WHAT IS UV PROTECTION?

Ultraviolet (UV) Stabilization

Plastics are attacked and deteriorate when exposed to direct sunlight. When plastic tanks absorb the sun's ultraviolet light, the UV energy excites the polymers' chains, causing them to break. The effects are discoloration, embrittlement and eventual cracking. Elevated temperatures and oxygen tend to accelerate the deterioration. Tanks listed as suitable for outdoor service are protected from UV attack by: coloring or pigmenting and/or adding internal stabilizers which preferentially absorb or dissipate the UV energy. Shading tanks from the sun will also prevent deterioration.

Tanks must be free to expand or contract, avoid excessive tension on the tank.

For assistance in selecting the appropriate tank for a specific application, see the Tank Resin Selector Guide or contact SIERRA. Customer Service at 1-215-258-5602.

Light Stability Characteristics

All polyethylenes are susceptible to degradation upon long-term exposure to sunlight. This deterioration is brought about by chemical changes which occur in the polyethylene as a result of exposure to the ultraviolet (UV) portion of light. Degradation results in the polyethylene becoming embrittled, reducing the impact resistance and elongational properties of the part. Degradation from UV light can be effectively inhibited by the addition of UV stabilizers, which protect the polyethylene through preferentially absorbing, transferring or reflecting UV energy.

The UV life of a part is dependent upon UV additive level and type as well as part thickness and design, pigment type, level and effectiveness of dispersion, processing conditions and the geographic location where the molded part is used (see Figure 3). It is important when comparing resin UV performance to ensure that the testing has been done on a consistent basis. In Figure 1, accelerated weathering data is presented. Generally, 2,000 hours corresponds to 1 year in Florida and 1,400 hours to 1 year in Southern Canada. Often terms like "UV-8" are used. UV-8 means the material can withstand 8,000 hours in a Xenon Ci-65 weatherometer. UV-2 or UV-4 would mean 2,000 or 4,000 hours respectively. Hence, UV-8 corresponds to approximately 4 years of continuous outdoor exposure in Florida.

It is important to understand which weatherometer, i.e. Carbon Arc or Xenon, was used, as well as the details of how the weatherometer was run. ASTM D-2565 is the recognized standard. Testing can be performed using actual outdoor weathering exposure, such as Florida and Arizona, to confirm this data. Note Figure 1 uses the industry standard criteria of when the sample has reached less than 50% of its original break elongation to determine the end of the test. In most cases useful life of the part extends beyond this point. All samples in Figure 1 are nonpigmented as supplied by Exxon Chemical. The UV performance test data can be found on our data sheets for each specific grade.

Figure 1: Escorene Xenon Weatherometer Exposure Data

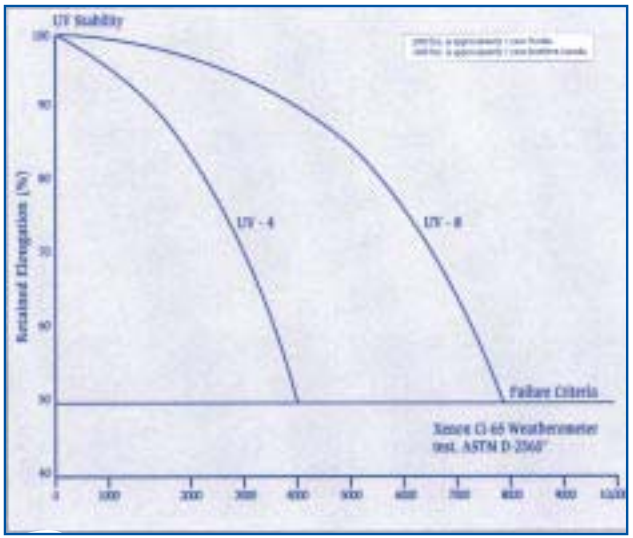
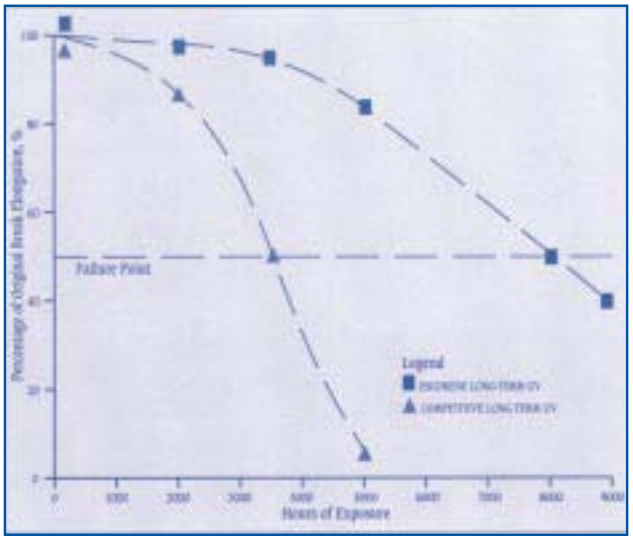
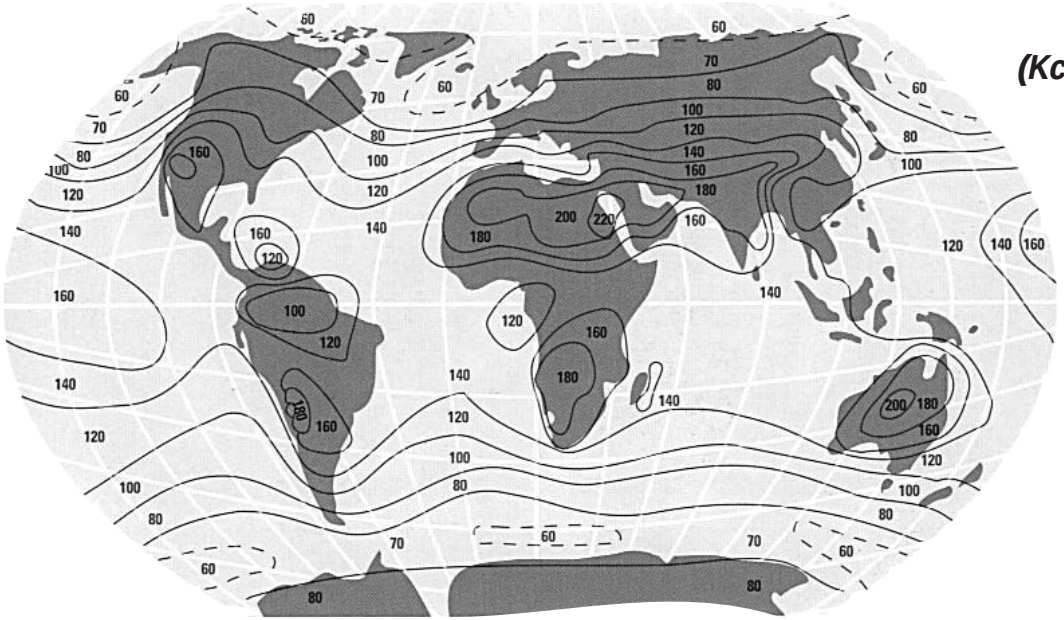


Figure 2: Comparison of Rotational Molding UV Performances



GENERAL ISOLINES OF GLOBAL RADIATION

FIGURE 3



(Kcal/cm@2/yr.)

USE OF FIGURE 3

Years = 70 x UV Rating
(Your Location's Isoline)
(from Figure 3)

Example: Natural Part, Molded Properly, Using UV-8 Additive Package
For Use in Florida

i.e. Florida = 140 Kcal/cm@2/yr. (from Figure 3)
Thus Years "Expected" = 70/140 x 8
= 4 Years (until 50% of original break elongation properties left)

UV Ratings from Supplier ie: UV-4, UV-8 [Click here to return to www.petanks.com]