24-hour nurses' station planning example

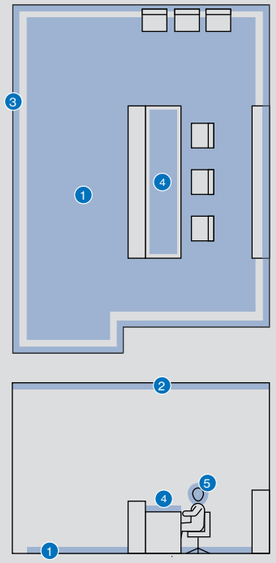
The lighting of a 24-hour nurses' station must meet many requirements. This area must be suitable for office work as well as for communicative exchange. Furthermore, the night-time lighting situation must be set. Therefore, we selected an HCL design for this example. Human Centric Lighting meets both the minimum requirements for the respective visual task and also fulfils biological needs, in our case those of 50-year-old carers. Furthermore, emotional lighting components must also be available. To meet emotional needs, we have chosen a dynamic lighting control system that offers a very high colour rendering of $R_a / R_e \geq 90$ across all colour temperatures. On the walls, narrow-beam CWD spotlights produce a cosy atmosphere at off-peak times.

During the night, the colour temperature is reduced to ≤ 2700 K. The workplace lighting can be adjusted as desired via a dimmer. In the corridor area, illuminance can be reduced to 50 lx.

Lighting standard EN 12646-1 minimum requirement

- For the workplace, the requirements of an office are used, and for the area around the base, the requirements of a corridor with multiple uses are used
- Floor, wall, and ceiling with minimum illuminance of 200 lx, 75 lx and 50 lx
- 500 lx are required in the visual task area
- As the nurses' station is a communication room, a cylindrical illuminance of E_z 150 lx must be available
- Glare limitation UGR ≤ 19

Specifications



Measured surfaces
1 Floor
2 Decke
3 Wände
4 Arbeitsfläche
5 Gesichtsfeld

24-hour nurses' station room dimensions:
Floor area: 40,05 m²
Ceiling height: 3,3 m
Luminaire height: LINEA system 2,35 m

Reflection
Floor 40 %, walls 80 %, ceiling 90 %
Maintenance factor: 0.8

MEDI lux – what biological illuminance is required vertically at the resident's eye?

According to DIN SPEC 67600, 250 MEDI lux (Melanopic Equivalent Daylight Illuminance) must be present vertically on the eye for at least four hours in the mornings. MEDI lux is the melanopic and daylight equivalent assessed illuminance.

How does one convert to visual lux?
In our example we assume 4000 K with a MR of 0.75. First, the assumed 250 MEDI lux are divided by the melanopic effect factor of MR = 0.75 [250 / 0.75 = 333 lx]. To arrive at the daylight equivalent illuminance, the result is then multiplied by the constant daylight correction factor of 1.103 [333 lx × 1.103 = 368 lx]. This 368 lx is the biologically necessary vertical illuminance for a 32-year-old observer.

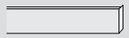
DIN SPEC 5031-100 has age-specific correction factors for lens opacity and pupil constriction. Multiplied by this, the factor for a 50-year-old observer is 0.664. For a 50-year-old observer, 554 lx of vertical illuminance is calculated [368 lx / 0.664 = 554 lx].

In this example, there is enough vertical illuminance for a 50-year-old carer.

LINEA | SASSO PRO | BETO | SONO FLEX

5500 K activating light atmosphere, in the mornings for at least four hours

LINEA system wall

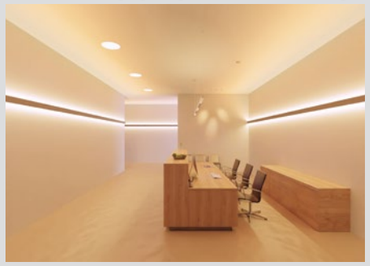


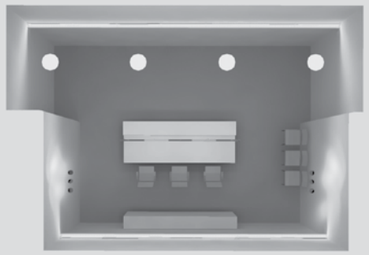
SASSO PRO 100 recessed

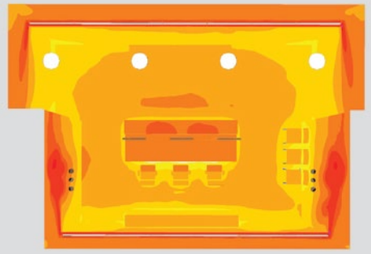
BETO suspended

SONO FLEX recessed

2500 K relaxing lighting mood, in the evenings







Number	Luminaire
13	LINEA system (direct opal / indirect asym.), TW, 3690 lm (38 W) | XCS
6	SASSO PRO 100, CWD, 1403 lm (14.5 W)
3	BETO suspended (direct/indirect), TW, 4298 lm (30.5 W)
4	SONO FLEX 350 IP54, CWD, 1503 lm (16 W)

Measured surface	Standard requirement (EN 12464-1)	Luminous intensity (calculated at 4000 K)
1 **Floor**	E_m 200 lx	E_m 982 lx
2 **Ceiling**	E_m 50 lx	E_m 916 lx
3 **Walls** (ø of all walls)	E_m 75 lx	E_m 812 lx
4 **Arbeitsfläche**	E_m 500 lx	E_m 1188 lx
5 **Visual field** seated position - for communication	E_m 150 lx	E_m 691 lx
- biologically effective for:	**Recommendation** (DIN SPEC 67600 / 5031-100)	
≤ 50-year-old caregiver	$E_m \geq 554$ lx	✓