LED lighting for stable and farmyard

The new standard with many advantages

KERBL

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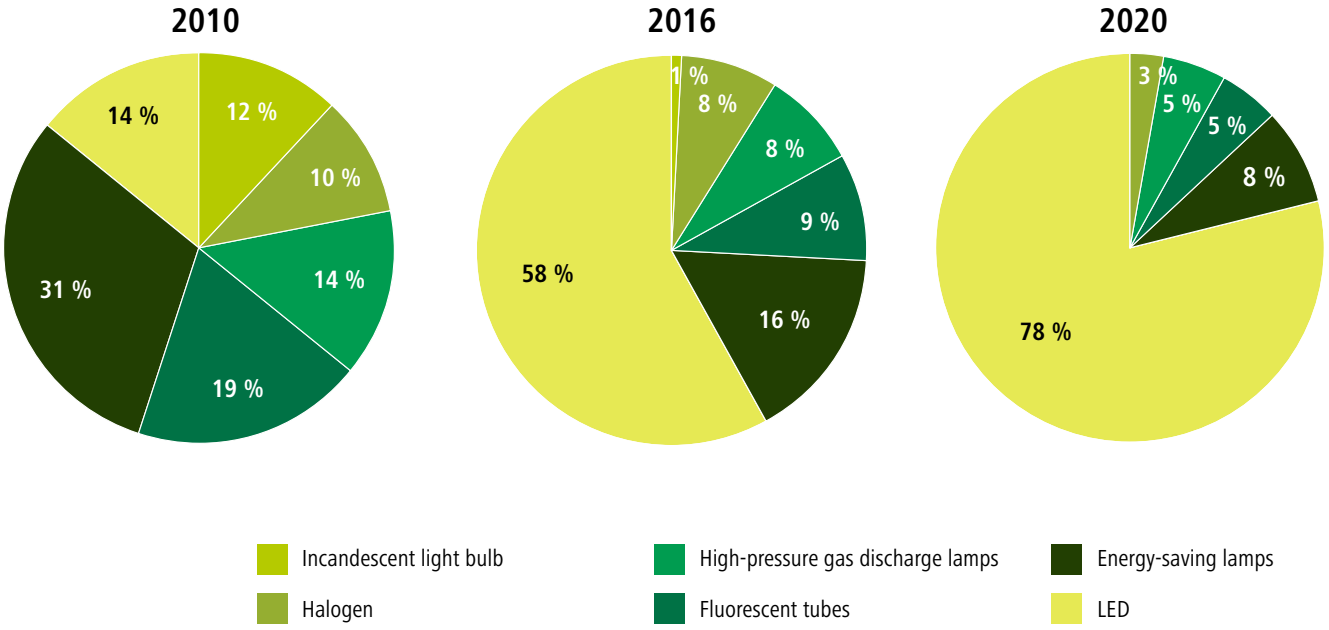
The new standard with many advantages

The triumphant advance of the LED

The lighting market is currently undergoing a massive upheaval. While the classic light bulb has already disappeared from the market, other traditional lighting sources such as halogen, energy-saving and discharge lamps are more and more being replaced by more modern technologies.

The European Union is taking a leading role in this: With Directive 2009/125/EC (Ecodesign Directive), the legal framework has been created for the eco-design of energy-related products such as those used for lighting systems. Inefficient products are supposed to be gradually phased out of the market.

And due to its high energy efficiency and life span, LED technology has emerged as the clear winner in this area. In 2011, the share of LED products in the global lighting system market was still at 12 %; however, according to a study by the McKinsey consulting firm, this share will rise to over 70 % by 2020 - the triumphant advance of LED is thus rapid and unstoppable.



Source: McKinsey

LED lighting for stable and farmyard

This development has obviously also made its way to the stable door and beyond because the advantages of this technology are so overwhelming.

Even we are convinced of the benefits of LED lighting and currently offer a select product line for agricultural use.

Take a look at our diverse range of products
and see for yourself!

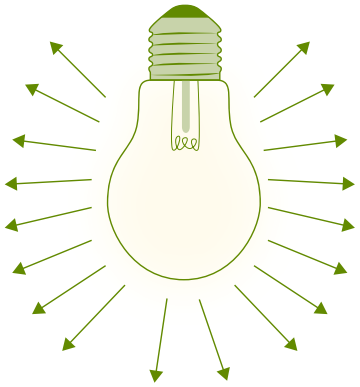
Basic lighting technology terms

Nowadays it is not enough to judge the light output of a lamp or bulb by just the wattage. What is more important is the luminous flux (lumens) as well as the luminous efficacy (lumens per watts).

Luminous flux

Unit: Lumens (lm)

The luminous flux characterises the total amount of light given off by a light source in all directions. This is an important criterion when comparing luminaires.

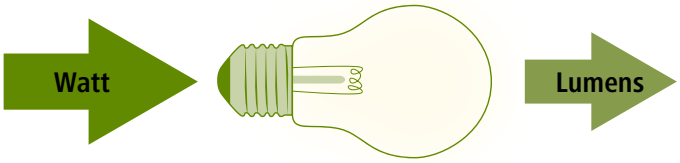


Example
A 100 W bulb generates a luminous flux of appox. 1000 lumens.

Luminous efficacy

Unit: Lumens per watt (lm/W)

The luminous efficacy characterises the level of effectiveness of a light source and is calculated from the relationship of the luminous flux to the recorded output.



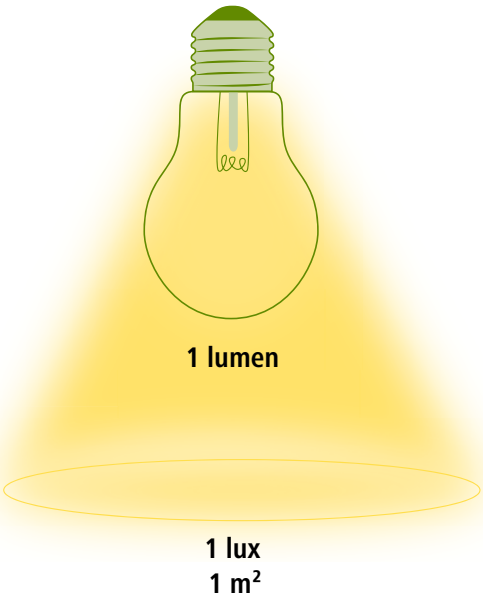
Examples	
Classic light bulb	approx. 10 lm/W
Halogen spotlight	approx. 18 lm/W
LED chip	approx. 80-120 lm/W

Lighting strength

Unit: Lux (lx)
1 Lux = 1 lm/m²

The lighting strength characterises the luminous flux striking a specific surface. It is ultimately the deciding measure for evaluating the brightness at a specific point in the space.

The greater distance away the light source is located, the larger the illuminated surface and correspondingly the lower the lighting strength will be. The measurement of the lighting strength in the stable should take place at eye level.



Examples	
Typical office lighting	500 lx
Recommended lighting strengths for calf birthing stalls and feed preparation areas according to DIN EN 12464-1	200 lx
Recommended lighting strength for a light regime for increasing milk yields	200 lx
Min. requirement for calves and pigs according to the German regulation regarding the protection of animals and the keeping of production animals	80 lx

LED lighting for stable and farmyard

The advantages at a glance

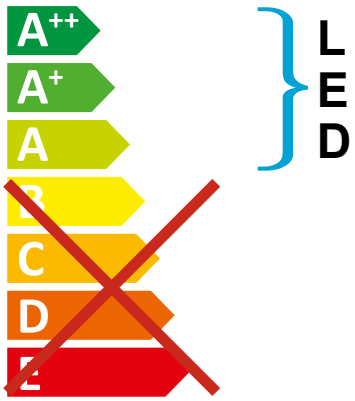
LED technology in the stable pays off

LEDs operate at a high level of effectiveness and are extremely efficient. Their luminous efficacy is thus especially high.

The investment costs for new equipment or a conversion are currently still normally higher when compared to conventional lighting technology; however these costs will pay for themselves over a short amount of time due to the considerable savings in operating costs – when all is said and done, you will be saving real cash, day after day!

LED lights with industrially manufactured LED chips have, for example, approx. a 5 x higher luminous efficacy than conventional halogen lights.

Though it is true that modern discharge lamps (fluorescent lamps, metal halide lamps) also achieve high luminous efficacy; however, you have to take into account here that the light is given off in all directions and despite reflectors, a portion of that light is "lost." In contrast, LEDs emit light downward at a defined angle of, e.g. 120° – therefore, the light reaches where it is really needed.



80 % less energy costs at the same light output

Comparison of LED and halogen spotlights

Example: Burning life 8 hours per day (2,920 hours per year)

Luminaire	Light power produced	Annual electricity costs (based on € 0.20/kW)
500 watt halogen spotlight (18 lm/W)	9000 lumens (500 watt x 18 lm/W)	€ 292.00
100 watt LED spotlight (90 lm/W)	9000 lumens (100 watt x 90 lm/W)	€ 58.40
Annual electricity cost savings:		**€ 233.60**

A good 100 watt LED spotlight will be just as bright as a 500 watt halogen spotlight, but will use approx. 80 % less power.

High service life

LED chips have a very long service life up to 50,000 hours. In continual operation, that amounts to approx. 6 years; at 8 hours of daily operation, this amounts to over 17 years. Costs for maintenance and lamp replacement are also reduced to a minimum.

Examples		
LED chip	up to	50,000 h
Modern fluorescent lamp	approx.	18,000 h
Halogen lamp	approx.	2,000 h
Light bulb	approx.	1,000 h

LED chips also do not simply fail, but rather begin to lose their brightness over time (degradation). Reputable providers normally offer a "useful life duration" according to EU Regulation 1194/2012. For example, the information "L_{70}" indicates that the LED chip will still achieve 70 % of its original light output after 50,000 hours.

The life span of an LED chip depends, among other things, on the operating and ambient temperature: The better the heat dissipation and the lower the ambient temperature, the slower the ageing process.

High switching capacity
On – Off – On – Off … Contrary to energy-saving and fluorescent lamps, the robust light emitting diode is practically impervious to frequent switching on/off. Thus they are also well-suited for switch intensive operation on motion detectors.

Immediate full light output
Energy-saving and discharge lamps require a "warm-up time" of almost a few minutes to reach full brightness. With LEDs, this scenario is a thing of the past because they offer immediate 100 % light output when turned on.

Full light output even at low temperatures
LEDs also operate extremely efficiently at low temperatures and are, therefore, ideal for use in outside areas or in unheated buildings. For example, while an LED tube continues to emit its full light output at an ambient temperature of 0 °C, a typical fluorescent tube, which is designed for ambient temperatures of 20 °C, only emits 40-60 % of its max. value.

Does not attract insects
Insect eyes contrary to human eyes are especially sensitive to ultraviolet radiation (UV). While the mercury vapour high pressure lamps frequently used in the past acted like a vacuum cleaner sucking up millions of insects due to its high share of UV, the light emitted by LEDs are very insect-friendly – it contains practically no UV radiation.

No additional heat input
The light emitted by an LED remains cool – compare that to thermal radiators such halogen or incandescent light bulb lamps for which a large portion of the energy is output in infrared radiation and thus in heat. The electronics of LEDs due in fact produce heat; however, this is not emitted in the direction of the object being illuminated.

Natural colour perception
In dairy cattle farming, a high and natural colour rendering is required for the colour differentiation between blood, urine and milk, especially in treatment areas, sick stalls and calving bays.
The quality of the colour rendering is expressed in terms of the Ra value. The maximum possible value is 100. A Ra value of > 75 is recommended. Contrary to LEDs, sodium vapour lamps, for example, have a very poor colour rendering (Ra 20-50).

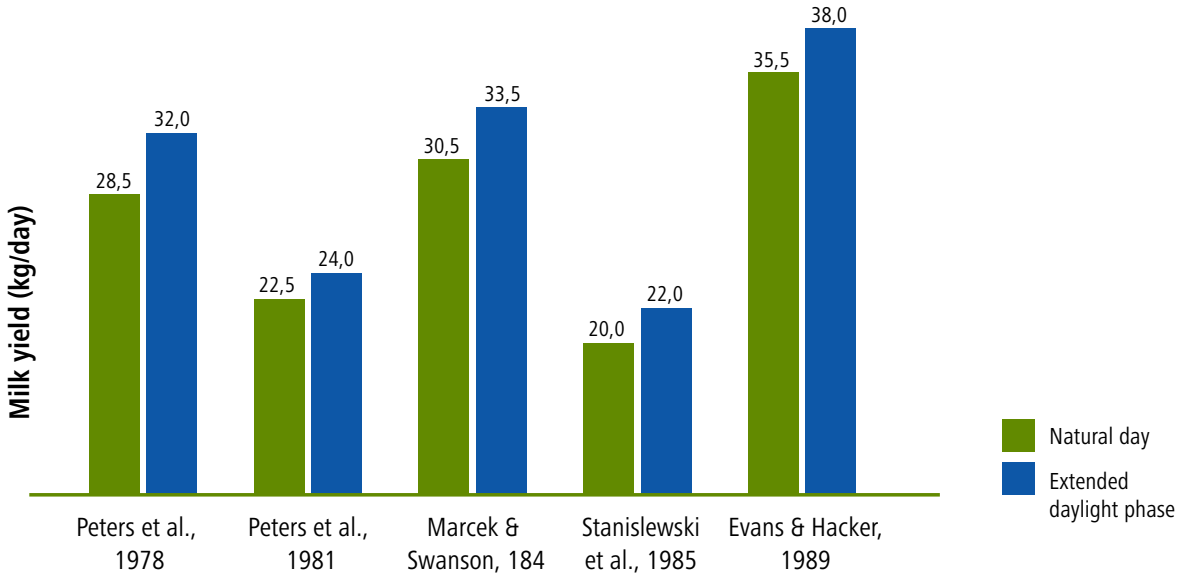
Environmentally-friendly and safe operation
Due to its high energy efficiency, the CO_2 pollution is correspondingly low. Operation is completely safe and disposal can be made via community collection centres because LED lights do not contain any mercury. Naturally, all of our products meet the requirements of Guideline 2002/95/EC regarding limiting the use of certain hazardous substances in electric and electronic devices (RoHS).

RoHS

More milk through more light

Lighting duration, lighting intensity and light colour all have a major impact on lactation, fertility and the well-being of animals. In dairy cattle farming, lighting management, therefore, is extremely important.

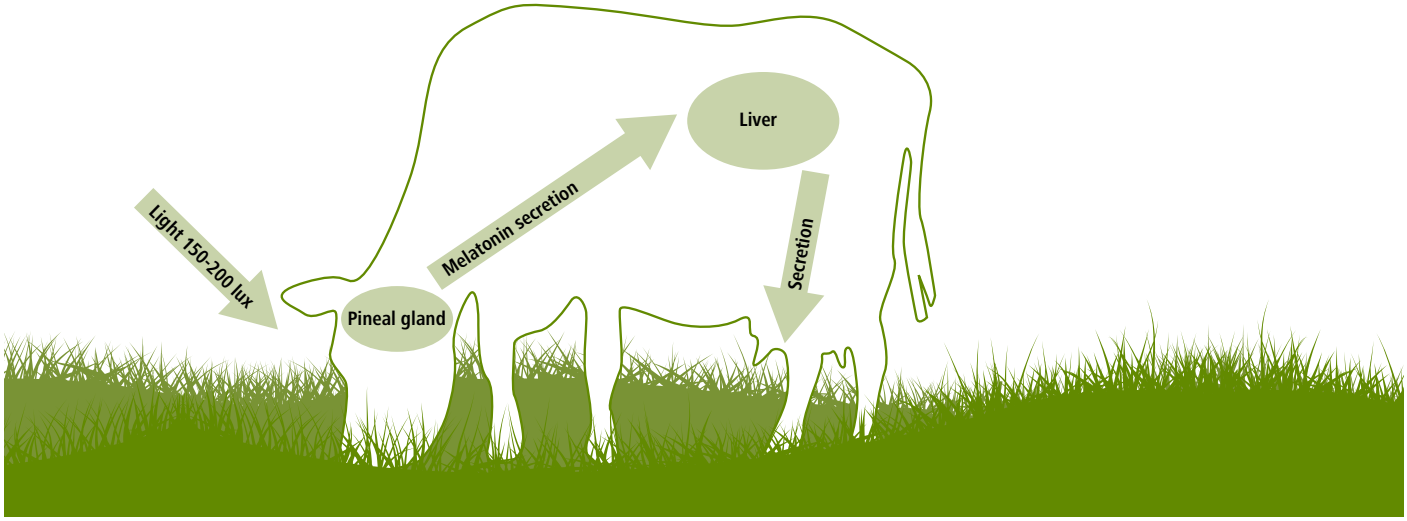
Scientific studies have shown that daily milk production can be increased 5-15 % on average during long daylight phases with 16 hours of light and 8 hours of darkness. However, this requires a uniform lighting strength of 150-200 lux.



Source: Bayerische Landesanstalt für Landwirtschaft (LfL), LfL-Information "Licht und Lichtprogramme in der Rinderhaltung" (Light and lighting programmes in cattle husbandry), February 2012

How does this work?

Light signals are sent to the pineal gland via the animal's eyes. A higher amount of light reduces the secretion of the hormone melatonin from the pineal gland, whereby the liver is stimulated to produce the IGF-1 hormone. This leads to increased activity for the cow, increased appetite and increased milk production.



Young cattle

An increase in the light intensity with 16 hours of light and 8 hours of darkness also has a positive effect on young cattle. An increased amount of light encourages activity and appetite, and accelerates the growth of the animal.

Dry cows

For dry cows, daylight phases with 8 hours of light and 16 hours of darkness are helpful. This leads to higher milk yield when lactation starts again. It also has a positive effect on feed intake and the immune system. Thus it is recommended to keep dry cows in a separate stable.

Lactating cows	Young cattle	Dry cows
150-200 lux	150-200 lux	150-200 lux
16 h of light	16 h of light	8 h of light
8 h of darkness	8 h of darkness	16 h of darkness

LED lights meets all of these requirements

LED lights are especially well-suited for new stable construction and the renovation of old stables in order to achieve optimal milk and/or growth output.

And when it comes to service life and efficiency, LED lights are superior to all other variants.
The higher the annual number of operating hours, the greater the importance of this advantage.

Influence on colour temperature

The colour temperature of a light source also has a significant influence on biorhythms. In this case, a basic distinction is made between warm white (< 3300 K), neutral white and daylight white (> 5300 K).

The higher the colour temperature, the higher the blue/green portion in the spectral composition of the light. Because the brightness perceived by cattle eyes is highest in the blue/green range, the use of lights with a higher colour temperature is recommended in order to achieve a productivity increase.

LEDs with a colour temperature of 6500 K are, therefore, extremely well-suited for this. For humans, this also boasts mental and physical performance and prevents the eyes from quickly becoming fatigued.

LED lighting for stable and farmyard

LED Indoor Spotlight

LED Indoor Spotlight

LED Indoor Spotlight for lighting stables, riding halls, industrial buildings and warehouses, barns, workshops, etc.

- high energy cost savings compared to regular T8 fluorescent lamps
- ideal for high-ceiling structures
- no warm-up time
- simple ceiling mounting with ring
- incl. hanging chain
- housing made from aluminium die casting
- cable length approx. 50 cm
- cannot be dimmed

technical data	
Service life (L70)	approx. 35,000
Input voltage	100 - 240 V AC
Working temperature	-30 °C to +50 °C
Colour temperature	6500 K
Protection class	34575/34576: IP54 34577: IP65
Colour rendering (CRI)	RA > 75
Light angle	approx. 90°

CE

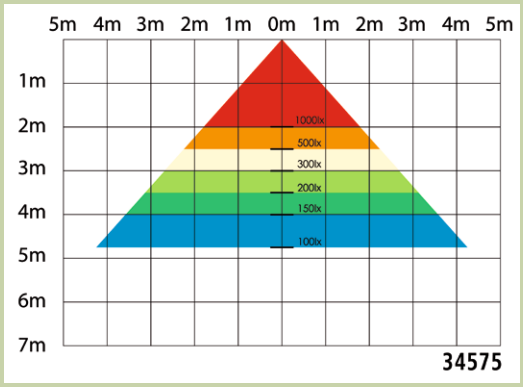
ref. no.	description
34575	50 W = 4000 Lumen, equivalent to approx. 225 W Halogen*
34576	100 W = 8000 Lumen, equivalent to approx. 450 W Halogen*
34577	150 W = 12000 Lumen, equivalent to approx. 670 W Halogen*

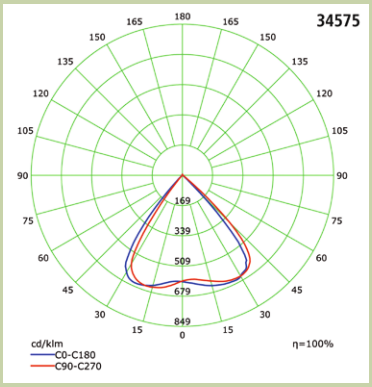
The indoor spotlights comprise built-in LED bulbs. The bulbs in the light cannot be replaced.

* at approx. 18 lumens/watt

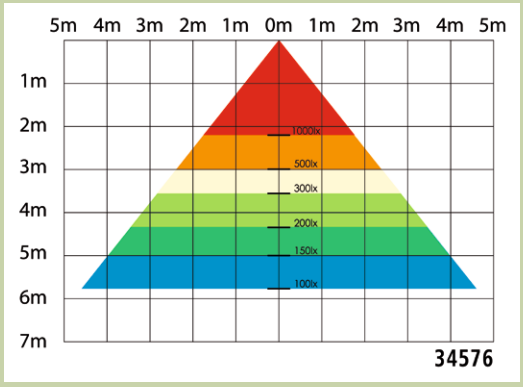
Lighting strength & Light distribution curves

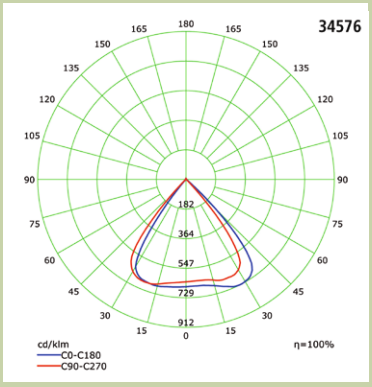
50 Watt



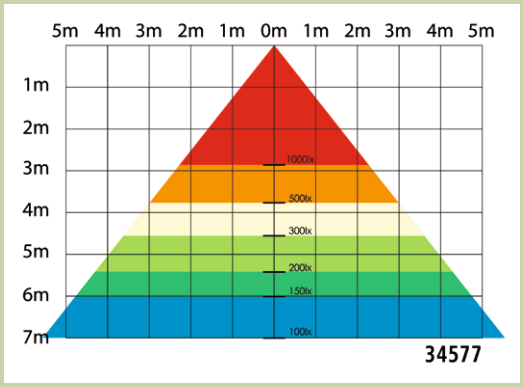


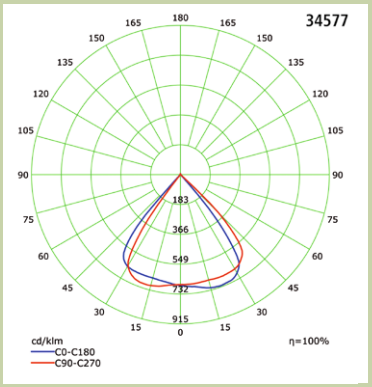
100 Watt





150 Watt





Calculation aid

140 - 160 lux

Stable width 30 m

Height*	8 m	7 m	6 m	5 m
Length	Number of Spotlights			
30 m	8	8	6	10
40 m	10	10	8	12
50 m	12	12	10	16
60 m	14	14	12	18
70 m	18	16	14	20
80 m	20	18	16	24

Spotlight	150 W	150 W	150 W	100 W
Rows	2	2	2	2
Distance max.	7,5 m	7,5 m	7,5 m	7,5 m

Stable width 24 m

Height	8 m	7 m	6 m	5 m
Length	Number of Spotlights			
40 m	12	12	10	15
50 m	14	14	12	18
60 m	16	16	16	21
70 m	20	18	18	24
80 m	22	22	20	30
90 m	24	24	22	33

Spotlight	150 W	150 W	150 W	100 W
Rows	2	2	2	3
Distance max.	7,5 m	7,5 m	7,5 m	7,5 m

Stable width 20 m

Height	8 m	7 m	6 m	5 m
Length	Number of Spotlights			
50 m	18	16	15	24
60 m	20	20	18	18
70 m	24	22	21	32
80 m	28	26	27	36
90 m	30	30	30	40
100 m	34	32	30	44

Spotlight	150 W	150 W	150 W	100 W
Rows	2	2	3	4
Distance max.	6 m	6 m	7,5 m	7,5 m

180 - 200 lux

Stable width 30 m

Height	8 m	7 m	6 m	5 m
Length	Number of Spotlights			
30 m	10	10	10	8
40 m	12	12	12	12
50 m	16	16	14	14
60 m	18	18	16	16
70 m	22	20	20	18
80 m	24	24	22	22

Spotlight	150 W	150 W	150 W	100 W
Rows	2	2	2	2
Distance max.	6 m	6 m	6 m	7,5 m

Stable width 24 m

Height	8 m	7 m	6 m	5 m
Length	Number of Spotlights			
40 m	16	14	15	12
50 m	18	18	18	15
60 m	22	22	21	21
70 m	26	24	24	24
80 m	28	28	27	27
90 m	32	32	30	30

Spotlight	150 W	150 W	150 W	100 W
Rows	2	2	3	3
Distance max.	5 m	5 m	6 m	7,5 m

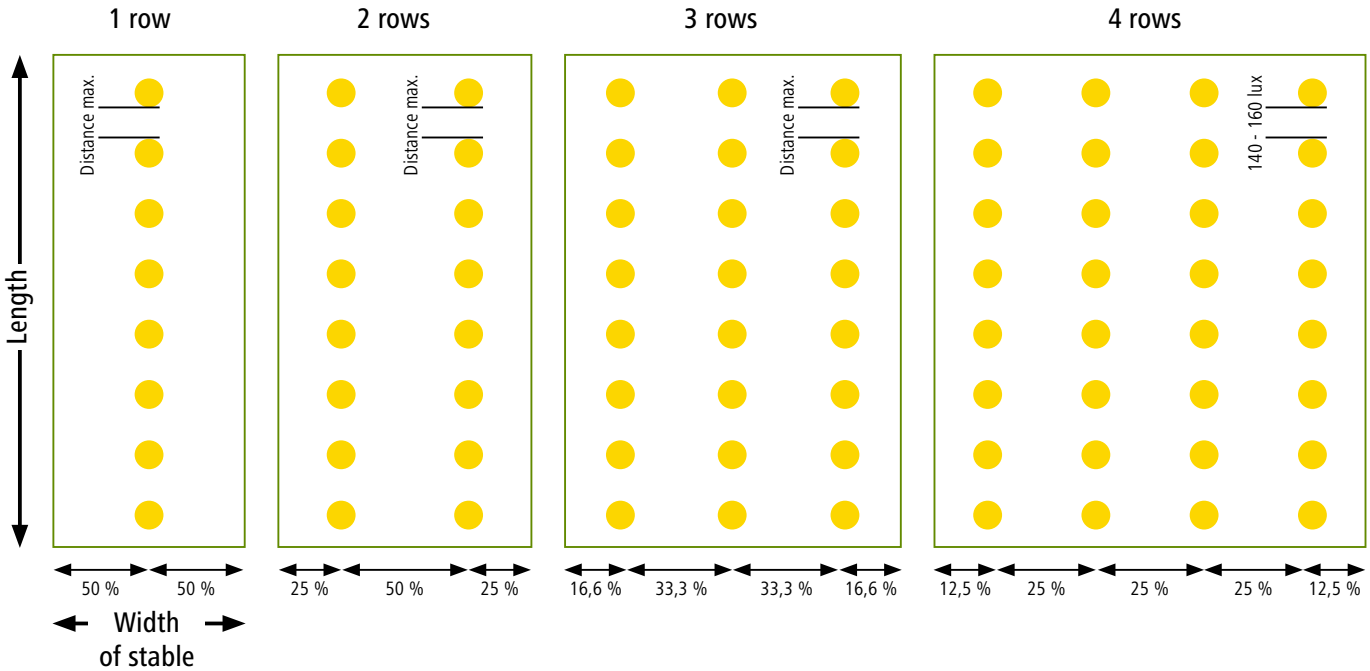
Stable width 20 m

Height	8 m	7 m	6 m	5 m
Length	Number of Spotlights			
50 m	24	21	21	21
60 m	27	27	24	24
70 m	33	30	30	27
80 m	36	36	33	30
90 m	42	39	39	36
100 m	45	45	42	39

Spotlight	150 W	150 W	150 W	100 W
Rows	3	3	3	3
Distance max.	6 m	7,5 m	7,5 m	7,5 m

* Aufhängehöhe der Leuchte

Arrangement of lights

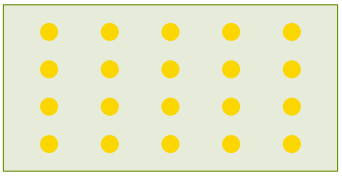
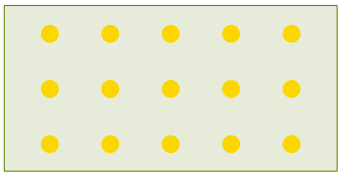


Conversion to LED technology

Investment calculation using a dairy stable as an example

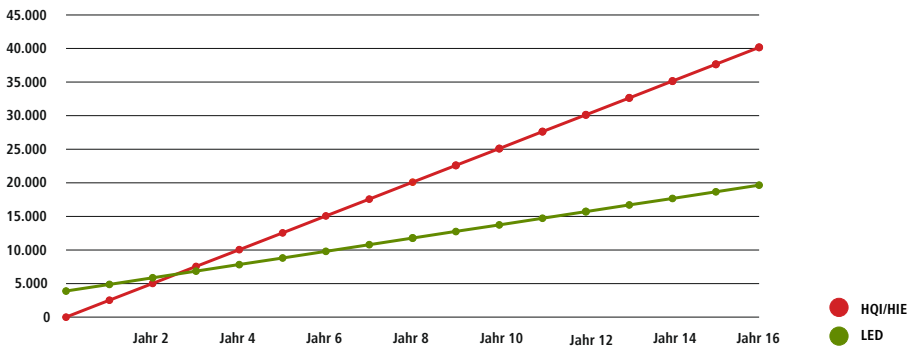
Halogen metal halide lamps (HQI/HIE) are frequently the first choice for stable lighting due to their relatively good luminous efficacy and colour rendering. The following example shows, however, that a conversion to LED technology can pay for itself quite quickly.

Dairy stable with 40 x 24 metres	
Installation height of the lights	6 metres
Average lighting strength	approx. 200 lux
Average burning life	6 hours per day

Type	**Before: Halogen-metal vapour 250 W**	**After: LED Indoor Spotlight 150 W**
		
Power consumption	272 watts (incl. ballast)	150 watts
Service life of the light source	approx. 11,000 hours (= 5 years at a burning life of 6 h/day)	approx. 35,000 hours (= 16 years at a burning life of 6 h/day)
Required number of lights for 200 lux	20 pieces	15 pieces
		
Total connected load in the stable	5440 watts	2250 watts
Energy consumption per year (2190 h)	11,914 kWh	4928 kWh
Investment costs for 15 LED lights		€ 3,885
Energy costs per year (€ 0.20 /kWh)	€ 2,383	€ 986
Costs for lamp replacement, annualised	€ 128	
Total costs per year	€ 2,511	€ 986

Cost savings per year	**€ 1,525**
Amortisation period	**2.5 years**
Total cost savings after 16 years	**€ 20,515**

Cost trend over 16 years



LED Outdoor Spotlight

LED Outdoor Spotlight for lighting stables, barns, sheds etc.

- with energy-efficient, high-performance LED chips
- reduced power consumption by approx. 80 % at the same illumination intensity in comparison to conventional halogen lamps
- housing made from aluminium die casting
- no warm-up time
- suitable for outdoor use
- with adjustable clamping bracket
- cannot be dimmed
- with connecting cable approx. 50 cm

LED Outdoor Spotlight without motion detector

ref. no.	description	width	height
34587	10 W	115 mm	85 mm
34588	20 W	180 mm	140 mm
34589	30 W	225 mm	186 mm
34590	50 W	288 mm	235 mm
34595	80 W	380 mm	310 mm
34594	100 W	380 mm	310 mm

LED Outdoor Spotlight with motion detector

The sensor detects movement
in a detection field of 150°
TIME: Operating duration (10 s - 7 min)
SENS: Sensor sensitivity
LUX: Ambient light at which the lamp switches on (0 lux - 200 lux)

ref. no.	description
34569	10 W
34570	20 W
34571	30 W
34572	50 W
34573	80 W
34574	100 W

CE

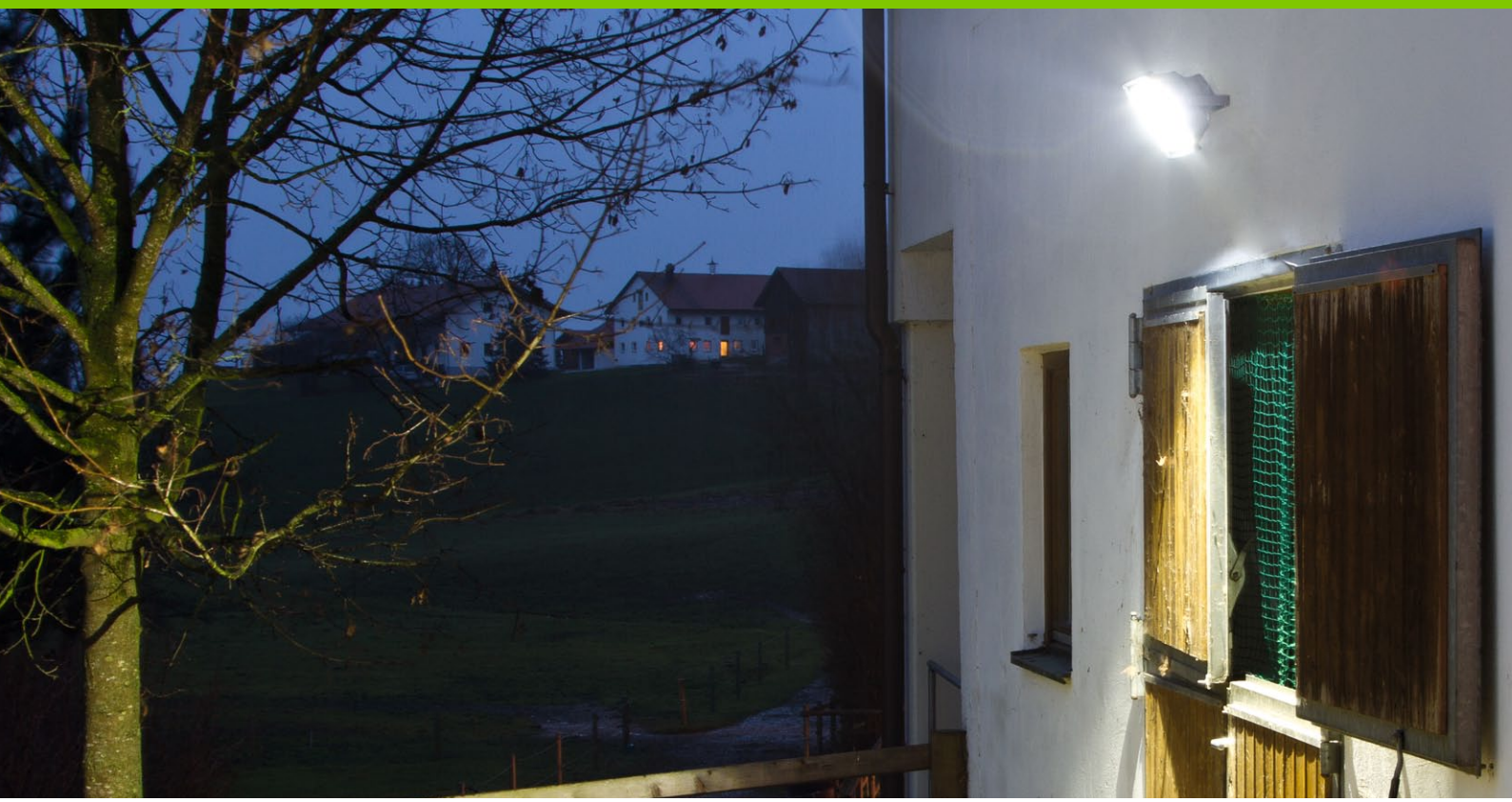
* at approx. 18 lumens/watt

The exterior lamps comprise built-in LED bulbs. The bulbs in the light cannot be replaced.

uses approx. 80 % less power in comparison to conventional halogen lamps

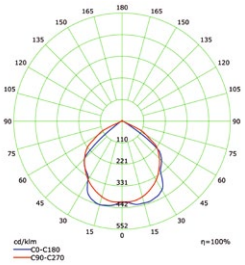
10 watt LED = 800 lumens, equivalent to approx. 45 W Halogen
20 watt LED = 1600 lumens, equivalent to approx. 90 W Halogen
30 watt LED = 2400 lumens, equivalent to approx. 135 W Halogen
50 watt LED = 4000 lumens, equivalent to approx. 225 W Halogen
80 watt LED = 6400 lumens, equivalent to approx. 360 W Halogen
100 watt LED = 8000 lumens, equivalent to approx. 450 W Halogen

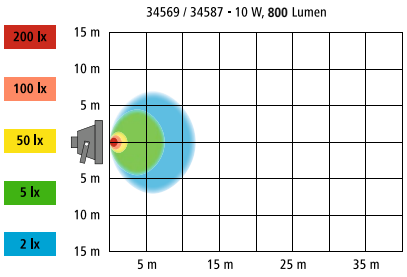
technical data	
Service life (L70)	approx. 35.000
input voltage	100 - 240 V AC
working temperature	-30 °C to +50 °C
Colour temperature	6500 K
Protection class	IP 65
lumen/watt	80 lumens
colour rendering (CRI)	Ra > 75
light angle	approx. 120°



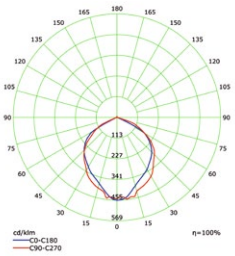
Lighting strength & Light distribution curves

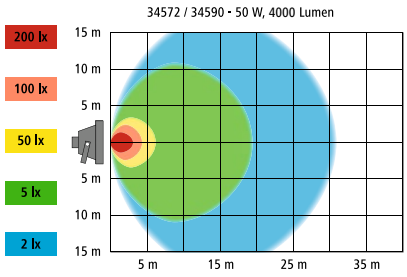
10 Watt



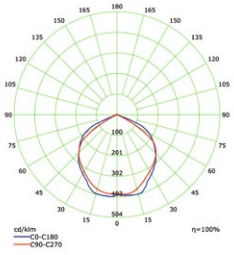


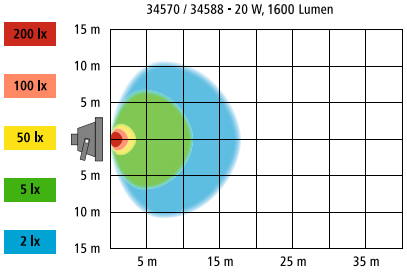
50 Watt



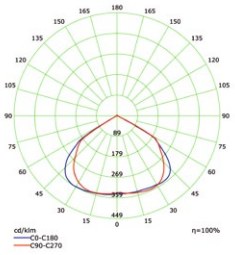


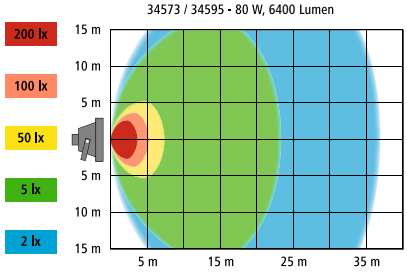
20 Watt



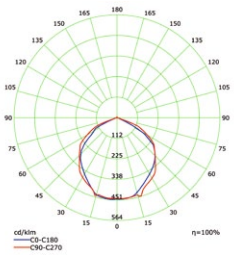


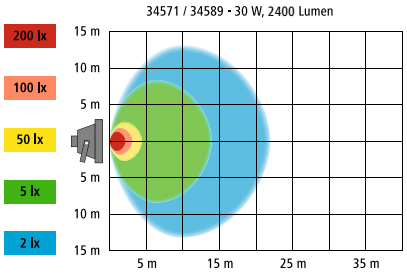
80 Watt



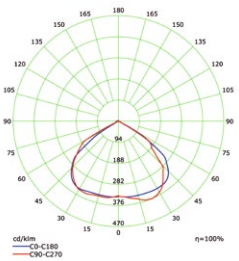


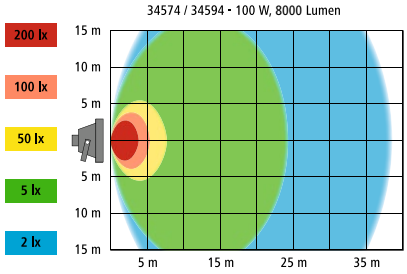
30 Watt





100 Watt





LED tubes and moisture-proof lights

LED tubes- the energy-saving alternative to classic T8 fluorescent tubes!

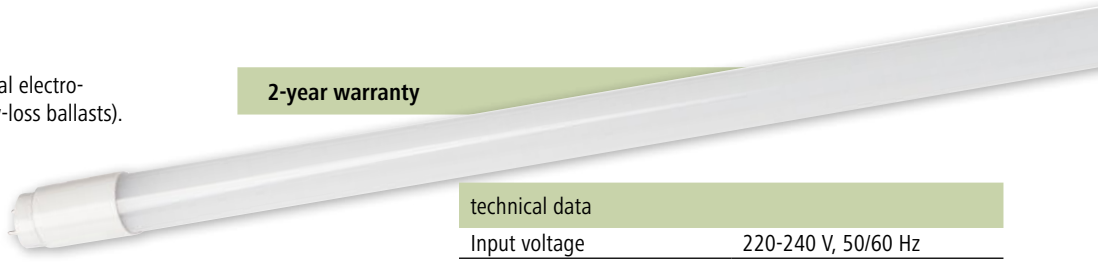
The advantages at a glance:

- high energy cost savings compared to regular T8 fluorescent lamps
- extremely high service life (> 30,000 h) and switching capacity
- full light output even at low temperatures
- full, immediate luminosity, no flickering, no humming
- uniform and glare-free illumination
- high colour reproduction (Ra > 80), suitable for nearly all operating site according to workplace guidelines
- sturdy plastic housing without any glass parts
- mercury-free

LED Tube EcoSTAR

- only suitable for luminaires with conventional electro-magnetic ballasts (conventional ballasts/low-loss ballasts).
- LED Tubes cannot be dimmed.
- TÜV approved

2-year warranty



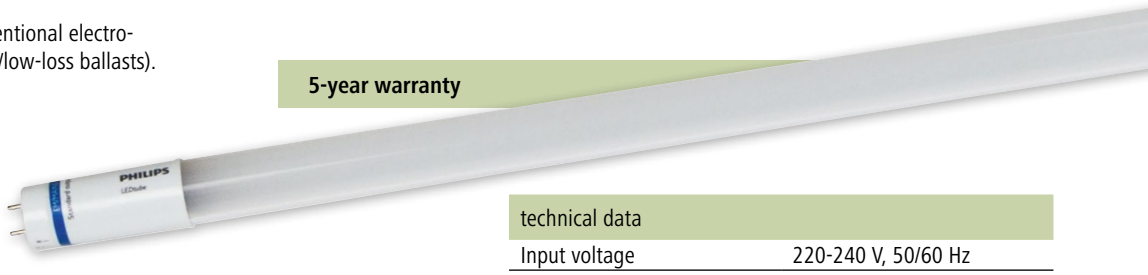
ref. no.	description
34556	EcoSTAR 150, 150 cm, 22 watts, 2,000 lumens
34557	EcoSTAR 120, 120 cm, 18 watts, 1,600 lumens

technical data	
Input voltage	220-240 V, 50/60 Hz
Colour temperature	6500 K
CRI colour rendering index	Ra > 80
Light angle	150°
Service life (L70)	> 30,000 h
Energy efficiency class	A

Philips Master LEDtube Value

- only suitable for luminaires with conventional electro-magnetic ballasts (conventional ballasts/low-loss ballasts).
- LED Tubes cannot be dimmed
- KEMA-KEUR (DEKRA) tested

5-year warranty



ref. no.	description
34551	Master LEDtube Value, 150 cm, 20 Watt, 2,000 lumens
34554	Master LEDtube Value, 120 cm, 14.5 Watt, 1,600 lumens

technical data	
Input voltage	220-240 V, 50/60 Hz
Colour temperature	6500 K (daylight white)
CRI colour rendering index	Ra 83
Light angle	150°
Service life (L70)	> 40,000 h
Energy efficiency class	A+

Moisture-proof diffuser light for LED Tube

- housing made from glass fibre reinforced polyester, low inflammability
- cover made from acrylic glass (PMMA), transparent, pearled interior, with clip locks
- protected against powerful water jets and dust-proof (IP 65 protection class)
- with D marking according to DIN EN 60598-2-24, therefore suitable for areas at risk of fires due to combustible dusts or fibres
- incl. microfuse
- no bridging starter required
- only suitable for T8 LED Tubes (Ø 26 mm)
- suitable for LED Tubes type 34551, 34554, 34556, 34557

ref. no.	description
34561	Moisture-proof diffuser light for LED Tubes 120 cm
34562	Moisture-proof diffuser light for LED Tubes 150 cm

Light source not included!

2-year warranty

LED Moisture-proof Lamp FarmSTAR

Perfect for rough conditions in wet, moist or dusty environments!

- for lighting stables, riding halls, industrial buildings and warehouses, barns, workshops, etc.
- with integrated high-performance LED chips (no fluorescent tubes required)
- high energy cost savings compared to regular T8 fluorescent lamps
- protected against powerful water jets and dust-proof (IP 65 protection class)
- with D marking according to DIN EN 60598-2-24, therefore suitable for areas at risk of fires due to combustible dusts or fibres (hay storage, feed, bedding, etc.)
- stable, shock-resistant housing made of polycarbonate
- extremely high service life (> 30,000 h) and switching capacity
- full light output even at low temperatures
- uniform and glare-free illumination due to a frosted cover
- high colour reproduction (Ra > 80), suitable for nearly all operating site according to workplace guidelines
- mercury-free
- incl. installation clips made of stainless steel
- this light cannot be dimmed

ref. no.	description
34558	LED Moisture-proof Lamp FarmSTAR, 121 cm / 25 W

This light contains built-in LED bulbs.
The bulbs in the light cannot be replaced.

technical data	
Power	25 W
Luminous flux	2,000 lm
Input voltage	220-240 V, 50/60 Hz
Colour temperature	6500 K
CRI colour rendering index	Ra > 80
Light angle	180°
Half-value angle	120°
Service life (L70)	> 30,000 h
Dimensions	approx. 1210 x 75 x 78 mm
Safety class	IP 65
Protection class	I

Albert Kerbl GmbH
Felizenzell 9
84428 Buchbach
Germany
Telefon +49 8086 933-100
Telefax +49 8086 933-500
E-Mail info@kerbl.de
www.kerbl.de

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All prices are subject to change.
Changes in colour and design may occur due to printing technology reasons.

PR250=LED-Programm_EN_ohnePreis_0915