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Effect of Cure Temperature on the Glass Transition Temperature and Mechanical Properties of Epoxy Adhesives

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This paper describes the influence of the curing temperature on the physical and mechanical properties of two structural adhesives. This work was undertaken to improve the understanding of the effect of curing temperature in the glass transition temperature, T_g, and stiffness of epoxy adhesives [1]. The mechanical properties of the adhesives were measured in bulk specimens. T_g was measured by a dynamic mechanical analysis using an in-house developed apparatus. The curing process was the same for all tests, consisting of a curing stage followed by a post cure stage. The initial stage was performed at different temperatures while the post curing stage was always performed at room temperature until the adhesive was completely cured. The mechanical properties and the T_g was found to vary as a function of the cure temperature of the adhesive. When cured below the glass transition temperature of the fully cured network, $T_{g\infty}$, the strength and stiffness of the adhesive increase as the cure temperature increases and the T_g is higher than the cure temperature [2 - 3]. When cured above $T_{g\infty}$, the strength and stiffness decrease as the cure temperature increases and the T_g is higher than the cure temperature [4].

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