

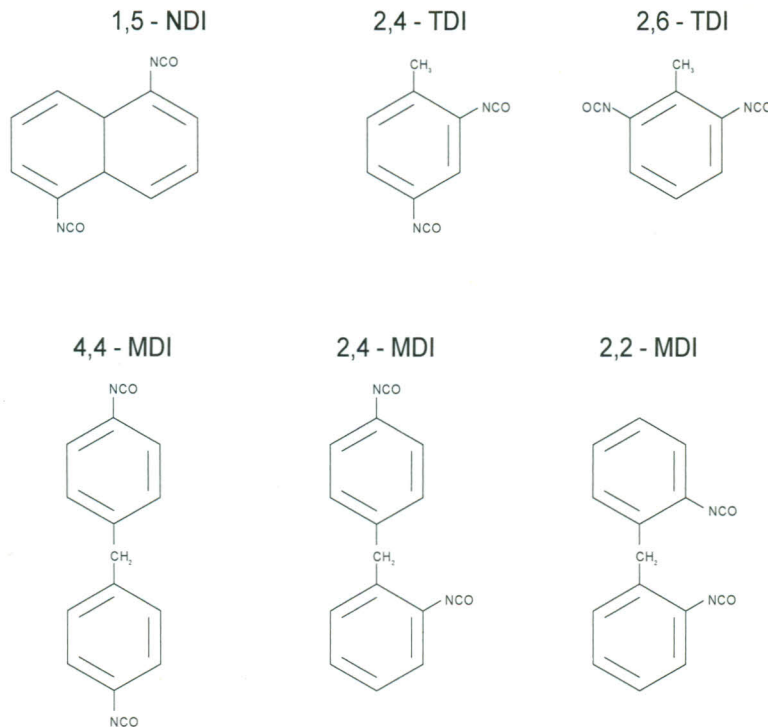


Plei-Tech 15 (Vulkollan™), is a specific type of polyurethane, formulated with 1,5 Naphthalene Diisocyanate, and is prone to discoloration when exposed to sun or UV light sources, and during the post curing process associated with this particular polyurethane material.

The discoloration of aromatic isocyanate based polyurethanes is due to their susceptibility for oxidation. This occurs readily via a radical mechanism and results in the formation of quinonoid structures which are colored. The formation of a quinonoid structure is possible because of the abundance of Pi electrons in the aromatic benzene ring and the ability of these Pi electrons to "resonate" around the molecule. Anything that enhances this "resonance" will deepen the color, specifically UV or Thermal energy.

In the case of 1,5 Naphthalene Diisocyanate, we have: (i) two benzene rings fused to one another - thus increased resonance, and (ii) two nitrogen atoms attached to the naphthalene ring in the 1- and 5-positions of the naphthalene ring. The presence of nitrogen atoms in the 1- and 5- positions greatly enhances "resonance". As such NDI based urethanes are more highly susceptible to this color changing than their MDI and TDI counterparts.

Generally, the darkening of Plei-Tech 15 is associated with curing of the product and should be considered to be advantageous to product performance. It should be noted that the "resonance" is not a pigmenting process, and as such the color change in the product will not be consistent or predictable.



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