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Acrylic Window Terminology and Crazing Acceptance Criteria

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

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1. SCOPE:

   a. Compile a useful list of terms that are associated with acrylic window crazing and damage.
   b. Develop operator inspection, service life, and crazing acceptance criteria for acrylic windows.

2. REFERENCES:

   There are no referenced publications specified herein.

3. DISCUSSION:

3.1 Terminology:

Terminology used is general in nature, not scientific, such as defining crazing on a molecular level. This will allow someone who was looking at a cloudy window to determine, for example, whether the cloudy defect is crazing or haze.

See Appendix A for terminology list.

3.2 Crazing Acceptance Criteria:

Crazing limits are the choice of each individual operator based upon economic and customer satisfaction criteria and restrictions or conditions established by applicable airframe manufacturers.

3.2.1 Acceptable Acrylic Window Inspections: An objective method of measuring window crazing has not been developed. It is preferred that any objective crazing measurement method be accomplished by one person in any lighting condition.

3.2.2 Acceptable Acrylic Window Service Life: A poll determined that the operators require any "craze resistant" acrylic window to last a minimum of 20,000 flight hours before it must be removed for excessive crazing.

Some preferable characteristics of a "craze resistant" window would be:

a. Windows be reworkable at operator's facility, including reapplication of any coatings.
b. Service life should be commensurate with any increase in "cost to buy" and "cost to fly".
c. Directly interchangeable with existing acrylic windows.

3.2.3 Acceptable Acrylic Window Crazing Limits:

a. Cabin Windows: Crazing that is within allowable depth limits of the maintenance manual are considered cosmetic in nature. Therefore, each individual operator should set its own standards for removal due to cosmetic window crazing.

b. Door and Emergency Escape Windows: Even though crazing on door and emergency escape windows may be cosmetic, flight attendants must be able to assess conditions through these windows in an emergency situation. This, therefore, becomes a safety issue and the operators should make the “ability to assess outside conditions” part of determining the crazing limit.

c. Cockpit Windows: Flight deck crews cannot have an obstructed view. Therefore, window crazing is a safety issue. Crazing limits should be made with this in consideration. Flight deck crews have ultimate authority in determining whether or not a crazed window needs to be changed prior to flight. The objective should be to institute acceptable crazing limits that mirror those maintained by flight deck crews.

4. CONCLUSION:

Because each operator must make their decisions for purchasing, maintaining, and removing acrylic windows based upon their economic and marketing analysis, it is not possible to make many absolute requirements for acceptable acrylic windows. The one common characteristic expressed by the operators interviewed is that any acrylic window remain within craze limits for a minimum of 20,000 flight hours. This minimum life requirement does not constrain window manufacturers to a particular design but in fact could still allow enough options for the operators to choose from a number of windows based upon initial purchase price, its anticipated life, and maintenance requirements.

Perhaps the best method currently available to objectively measure craze level of acrylic windows is by using photographs of reference windows in various stages of crazing. A window viewed at a particular angle with a strong light source can be compared with these reference photographs to determine whether or not the window exceeds the operators own maximum craze limit. Development of a simple “craze meter” device of some sort is encouraged so that precise standards for classifying crazing can be developed by the OEMs and operators. It is recommended that operators establish a reference photograph file or a reference set of standards that define the operator's craze limits.