

3.4 VISUAL FIELD GLARE

Glare is difficulty seeing in the presence of bright light such as sunlight or artificial light (car head lamps 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 task and the glare source. Factors such as the angle between the task and glare source and eye adaptation have significant impacts on the experience of glare.

Types of Glare

Glare is generally divided into two types;

- (i) **discomfort glare and**
- (ii) **disability glare.**

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

Disability glare impairs the vision of objects without necessarily causing discomfort. This will arise when driving westward at sunset.

Disability glare is often caused by inter-reflection of light within the eyeball. This reduces the contrast between task and glare source such that the task cannot be distinguished. When glare is so intense that vision is completely impaired, it is called dazzle.

Reducing factors of visibility

Glare can reduce visibility by

1. Reduction of brightness of the rest of the scene by constriction of the pupils.
2. Reduction in contrast of the rest of the scene by scattering of the bright light within the eye.
3. Reduction in contrast by scattering light in particles in the air.

4. Bloom surrounding objects in front of glare.
5. Reduction in contrast by reflection of bright areas on the surface of a transparent medium or glass, plastic or water.

When the sky is reflected in a lake, so that the bottom below or objects in the water cannot be seen. This is known as veiling glare.

Methods to reduce glare

1. Sunglasses are often worn to reduce glare. The polarized sunglasses are designed to reduce glare caused by light reflected from non-metallic surfaces such as water, glossy printed matter or painted surfaces.
2. An anti-reflective treatment of an eyeglass reduces the glare at night and glare from inside lights and computer screens.
3. Some types of eyeglasses can reduce glare that occurs because of the imperfections on the surface of the eye.

Measurement of glare

Glare is typically measured with luminance meters or luminance cameras. Both are able to determine the luminance of objects within small solid angles. The glare of a scene (ie.,) visual field of view, is then calculated from the luminance data of that scene.

Unified Glare Rating

The unified glare rating (UGR) is a measure of the glare in a given environment.

It is basically the logarithm of the glare of all visible lamps divided by the background illumination (L_b).

$$UGR = 8 \log \left[\frac{0.25}{L_b} \sum L_n^2 \frac{w_n}{P_n^2} \right]$$

where \log is the common logarithm (base 10).

L_n - luminance of each light source numbered,

ω_n - solid angle of the light source seen from the observer

and

p_n - Gath position index, which depends on the distance from the line of sight of the viewer.



