5.2 Refractors

Refractors control light distribution by turning the incident light ray through a desired angle following Snell's Law. This can be done using either prisms or lenses. For luminaires using large area light sources, such as a fluorescent lamp, multiple prisms are moulded in a transparent material, usually acrylic or polycarbonate plastic. The number, location, angle of incidence and shape of the different types of prism determine the light distribution. For luminaires using a point light source a lens can be used. The position and shape of the lens determines the light distribution.

NOTE 1 By using LED technology the topic of refractors became a much more important issue in comparison to common lamp technology refractors. Developments in this field are very fast and the different manufacturers are using different combinations of lenses, reflectors, refractors and diffusers to optimise the light distribution, homogenous colour-mixing, to get rid of glare problems or to improve the efficiency of LED luminaires.

5.3 Diffusers

Diffusers are transparent materials that scatter light in all directions. They provide no control of light distribution but do serve to reduce the brightness of the luminaire. Diffusers are commonly made of materials that maximise light scatter and minimise absorption, such as opal glass or plastic.

NOTE 1 By using LED technology the topic of refractors became a much more important issue in comparison to common lamp technology refractors. Developments in this field are very fast and the different manufacturers are using different combinations of lenses, reflectors, refractors and diffusors to optimise the light distribution, homogenous colour-mixing, to get rid of glare problems or efficiency of LED luminaires.

5.4 Baffles

Baffles can have three functions; to hide the light source from common viewing angles, to reduce the amount of spill light, and to control the light distribution. The extent to which the light source is hidden from view is quantified by two angles, the shielding angle and its complementary, the cut-off angle. The shielding angle is the angle between the horizontal and the direction at which the light source ceases to be visible.

A common example of a baffle being used to hide the light source is the diffusely reflecting louvre. This louvre can take a wide variety of forms, lamellae, egg-crate, concentric rings and honeycomb depending on the shape and size of the luminaire, for outdoor it is usually made of a black diffusely reflecting material. If the purpose is primarily to reduce spill light, the material used for the louvre will be of low reflectance, and mostly black. In addition to louvres, spill light can be controlled by the use of low reflectance baffles, called barn doors (See NOTE 1) and mounted on the luminaire (Figures 88, 89, 90).

NOTE 1 It is not usual to have barn doors used at outdoor lighting applications – the wind can easily create problems and will not allow for stable adjustment.