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Welcomes You to a

**Polyurethane Elastomer  
Design Guide**

This Chapter Covers  
**Climatic Conditions**

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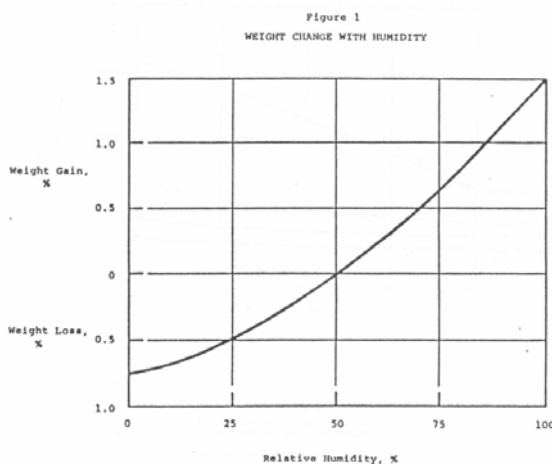
## Climatic Conditions, Testing and Moisture Equilibration

Water, liquid or vapor is nearly always present and in contact with rubber parts in service. Therefore, it is important to know what effect water has on properties.

The overall strength of ADIPRENE® L urethane rubber is reduced slightly when exposed to water. This is a reversible effect and properties are regained when parts are dried. ADIPRENE®, a polyether urethane, is very resistant to degradation by moisture upon long-term aging.

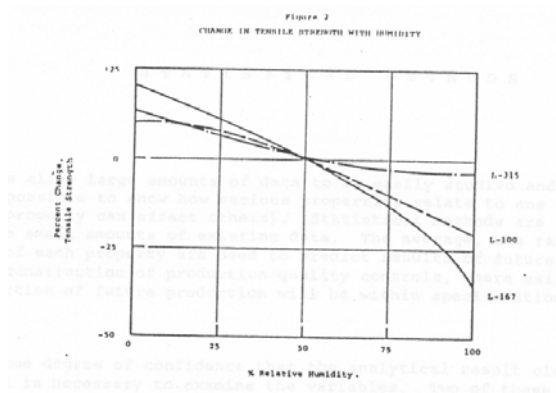
Changes in atmospheric conditions, during mixing and after curing, do not cause significant changes in properties of ADIPRENE® L. Temperatures from 70°F to 90°F with 35% to 88% RH when mixing, and 70°F to 100°F with 20% to 90% RH when after-curing, have no effect on properties. Even with all of these ambient conditions, vulcanizates attain 90% of their ultimate properties within four days after being mixed, regardless of the processing conditions over the ranges listed, provided initial cure requirements are met. (RH -Relative Humidity)

All elastomers absorb moisture. The gain or loss in weight from 50% RH to equilibration at 100% and 0% respectively is plotted for three polymers of ADIPRENE® in Figure 1. Approximately seven days are required to stabilize weight gain or loss of atmospheric moisture.



Testing value can be altered considerably by humidity; therefore, comparisons should be made at the same humidity conditions. Humid service conditions can influence properties and for that reason performance in static type applications. Dynamic applications usually generate heat within the part, tending to dry it and minimize the effects of moisture.

The moisture content of urethane vulcanizates at equilibrium with the atmosphere varies about 2% as the relative humidity changes from 100% to 0%. How tensile strength varies with relative humidity at 75% is shown in Figure 2. A change in relative humidity from 50% to 100% produces a 25% reduction in the tensile strength of ADIPRENE® L-100



Other properties, such as tear and abrasion, have lower values with increasing humidity. Equilibration of test specimens with humidity over the range of 0% to 100% RH causes a significant change in tensile strength and successively smaller changes in 300% modulus, 100% modulus and tear strength (Figures 3 and 4).

