

2.9. Protective measures.

2.9.1.* Arrays and reflectors in high winds.

2.9.2. Health and safety procedures.

In this section we document health and safety procedures to avoid overexposure of the eyes to sunlight from reflectors.

The human visual system response is logarithmic, not linear, resulting in the ability to perceive an incredible brightness range. In broad daylight, humans can visualize objects in the glaring light from the sun, while at night large objects can be detected by starlight when the moon is dark. At threshold sensitivity, the human eye can detect the presence of about 100-150 photons of blue-green light (500 nanometers) entering the pupil.

Adaptation of the eye enables vision to function under such extremes of brightness. Several mechanisms are responsible for the ability of the eye to adapt to a high range of brightness levels. Adaptation can occur in seconds (by initial pupillary reaction) or may take several minutes (for dark adaptation), depending upon the level of brightness change. Full cone sensitivity is reached in about 5 minutes, whereas it requires about 30 minutes to adapt from moderate sensitivity to the full sensitivity produced by the rod cells.

Photokeratitis is a painful eye condition caused by exposure of insufficiently protected eyes to the ultraviolet (UV) rays from either natural sources (intense sunlight) or artificial (the electric arc during welding). Photokeratitis is akin to a sunburn of the cornea, and is not usually noticed until several hours after exposure. Symptoms include increased tears and a feeling of pain, likened to having sand in the eyes.

The injury may be prevented by wearing eye protection that blocks most of the ultraviolet radiation, such as welding goggles with the proper filters, a welder's helmet, sunglasses rated for sufficient UV protection, or appropriate snow goggles. The condition is usually managed by removal from the source of ultraviolet radiation, covering the corneas, and administration of pain relief.

Because of the possibility of blinding sunlight from reflectors, people entering the roof area should wear UV sunglasses which are not free to fall, or goggles. A danger warning for access to the roof should be prominently displayed, and where to get UV sunglasses on the premises.

In case of a person not following these instructions, not able to follow them and irrespective of this, training should be provided for emergency procedures when someone is not able to see on the roof, and these procedures should also be prominently displayed. For instance, it could be stated that in the case of blinding reflected sunlight, the person should shut their eyes and cover them with their hands, turn away from the reflection if where it is coming from is known, wait for a minute, and then with fingers moved to see partly, proceed to the exit.

No solar reflectors should be installed where their reflection is visible from the ground or where adjacent buildings may be subject to blinding reflections visible from these buildings at any time of day.

2.9.3.* Reflectors and the behaviour of birds.

2.9.4. Cooling systems.

Temperature control and asymmetry of heating in panels and arrays – effect on output of asymmetry.

2.9.5. Washing systems.

Effect on panels and reflectors of dust and bird droppings.

Recycled rainwater, filtering, power to pump rainwater.

*** = omitted in the first edition**