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15 January 2010

Superseding
PIA-TS-108
12 December 1992

PIA Technical Standard

Parachute Canopy Fabric Pull Test Non-Destructive Method

Disclaimer: Parachute canopy manufacturers may have pull test requirements that differ in methods, procedures, and loads applied. Test procedures specified by the canopy manufacturer takes precedence over the test procedures described in this document. The person performing the pull tests must determine if the canopy manufacturer has a specific method of pull testing their canopy fabric.

Background: The purpose of this test method is to provide a simple, standardized, non-destructive method of verifying the strength of parachute canopy fabric. **This test method may be used when no other procedure is specified by the manufacturer.** Although this test is intended to be non-destructive, caution should be exercised as this test could damage the fabric, if the fabric is not positioned correctly or is not secured tightly. It may also affect the fabric permeability.

This method is designed to replace the old "Riggers' Thumb Test", first devised in response to the "canopy acid-mesh" discovery in the mid-1980's. It is now the accepted method for all parachutes requiring canopy fabric strength tests. Reasons for testing may include: Manufacturer's Service Bulletins (SBs), Airworthiness Directives (AD's), aging material, chemical contamination, UV exposure or discoloration of a suspicious origin, such as grease.

Tools required and possible sources are as follows:

2 ea. Locking Fabric Clamps

Figure 1

Para-Gear Equipment Co.
3839 W. Oakton St.
Skokie, IL 60076-3438

800-323-0437 (P/N S7989)
www.para-gear.com

Aerostar International, Inc.
1814 N.
Sioux Falls, SD 57117-5057

605-331-3500 (P/N 51406M)
www.aerostar.com

Ink, Marking (for parachutes and other textile items)
A-A-59211 (21Jul/98) Supersedes MIL-I-6903C (5Mar/68)

American Writing Ink Co.
33 Endicott St.
Norwood, MA 02062

781-762-0026

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Strata Blue P/N 7510-00-286-5362 Available in 1 pint container
Orange-Yellow P/N 7510-00-634-6583 Available in 1 pint container

Hitt Marking Devices, Inc. 714-979-1405
3231 W. MacArthur Blvd. 800-969-6699 (toll free)
Santa Ana, CA 92704 www.hittmarking.com

Sharpie Pen- black

1 ea. Calibrated Spring Scale, 50 lb. (23 kg.) minimum capacity

This scale should be calibrated at least once a year to an accuracy of +/- 3 lbs. It should be identified with a serial number and written verification of calibration must be kept on file. An adhesive label (or similar) should be affixed to the scale showing the date calibrated and the date next calibration is due. If the scale is damaged in any manner, such as dropping, it must be pulled from service and tagged as unserviceable until its recalibration.

Test Procedures: The following procedures do not take precedence over a manufacturer's test procedures for their products. Before testing make sure you have the manufacturer's most current test procedures.

A minimum of 2 areas should be tested on a canopy, but not less than 2 pull tests on each separate color (1 in the warp direction and 1 in the fill direction). When testing look for areas of contamination and/or discoloration. If possible remain approximately 6 inches (150mm) from any seam.

Proceed as follows:

NOTE: Steps 1 and 2 apply to cases involving acid-mesh pull testing.

1. Locate the mesh vents in the canopy and determine the fabric areas which are in contact with the mesh when the canopy is packed. These areas are shown as the diagonally shaded lines in typical tri-vent canopies (see FIGURE 2).
2. Perform one 40 lb. (18 kg.) pull test on each panel of material that comes in contact with the mesh when the canopy is packed. Alternate tests from the warp to fill direction on the panels. This could be as few as four tests or as many as twelve tests on some bias constructed canopies.

CAUTION: Never attach fabric clamps or perform pull tests on the mesh covered areas of any canopy. Extensive damage will result.

NOTE: Steps 3 through 6 apply to all pull tests (not just acid-mesh).

3. The area to be tested must be visibly marked for future reference. Refer to FIGURE 3 for examples of how to mark the parachute to be tested.
4. After the marking ink has dried, attach the locking fabric clamps to the ripstop fabric as shown in FIGURE 4. The distance between the clamps should be 3 inches (76.2mm) plus or minus ¼

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inch (6.35mm) and the clamps must be aligned so that the ripstop pattern is parallel (not on bias) to the edge of the jaws. Lock the clamps **VERY SECURELY**. This will prevent slippage and possible damage to the fabric.

NOTE: If the area to be tested is too small to allow 3 inches (76.2mm) plus or minus ¼ inch (6.35mm) between the jaws of the fabric clamps (such as the apex area of a round canopy), the distance between the jaws may be reduced to 2 inches (50.8mm) plus or minus ¼ inch (6.35mm).

5. Secure one clamp to the packing table or other object which will allow a sufficient load to be applied without movement of the fabric clamp. Attach the spring scale hook to the other fabric clamp and apply the load very smoothly and steadily. Hold the load for 3 seconds.

6. Record test results on the tested areas in contrasting ink as shown in FIGURE 5. Information should include the following:

- The amount of loading pulled to in pounds or kilograms
- The date tested
- The word PASS or FAIL
- The name and certificate number of the individual performing the test.

After completing the tests record the information in your rigger logbook and on the packing data card.

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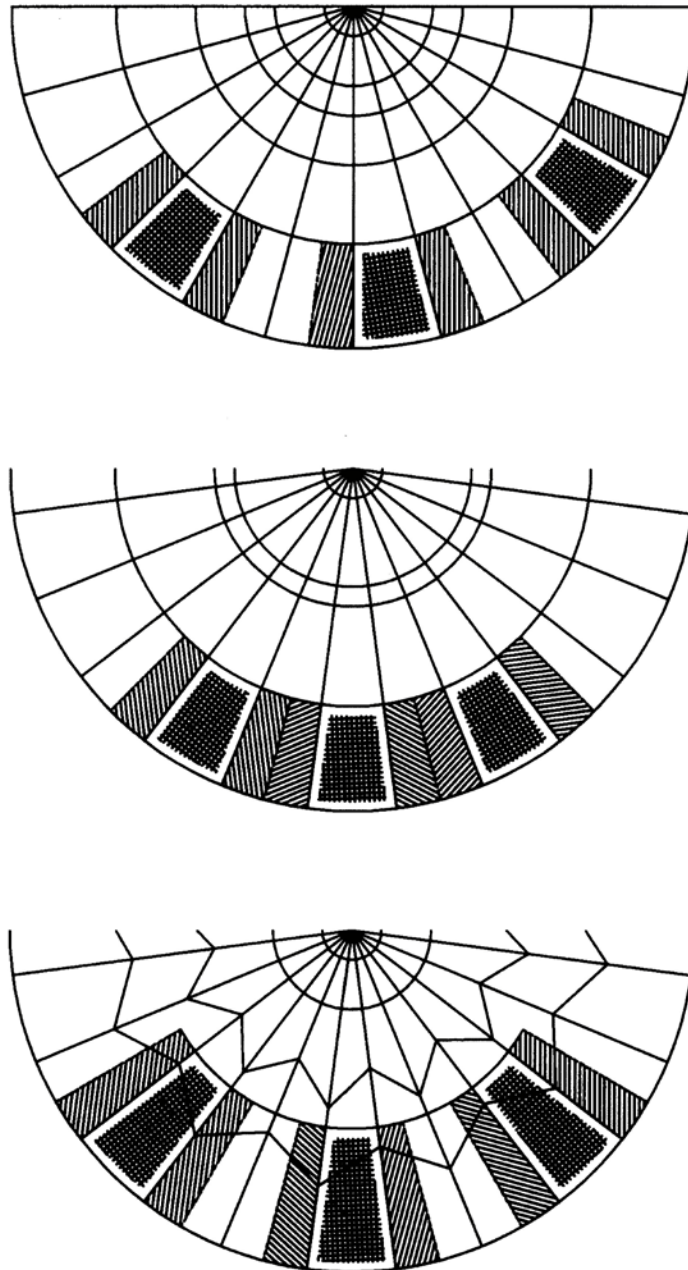


Fabric clamp (rubber padded/square jaw)

FIGURE 1

NOTE: Use only approved fabric clamps. Improvised or homemade clamps may increase the chances of damaging the area to be tested.

Below are diagrams of typical tri-vent modifications.



NOTE: Diagonally shaded areas show examples of fabric that comes in contact with mesh or may contact mesh.

FIGURE 2

<p>___ LB/KG PULL TEST: DATE: RIGGER'S NAME AND CERTIFICATE NUMBER</p>
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NOTE: This method uses either the corners of the box (above) or the dots (below) as guides for the fabric clamps.

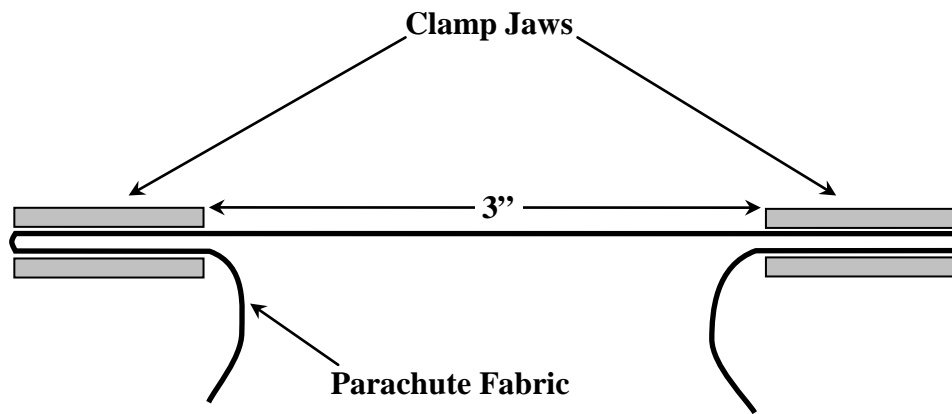
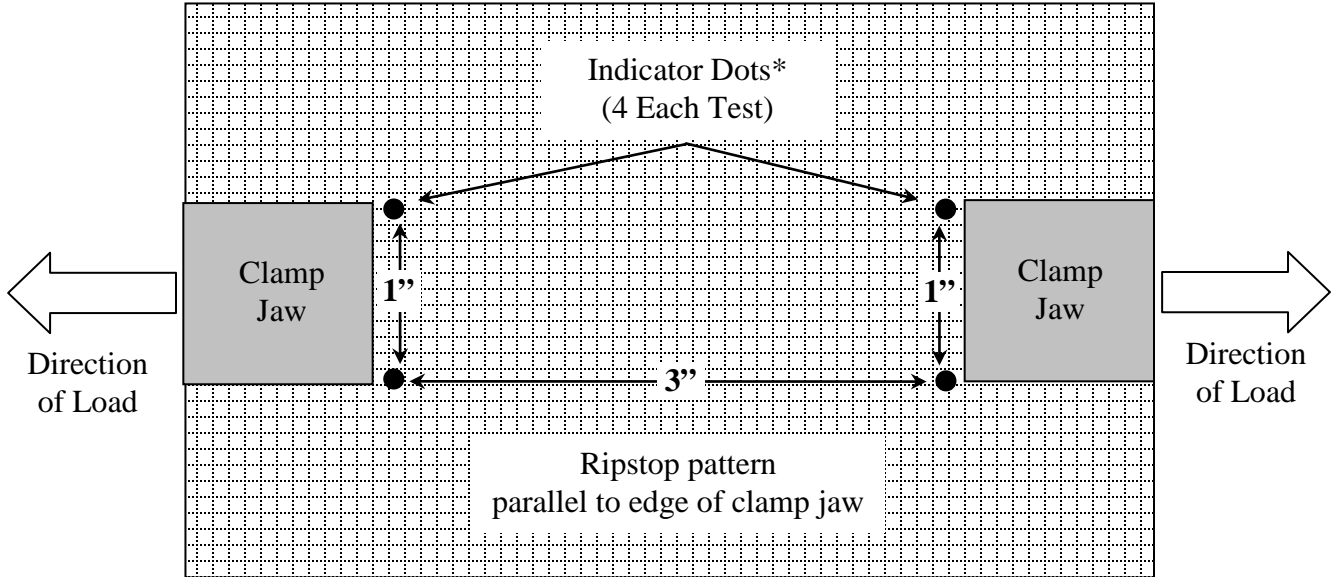
●	___ LB/KG PULL TEST:	●
	DATE:	
	RIGGER'S NAME AND CERTIFICATE NUMBER	
●		●



Examples of canopy markings

FIGURE 3

NOTE: Use only a rubber stamp and approved ink or a black Sharpie™ pen to mark the areas to be tested. Do not use a ballpoint pen, pencils or similar items to mark the test area. This could result in damaging the fabric being tested.



How to attach clamps

FIGURE 4

40 LB PULL TEST: PASSED
DATE: 14 JUN 2009
MASTER RIGGER: JOE RIGGER 1234567

Example of completed test

FIGURE 5