

## Exposing UTEC® to Sunlight

The Ultra High Molecular Weight Polyethylene – UTEC®, like the majority of synthetic resins, is subject to degradation reactions induced by ultraviolet radiation and oxygen. The degraded material presents modified visual aspect, density increase, and decrease in abrasion wear, impact resistance and tensile properties. The radiation which is responsible for the launch of the aging process on the plastics materials is a solar light component, whose wavelength is between 290 and 400 nm.

The UTEC® resins, in general, present good resistance to sunlight radiation when compared to other Polyolefins. On the applications subject to only indirect light exposure (shadow), the UHMWPE – UTEC® has been used without any special protection additive, and keeps its good performance over all its lifetime with no degradation signs. On the other hand, if the application requires direct sunlight exposure, as electrical insulators, marine fenders, and some uses in the mining industry, it's recommended appropriate polymer protection.

### PROTECTION AGAINST ULTRAVIOLET RADIATION

**Carbon Black as Light Absorber** – the incorporation of 2.5% Carbon Black type N-220 homogeneously dispersed into the polymer mass yields durability for many years and is the most economic and simple protection means. Despite being efficient, the Carbon Black has a color issue – all parts must be black. When the final product cannot be black, one must use chemical protection.

**Chemical Protection** – practical results have shown that the free radical inhibitors, like the hindered amine light stabilizers (HALS), present better performance if compared to the regular chemical absorbers. The typical HALS concentration in the blend is in a range between 0.05 to 0.3%. In general, it's been a consensus on the technical literature that the incorporation of 0.05% HALS to the UHMWPE resin yields a lifetime of about five years.

HALS	Bis-2,2,6,6-tetramethyl-4-piperidyl sebacate
UVA	2-Hidroxi-4-n-octoxibenzophenone

The table below presents the exposure time on a Weather-O-Meter equipment, in hours, of a 6.3 mm-thick specimen, correspondent to a 50%-loss on its elongation.

Protection Means	Time (h)
Reference .....	1 000
0.30% UVA .....	1 700
0.10% HALS .....	6 500
2.5% CB .....	>10 000

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The lifetime of a UHMWPE component that is exposed, even indirectly, to ultraviolet radiation, is subject to variations in accordance to its geographical position on the Globe. Other variables include the season of the year and the reflection media.

It is recommended that the end-user performs durability tests to evaluate the correct needed additivation, for every new application.

Note: The information contained herewith is merely informative, expressed in good faith, and represent the truth regarding current knowledge. They do not imply in any result or performance warrant or guarantee. The data herewith shall not be used as specification parameters.