

# Lighting and recommended type of lamps

## According to recommendations UNI 10380 / A1

COLOUR TONE: W = < 3300K e 5300K; D = > 5300K - Ra=colour yield - G=quality class  
for glare limitation

| FIELD OF APPLICATION         | TYPE OF AREA                                          | LIGHTING Lux |       |        | TONE K    | Ra | G |
|------------------------------|-------------------------------------------------------|--------------|-------|--------|-----------|----|---|
|                              |                                                       | MIN          | MED   | MAX    |           |    |   |
| RESIDENTIAL HOMES AND HOTELS | Conversation or transit area                          | 50           | 100   | 150    | W         | 1A | A |
|                              | Reading areas                                         | 200          | 300   | 500    | W         | 1A | A |
|                              | Writing areas                                         | 300          | 500   | 750    | W         | 1A | A |
|                              | Dining areas                                          | 100          | 150   | 200    | W         | 1A | A |
|                              | Kitchen Bathroom                                      | 200          | 300   | 500    | W         | 1A | A |
|                              | General lighting Bathroom                             | 50           | 100   | 150    | W         | 1A | B |
|                              | Mirror area Bedrooms                                  | 200          | 300   | 500    | W         | 1A | B |
|                              | General lighting Bedrooms                             | 50           | 100   | 150    | W         | 1A | B |
|                              | Wardrobe area Rooms                                   | 200          | 300   | 500    | W         | 1A | B |
|                              | Sleeping area Bedrooms                                | 200          | 300   | 500    | W         | 1A | B |
|                              | Ironing, sewing and mending                           | 500          | 750   | 1000   | W         | 1A | A |
|                              |                                                       |              |       |        |           |    |   |
|                              |                                                       |              |       |        |           |    |   |
| COMMUNAL ENVIRONMENTS        | Transit areas, corridors                              | 50           | 100   | 150    | W - N     | 2  | D |
|                              | Stairs, lifts                                         | 100          | 150   | 200    | W - N     | 2  | D |
|                              | Warehouses and storage                                | 100          | 150   | 200    | W - N     | 3  | D |
|                              |                                                       |              |       |        |           |    |   |
| SPORTS ENVIRONMENT           | Bowling                                               | 300          | 500   |        | N         | 1B | A |
|                              | Gyms                                                  | 300          | 500   |        | N         | 1B | A |
|                              | Swimming pools                                        | 300          | 500   |        | N         | 1B | A |
|                              | Tennis/volleyball                                     | 500          | 750   |        | N         | 1B | A |
| AUDITORS LIBRARIES           | Theatres and concert halls                            | 50           | 100   | 150    | W - N     | 1B | B |
|                              | Multi-purpose                                         | 150          | 200   | 300    | W - N     | 1B | B |
|                              | Book shelving (vertical)                              | 150          | 200   | 300    | W - N     | 2  | C |
|                              | Reading tables                                        | 300          | 500   | 750    | W - N     | 1B | B |
|                              | Reading tables Cataloguing and classification benches | 200          | 300   | 500    | W - N     | 1B | B |
|                              | Legatura                                              | 200          | 300   | 500    | W - N     | 2  | B |
|                              |                                                       |              |       |        |           |    |   |
| CHURCHES                     | Binding Gen. areas, Benches                           | 50           | 100   | 150    | W - N - D | 2  | B |
|                              | Altar, pulpit                                         | 150          | 200   | 300    | W - N - D | 2  | B |
| SHOPS WAREHOUSES             | Transit areas                                         | 150          | 200   | 300    | N         | 1B | B |
|                              | Merchandise display                                   | 300          | 500   | 750    | N         | 1B | B |
|                              | Windows Wards                                         | 500          | 750   | 1000   | W - N - D | 1B | B |
|                              |                                                       |              |       |        |           |    |   |
| HOSPITALS                    | General lighting Wards                                | 50           | 100   | 150    | W         | 1A | A |
|                              | Examinations Wards                                    | 200          | 300   | 500    | W         | 1A | A |
|                              | Reading Wards                                         | 150          | 200   | 300    | W         | 1A | A |
|                              | Night transit Examination rooms                       | 3            | 5     | 10     | W         | 1A | A |
|                              | Gen. lighting Examination rooms                       | 300          | 500   | 750    | W         | 1A | A |
|                              | Examination rooms, inspections                        | 750          | 1000  | 1500   | W - N     | 1A | A |
|                              | Terapie intensive                                     | 200          | 300   | 500    | W         | 1A | A |
|                              | Intensive care Surgery                                | 500          | 750   | 1000   | N         | 1A | A |
|                              | Gen. lighting Surgery                                 | 10000        | 30000 | 100000 | N - D     | 1A | A |
|                              | Gen. lighting Autopsy rooms                           | 500          | 750   | 1000   | N - D     | 1A | A |
|                              | Localised lighting Autopsy rooms                      | 5000         | 10000 | 15000  | N - D     | 1A | A |
|                              | Gen. lighting Labs and pharmacies                     | 300          | 500   | 750    | N - D     | 1A | A |
|                              | Loc. lighting Labs and pharmacies                     | 500          | 750   | 1000   | N - D     | 1A | A |
|                              | Gen. lighting Consult. rooms                          | 300          | 500   | 750    | W - N     | 1A | A |
|                              | Localised lighting Consult                            | 500          | 750   | 1000   | W - N     | 1A | A |

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for glare limitation**

| FIELD OF APPLICATION        | TYPE OF AREA                                          | LIGHTING Lux |      |      | TONE K    | Ra | G |
|-----------------------------|-------------------------------------------------------|--------------|------|------|-----------|----|---|
|                             |                                                       | MIN          | MED  | MAX  |           |    |   |
| SCHOOLS                     | Gen. lighting Classrooms                              | 300          | 500  | 750  | W - N     | 1B | B |
|                             | Classrooms, board                                     | 300          | 500  | 750  | W - N     | 1B | B |
|                             | Art and scientific labs                               | 500          | 750  | 1000 | W - N - D | 1B | B |
|                             | University lecture halls, gen. lighting               | 300          | 500  | 750  | W - N     | 1B | B |
|                             | University lecture halls, board                       | 500          | 750  | 1000 | W - N     | 1B | B |
|                             | University lecture halls, demo benches                | 500          | 750  | 1000 | W - N     | 1B | B |
|                             | Workshops and rooms for art education                 | 300          | 500  | 750  | W - N     | 1B | B |
|                             | Assembly halls General offices                        | 150          | 200  | 300  | W - N     | 1B | B |
|                             |                                                       |              |      |      |           |    |   |
| OFFICES<br>OPEN SPACE       | Typing pool and computer rooms                        | 300          | 500  | 750  | W - N     | 1B | B |
|                             | Offices for designers and designing                   | 500          | 750  | 1000 | W - N     | 1B | B |
|                             | Meeting rooms                                         | 300          | 500  | 750  | W - N     | 1B | B |
|                             |                                                       |              |      |      |           |    |   |
| STEELWORKS AND SIMILA       | Production plants without manual intervention         | 50           | 100  | 150  | W - N     | 3  | D |
|                             | Production plants with manual intervention            | 100          | 150  | 200  | W - N     | 3  | C |
|                             | Fixed workstations in production plants               | 200          | 300  | 500  | W - N     | 3  | C |
|                             | Control of platforms and inspection                   | 300          | 500  | 750  | W - N     | 3  | B |
|                             |                                                       |              |      |      |           |    |   |
| ASSEMBLY LINES              | Heavy machinery                                       | 200          | 300  | 500  | W - N     | 3  | C |
|                             | Engines and vehicle chassis                           | 300          | 500  | 750  | N - D     | 3  | C |
|                             | Electronic and office equipment                       | 500          | 750  | 1000 | N - D     | 2  | B |
|                             | Small tools and objects                               | 1000         | 1500 | 2000 | D         | 2  | B |
|                             |                                                       |              |      |      |           |    |   |
| PAPER MILLS                 | Paper and cardboard prod.                             | 200          | 300  | 500  | W - N     | 3  | C |
|                             | Automatic processes                                   | 150          | 200  | 300  | W - N     | 3  | C |
|                             | Inspection, classification                            | 300          | 500  | 750  | W - N - D | 2  | B |
|                             |                                                       |              |      |      |           |    |   |
| CEMENT WORKS                | Crushing and firing                                   | 100          | 150  | 200  | W - N     | 3  | D |
|                             |                                                       |              |      |      |           |    |   |
| ELECTRICITY<br>POWER PLANTS | Boiler room                                           | 50           | 100  | 150  | W - N     | 3  | D |
|                             | Alternator room                                       | 150          | 200  | 300  | W - N     | 3  | C |
|                             | Ancillaries, pumps, tanks, compressors, etc.          | 50           | 100  | 150  | W - N     | 3  | D |
|                             | Comms. Rooms, phones                                  | 150          | 200  | 300  | W - D     | 2  | B |
|                             | Control rooms (tables, vertical control panels, etc.) | 200          | 300  | 500  | W - N     | 2  | B |
|                             |                                                       |              |      |      |           |    |   |
| PAINT PRODUCERS             | Coarse painting                                       | 200          | 300  | 500  | W - N     | 1B | C |
|                             | Standard painting                                     | 300          | 500  | 750  | W - N     | 1B | C |
|                             | Fine painting                                         | 500          | 750  | 1000 | W - N     | 1B | B |
|                             | Retouching and colour control                         | 750          | 1000 | 1500 | N - D     | 1A | B |
|                             |                                                       |              |      |      |           |    |   |

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| FIELD OF APPLICATION                        | TYPE OF AREA                                                      | LIGHTING Lux |      |      | TONE K    | Ra    | G   |
|---------------------------------------------|-------------------------------------------------------------------|--------------|------|------|-----------|-------|-----|
|                                             |                                                                   | MIN          | MED  | MAX  |           |       |     |
| FOUNDRIES                                   | Fusion tanks                                                      | 150          | 200  | 300  | W - N     | 3     | D   |
|                                             | Mould preparation and heavy-duty moulding                         | 200          | 300  | 500  | W - N     | 3     | D   |
|                                             | Mould preparation and moulding for fine machining and inspections | 300          | 500  | 750  | W - N - D | 3     | B   |
|                                             |                                                                   |              |      |      |           |       |     |
| AVIATION INDUSTRY                           | Inspection and repair                                             | 300          | 500  | 750  | W - N     | 3     | B   |
|                                             | Engine testing                                                    | 500          | 750  | 1000 | N - D     | 3     | B   |
| FOOD INDUSTRY                               | Work areas in general                                             | 200          | 300  | 500  | W - N     | 2     | C   |
|                                             | Automatic processes                                               | 150          | 200  | 300  | W - N     | 2     | C   |
|                                             | Checking, manual decoration                                       | 300          | 500  | 750  | W - N - D | 1B    | B   |
|                                             |                                                                   |              |      |      |           |       |     |
| CHEMICAL INDUSTRIES                         | Production plants with periodic interventions                     |              | 100  | 150  | 200       | W - N | 3   |
|                                             | Automatic processes                                               | 50           | 100  | 150  | W - N     | 3     | D   |
|                                             | Internal areas for planning                                       | 200          | 300  | 500  | W - N     | 3     | C   |
|                                             | Control rooms/labs                                                | 300          | 500  | 750  | W - N - D | 2     | B   |
|                                             | Pharmaceutical production                                         | 300          | 500  | 7500 | W - N - D | 2     | B   |
|                                             | Inspection                                                        | 500          | 750  | 1000 | W - D     | 2     | B   |
|                                             | Colour control                                                    | 750          | 1000 | 1500 | D         | 1A    | A-B |
|                                             | Tyre production                                                   | 300          | 500  | 750  | W - N - D | 3     | C   |
|                                             |                                                                   |              |      |      |           |       |     |
| ELECTRO-TECHNICAL AND ELECTRONIC INDUSTRIES | Cable production                                                  | 200          | 300  | 500  | N - D     | 3     | C   |
|                                             | Office machinery assembly, telephones, etc.                       | 300          | 500  | 750  | W - N - D | 2     | B   |
|                                             | Radio-video assembly                                              | 750          | 1000 | 1500 | W - N     | 2     | B   |
|                                             | Precision assembly, electronic components                         | 1000         | 1500 | 2000 | D         | 2     | B   |
| TANNING INDUSTRIES                          | Generic work areas                                                | 200          | 300  | 500  | W - N     | 3     | C   |
|                                             | Pressing - cutting                                                |              |      |      |           |       |     |
|                                             | sewing - footwear prod.                                           | 500          | 750  | 1000 | W - N - D | 2     | B   |
|                                             | Classification - quality and colour checking                      | 500          | 750  | 1000 | W - N - D | 1A    | A-B |
| TEXTILE INDUSTRIES                          | Unpacking - carding - laying out                                  | 200          | 300  | 500  | W - N     | 2     | C   |
|                                             | Spinning                                                          | 300          | 500  | 750  | W - N     | 1B    | B   |
|                                             | Winding Laying out                                                | 300          | 500  | 750  | W - N - D | 1B    | B   |
|                                             | dyeing Weaving - sewing                                           |              |      |      |           |       |     |
|                                             | textile printing                                                  | 500          | 750  | 1000 | W - N - D | 1B    | B   |
| MECHANICAL AND ASSEMBLY WORKSHOPS           | Occasional work                                                   | 150          | 200  | 300  | W - N     | 3     | C   |
|                                             | Benches for machining of large workpieces, welding                | 200          | 300  | 500  | W - N     | 3     | C   |
|                                             | Benches for machining medium workpieces                           | 300          | 500  | 750  | W - N     | 3     | C   |
|                                             | Benches for machining fine                                        | 500          | 750  | 1000 | W - N - D | 3     | B   |
|                                             | Workpieces Automatic machines                                     | 300          | 500  | 750  | W - N     | 3     | C   |
|                                             | Sophisticated automatic machines                                  | 500          | 750  | 1000 | W - N - D | 3     | B   |
|                                             |                                                                   |              |      |      |           |       |     |

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|---------------------------------|----------------------------------------|--------------|------|------|-----------|----|-----|
|                                 |                                        | MIN          | MED  | MAX  |           |    |     |
| CLOTHING PRODUCTION             | Cutting and sewing                     | 500          | 750  | 1000 | N - D     | 2  | B   |
|                                 | Checking and inspection                | 750          | 1000 | 1500 | N - D     | 2  | A-B |
|                                 | Ironing                                | 300          | 500  | 750  | W - N - D | 2  | B   |
|                                 |                                        |              |      |      |           |    |     |
| GLASS AND CERAMIC PRODUCTION    | Furnaces                               | 100          | 150  | 200  | W - N     | 3  | D   |
|                                 | Mixing, moulding, kilns                | 200          | 300  | 500  | W - N     | 3  | C   |
|                                 | Finishing, enamelling check.           | 300          | 500  | 750  | W - N     | 3  | C   |
|                                 | Painting, decorations                  | 500          | 750  | 1000 | W - N - D | 2  | B   |
|                                 | Glass grinding, fine processing        | 750          | 1000 | 1500 | W - N - D | 2  | B   |
| PRINTING AND BINDING SHOPS      | Spaces equipped with printing machines | 300          | 500  | 750  | W - N     | 2  | B   |
|                                 | Compositions                           | 500          | 750  | 1000 | W - N - D | 1B | B   |
|                                 | Retouching, engraving                  | 750          | 1000 | 1500 | N - D     | 1A | B   |
|                                 | Printing and colour reproduction       | 1000         | 1500 | 2000 | D         | 1B | B   |
|                                 | Engravings on steel and copper         | 1500         | 2000 | 3000 | D         | 1B | B   |
|                                 | Binding                                | 300          | 500  | 750  | W - N     | 2  | B   |
|                                 | Ornamental workings                    | 500          | 750  | 1000 | W - N     | 1B | B   |
|                                 |                                        |              |      |      |           |    |     |
| WOOD TREATMENT AND WOOD WORKING | Saws                                   | 150          | 200  | 300  | W - N     | 2  | B-C |
|                                 | Workbenches, assembly                  | 200          | 300  | 500  | W - N     | 2  | B   |
|                                 | Fine machining                         | 300          | 500  | 750  | W - N - D | 2  | A-B |
|                                 | Finishing and checking                 | 500          | 750  | 1000 | N - D     | 1B | A-B |

A maintenance factor of 0.80 is used for the design of indoor environments with artificial light. In exceptional cases only, for example in dusty environments or where it is difficult to clean the lighting system and rooms, a maintenance factor of 0.70 or 0.60 is used. The lighting always refers to the horizontal surface.

### LIGHT TONE AND COLOUR RENDERING

The prescriptions concerning tone and colour rendering are a very innovative part of the standard, as these quality aspects have so far always been overlooked.

*A careful selection of the type of light source will ensure that well-designed and built lighting systems do not produce disappointing results in terms of quality because an incorrect choice of lamps.*

Essentially, as shown in the table, the standard associates illuminance values to correct colour tones, so that the "visual sensation" in the illuminated environment may be perceived as "pleasant".

The three tones envisaged are:

W, warm, warm white light with colour temperature < of 3300° I, intermediate, neutral white light with colour temperatures between 3300° K and 5300° K;

D, daylight, bright light with colour temperatures > 5300 K. The colour rendering group for offices is 1B, the equivalent of an Ra colour rendering index between 80 and 90 (table 2)

All illuminance-colour temperature combinations have been determined according to the Kruithoff chart, which states that, for a comfortable visual sensation, low luminances should be combined with low colour temperature lamps, and conversely, high luminances should be combined with high colour temperature lamps, so that the luminance value line, colour temperature line, and selection line meet in the "visual comfort" zone.

The standard also associates each environment, depending on the type of activities which are carried out in it, with the colour rendering degree Ra (minimum) provided by the lamps used.

Thus, it is clear that visual comfort, i.e. good lighting quality, also depends largely on the light source used. An appropriate choice of colours and finishings for internal surfaces and furniture, well matched with the lamp colour characteristics, will ensure the creation of a suitable ambience.

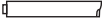
Preferred colours vary according to climate, nationality, age, gender, personality and culture of the customer.

One of the most important objectives to keep in mind, when designing the lighting system for particular rooms, is to create a suitable ambience for the type of room and people's tastes, using light sources that provide the appropriate tone of light and colour rendering quality.

| Colour Rendering Group (Ra) | Colour Rendering index |
|-----------------------------|------------------------|
| 1A                          | >90                    |
| 1B                          | 80 ≤ Ra ≤ 90           |
| 2                           | 60 ≤ Ra ≤ 80           |
| 3                           | 40 ≤ Ra < 60           |
| 4                           | 20 ≤ Ra < 40           |

tab. 2 - Ra = Colour Rendering and corresponding colour rendering index

# Lamp features (and relevant phasing at $\cos \mu = 0.90$ pprox. (230V/50Hz)

| POWER<br>W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | DIMENSIONS<br>mm | CONDENS.<br>250V $\mu$ F | TEMPERAT.<br>colour °K | LAMP<br>FITTING | ILCOS | EFF.<br>LUM. | LUMINANCE<br>CD/CM <sup>2</sup> | LUMINOUS<br>FLUX |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------|------------------------|-----------------|-------|--------------|---------------------------------|------------------|
| <b>Linear fluorescent T8 Ø 26 mm.</b>                                                                                                                                                                                                                                                                                                                                                                                |                  |                          |                        |                 |       |              |                                 |                  |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 26 x 590         | 5                        | 2700/6000              | G13             | FD    | 88lm/w       | 1.0cd/cm <sup>2</sup>           | 1350             |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 26 x 895         | 5                        | 2700/6000              | G13             | FD    | -            | 1.1cd/cm <sup>2</sup>           | 2350             |
| 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 26 x 1200        | 5                        | 2700/6000              | G13             | FD    | 100lm/w      | 1.2cd/cm <sup>2</sup>           | 3350             |
| 58                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 26 x 1500        | 7                        | 2700/6000              | G13             | FD    | 100lm/w      | 1.5cd/cm <sup>2</sup>           | 5200             |
| <b>Linear fluorescent T5 Ø 16 mm.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                          |                        |                 |       |              |                                 |                  |
| standard lamp features: FH Osram                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                          |                        |                 |       |              |                                 |                  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 549         | -                        | 3000/6000              | G5              | FD    | 96lm/w       | 1.7cd/cm <sup>2</sup>           | 1350             |
| 21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 849         | -                        | 3000/6000              | G5              | FD    | 100lm/w      | 1.7cd/cm <sup>2</sup>           | 2100             |
| 28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 1149        | -                        | 3000/6000              | G5              | FD    | 104lm/w      | 1.7cd/cm <sup>2</sup>           | 2900             |
| 35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 1449        | -                        | 3000/6000              | G5              | FD    | 104lm/w      | 1.7cd/cm <sup>2</sup>           | 3650             |
| standard lamp features: FQ Osram                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                          |                        |                 |       |              |                                 |                  |
| 24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 549         | -                        | 3000/6000              | G5              | FD    | 83lm/w       | 2.5cd/cm <sup>2</sup>           | 2000             |
| 39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 849         | -                        | 3000/6000              | G5              | FD    | 90lm/w       | 2.8cd/cm <sup>2</sup>           | 3500             |
| 54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 1149        | -                        | 3000/6000              | G5              | FD    | 93lm/w       | 2.9cd/cm <sup>2</sup>           | 5000             |
| 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 x 1449        | -                        | 3000/6000              | G5              | FD    | 88lm/w       | 2.7cd/cm <sup>2</sup>           | 7000             |
| The new T5 lamps with Ø 16mm. allow for: more compact fixtures, better directionality of light, greater luminous efficiency of the light fixture, lower power installed in the systems with the same lighting characteristics, luminaires perfectly adapted to standard false ceilings, better efficiency in relation to temperatures (optimum functioning 35°C). Using electronic power supply also allows greater efficiency and lamp life, no flicker. The T5 lamps are divided into two families: |                  |                          |                        |                 |       |              |                                 |                  |
| FH-HE = *high luminous efficiency resulting in energy savings.                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                          |                        |                 |       |              |                                 |                  |
| *no problem in reducing glare thanks to luminance values that are the same for all powers and similar to those of T8 lamps                                                                                                                                                                                                                                                                                                                                                                            |                  |                          |                        |                 |       |              |                                 |                  |
| *ideal for lighting indoor areas such as offices, open spaces or with normal installation heights (about 3/4m)                                                                                                                                                                                                                                                                                                                                                                                        |                  |                          |                        |                 |       |              |                                 |                  |
| FQ-HO = *luminous efficiency resulting in lower energy savings than the previous ones                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                          |                        |                 |       |              |                                 |                  |
| *high luminance values of lamp resulting in glare reduction problem                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |                          |                        |                 |       |              |                                 |                  |
| *high luminous fluxes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                          |                        |                 |       |              |                                 |                  |
| *ideal for lighting areas with elevated installation heights (about 6/8m.) or with direct/indirect light fixtures                                                                                                                                                                                                                                                                                                                                                                                     |                  |                          |                        |                 |       |              |                                 |                  |
| <b>Circular fluorescent - FC</b>                                                                                                                                                                                                                                                                                                                                                                                     |                  |                          |                        |                 |       |              |                                 |                  |
| 22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 29 x 216       | 5                        | 2700/4000              | G10q            | FC    |              |                                 | 1350             |
| 32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 30 x 307       | 5                        | 2700/4000              | G10q            | FC    |              |                                 | 2050             |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 30 x 409       | 5                        | 2700/4000              | G10q            | FC    |              |                                 | 2900             |
| <b>Compact fluorescent - FLC S</b>                                                                                                                                                                                                                                                                                                                                                                                   |                  |                          |                        |                 |       |              |                                 |                  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 34 x 20 x 108    | 2.2                      | 2700/4000              | G23             | FSD   |              | 2.5cd/cm <sup>2</sup>           | 250              |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 34 x 20 x 138    | 2.1                      | 2700/4000              | G23             | FSD   |              | 2.6cd/cm <sup>2</sup>           | 400              |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 34 x 20 x 168    | 2                        | 2700/4000              | G23             | FSD   |              | 2.8cd/cm <sup>2</sup>           | 600              |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 20 x 238    | 1.7                      | 2700/4000              | G23             | FSD   |              | 2.7cd/cm <sup>2</sup>           | 900              |
| <b>Compact fluorescent - FLC S/E</b>                                                                                                                                                                                                                                                                                                                                                                               |                  |                          |                        |                 |       |              |                                 |                  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 34 x 20 x 108    | 2.2                      | 2700/4000              | 2G7             | FSD   |              | 2.5cd/cm <sup>2</sup>           | 250              |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 34 x 20 x 138    | 2.1                      | 2700/4000              | 2G7             | FSD   |              | 2.6cd/cm <sup>2</sup>           | 400              |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 34 x 20 x 168    | 2                        | 2700/4000              | 2G7             | FSD   |              | 2.8cd/cm <sup>2</sup>           | 600              |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 20 x 238    | 1.7                      | 2700/4000              | 2G7             | FSD   |              | 2.7cd/cm <sup>2</sup>           | 900              |
| <b>Compact fluorescent - FLC D</b>                                                                                                                                                                                                                                                                                                                                                                                 |                  |                          |                        |                 |       |              |                                 |                  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 110    | 2.2                      | 2700/4000              | G24d-1          | FSD   |              | 4cd/cm <sup>2</sup>             | 600              |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 138    | 1.8                      | 2700/4000              | G24d-1          | FSD   |              | 4cd/cm <sup>2</sup>             | 900              |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 153    | 2.2                      | 2700/4000              | G24d-2          | FSD   |              | 4.5cd/cm <sup>2</sup>           | 1200             |
| 26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 172    | 3.2                      | 2700/4000              | G24d-3          | FSD   |              | 5.5cd/cm <sup>2</sup>           | 1800             |
| <b>Compact fluorescent - FLC D/E</b>                                                                                                                                                                                                                                                                                                                                                                               |                  |                          |                        |                 |       |              |                                 |                  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 103    | 2.2                      | 2700/4000              | G24q-1          | FSQ   |              | 4cd/cm <sup>2</sup>             | 600              |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 146    | 1.8                      | 2700/4000              | G24q-1          | FSQ   |              | 4cd/cm <sup>2</sup>             | 900              |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 153    | 2.2                      | 2700/4000              | G24q-2          | FSQ   |              | 4.5cd/cm <sup>2</sup>           | 1200             |
| 26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34 x 34 x 165    | 3.2                      | 2700/4000              | G24q-3          | FSQ   |              | 5.5cd/cm <sup>2</sup>           | 1800             |
| <b>Compact fluorescent - FLC T e T IN</b>                                                                                                                                                                                                                                                                                                                                                                          |                  |                          |                        |                 |       |              |                                 |                  |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 49 x 45 x 123    | 2.3                      | 2700/4000              | Gx24d-2         | FSQ   |              | 4.7cd/cm <sup>2</sup>           | 1200             |
| 26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 49 x 45 x 138    | 3.2                      | 2700/4000              | Gx24d-3         | FSQ   |              | 6cd/cm <sup>2</sup>             | 1800             |
| <b>Compact fluorescent - FLC T/E e T/E IN</b>                                                                                                                                                                                                                                                                                                                                                                      |                  |                          |                        |                 |       |              |                                 |                  |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 49 x 45 x 116    | 2.3                      | 2700/4000              | Gx24d-3         | FSQ   |              | 4.7cd/cm <sup>2</sup>           | 1200             |
| 26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 49 x 45 x 131    | 3.2                      | 2700/4000              | Gx24d-3         | FSQ   |              | 6cd/cm <sup>2</sup>             | 1800             |
| <b>Compact fluorescent - FLC L</b>                                                                                                                                                                                                                                                                                                                                                                                 |                  |                          |                        |                 |       |              |                                 |                  |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 44 x 23 x 217    | 4.2                      | 2700/4000              | 2G11            | FSQ   |              | 1.5cd/cm <sup>2</sup>           | 7500             |
| 24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 44 x 23 x 317    | 3.6                      | 2700/4000              | 2G11            | FSQ   |              | 1.6cd/cm <sup>2</sup>           | 1200             |
| 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 44 x 23 x 411    | 4.4                      | 2700/4000              | 2G11            | FSQ   |              | 1.8cd/cm <sup>2</sup>           | 1900             |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 44 x 23 x 533    | -                        | 2700/4000              | 2G11            | FSQ   |              | 1.6cd/cm <sup>2</sup>           | 2200             |
| 55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 44 x 23 x 533    | -                        | 2700/4000              | 2G11            | FSQ   |              | 2.1cd/cm <sup>2</sup>           | 3000             |
| <b>Compact fluorescent - FLC EL</b>                                                                                                                                                                                                                                                                                                                                                                                |                  |                          |                        |                 |       |              |                                 |                  |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 45 x 143       | -                        | *                      | E27             | FB    |              |                                 | 900              |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 45 x 156       | -                        | *                      | E27             | FB    |              |                                 | 1200             |
| 23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 45 x 173       | -                        | *                      | E27             | FB    |              |                                 | 1500             |
| <b>Compact fluorescent 2D</b>                                                                                                                                                                                                                                                                                                                                                                                      |                  |                          |                        |                 |       |              |                                 |                  |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 27 x 142 x 110   | 2                        | 2700                   | GR8             | FU    |              |                                 | 1050             |
| 38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 35 x 205 x 205   | 5                        | 3000                   | GR10q           | FU    |              |                                 | 3050             |
| <b>Halogen light Ø 51</b>                                                                                                                                                                                                                                                                                                                                                                                          |                  |                          |                        |                 |       |              |                                 |                  |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 51 x 45        | -                        | 3100                   | GX5,3           | HR    |              |                                 | 3200             |
| 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 51 x 45        | -                        | 3100                   | GX5,3           | HR    |              |                                 | 6600             |
| 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ø 51 x 45        | -                        | 3100                   | GX5,3           | HR    |              |                                 | 15000            |
| <b>Halogen light with reflector PAR30</b>                                                                                                                                                                                                                                                                                                                                                                          |                  |                          |                        |                 |       |              |                                 |                  |
| 75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 90.5 x 92        | -                        | 2950                   | E27             | IPAR  |              |                                 | 2950             |