Glare and Glass

Description

Glare is the difficulty of seeing in the presence of bright light, such as direct or reflected sunlight, it also occurs with artificial light such as car headlamps at night. Because of this, some cars include mirrors with automatic anti-glare functions.

Glare is caused by a significant ratio of luminance between the object, which is being looked at, and the glare source. Factors such as the angle between the object and the glare source and eye adaptation have significant impacts on the experience of glare.

Types of Glare

Glare can be generally divided into two types, discomfort glare and disability glare.

Discomfort glare results in an instinctive desire to look away from a bright light source or difficulty in seeing an object.

Disability glare renders the task impossible to view, such as when driving westward at sunset. Disability glare is often caused by the inter-reflection of light within the eyeball, reducing the contrast between object and glare source, to the point where the object cannot be distinguished. When glare is so intense that vision is completely impaired, it is sometimes called dazzle.

Glare can reduce visibility by:

- Reduction of brightness of the rest of the scene by constriction of the pupils.

- Reduction in contrast between print and paper by reflection of the light source in the printed matter (veiling glare).

- Reduction in contrast by reflection of bright areas on the surface of a transparent medium as glass, plastic or water; for example when the sky is reflected in a lake, so that the bottom below or objects in the water cannot be seen (veiling glare).

Sunglasses are often worn to reduce glare; polarized sunglasses are designed to reduce glare caused by light reflected from non-metallic surfaces such as water, glossy printed matter, painted surfaces or glass surfaces.

A flat vertical glass façade or window, with either clear or coated glass, can reflect sunlight into the eyes of the observer, causing considerable discomfort, the immediate reaction being to shield the eyes or look away until the sun moves further across the sky, the angle of reflection then alters and is no longer of concern to the observer.

Glare Inside a Building

Occupants or users of a building, such as a conservatory, may find it difficult to read a newspaper due to veiling glare. The solution to this is to reduce the amount of light entering the conservatory. This is most often achieved by the selection of a body tinted or coated glass for use in the roof which reflects more of visible light than clear glass.

Glass Type 6/16/6 unit	Typical Light Transmission	Approximate Glare Reduction
Clear glass	78%	0%
Low emissivity glass	70%	8%
Body tinted glass	40%	38%
High performance coated glass	70 – 8%	8 – 70%

It is difficult to be sure exactly which level of light transmission is necessary for each

situation, since some people are more sensitive to light than others, but in general, if glare is an issue, then glass with a reduced light transmission will reduce the effects of glare inside a building. If the selected glass is not sufficient to negate the problem then it may be possible to use blinds or a tinted film in conjunction with the glazing.

Glare Outside a Building

When glare is experienced from the outside of a building, particularly with curved glass in a façade, this presents a different scenario, similar to the reflections experienced on the curved glass surface of a computer or television screen, the reflective curved screen reflects images of the scene it faces, including lighting and on occasion sunlight. However, because it is curved it reflects images at a considerably wider range of angular viewing.

The curved glass in a rear car window often exhibits the same properties, it is difficult to escape the glare from certain types of car rear windows, with a curved surface, when the sun is high in a cloudless sky and can make driving in the following car very uncomfortable.

On a curved glass façade, the angle of the reflection does not change as the sun moves through the sky, the reflection simply moves to another part of the glass, and in effect follows the sun as it moves across the sky, producing a continuous range of reflections rather than just the one in a flat glass surface. This results in the glare from these surfaces being experienced for an extended period of time and can result in considerable concern for the observer.

This type of glare, caused by direct sunlight, reflected from curved glass surfaces, can occur in both coated and uncoated glass, both providing similar levels of discomfort. The type of coating applied to the glass having no effect under these circumstances as it is masked by the brightness of the reflected sunlight. For example, a difference in reflection of 10 or 20% of a coated glass, which is noticeable under an overcast sky, will be masked (veiling glare) and will have no effect on the level of glare from the glass surface.

The most effective methods of preventing this type of glare is to either shade the glass from the path of the sun or orientate the glass into a suitable position where it is unlikely to be a cause for concern, such as a North facing façade.

Alternatively a low reflection glass may help reduce this type of reflected glare, but this cannot be guaranteed as the light intensity may be too high on occasions to be affective.

Dual Seal Glass Limited

403 Leeds Road

Huddersfield

HD2 1XU

Tel: 01484 420030