



Curing PEXIDAN® Moisture-Crosslinkable Insulation Systems

PEXIDAN® moisture-crosslinkable technology is a process of crosslinking that involves a reaction with water. Curing depends upon a number of variables, the most critical being humidity, temperature, and part thickness. Each PEXIDAN® system cures slightly differently and each has its own ultimate cure level. Similar to paints or concrete, the definition of 'cured' will depend upon the properties being sought. When force curing is employed, the length of time that the finished goods sit prior to the curing process will impact how long they need to be force-cured since the curing process can and will take place at any and all conditions. The conditions affect only the rate of cure. Finally, force curing requires bringing the goods to a desired set of conditions, and the time it takes to reach those conditions will be dependent on the capabilities of the equipment and on the quantity of goods being cured. Often it can take many hours to bring the goods to the desired temperature and humidity.

PEXIDAN® systems don't generally have to be fully cured to meet the requirements of the application, though full cure is always desirable. There are no 'typical' cure conditions so prediction of cure time usually involves some trial-and-error. For most applications, PEXIDAN® insulation is considered cured when it meets a hot-elongation or a hot-deformation requirement, and that can range from a few hours at 100°C to weeks under ambient conditions. Here are some basics with regard to curing:

- 1) Cure rate is directly related to moisture level of the surroundings (the partial pressure of water vapor), so doubling the moisture level will cut cure time in half. Water immersion is ideal below the boiling point of water, but not practical above 100°C unless it is done under pressure.
- 2) Cure rate approximately doubles for every 10°C temperature rise, so going from room temperature to 30°C will cut the cure time in half, and going to 40°C will cut it in half again (all at the same %RH).
- 3) Cure rate is inversely proportional to the square of the thickness, so doubling the wall thickness means it take 4 times longer to cure all the way though. In practice, the effect of thickness on cure time is minimized because properties improvements don't follow a linear relationship to cure level and curing at the surface takes place rapidly.

So the answer to how long it takes to cure PEXIDAN® isn't straightforward. At 100°C/100%RH one can expect a high level of cure in PEXIDAN® insulations within 2-3 hours for most thicknesses. At 80°C/100%RH one can expect a high level of cure in 6-8 hours. At room temperature (RH typically below 50%) one should expect it to take 14+ days to reach a high level of cure. Most customers will find that they can quickly zero-in on a suitable cure time by checking deformation or hot elongation of finished goods cured under known conditions with the help of the basic principles described above.

As a general guide to curing, the following Figures 1 and 2 represent typical cure times for achieving 30% deformation in small-diameter insulated wires using different PEXIDAN® systems. As mentioned above, results can be highly variable, especially with ambient curing since parameters of temperature and humidity are generally not well controlled if controlled at all. Varying conditions from day to day during an ambient-cure process can greatly affect the overall cure rate.

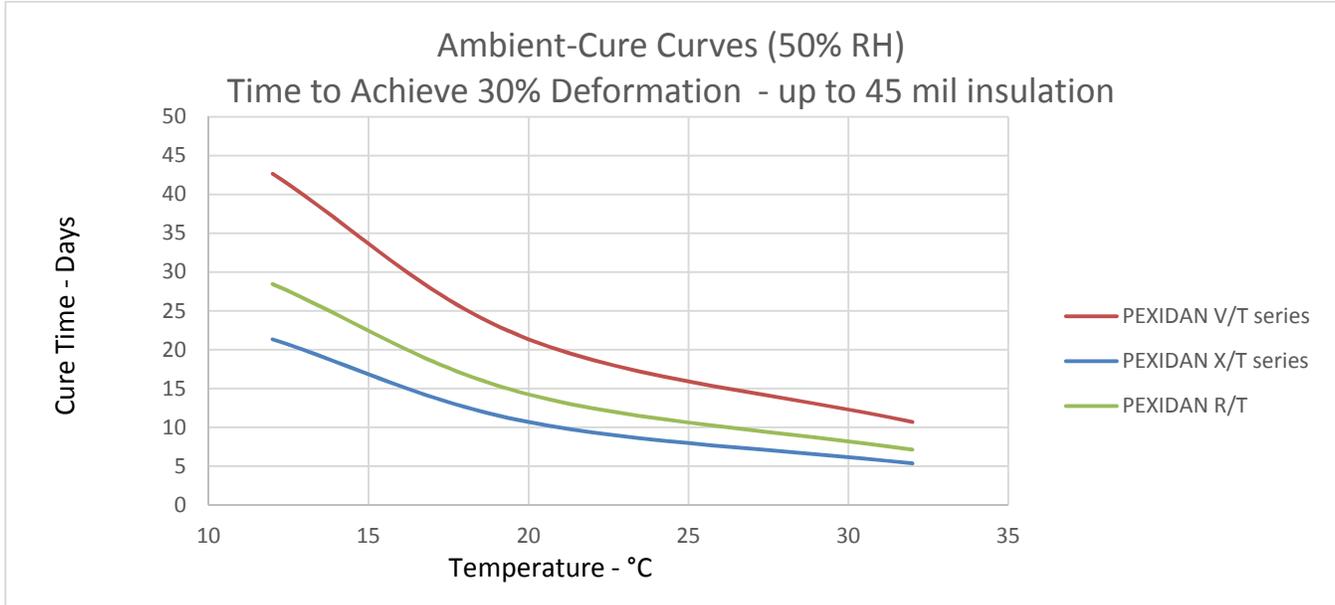


Figure 1 - Typical ambient cure rates for chosen PEXIDAN systems

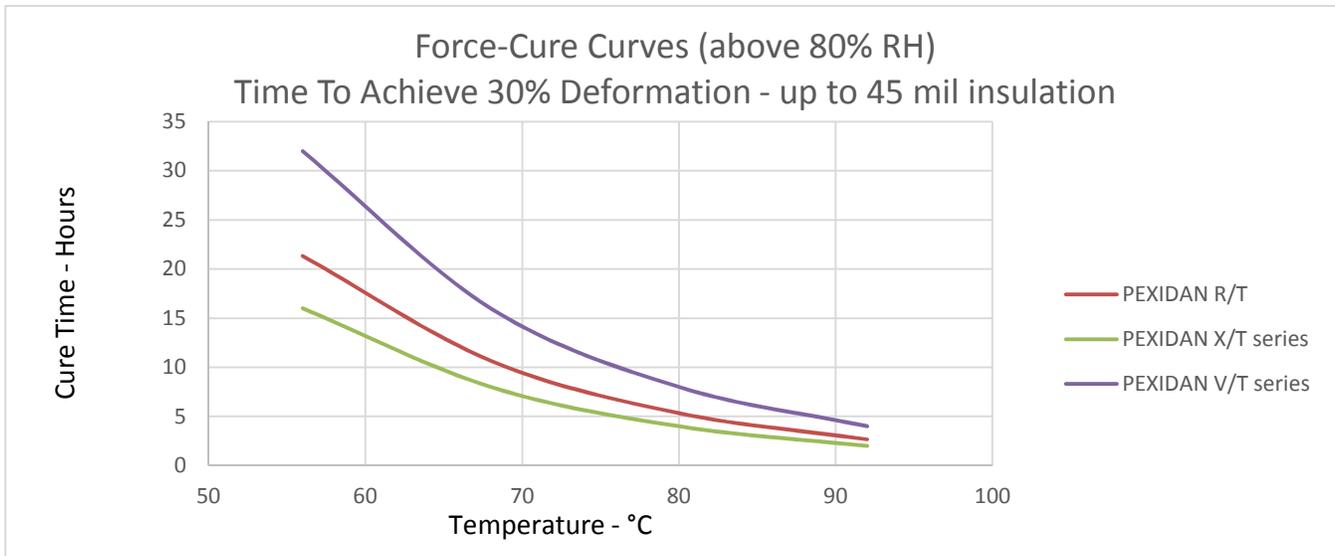


Figure 2 - Typical force-cure rates for chosen PEXIDAN systems

For insulation 60 to 90 mil thickness these values are approximately doubled.

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