3F LED Technology

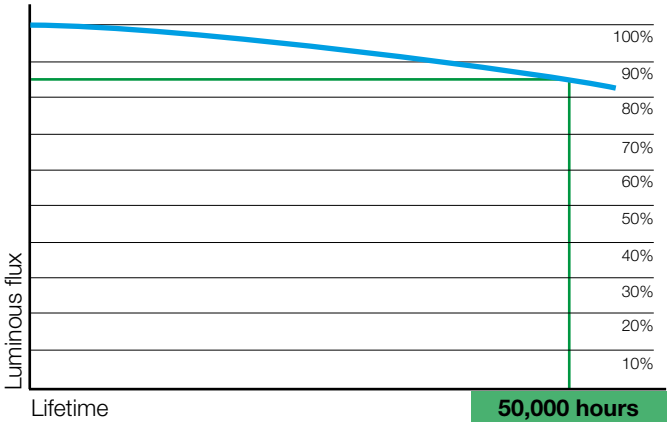
Glossary

Luminous flux
The luminous flux, or light flow, coming from the luminaire represents the quantity of light actually coming out of the device, as its value is defined having already taken into account the luminous efficiency of the luminaire.

Luminous efficiency
The luminous efficiency of the luminaire is the most useful parameter for the designer for determining the correct luminaires to install as it supplies a practical figure between light emitted and total power consumption of the light.
Beware of publications listing higher luminous efficiencies based on the theoretical efficiency of the bare LED (reference temperature 25°C) and not its actual performance when installed inside the luminaire.

Relative humidity
For correct maintenance and operation of traditional LED modules over time, the maximum permissible humidity on the component is 85%.
For specific applications, UR95 LED modules may be required, guaranteeing correct operation at humidity values of up to 95%.

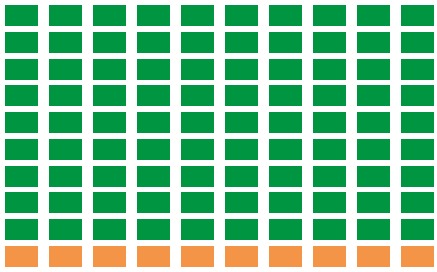
Lifetime (L value)
As previously mentioned, LED sources, unlike traditional lighting, do not tend to suddenly blow at the end of their lifetime; LEDs rather have a gradual reduction of their luminous output overtime before completely running out after a very long time.



The percentage decline of the luminous flux with reference to the useful number of operating hours (usually 50,000 hours) is therefore determined with the parameter “L”.
L85:50000h therefore means that, having reached 50,000 h of operation, the LED module still provides 85% of its initial luminous flux.

LED life expectancy (B value)
In LED ratings the value B, followed by a value normally between 10 and 50, indicates the quality of the component used as it defines the percentage of components which, after the normal 50,000 h has elapsed, maintain their rated luminous flux.

An LED with declared values of L85/B10=50,000h indicates that on reaching 50,000h, 90% (B10) of the components will have a residual luminous flux of at least 85% of the initial value (L85).
If, in the listed characteristics of the LED luminaire, the value B is not indicated, this is considered to be a B50 device - or in other words, 50% of the LEDs do not guarantee the average useful life value indicated.
We should clarify that this parameter is strongly influenced by the operating conditions of the LED inside the luminaire, and the result is therefore a combination of the quality of the component and good research.



equal to or more than 85% of the initial flux

less than 85% of the initial flux

LED failure rate (C value)
This value indicates the percentage of LEDs which are no longer operational at the end of their lifetime.
This value can be indicated with two combinations:
- L85/B10/C0: 50,000 hours - indicates that after 50,000 hours, the percentage of LEDs no longer working is 0%.
- L85/B10: 50,000 hours - L0/C10: 200,000 hours - indicates that after 200,000 hours, the percentage of LEDs no longer working is 10%.

All LEDs used by 3F Filippi have a failure rate C0 after 50,000 hours. If this value is not indicated, it should be considered C0.

Imperfection rate (F value)
On the basis of new requirements for LED modules, the F value, followed by a value normally between 10 and 50, provides a more detailed indication of the quality of the component used as it defines, as well as the percentage of components which do NOT maintain their declared luminous flux characteristics (B), also the failure percentage of the LED component.
Imperfection rate “F” = “B” value + “C” value
On 3F LEDs, as the “C” value is 0, the imperfection rate “F” is the same as the life expectancy (“B” value).

Colour tolerance (MacAdam ellipses) - SDCM
Measurement of the chromatic co-ordinates performed during production of the LED allows selection (known as Binning) to classify the LEDs on the basis of their chromatic differences.
This classification, performed via analysis of the so-called MacAdam ellipses (which express colour deviations on the XY axes), allows constant tonality to be obtained among the individual LEDs in the same group and an SDCM (Standard Deviation of Colour Matching) which can be classified as:
- With the value 1 there is no chromatic difference between the individual LEDs.
- With values 2 and 3 the difference is not visible to the human eye and the LEDs are considered of good quality.
- With a value of 4, the difference begins to become visible to the human eye.
- As the value increases, the difference is increasingly noticeable, and the type of application will dictate whether these differences in colouration in the LED group used are acceptable or not.

3F Filippi provides both the initial value and the value over time. Indeed, due to the consumption of phosphors present in the LEDs, the colour tolerance can change over time.
All LEDs used by 3F Filippi always have an initial colour tolerance value of less than 3 MacAdams SDCM, and a colour tolerance value over time of less than 4.

Photometric code
The photometric code consists of 6 digits and indicates the basic parameters of the quality of light, as per the example:

840/349	means	8	4	0	/	3	4	9
		Colour rendering index (CRI) >80	Colour colour temperature 4000 K			Tolerance of the initial colour (MacAdam): SDCM 3	Tolerance of the colour over time (MacAdam): SDCM 4	Percentage of luminous flux after 6,000 hours: >90%.

Energy efficiency class
The Directive EU 874/2012 regarding the energy labelling of luminaires sold directly to end users stipulates that for all LED luminaires with integrated light sources, the Energy Efficiency Class (EEC) indicated must be as follows: A / A+ / A++.
Indicating a precise energy efficiency class means that the luminaire has been assessed as if it were a lamp/source.
As such, all 3F Filippi luminaires come with the best Energy Efficiency Class (EEC): A / A+ / A++ (EU 874/2012).