	708	70984.000	160	72130.000	184	73466.000	251	73838.000	247	74759.000	239	75666.000	140	76446.000	157
44523.000	708	70985.000	160	72131.000	186	73467.000	251			74800.000	252	75667.000	133	76448.000	158
44526.000	706	70986.000	139	72132.000	185	73500.000	285	74390.000	239	74801.000	252	75668.000	133	76449.000	158
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76493.000	158	77198.000	146	77794.000	221	79261.000	90	81027.000	714	83586.000	406			88167.000	300
76494.000	158	77201.000	210	77799.000	221	79263.000	90	81029.000	717	83587.000	452	85022.000	697	88168.000	301
76496.000	175	77231.000	210	77802.000	269	79264.000	90	81030.000	716	83588.000	387	85023.000	697	88169.000	301
76497.000	175	77246.000	211	77809.000	269	79265.000	90	81031.000	716	83589.000	446	85024.000	697	88170.000	301
76499.000	155	77306.000	229	77810.000	267	79266.000	90	81040.000	715	83590.000	406	85025.000	729	88171.000	303
76500.000	155	77307.000	229	77811.000	267	79267.000	90	81042.000	715	83592.000	459	85026.000	698	88172.000	301
76502.000	155	77308.000	230	77846.000	268	79268.000	90	81043.000	716	83670.000	304	85028.000	698	88173.000	301
76503.000	155	77309.000	230	77848.000	268	79300.000	84	81050.000	716	83671.000	304	85029.000	698	88276.000	456
76505.000	155	77312.000	231	77885.000	269	79301.000	84	81051.000	716	83672.000	387	85030.000	729	88277.000	456
76506.000	155	77313.000	231	77890.000	269	79302.000	83	81093.000	353	83679.000	310	85035.000	729	88281.000	457
76508.000	155	77318.000	231			79304.000	84	81251.000	347	83680.000	304	85044.000	730	88282.000	457
76509.000	155	77319.000	231	78301.000	81	79306.000	84	81261.000	347	83681.000	304	85045.000	730	88285.000	456
76511.000	173	77323.000	232	78302.000	81	79307.000	84	81271.000	365	83682.000	386	85060.000	730	88286.000	457
76512.000	173	77324.000	232	78303.000	81	79308.000	84	81274.000	365	83689.000	304	85065.000	730		
76529.000	157	77332.000	233	78304.000	81	79309.000	84	81281.000	366	83690.000	304	85070.000	731	89201.000	437
76530.000	157	77333.000	233	78323.000	88	79310.000	84	81545.000	380	83773.000	311	85075.000	731	89202.000	437
76531.000	157	77336.000	233	78341.000	81	79311.000	84	81628.000	348	83774.000	345	85085.000	731	89203.000	436
76532.000	157	77337.000	233	78342.000	81	79315.000	83	81629.000	352	83775.000	356	85090.000	731	89216.000	436
76533.000	157	77343.000	232	78343.000	81	79320.000	84	81630.000	349	83776.000	356	85201.000	502	89217.000	435
76534.000	157	77344.000	232	78344.000	81	79321.000	84	81631.000	352	83777.000	363	85588.000	507	89218.000	435
76535.000	157	77460.000	203	78350.000	86	79322.000	83	81632.000	350	83811.000	311	85589.000	508	89221.000	433
76536.000	157	77461.000	203	78353.000	88	79324.000	84	81633.000	352	83812.000	345	85592.000	507	89225.000	435
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76538.000	174	77495.000	202	78362.000	81	79327.000	84	81637.000	375	83814.000	60	85594.000	507	89341.000	433
76539.000	156	77496.000	202	78363.000	81	79328.000	84	81638.000	373	83816.000	60	85595.000	508	89351.000	433
76540.000	156	77563.000	202	78364.000	81	79329.000	84	81639.000	376	83817.000	60	85887.000	503	89361.000	434
76541.000	153	77564.000	202	78633.000	86	79330.000	84	81640.000	372	83819.000	311	85888.000	504	89371.000	434
76542.000	153	77565.000	202	78651.000	86	79331.000	84	81641.000	374	83829.000	60	85890.000	503	89908.000	404
76550.000	166	77566.000	203	78652.000	86	79335.000	83	81643.000	381	83831.000	310				
76551.000	166	77567.000	203	78670.000	86	79340.000	91	81645.000	378	83832.000	344	86002.000	502		
76552.000	170	77568.000	203	78671.000	86	79341.000	91	81647.000	383	83833.000	310	86005.000	502		
76553.000	170	77569.000	202			79343.000	91	81649.000	379	83834.000	429				
76554.000	169	77570.000	202	79023.000	85	79344.000	91	81655.000	354	83836.000	564	87101.000	527		
76555.000	169	77571.000	202	79024.000	85	79345.000	91	81656.000	382	83837.000	564	87600.000	497		
76556.000	165	77582.000	205	79030.000	85	79346.000	91	81659.000	354	83838.000	564	87602.000	497		
76557.000	165	77583.000	205	79031.000	85	79347.000	91	81660.000	383	83910.000	521	87603.000	519		
76558.000	169	77584.000	205	79036.000	85	79348.000	91			83921.000	363	87606.000	517		
76559.000	169	77585.000	205	79037.000	85	79360.000	91	82508.000	403	83922.000	363	87607.000	519		
76560.000	170	77588.000	205	79038.000	85	79361.000	91	82512.000	403	83923.000	363	87608.000	519		
76561.000	170	77589.000	205	79039.000	85	79363.000	91	82950.000	345	83924.000	363	87609.000	520		
76562.000	162	77590.000	204	79047.000	84	79364.000	91	82952.000	356	83925.000	363	87610.000	517		
76563.000	162	77591.000	204	79048.000	84	79365.000	91	82953.000	356	83926.000	363	87611.000	517		
76564.000	168	77592.000	204	79052.000	85	79366.000	91	82954.000	356	83927.000	754	87615.000	520		
76565.000	168	77593.000	204	79053.000	85	79367.000	91			83928.000	754	87621.000	518		
76566.000	167	77594.000	204	79054.000	85	79368.000	91	83260.000	445	83929.000	754	87626.000	518		
76567.000	167	77595.000	204	79055.000	85	79500.000	86	83261.000	443	83941.000	406	87640.000	497		
76568.000	161	77707.000	277	79092.000	84	79501.000	86	83264.000	445	83942.000	406	87890.000	527		
76569.000	161	77709.000	277	79093.000	84	79503.000	87	83265.000	443	83943.000	406				
76570.000	167	77712.000	277	79094.000	84	79504.000	87	83266.000	413	83951.000	345	88045.000	315		
76571.000	167	77722.000	278	79095.000	84	79515.000	86	83267.000	413	83952.000	311	88047.000	317		
76572.000	168	77738.000	276	79200.000	83	79527.000	87	83271.000	444	83953.000	356	88049.000	318		
76573.000	168	77739.000	276	79201.000	83	79528.000	87	83273.000	444	83954.000	356	88050.000	315		
76574.000	164	77740.000	279	79204.000	83	79530.000	87	83275.000	444	83955.000	363	88051.000	315		
76575.000	164	77742.000	279	79206.000	83	79546.000	102	83276.000	414	83956.000	311	88052.000	315		
76576.000	163	77743.000	275	79207.000	83	79547.000	87	83392.000	338	83958.000	356	88053.000	316		
76577.000	163	77744.000	275	79208.000	83	79548.000	87	83394.000	377	83959.000	311	88060.000	317		
76580.000	177	77745.000	279	79209.000	83	79549.000	87	83474.000	462	83965.000	504	88061.000	317		
76581.000	177	77746.000	276	79210.000	83	79550.000	86	83475.000	464	83967.000	465	88062.000	316		
76582.000	177	77747.000	276	79211.000	83	79551.000	86	83478.000	462	83971.000	407	88063.000	316		
76583.000	177	77748.000	268	79220.000	83	79555.000	86	83479.000	464	83972.000	407	88100.000	307		
76584.000	177	77749.000	268	79221.000	83	79556.000	86	83481.000	462	83973.000	407	88110.000	307		
76585.000	177	77752.000	268	79224.000	83	79560.000	86	83482.000	464	83974.000	344	88111.000	307		
76586.000	178	77753.000	268	79226.000	83	79561.000	86	83484.000	463	83977.000	344	88120.000	307		
76587.000	178	77756.000	274	79227.000	83	79565.000	86	83489.000	463	83978.000	344	88130.000	308		
76588.000	178	77757.000	275	79228.000	83	79566.000	86	83493.000	463	83979.000	344	88131.000	308		
76589.000	178	77758.000	274	79229.000	83	79570.000	86	83516.000	490	83980.000	304	88135.000	308		
76590.000	178	77759.000	275	79230.000	83	79571.000	86	83517.000	490	83985.000	387	88145.000	309		
76591.000	178	77761.000	276	79231.000	83			83569.000	465	83986.000	387	88146.000	309		
76592.000	175	77762.000	276	79240.000	90			83572.000	465	83987.000	387	88147.000	309		
76593.000	175	77763.000	268	79241.000	90	81010.000	712	83578.000	438	83988.000	387	88148.000	309		
76594.000	176	77764.000	268	79243.000	90	81011.000	713	83579.000	311	83992.000	387	88160.000	299		
76595.000	176	77780.000	280	79											

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