

RESISTANCE OF WINDSCREEN TO BIRD IMPACT DURING COLD WEATHER

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A study on the behaviour of glass windscreen in case of bird impact, when there is no warming and cold weather, shows that there is no deterioration in bird impact resistance for glass windscreen with thin interlayers.

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Introduction

The French S.T.P.A. sponsored since 1985 a study on the behaviour of no warming windscreens at low temperature during bird impact.

Test conditions

Several tests were done in C.E.A.T. with windows mounted on frame which is not representative of aircraft frame.

First shots were done at room temperature (about 10°C) to determine critical speed for each selected compositions of window.

Then shots were done on no-warming, cooled and same composition window. It was established that cooling window mounted on frame by carboxylic put on a window side was too long and few satisfying; so the windows were stocked in a freezer during more than 12 hours, then they were mounted as quickly as possible on the frame. The window's temperature at the shot instant was about -18°C.

Results

The following table gives the summary of tests with 4 pounds birds for glass window with different thickness of interlayers (P.V.B.)

Interlayer Thickness	Results	Conclusion
1mm/1,4mm/ 1mm	At room and low temperature perforation between 190 and 200 m/s	No significative difference
1mm/1,4mm/ 1mm	Limit speed at room temperature : 181 m/s at low temperature : 177 m/s	No significative difference
1mm/2mm/ 1mm/3mm	At room temperature important partial failure at 222 m/s At low temperature perforation between 207m/s and 222m/s	Very low difference, not easily evaluable
1mm/4mm	At room temperature perforation between 225m/s and 250m/s At low temperature important partial failure at 220 m/s	Decrease of perforation speed not exeeding 30m/s

Conclusion

The resistance decrease to bird impacts at low temperature for aircraft glass windows with inter layers in P.V.B. is

- negligible if the P.V.B. layers have thickness of 1,5mm maximum
- weak if there is P.V.B. layers of 4mm maximum;the dispersion of results can be partially explained by fabrication tolerances.

The present study shall be continued to establish a decreasing law at low temperature for the resistance to bird impacts of glass windows versus interlayer (P.V.B.) thickness.