

**D-TEC**  
LIGHTING SYSTEMS

Designed.  
For your eyes.

Enlightening facts about light

A lighting handbook from D-TEC

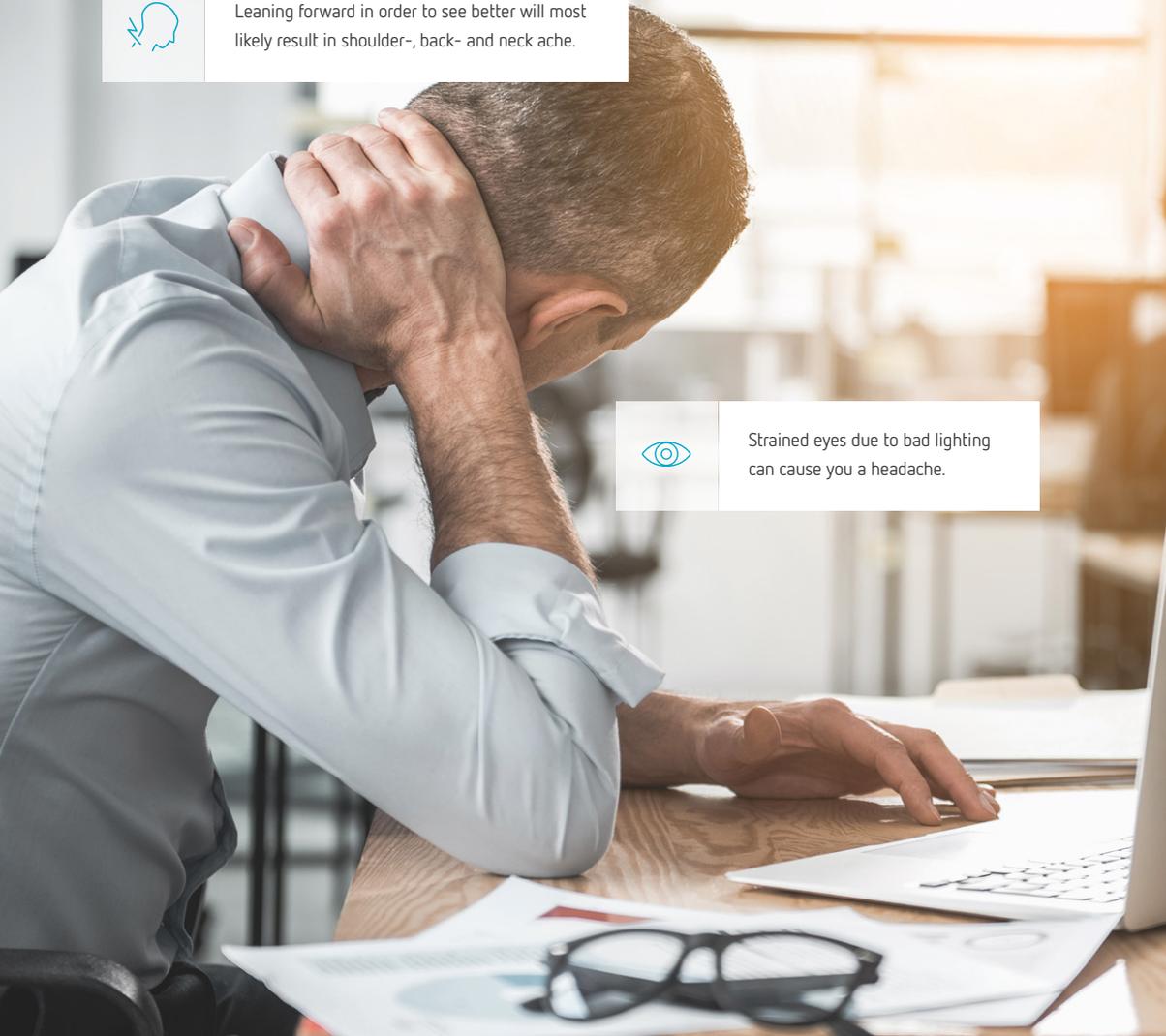




Leaning forward in order to see better will most likely result in shoulder-, back- and neck ache.



Strained eyes due to bad lighting can cause you a headache.



# Bad lighting – a workplace hazard?

Despite the fact that light has a big impact on our circadian rhythm, where the hormone levels of melatonin and serotonin play an important role, many employers don't see the lack of light ergonomics as a potential workplace hazard. But the symptoms tell us otherwise. With this handbook we hope to shed some light over the problem – and the solution.

Melatonin and serotonin are in charge of regulating our mood as well as our eating- and sleeping habits. When spending most of our time indoors, our hormones aren't regulated by the ultimate source of light – the sun. Instead, they are adapting to the light produced by your choice of artificial sources. If that light is poor, it sets your hormone levels off track, and in turn, can cause sleeping problems, stress and tiredness.

## COMMON SYMPTOMS CAUSED BY POOR LIGHTING:

- Headaches
- Lowered immune system
- Sleeping problems
- Neck, shoulder and back problems
- Stress
- Lower productivity and more errors being made
- Tiredness
- Inability to match or select correct colours

# How many Lux do you have at your workplace?

Did you know that a higher intensity of illumination provides better vision and lets you see smaller contrasts better?

A typical office space typically offers around 1000 Lux, where 3000 - 5000 Lux is recommended for demanding workplaces. Contact your nearest D-TEC retailer to find out your Lux level.

| ZONE 1                                     | ZONE 2                                 | ZONE 3                                |
|--|--|---------------------------------------|
| <b>Operational lighting</b>                | <b>Surrounding lighting</b>            | <b>General lighting</b>               |
| Measure 70 cm from the light source.       | Measure 120 cm from the light source.  | -                                     |
| Recommended level:<br>20 000 - 45 000 Lux. | Recommended level:<br>3000 - 5000 Lux. | Recommended level:<br>500 - 1000 Lux. |
| Your level:<br>-----                       | Your level:<br>-----                   | Your level:<br>-----                  |

## COMMON LUX LEVELS

- Direct sunlight: 100 000 Lux
- A typical office space: 1000 Lux
- Sitting in the shade: 10 000 Lux
- Moonlight: less than 1 Lux
- A demanding workplace: 3000 - 9500 Lux



## Perfect colour rendering? Check.

Tired of heading over to the window when reviewing different colour shades? Note that the colour temperature (K) of the sun changes during the hours of the day and depending on the weather too. Therefore, we're proud to offer you no less than 94 CRI on the Colour Rendering Index scale (the sun gives you 100 CRI), assuring you that the colour you pick is correct.





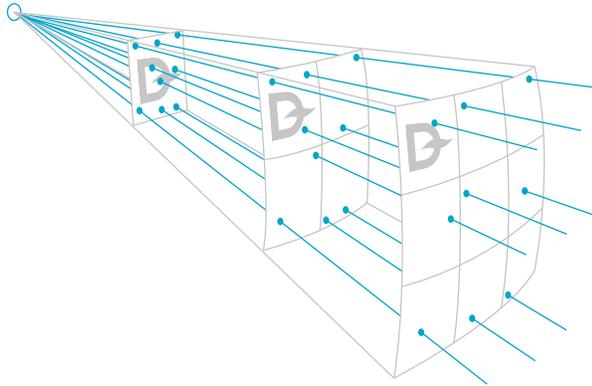
## Where did all the shadows go?

Don't be surprised if your patients will be asking where all shadows went!  
The secret? Hundreds of small LED sources work together to spread the light evenly with help from integrated micro prisms – leaving you with no shadows, better working conditions and fewer mistakes being made. If you want your light source to impress your patients even more, why not let your lamp show the colours of the rainbow or a soothing ever-changing flow of light! Sounds interesting? Check out our model Cloud.

# Where should you place your light sources?

Did you know that the intensity of the illumination is inversely proportional to the square of the distance? See illustration below. That said, an object of the same size that is located twice as far away, receives only one-quarter the same light. Therefore, we offer floating lamps, in order to get closer to the work area.

Placement of light source

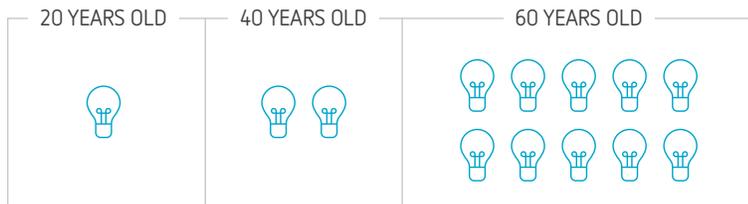


# Prepare yourself for a better night's sleep – during your workday

We're not designed to live indoors using artificial lighting. But if you imitate the sun and choose an intense blue-rich light in the morning to help you staying alert (see the example with 6500 K to the right), and then switch to a warmer, softer light in the afternoon (3000 K), it helps you to wind down – and you will sleep better. If you don't want to handle the switching, we offer an auto-dynamic daylight option in our range. Check out Clair seen to the right.

## How old are your employees?

The reason we're asking is that good lighting is particularly important when you're getting older due to changes in the pupil, lens, and the retina. In fact, a 40-year-old needs twice as much light compared to a 20-year-old. And a 60-year-old needs ten times more light to achieve the same visual performance as a 20-year-old. That said, having older employees demands better lighting.





3000 K

6500 K

Clair

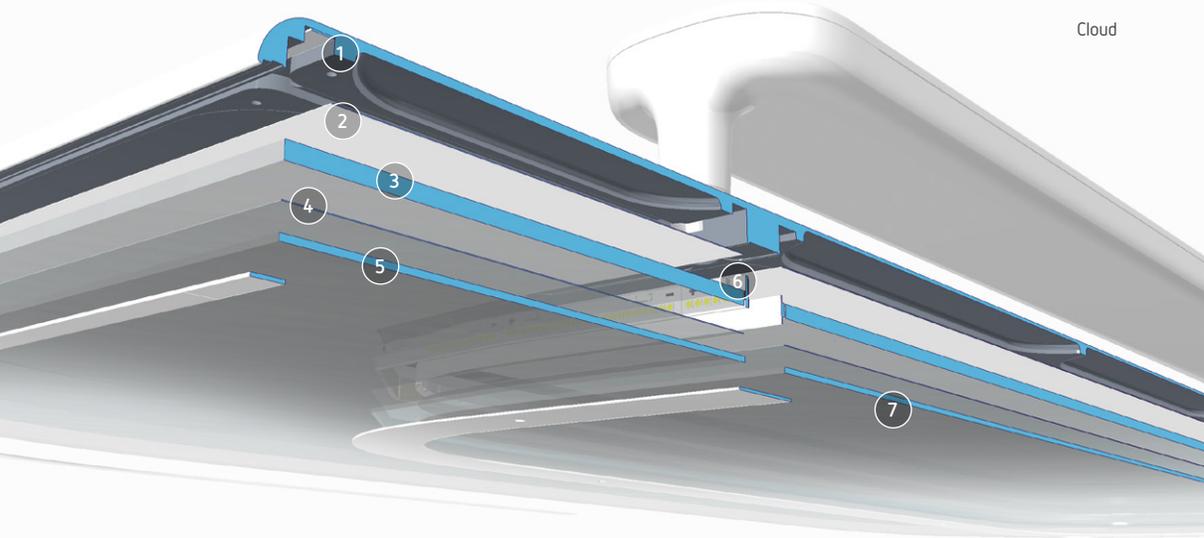
# Good for the environment, your wallet and your eyes

When making a switch to more efficient light sources like LED, you can start saving up to 85% on energy bills, from day one. You will also benefit from a low thermal heating, no acoustic noise and an increased light quality, since the technology provides more light per watt than its competitor.

During a typical workday, your eyes are forced to change focus between a brighter operational light and the surrounding light over 1000 times. To avoid eye strain and headaches, you can lower the contrast between your existing light sources by applying a 1:5 ratio. You can also use many light sources that work together to create the perfect light – instead of using fewer, yet stronger light sources. Sounds advanced? It is, but besides designing a shadow-, glare- and flicker free range, we built in a function that lowers the contrast for you as well.

Want to learn more? Check out the description to the right.





1. A frame milled in solid aluminium for maximum stability and efficient cooling.
2. A high-end reflector that reflects more than 98% of the light. A normal mirror reflects 80 - 90%.
3. A light guide plate that transports and spreads the light from the LED's to make a large lit surface, rather than several spots. This reduces glare and makes it much more comfortable for the patient.
4. Thin diffusing sheet that diffuses the light and reduces internal losses.
5. A micro prismatic sheet that controls the spreading angle of the light and reduces shadows and glare.
6. An array of the latest most efficient LED's from Cree produces 165 lm/W at CRI > 90. Each Cloud luminaire contains up to 1023 LED's.
7. A diffusing sheet with a combination of structure and diffusing particles creates an even distribution of light and mix of colour.

# A lighting checklist for your workplace

- Choose light sources that let you avoid flickering, glare and shadows.
- Be kind to your eyes by choosing a set-up that provide you with a low contrast between your light sources to reduce eye strain and fatigue.
- If you want to increase the luminous flux further, you can paint the walls and the ceilings in light colours.
- Choose light sources with low thermal heating and no acoustic noise.
- Choose light sources that have correct colour rendering, especially if your work within dentistry, beauty or dermatology.
- If necessary, whitewash or shade windows and skylights to avoid glare.
- If having computer screens, make sure that they are positioned so that the ceiling lighting or the light from the windows is not reflected and produces glare for the users.