



ref SB132 issue 4 sail reinforcement test.doc

US SAFETY DIRECTIVE NUMBER 132 132, ISSUE 4.

TITLE	Sail reinforcement degradation additional test issue 4.
CLASSIFICATION	P&M Aviation have classified this bulletin as Mandatory. The CAA have classified this bulletin as Mandatory.
COMPLIANCE	For sail reinforcement bands more than 2 years old or more than 500 hours flight time (whichever comes first), at each permit to fly annual inspection.
APPLICABILITY	Quik, GT450, QuikR and Quik GTR with X-05 or Technora reinforcement bands.

1) INTRODUCTION

This service bulletin is revised to issue 4 to clarify the test method which must be carried out with a de tensioned sail for more consistent results..

This service bulletin was revised to issue 2 to increase the test loads. The reinforcement band test loads are 9kgf for the X-05 aramid and 8kgf for the black Technora spanwise cords.

Issue 3 was introduced to require tests to be done with a slack sail and issue 4 clarifies the test procedure.

An accident to a GT450 occurred where the sail failed in flight during very gusty conditions, by ripping along the edge of the keel pocket, starting from the trailing edge. Failure propagated from the X-05 aramid reinforcement. The trailing edge steel cable did not arrest the split. The sail was 6 years old and had flown 1000 hours. When tested shortly after the accident, the sail fabric ripped at 1000gr on the Bettometer test and the aramid reinforcement cords failed under the hook test at 5kgf, i.e. both just below the limits at the time as defined by Issue 1 of this bulletin. The aircraft was being flown in 25kt gusting 35kt conditions, in excess of the operators manual limitation of 23mph. The aircraft was being flown on the landing approach at fast trim setting. High airspeed in strong turbulence gives high gust loads.

To give confidence in the structure, it has been found necessary to increase the test load for the reinforcement cords. Aramid used before serial number 8130 (26/07/2005) has straight cords on a cloth backing, this type has different characteristics and the new test is not applicable.

A normal Bettometer cannot be used as the test load is too high. Approved test equipment is available at low cost from P&M Aviation, tel. +(44)(0)1706 655134.

To preserve the sail, whenever possible it should be protected from light, e.g. by covers, when not in use. Treatment every 12 months using Nikwax Tent & Gear Solarproof also increases the fabric UV life. The Technora reinforcement material bands are wider than the aramid and it has a much slower rate of degradation. The UV life of the main fabric has also been increased with the introduction of UV treated TNF 215 sailcloth from serial no. 8586 (28/06/2011). However, the materials will still degrade eventually and must be regularly tested to ensure airworthiness.

Note – all tests must be carried out using approved test equipment. In this bulletin, for UK registered aircraft, “inspector” means a BMAA inspector with A and I approval. In the USA the persons who can conduct the test are A&P, LSA Repairman Certificate or P&M Authorized Manufacturers Rep. For aircraft abroad, a recognised airworthiness inspector must do the test. If the sail main body has sufficient remaining strength, it is possible to replace the aramid bands with Technora. Scrapped sails must be cut to be rendered impossible to use for flight. Replacement cost and turn around time are kept as low as possible, normal warranty rights also apply.

2) ACTION

Inspection

The following materials are subject to the additional reinforcement test:

a) Aramid type X-05, which is made of yellow/gold cords woven in a cross pattern with additional diagonal cords sandwiched between transparent mylar films (see fig 1). This is the type which failed when degraded.

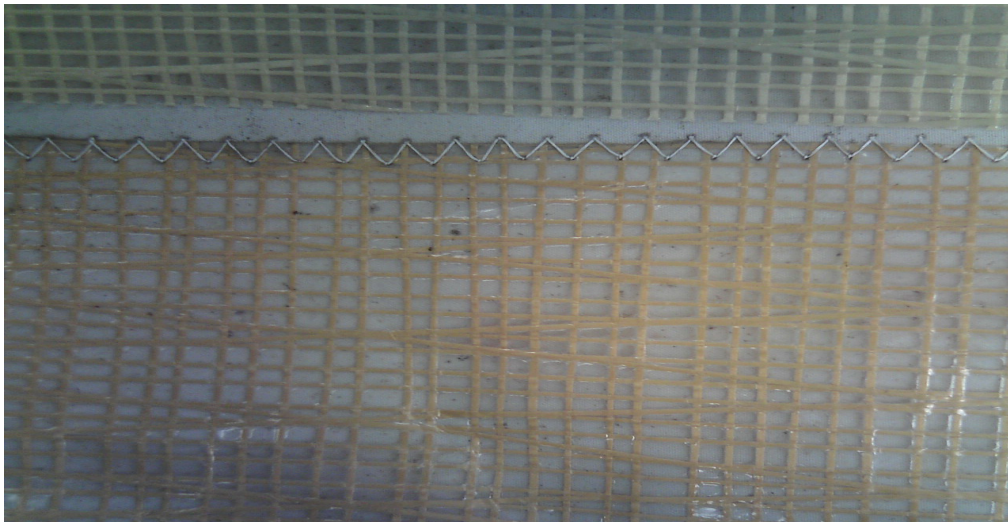


Fig 1, X-05 material. Top strip is new (bright yellow fibres) Bottom strip is degraded (gold/brown).

b) Technora, which is the same weave pattern as X-05 but with black cords and wider sail reinforcement strips (fig. 2). This was introduced from serial no. 8526 on.

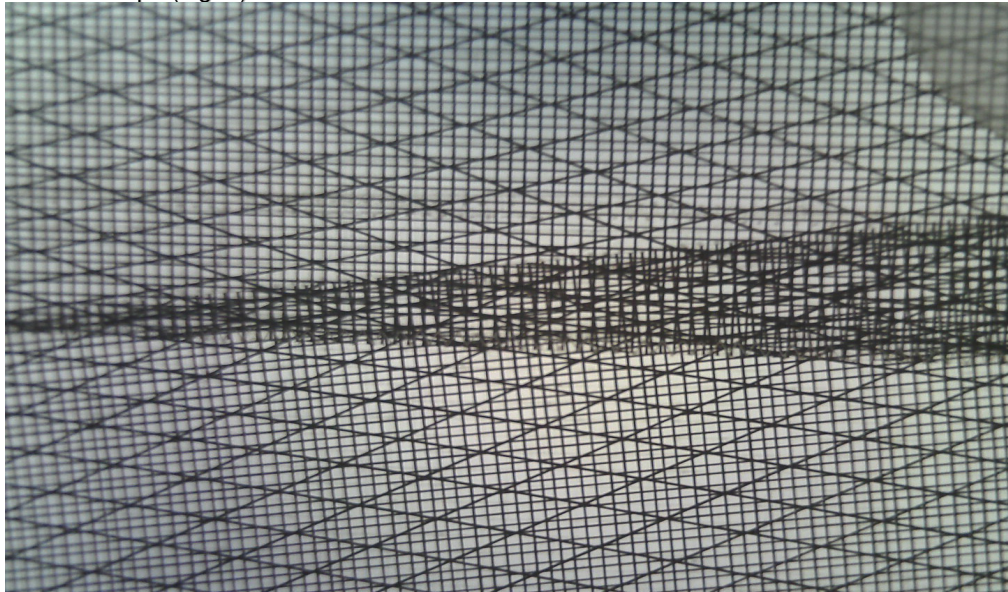


Fig 2. Technora material

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The aramid fibres start life as a bright yellow, which changes to a dull gold/brown as UV degradation develops. It may be possible to see the colour change beneath the area covered by the winglet (where fitted). The Technora is a para-aramid but dyed black to improve UV tolerance.

Implementation

The test is to be carried out by an inspector, on 2 places on each side of the wing (a total of 4 tests), within the area shown in fig 3. The test is to be carried out with the sail un-tensioned. This can be achieved by removing the 4 tip battens in the test area to ensure no tension remains, if the wing cross tube tension is left applied.

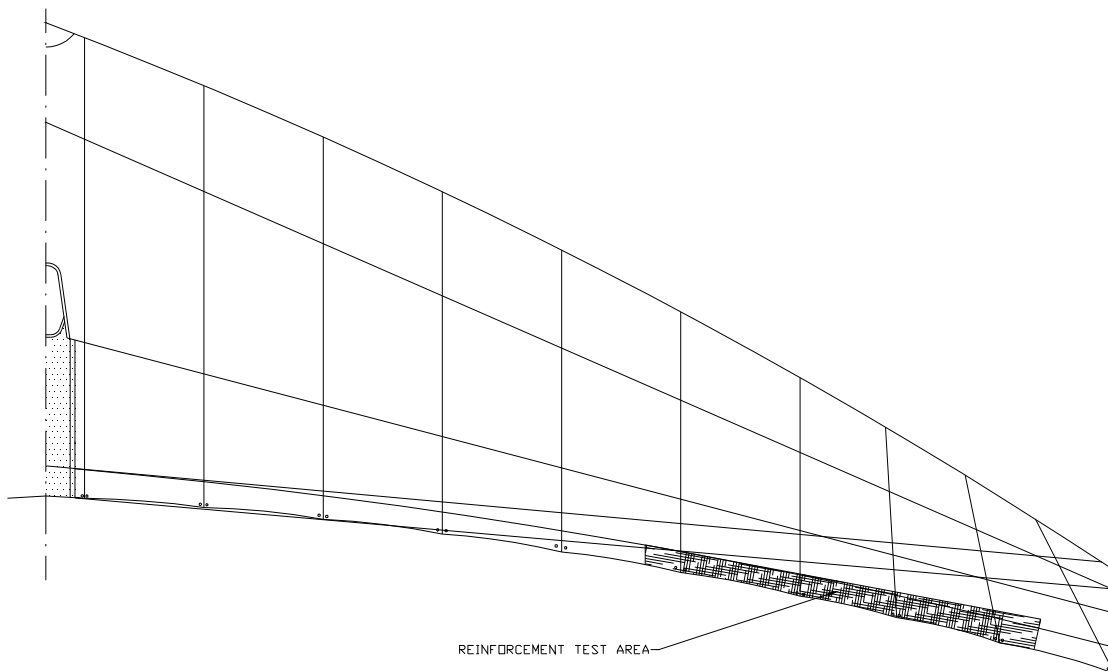


Fig 3. area for reinforcement tests

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Look for a cord which is woven underneath nearby cords, to avoid pulling one out of the surface as shown in fig 4.

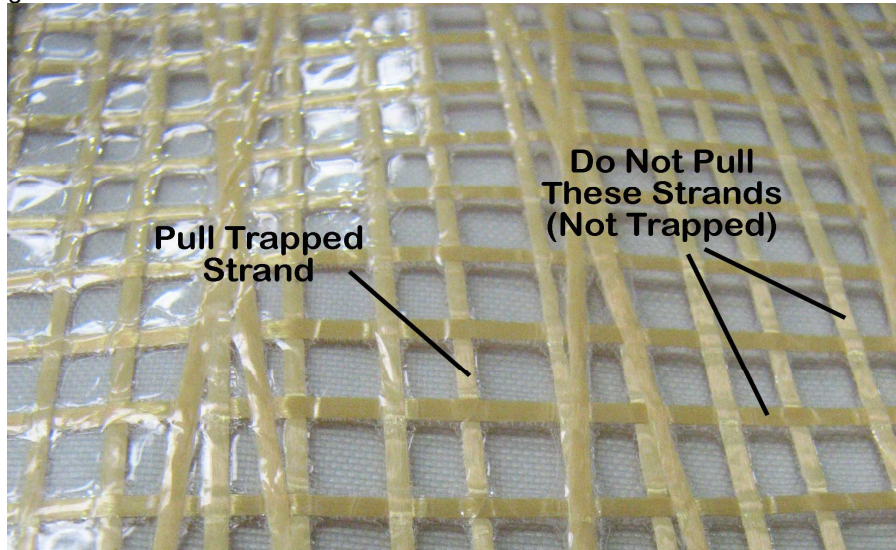


Fig 4 showing the correct strands to pull.

Using an approved test instrument (consisting of a modified spring balance of 10kg capacity and a 1.5mm diameter smooth hook with a sharp point), carefully capture one cord, avoiding picking up any additional fibres from the adjoining layer. Pull away from the surface, allowing the material to fold as shown in fig 6, gradually increasing the load until the test value is reached. If the cord consistently breaks below 8kgf (Technora Black) or 9kgf (aramid yellow) load then it has failed. Care must be taken as if a cord fails, the hook will easily penetrate the Inspector's skin.

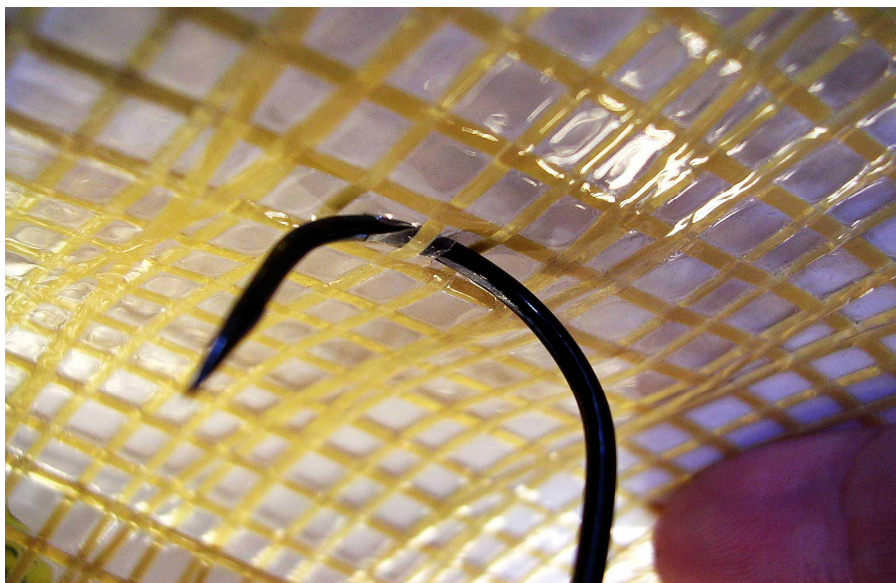


Fig 5 showing hook in position. Note adjacent strands must trap fibre being pulled.

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Fig 6. Hook through one spanwise cord which is woven under the surrounding cords as shown. Allow the sail to fold and grasp both surfaces. Pull gradually up to the test load as shown.

3) Documentation

This service bulletin must be attached to the operator’s manual.

The test must be carried out by an inspector and “sail reinforcement test to XXkg carried out to SB 132 issue 4” entered in the aircraft technical logbook.


4) Continued Airworthiness


The test must be carried out and added to the technical records for the aeroplane at each annual inspection, “sail reinforcement test to XXkg carried out to SB 132 issue 4” and signed by the inspector.

When filling in the BMAA permit renewal forms, the test load applied must be noted as well as ticking the box.

ISSUED BY W.G.Brooks

DATE 18/06/13

Approved		Date 18/06/13
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