Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

Subject: ACTION: Policy on Acceptability of Temperature Differential between Wet Glass Transition Temperature (Tgwet) and Maximum Operating Temperature (MOT) for Epoxy Matrix Composite Structure

Date: FEB 18 1999

From: Manager, Regulations and Policy Branch
Small Airplane Directorate, ACE-111

Reply to Attn. of: Lester Cheng
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To: SEE DISTRIBUTION

The Small Airplane Directorate received recent requests asking for clarification on the acceptability of the temperature differential between the wet glass transition temperature (Tgwet) and the maximum operating temperature (MOT) for epoxy matrix composite structure. We reviewed this matter and have developed the following policy. This policy is only applicable to Part 23 aircraft.

In general, a minimum of "50° Fahrenheit differential" will be used as a guideline in determining the acceptability of the temperature differential between Tgwet and MOT for epoxy matrix composite structure. This "50° Fahrenheit differential" is based on past service experience of epoxy matrix composite structure used in both civilian and military aircraft and is considered conservative.

If a temperature differential of less than 50° Fahrenheit is requested, more rigorous environmental testing studies, including some large scale tests for hot/wet conditions, are required to confirm the composite structure has adequate stiffness, strength, and durability. This approach should consider the stress levels and design detail of each specific application. Past experience indicates that large scale testing for hot/wet performance will generally result in lower environmental knockdown factors. Large scale tests also help identify if significant out-of-plane loads exist due to secondary loading effects for a particular composite design. Such weaknesses could be aggravated by poor environmental resistance to hot/wet conditions.

The method of intersecting slopes for the Dynamic Mechanical Analysis (DMA) storage modulus curve is recommended for the Tgwet measurement. Other equivalent methods of determining Tgwet may be used if approved by the FAA.

If you have any questions or need additional information, please contact Mr. Lester Cheng, at 816-426-6941.

David R. Showers

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