



“The ultimate criteria [sic.] for an office lighting solution is how well it facilitates work performance and user satisfaction.”

Introduction to RP-1-04

Abstract

RP1 recognizes that good quality recessed office lighting depends upon many factors, including illuminance, glare and brightness.

Historically, the physical limitations of recessed lighting technologies have made it difficult to achieve good quality office lighting in low ceiling environments.

PureFX is the answer specifiers have been waiting for. Using a proprietary technology called MesoOptics® to purify and control light, PureFX provides both comfortable brightness and excellent glare control, while appropriately illuminating the space.

The New RP1 and PureFX™

In response to many enquiries from lighting professionals, this document has been prepared to explain how RP1 has changed, and how PureFX works with the new recommendations.

What is RP1 and how has it changed?

RP1 is a document that outlines Recommended Practices for lighting design in office environments. These recommended practices represent the consensus opinion of lighting industry participants, and are published by the Illuminating Engineering Society of North America (IESNA).

Recently, RP1 underwent a comprehensive overhaul to bring it up to date with current lighting research and best practices. The revised RP1 (RP-1-04), which was unveiled by IESNA earlier this year, incorporates several significant changes.

Most importantly, the entire structure, language and recommendations of the new RP1 have been extensively revised to support a more balanced and flexible approach to lighting design, one that considers human perception as well as lighting metrics. This is also reflected in the revised layout of the Lighting Design Guide in the ninth edition of the IESNA Lighting Handbook, which has been restructured to consider a wide range of lighting criteria in addition to traditional illuminance benchmarks.

Applying RP1 to recessed office lighting

While recognizing that quality lighting consists of multiple criteria, including architectural, environmental and economic factors, RP1 asserts that, “the ultimate criteria [sic.] for an office lighting solution is how well it facilitates work performance and user satisfaction”. Consequently, RP1 is primarily concerned with aspects of the lighting system that significantly impact the psychological well-being and productivity of workers, which, when applied to direct lighting, can be broken down into three categories: illuminance, glare and brightness.

Illuminance

RP1 recommends that “illuminance should be kept as low as possible” (section 9.2), with supplemental task lighting applied where necessary. Light levels as low as 30 footcandles on the work plane are considered acceptable in many cases, and 50 footcandles is regarded as a maximum (see Handbook).

Glare

RP1 suggests that the intensity of light emitted from a luminaire toward a computer screen is predictive of its acceptability with respect to glare. For ‘normal offices’, where a mix of VDT and paper tasks are performed, RP1 recommends that the intensity of light emitted from a luminaire should not exceed 300 candelas at 65-90 degrees from vertical. For ‘VDT-intensive’ offices, such as call centers, the offending zone is larger, between 55-90 degrees. The specific candela limits at different angles are provided below:

RP1’s luminous intensity guidelines

Angle from vertical	VDT-intensive	Normal
55 degrees	300 cd	-
65 degrees	220 cd	300 cd
75 degrees	135 cd	185 cd
85 degrees	45 cd	60 cd

Brightness

RP1 recognizes that there is a link between brightness and the visual comfort and psychological well-being of workers (introduction and sections 7.2.5 and 9.6.2). Treating brightness as “essentially a perceptual response” (section 7.1.2), RP1 broadly recommends that lighting professionals consider the luminous environment in their design approach.



The desired combination of illuminance, glare control and comfortable brightness recommended in RP1 has been notoriously difficult to achieve with traditional recessed lighting systems.

Historical shortcomings of recessed luminaires

The desired combination of illuminance, glare control and comfortable brightness recommended in RP1 has been notoriously difficult to achieve with traditional recessed lighting systems. To warn specifiers of this fact, RP1 explicitly highlights two of the most common shortcomings of recessed luminaires.

1. Low brightness luminaires designed to solve potential glare problems in computer screens, including some parabolic luminaires, can have a severe environmental impact in terms of reducing brightness in the space (section 9.6.2).
2. Newer recessed or semi-recessed luminaires designed to produce a brighter-looking space, including some direct/indirect luminaires, can create eye adaptation problems due to the high luminance of the luminaire and the stark contrast between the luminaire and the ceiling (section 9.8).

PureFX and RP1

The philosophy and recommendations of the new RP1 fit well with PureFX, a new family of recessed luminaires from Ledalite Architectural Products. Using a proprietary technology called MesoOptics® to purify and control light, PureFX provides both comfortable brightness and excellent glare control, while appropriately illuminating the space.

Comfortable brightness

PureFX creates a bright, natural-looking and pleasant environment that enhances the psychological well-being of workers. With PureFX, the amount of brightness on the ceiling, walls and work surfaces is balanced and visually comfortable. Furthermore, the luminance of the PureFX luminaire is exceptionally consistent across the entire lens, thanks to the unique diffusive qualities of MesoOptics technology, minimizing the contrast between the lighting system and the ceiling.

PureFX creates a bright, natural-looking and pleasant environment that enhances the psychological well-being of workers.



Versions of PureFX that meet RP1's luminous intensity guidelines for 'normal office' environments

Warning: be very careful when interpreting candela values

1. Some recessed luminaires pose a greater potential glare problem than their reported candela value at 65 degrees suggests. Unlike PureFX, the surfaces of many recessed luminaires are not evenly luminous, containing variations in luminous intensity. 'Hot spots' on a luminaire are a common source of glare and visual discomfort, but are not reflected in photometric reports, which only measure the luminous intensity (in candelas) of the luminaire as a whole.

2. The surface area of the luminaire matters. For instance, despite meeting RP1's 300-candela limit at 65 degrees, the small surface area of the PureFX 6"x4' 1T5HO version actually makes it too bright for general office lighting. By contrast, the same lamping option in the larger 2'x4' housing is very unlikely to cause any glare problems in a normal office environment, despite slightly exceeding the 300-candela limit.

Glare control

While maintaining comfortable brightness in the space, the unique properties of MesoOptics technology also enable PureFX to provide a level of glare control that is appropriate for most office spaces. When evaluated according to RP1's luminous intensity guidelines, ten PureFX size and lamp combinations meet the recommendation for 'normal office' environments, and three other versions come very close.

	2x2	2x4	1x4	6"x4
These meet RP1's luminous intensity guidelines for the 'normal office'	1 TT5 (40W) 2 T5 2 T5HO 2 T8		1 T5 1 T5HO 1 T8	1 T5* 1 T5HO* 1 T8*
These slightly exceed RP1's luminous intensity guidelines for the 'normal office'	1 TT5 (50W) 1 TT5 (55W)	1 T5HO		

* The 6"x4' versions would not normally be used for general office lighting, despite meeting RP1 – see explanation in sidebar.

Note: The RP1 luminous intensity guidelines assume low quality computer screens. Higher quality screens, especially flat screens with anti-reflective coatings, are less likely to cause reflected glare.

Illuminance options

The PureFX family consists of many different size and lamp combinations, providing the lighting professional with maximum flexibility when designing for a given light level. Furthermore, because PureFX provides comfortable brightness in the space, experience has demonstrated that the low illuminances recommended by RP1, down to 30 or 35 footcandles, can easily be achieved with PureFX without making the space feel gloomy or unpleasant to work in.

See it for yourself

Like brightness, advances in technology need to be perceived. If you want to see a sample of the PureFX luminaire, visit an existing installation or try a risk-free mock-up, Ledalite would be pleased to arrange this for you.

Also, look out for a case study about how a premier engineering firm used PureFX to introduce controlled brightness to their office space, and at the same time beat one of the most stringent energy codes in the country by 40%. The case study will be published online in the 'downloads' section of the PureFX website at www.ledalite.com/products/purefx.

