THE EYE-SUN PROTECTION FACTOR (E-SPF®):
A More Complete Way to Look at Ultraviolet Radiation Hazard and Eye Protection

Why Do We Need A “Sun Protection Factor” for Eyewear?

Over the last three decades we have learned that it is critical to protect our skin from the sun. Today, consumers can easily find the sun protection they need by glancing at the sunscreen. But what if consumers want a similar means to judge the protection of their eyes from the sun’s damaging ultraviolet radiation (UVR)?

Sources of UVR

Much of the solar UVR that reaches the eye does not come directly from the sun. Rather, solar UVR can be scattered by clouds or reflected off objects, buildings, and the ground. In addition, UVR can be reflected by the back surfaces of sun and everyday lenses. A significant portion of this reflected UVR will reach the cornea, sclera, and periorcular epidermis.

This reflected UVR has grown in importance because the No-Glare technology that is often applied to the back surface of spectacle lenses (both clear and sun lenses) reflects a surprising amount of UVR. Recent work by Karl Citek, OD, PhD, has found that, although No-Glare lenses can transmit 99% of visible light, these lenses can reflect up to 50% of the incident UVR.¹

The result is that, until the development of the current generation of Crizal® lenses, lenses treated with No-Glare technology could reflect UVR onto the cornea, sclera, and delicate periorcular skin—even if the lens blocked 100% of UVR transmission. Of course, lenses without No-Glare technology can also reflect some amount of UVR into the eye.

E-SPF is defined as the ratio of UVR transmitted through the lens or reflection from the backside of the lens. E-SPF takes into account both sources of UVR. (Note: maximum reflection occurs when the UVR source is at 140° to 155°.)

Blocking UVR Transmission is Not Enough

Until now, the only quantitative measures of UVR protection offered by everyday or sun lenses have been based solely on UVR transmission, a measure of the fraction of radiation that is blocked from traveling through the lens. While this is helpful, a complete measure of UVR protection would also account for UVR that enters the eye from around the lens or is reflected off the back surface of the lens.

The Eye-Sun Protection Factor™ (E-SPF™)

What we need is a system with the elegant simplicity and complete public acceptance of the index used to rate skin care and sunscreen products’ efficiency. With that in mind, Essilor scientists, in conjunction with an independent third party expert, have created the Eye-Sun Protection Factor (E-SPF) index.

E-SPF is defined as the ratio of UVR incident on the cornea (weighted to take in consideration the impact of UVR at different wavelengths) with and without lenses in place (see box).

Table 1

<table>
<thead>
<tr>
<th>E-SPF of Different No-Glare Lenses</th>
<th>E-SPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crizal Avancé UV™, No-Glare Lens</td>
<td>25</td>
</tr>
<tr>
<td>Competitor A</td>
<td>≤ 3</td>
</tr>
<tr>
<td>Competitor B</td>
<td>5</td>
</tr>
<tr>
<td>Competitor C</td>
<td>5</td>
</tr>
</tbody>
</table>

* with clear 1.5 index plastic, E-SPF of 10.

Reference