

**Light can be white, white,
white or white.**

The right fluorescent lamp from OSRAM, whatever the application.

SEE THE WORLD IN A NEW LIGHT

OSRAM



Light colours.

Fluorescent lamps and their selection criteria.

Fluorescent lamps generate more than 70 % of all the artificial light in the world but consume only 50 % of the energy needed for lighting. Fluorescent lamps last between eight and forty times as long as ordinary light bulbs and need up to 90 % less electricity for the same brightness, depending on the type. They are therefore the best possible option for economical lighting. In addition to luminous efficacy and efficiency, the light colour or colour temperature and colour rendering are the most important criteria to consider when choosing the right light fluorescent lamp.





Colour rendering.

The first digit in the international colour code stands for the colour rendering:

8 = colour rendering index R_a 80 – 89

9 = colour rendering index R_a 90 – 100

Light colour / colour temperature.

The next digits in the international colour code stand for the light colour or colour temperature:

27 = 2700 K | **30** = 3000 K | **35** = 3500 K | **40** = 4000 K

54 = 5400 K | **65** = 6500 K | **80** = 8000 K

Light colour.

The light colour of a lamp depends on its spectral power distribution in the visible range. However, it is difficult to compare different lamps on the basis of their spectral power distribution. It is much easier to use their colour temperatures and colour rendering properties.

Colour temperature.

The colour temperature of a light source is defined as the light colour that corresponds to the temperature of a standard radiator (black body radiator). It is expressed in kelvin (K). The colour temperature of a lamp gives us an idea of its light colour. The light colours or colour temperatures of fluorescent lamps are determined by the composition of the phosphor coating on the inside of the tubes.

It is possible to produce white light with very different colour nuances.

Colour rendering.

The colour temperature indicates the shade that the light source appears to our eyes. If different light sources are used to illuminate coloured objects, the colours of these objects appear different despite the same colour temperature of the light sources. Such differences in quality are indicated by the colour rendering index R_a . The colour rendering index is determined by a comparison with the standardized black body radiator which is defined as having the “ideal” colour rendering R_a of 100 at every temperature.

Light colour = colour temperature + colour rendering.

The greater the differences in colour between the comparison lamp and the black-body radiator at the same colour temperature, the smaller the colour rendering index R_a . Colour temperature and colour rendering are therefore needed to define the light colour of a lamp fully.



	Colour temperature	Colour rendering	Light colour
Black body radiator	4000 K	$R_a = 100$	Ideal value
Lamp A	4000 K	$R_a \geq 90$	940
Lamp B	4000 K	$R_a \geq 80$	840
Lamp C	4000 K	$R_a \geq 60$	640

Notes:

Every colour temperature can have the ideal value of R_a 100. This means that the colours are rendered in the typical manner for this temperature. This is not always satisfactory, however. For example an incandescent lamp may render blue tones only in a subdued manner despite an R_a value of 99. If fine distinctions are required for blue tones a light colour with a higher colour temperature needs to be selected.

Colour rendering groups.

Light sources can be easily assigned to different colour rendering properties on the basis of the R_a index:







Properties	R_a index
Very good	90 – 100
Good	80 – 89
Satisfactory	70 – 79
Satisfactory	60 – 69
Adequate	40 – 59

Quality fluorescent lamps from OSRAM.

Modern high-quality fluorescent lamps from OSRAM are available in different light colours with different colour rendering properties and in numerous different wattages. Our complete range, supplemented and rounded off by fluorescent lamps for special applications, offers the perfect solution for every application and requirement.

Seven light colour groups.

Fluorescent lamps can be assigned to the following seven light colour groups according to their colour temperature:

	SKYWHITE	8000 K
	Cool Daylight	6500 K
	Daylight	5400 K
	Cool White	4000 K
	White	3500 K
	Warm White	3000 K
	INTERNA	2700 K

LUMILUX®, LUMILUX® DE LUXE and BASIC.

OSRAM fluorescent lamps are available in three versions for different application and requirement profiles. LUMILUX®, LUMILUX® DE LUXE and BASIC differ in particular in their colour rendering properties but also in other important parameters.

LUMILUX® lamps meet the requirements of colour rendering index 80 – 89. The special three-band phosphors of the LUMILUX® lamps ensure a high luminous flux with a luminous efficacy of up to 93 lm/W and therefore offer the most economical lighting.

LUMILUX® DE LUXE lamps have a colour rendering index > 90 with very good colour rendering properties. They offer the best colour rendering. However because of their lower luminous flux compared with LUMILUX® more lamps need to be used to achieve the same level of lighting.

BASIC lamps are reliable fluorescent lamps with a colour rendering index below 80. They are suitable for applications with modest requirements in terms of colour rendering and lighting comfort (e.g. garages, cellars, warehouses and outdoor lighting).

Fit for the future.

All fluorescent lamps from OSRAM in LUMILUX® and LUMILUX® DE LUXE versions already meet the requirements of the new European standard

EN 12464-1 for workplaces: “Lamps with a colour rendering index of $R_a < 80$ should not be used in rooms in which people work or stay for lengthy periods.”
(Source: EN 12464-1)

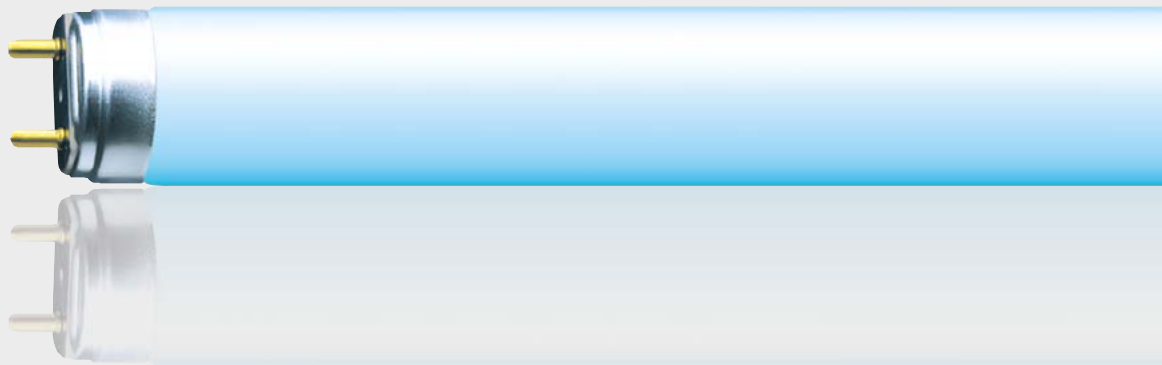


Special fluorescent lamps.

BIOLUX® lamps are ideal as additional lighting for terrariums and the like for small animals.

NATURA® and NATURA® SPS with their light colour 76 to DIN 10504 are ideal for displaying food and for presenting and selling flowers.

FLUORA® lamps with light colour 77 emit light at the blue and red ends of the spectrum. The result is healthier plants.



LUMILUX SKYWHITE®

A new dimension in white light.

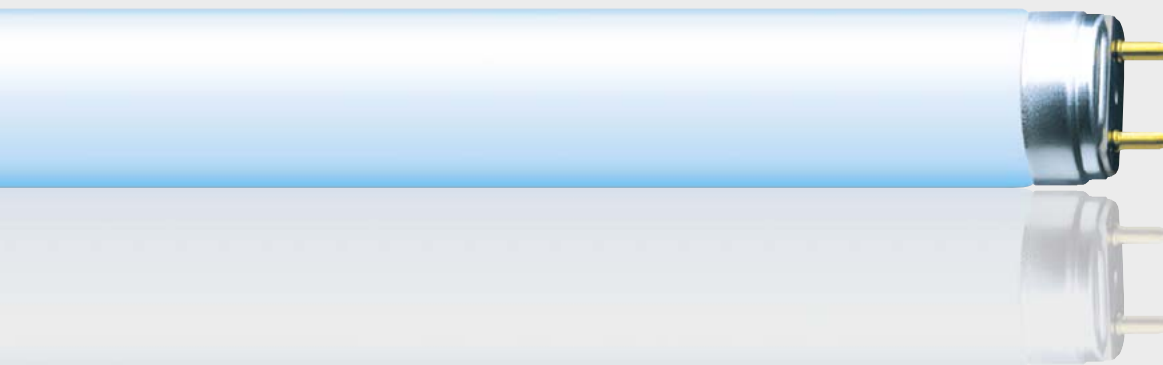
LUMILUX SKYWHITE® lamps produce heavenly light – at any time of day or night – thanks to its light colour 880, i.e. a colour temperature of 8000 K and good colour rendering of $R_a = 80$. These fluorescent lamps emit a large amount of “blue” light in the wavelength range from 410 to 460 nm and therefore come closer to natural daylight. They therefore improve contrast and reduce visual fatigue, which in turn helps of course to improve mental and physical performance.

This makes LUMILUX SKYWHITE® the first choice wherever high levels of concentration and well-being are needed in conjunction with special visual requirements.

LUMILUX SKYWHITE® lamps create a pleasant productive atmosphere in companies and public buildings – in stairwells and corridors, single and open-plan offices, conference rooms and hospitality rooms. The list is endless. They provide excellent lighting conditions in modern production complexes, bring fitness centres to life, help boost concentration levels in training rooms, classrooms, libraries, auditoriums and reading rooms, give retail premises a breath of fresh air – and are just what the doctor ordered for medical centres and waiting rooms.



The SKYWHITE® 880 light colour is the new “asset” for high-quality lighting with a wide variety of applications.



LUMILUX® Cool Daylight

Economical daylight.

Fluorescent lamps with light colour 865 are the ideal economical light source wherever the artificial lighting needs to have a daylight character, shades of colour have to be identified and colours have to be rendered as naturally as possible. These requirements have to be met, for example, in clothing and shoe shops, photographic, jewellery and flower shops, opticians, textile companies, doctors' practices and editorial offices.



LUMILUX® DE LUXE Cool Daylight

Daylight source for special requirements.

LUMILUX® DE LUXE Cool Daylight lamps correspond closely to standard illuminant D 65 and have a colour rendering index of $R_a > 95$. As they fall in quality class 2 (as defined in DIN 6173) they even meet the high requirements for colour matching. Previous this was possible only with costly colour testing luminaires fitted with XBO® lamps and filters. Now entire rooms can be illuminated with this type of light.

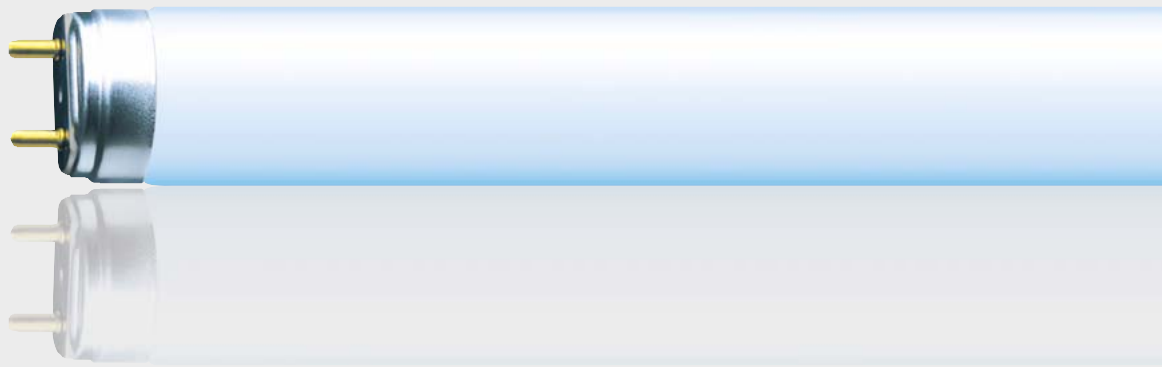


Source: Hetzler Store, Munich; Photo: Thomas Meyer; Light planning: Bernd König

Attractive lighting for modern merchandise presentation in light colour 865.



Light colour 965 puts pictures and exhibits in the right light.



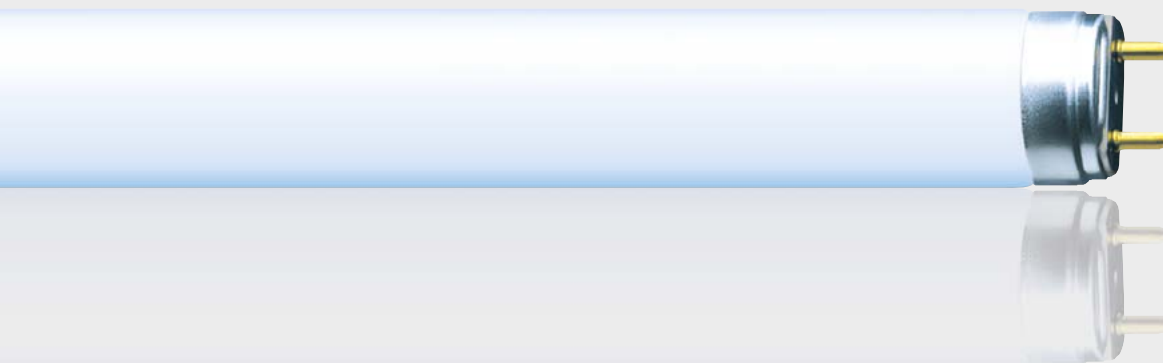
LUMILUX® DE LUXE Daylight

Daylight for optimum colour rendering.

LUMILUX® DE LUXE 954 is an even better choice for precise colour matching, the finest nuances and superb daylight quality. With this light colour it is possible to produce a close approximation to standard illuminant D 50. In dentists' practices, for example, crowns can be perfectly matched to the patient's natural tooth colour. In reprographic workshops, prints can be checked under optimum daylight conditions.



Light colour 954 combines high luminous flux and excellent colour rendering.



LUMILUX® Cool White

Economical light in which to work.

With a colour temperature of 4000 K, LUMILUX® Cool White is somewhere between daylight and incandescent light. It has a very bright appearance and combines very well with daylight without giving the impression of twilight. LUMILUX® Cool White is the most widely used light colour for “working light” and can be found in factories, workshops, shops, offices, exhibition halls, trade fairs and sports halls. It is also used extensively throughout the home in corridors, kitchens, bathrooms, cellars and hobby rooms.



The popular light colour 840 can also be used with great success in combination with daylight.



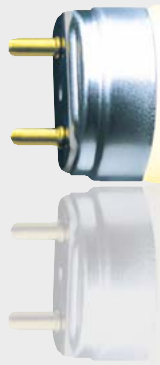
LUMILUX® DE LUXE Cool White

Optimum quality of light – high efficiency.

LUMILUX® DE LUXE 940 offers excellent colour rendering for all applications in which a neutral white light colour is required, such as clothing stores, print shops and factories assembling printed circuit boards.



Precision work is made easier by neutral white light colour 940 with optimum colour rendering.



LUMILUX® White

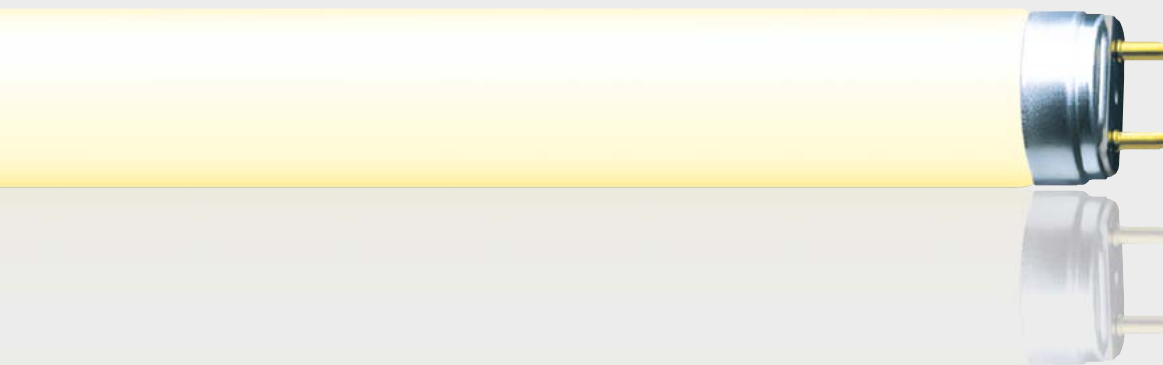
The golden middle way.

If LUMILUX® Cool White light is too “business-like” but “homely” lighting conditions are also not required, there is a “middle way”, namely LUMILUX® White with light colour 835. The fluorescent lamps with a colour temperature of 3500 K are the best solution for all applications in which it is important to strike the right balance between cool and cosy. Home offices for example take on a more professional look, while waiting rooms and reception areas seem friendlier and more comfortable in LUMILUX® White light.

Light colour 835 is already the most popular choice for offices and similar rooms in the USA, Great Britain and Commonwealth countries.



Professional and friendly: Light colour 835 is suitable for all domestic and commercial applications in which the right mix of light is important.



LUMILUX® Warm White

The warm economical light.

If you need light that is bright and cosy at the same time then LUMILUX® Warm White is the ideal choice. With a colour temperature of 3000 K the light is pleasantly “warm” and is similar to the light from tungsten-halogen lamps. It creates a relaxing atmosphere in which even high lighting levels do not seem too bright and in which people feel comfortable. LUMILUX® Warm White is used wherever both good background lighting and a positive mood are required, for example in shops, exhibition halls, trade fairs, schools, auditoriums, kindergartens, offices and meeting rooms.



LUMILUX® DE LUXE Warm White

The most beautiful colours in a warm light.

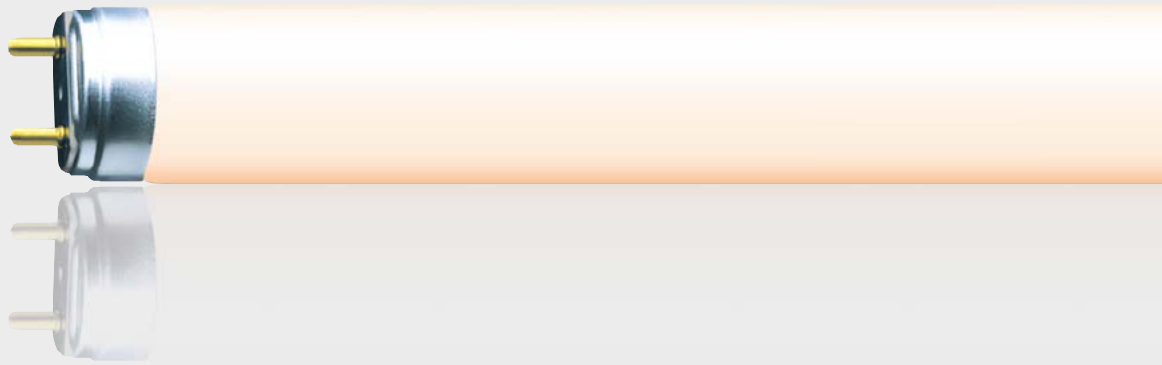
If, in addition to a warm light, the quality of colour rendering is a prime consideration, LUMILUX® DE LUXE Warm White 930 is the ideal supplement to lighting with light colour 830, for example in clothing stores, hairdressing salons, cosmetic studios and anywhere optimum colour rendering is an important requirement.



Light colour 830 provides bright background lighting and a pleasant atmosphere.



A brilliant choice: Light colour 930 shows everything as it really is – making it easier for customers to buy precisely what they want.



LUMILUX INTERNA®

Economical light for the home.

This is the “warmest” light of all the LUMILUX® light colours. With a colour temperature of 2700 K, LUMILUX INTERNA® is particularly cosy – just like the light from ordinary light bulbs. Light colour 827 brings out the best in wood. LUMILUX INTERNA® is ideal for installing in furniture and for use as indirect lighting. Fluorescent lamps with this warm light are used above all in the home, but they are also used in shops, hospitals and waiting rooms to create a positive atmosphere.

LUMILUX INTERNA® provides warm and welcoming lighting for public rooms such as hotel foyers, restaurants and theatres or a relaxing atmosphere in libraries, lecture halls and conference rooms.



Warmly recommended: LUMILUX INTERNA® is ideal wherever welcoming light and a relaxing atmosphere are required.

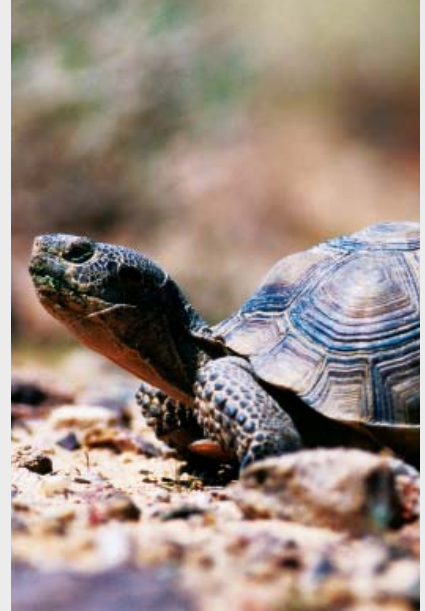


OSRAM BIOLUX®

Light that gives your animals a feeling of well-being.

OSRAM BIOLUX® fluorescent lamps from OSRAM emit a light of daylight white that gives your animals a sense of natural sunlight. Reptiles, tortoises and so on in particular need a daylight spectrum to remain healthy where there is little natural daylight.

Because of its spectral distribution, the light from OSRAM BIOLUX® lamps is also excellent for raising small animals (birds, fish, reptiles, etc.).



NATURA®/NATURA® SPS

Light for food.

Fluorescent lamps with light colour 76 are the perfect light source for making food look really appetising. Their specially matched spectrum makes meat, sausages, bread, cakes and other foods look fresh and appealing without disguising poor produce.

To meet the requirements of the International Food Standard (IFS) for lighting systems with open luminaires, NATURA® lamps are also supplied with splinter protection sleeves (SPS).



LIGHT COLOUR

77

FLUORA®

Light for healthier plants.

The light from FLUORA® fluorescent lamps has an emphasis at the blue and red ends of the spectrum so it is ideal for promoting photo-biological processes in plants. The result is healthier plants.

FLUORA® lamps are used wherever plants do not receive enough natural daylight, for example over feature planting in shopping centres, offices, hotels and the home, and also for florists' shops, greenhouses and aquariums.



LIGHT COLOUR

765

LIGHT COLOUR

640

BASIC

The conventional light colours.

Fluorescent lamps in BASIC light colours 765 (Cool Daylight) and 640 (Cool White) can be used in existing lighting systems in which relatively low levels of lighting comfort and colour rendering are required, for example in warehouses and garages.

Better to use LUMILUX® light colours

BASIC fluorescent lamps are no longer recommended for new installations or even for replacing lamps in existing lighting systems because LUMILUX® lamps offer more light, better colour rendering and higher luminous efficacy. This means that fewer luminaires are needed, making the lighting system much more economical. Even in old lighting systems the extra light from LUMILUX® lamps is beneficial. Old luminaires lose their initial efficiency as they yellow and the reflectors lose their shine. The higher luminous flux of the LUMILUX® lamps can compensate for this.



The right light colour for each lighting task.

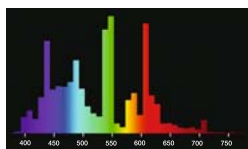
Selecting the light colour.

For many areas of application, the choice of the correct light is not based on clearly defined standards, as is the case with illuminance or colour rendering properties for example. In most cases, there are a number of valid alternatives. The application table shows this quite clearly. There is no one “correct” solution. Instead, the choice of light colour often depends on personal taste, national custom, interior design and our subjective perceptions. However, our application table will give you some valuable ideas. It shows the major applications for the different light colours of fluorescent lamps.

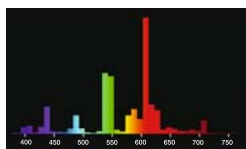
Cultural influences.

People in northern regions prefer warm white light colours, whereas people in the south prefer “colder” light. Homes filled with wood furniture in a rustic style lend themselves to warm white light, whereas white furniture, marble and chrome look better in neutral white or daylight colours. Warm white light is associated with leisure and relaxation, whereas neutral white and daylight white are associated with work and concentration.

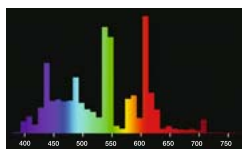
Further information is available on the internet at www.osram.de/lumilux and www.osram.com/lumilux and in our product brochures.



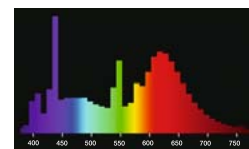
Light colour 965
LUMILUX® DE LUXE Cool Daylight



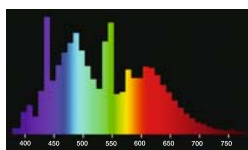
Light colour 827
LUMILUX INTERNA®



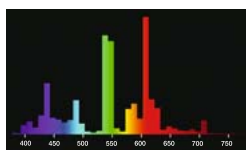
Light colour 954
LUMILUX® DE LUXE Daylight



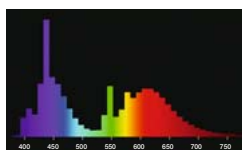
Light colour 76 NATURA®



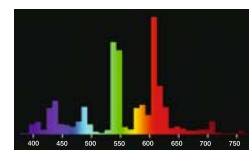
Light colour 965 BIOLUX®



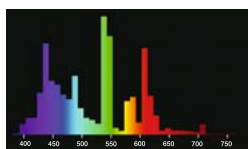
Light colour 840
LUMILUX® Cool White



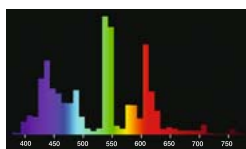
Light colour 77 FLUORA®



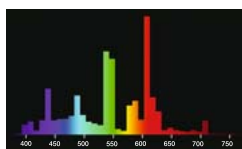
Light colour 835
LUMILUX® White



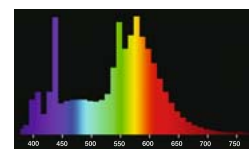
Light colour 880
LUMILUX SKYWHITE®



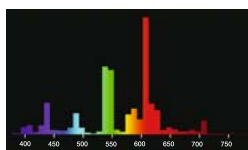
Light colour 865
LUMILUX® Cool Daylight



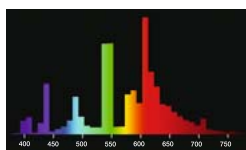
Light colour 940
LUMILUX® DE LUXE Cool White



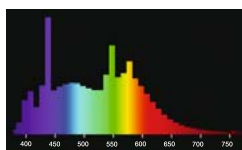
Light colour 640 BASIC
Cool White













Light colour 830
LUMILUX® Warm White



Light colour 930
LUMILUX® DE LUXE Warm White



Light colour 765 BASIC
Daylight

											
Area of application	SKYWHITE®	Cool Daylight		Daylight	Cool White		White	Warm White		INTERNA®	NATURA®
	880 8,000 K	865 6,500 K	965 6,500 K	954 5,400 K	840 4,000 K	940 4,000 K	835 3,500 K	830 3,000 K	930 3,000 K	827 2,700 K	76 3,500 K
Offices, administrative buildings											
Offices, corridors	•				•		•	•			
Meeting rooms	•						•	•		•	
Industry, trade, commerce											
Electrical industry		•			•						
Textile industry		•	•	•							
Woodworking industry		•	○	○	•						
Graphics industry, laboratories		○	•	•	○						
Colour matching			•	•		•					
Warehouses, transport depots					•						
Schools and lecture rooms											
Auditoriums, classrooms, Kindergartens	•		○		•		•	•		•	
Libraries, reading rooms					○		•	•		•	
Retail premises											
Food, general		○			•		•	•		•	
Bread and cakes										•	
Refrigerated counters, deepfreezers		•									
Cheese, fruit, vegetables										•	
Fish										•	
Meat, sausages			○								•
Textiles, leather goods		•	•	•	○	•	○	•	•	•	
Furniture, carpets							•	•	•	•	
Sporting goods, toys, stationery					•	○	•	•	○		
Photo, watches, jewellery		○	○	○	•	○	•	•	○		
Cosmetics, hairdressers					○	•	○	○	•	○	
Flowers		○	○	○	•	•			•	○	○
Department stores, supermarkets	•	○	•		○	•		○	•	•	
Public buildings											
Restaurants, inns, hotels					•		•	•		•	
Theatres, concert halls, foyers										•	
Exhibition rooms											
Exhibition halls and trade fairs	•				•			•			
Sports halls, multi-purpose halls	•				•		•	•			
Art galleries, museums		○		•	○	•			•		
Hospitals and surgeries											
Consulting and treatment rooms	•	○	•	•		•					
Hospital wards, waiting rooms	•		•			•			•		
Homes											
Living rooms										•	
Kitchens, bathrooms, hobby rooms, cellars		•			•				•	•	
Outdoor lighting, streets, paths, pedestrian zones					•			•			
• recommended ○ optional as required											

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