CLIMBING SUTRA TESTING FOR

PERFORMER FLYING HARNESSES 4-12-2022

TWO POINT HARNESSES

Includes Bungee Harness, Flying Floss Harness, Spectra Floss Harness, Single Point Swivel Harness, Bungee Wall Walker Harness, and Ultra Swivel Harness.

An adjunct to ANSI E1.43-2016 Entertainment Technology- Performer Flying Systems

FORWARD

These safety requirements and test methods have been prepared by Trade Holdings Inc. DBA Climbing Sutra, a manufacturer of performer flying harnesses for over 25 years.

In addition to the requirements specified in **ANSI E1.43-2016 Entertainment Technology-Performer Flying Systems,** these are the testing procedures that Climbing Sutra uses for certification of Climbing Sutra **Two Point** Performer Flying Harnesses. We hope it is a helpful resource to others for the evaluation of **Two Point** Performer Flying Harnesses. Please note, Fall Safety harnesses and Mountaineering harnesses are not designed for performer flying and lie outside the scope of these requirements. Performer Flying Harnesses are built for use in performer flying systems and shall not be used for fall safety. For the ANSI standard governing performer flying systems see **ANSI E1.43-2016 Entertainment Technology- Performer Flying Systems.**

1 SCOPE

This standard specifies safety requirements and tensile test methods for Climbing Sutra **Two Point** performer flying harnesses. Other types of Climbing Sutra performer flying harnesses include Stunt Vests, Corsets, Flying Shorts, Full Body Strap Harnesses, Positioning Belts, Twisting

Rings, Shoulder Harnesses, Ankle Harnesses, and Climbing Style Harnesses and Martial Arts Hong Kong Harnesses. The test methods for these types of Climbing Sutra performer flying harnesses are addressed in separate standards.

2 PRINCIPLE

A **Two Point** performer flying harness is placed on a rigid test dummy and subjected to the specified loads applied in sequence.

During the test the specified load bearing points must support the working load of 405 lbs. and meet the minimum breaking strength of 6,070 lbs. (27 kN) as specified.

3 TERMS AND DEFINITIONS

3.1 PERFORMER FLYING SYSTEM:

A system of components specifically designed to suspend an aerial performer or transport a performer through the air. The performer flying system includes the attachment to the facility/structural support down to and including the harness which attaches to the performer.

3.2 PERFORMER FLYING HARNESS:

A component that is worn by the performer to support their weight or secure the performer to a prop or performer flying system.

3.3 PICK:

Load bearing attachment point on a harness for supporting the performers weight. A soft pick is a pick made of webbing and stitching only. Picks may also consist of metal “O” or “D” Rings or other manufacturer hardware integrated into the harness.

3.4 BUCKLE:

A load bearing connector that is an integral part of the harness used to connect and adjust two pieces of webbing.

3.5 **TWO POINT HARNESS**:

A Two Point Performer Flying Harness is here defined as a harness incorporating both waist and leg straps and having a total of two attachment points (PICKS) with the points located at or above each hip. A Two Point Harness is designed for the performer to be supported by BOTH picks at the same time. A Two Point Harness is a webbing harness with a strap or straps that pass around the waist and straps that pass around each individual leg. Two Point Harnesses may have soft picks (webbing only), steel “O” or “D” ring hardware, or quick releases integrated at the attachment points.

3.6 PHOTO TWO POINT HARNESS

3.7 COMBINATION HARNESSES

When a harness design incorporates features of two or more styles of harness then it shall be tested for those features separately using a separate sample for each certification test. An example would be the Climbing Sutra Bungee Wall Walker Harness which can be used as a **climbing style harness** or as a **two point harness** and must therefore be tested to BOTH standards.

3.8 WORKING LOAD LIMIT (WLL)

The Working Load Limit is defined as the maximum allowable working load a performers body shall place on the harness pick during normal performance. For a standard Climbing Sutra Two Point Harness the Working Load Limit is 405 lbs.

3.9 MINIMUM BREAKING STRENGTH (MBS)

Minimum Breaking Strength aka Minimum Breaking Load is 6,070 lbs. (27 kN). MBS is the minimum force required to completely break a Two Point Harness as defined by test procedures in this standard.

4 APPARATUS

The apparatus shall consist of the following:

4.1 **Tensile Testing Machine** constructed so that a rigid test dummy may be suspended and pull testing be performed without interference. The tensile test equipment shall pull at a uniform rate of not greater than 60 inches (1524 mm) per minute and not less than 30 inches (762 mm) per minute.

4.2 **Load Cell** with current calibration and recording equipment capable of registering momentary peak loads up to 10,000 lbs. (45 kN) within an accuracy of +/-3% of the specified load. The recording data channel shall have a minimum sampling rate of 1,000 samples per second.

4.3 **Rigid Test Dummy** shall be sized for adults and meet the specifications described in one of the following safety standards: ANSI/ASSE Z359, or CSA Z259, or NFPA1983, or EN12277.

4.4 **Shackle** used to attach to the harness soft picks shall be polished (smooth finish) stainless or titanium alloy “bow” style shackle with a cross section (diameter) of 9-13mm. The bow ends

of the shackles shall connect to the harness soft picks. Two Point Harnesses with “O” rings or hip Swivel picks should use the manufacturer specified connection hardware.

5 TEST SPECIMENS

Test harnesses shall be new and in unused condition, selected randomly from a given model of harness. Harness model shall be retested after any design or materials change. Manufacture date, serial number, model name, and a picture of the harness shall be included with the final test report. Harness shall be properly sized and fitted to the test torso as per the manufacturer’s fitting instructions. In this standard it is accepted that stitching and/or webbing may tear while testing for the Minimum Breaking Strengths (MBS), but NOT for the Working Load Limit (405 lbs.)

6 CONDITIONING

Test sample shall be dry and conditioned in an atmosphere of 15 to 38 degrees Celsius for a minimum of 24 hours. Then sample shall be tested within 15 minutes.

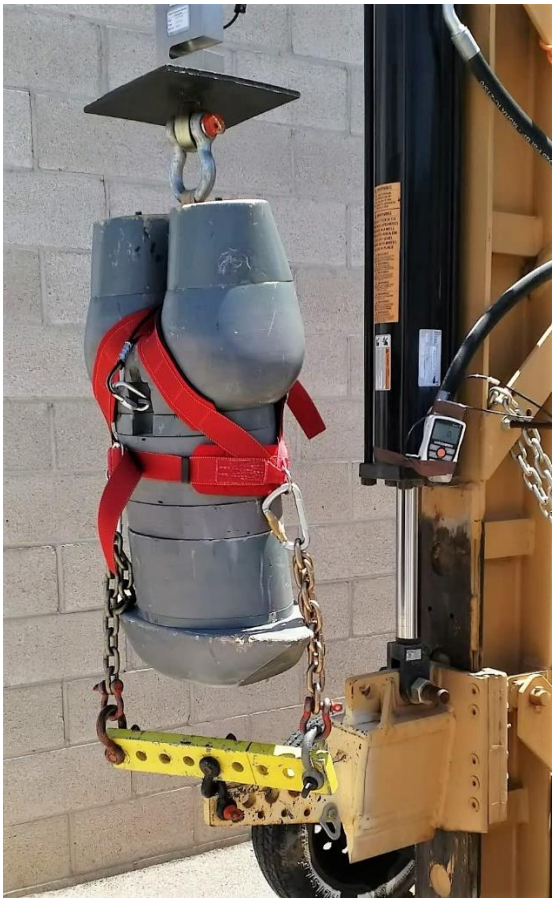
7 PROCEDURE

7.1 The Two Point Harness shall be placed on a standardized rigid test dummy.

7.2 All harness buckles shall be tightened as per the manufacturer’s instructions. Leg straps should be evenly tensioned. There should be space to insert a finger under each tensioned strap.

7.3 The rigid test dummy shall be suspended from the test apparatus by the buttocks ring with the dummy inverted. The two pick points of the harness shall share the load **evenly** by means of two equal length suspension lines (sling, cable, or chain) attached to the arms of a spreader bar which is pulled downward away from the dummy (pull is “up” relative to the

dummy). Suspension lines from the spreader bar shall be separated so the angle of pull from each hip pick shall be tipped away from the test torso by a minimum of 5 degrees off vertical and a maximum of 10 degrees off vertical per side. If the suspension lines interfere with the shoulders of the test dummy then one suspension line shall be positioned in front of one shoulder and the other line positioned in back of the opposite shoulder of the test dummy.



7.4 The shackles or manufacturer specified hardware shall be attached from the suspension lines to the two specified hip picks. The test connection equipment (shackles, slings, carabiners, cable, chain, etc.) shall load directly on the two points of the harness so as NOT to bind or cause additional leverage on the picks.

7.5 Working Load Limit (WLL) test. Force shall be applied over a period of 10 to 60 seconds until 405 +80/-0 lbs. (1.8 kN) is reached. The force of 405 +80/-0 lbs. shall be maintained for a period of 2 minutes, +15/-0 seconds, then immediately released. Inspect for any tearing of stitching or webbing. Any tearing of stitching or webbing fails the WLL test.

7.6 Minimum Breaking Strength (MBS) test. Using the same picks and rigging as in 7.5, the force shall be increased over a period of 10 to 30 seconds until the Minimum Breaking Strength of 6,070 lbs. (27 kN) is reached, then the force shall be immediately released. Tearing of stitching and webbing is acceptable in the MBS test providing the Minimum Breaking Strength of 6,070 lbs. (27kN) is reached or exceeded.

FAILURE OF ANY INDIVIDUAL TEST EQUALS FAILURE OF THE ENTIRE TEST.

End of tensile testing.

8 TEST REPORT / CERTIFICATE OF CONFORMANCE

8.1 Testing shall be performed, and a test report created by a company that is NOT the manufacturer or distributor; or a competing manufacturer or distributor of the harness being tested.

8.2 Test report shall include the testing company name with logo, address, website, contact information, contact person(s), and the supervisor of the test.

8.3 Test report shall include the manufacturer of the sample harness, the model number, serial number, manufacture date, and photograph of each sample tested.

8.4 Result of the test shall include a list of the peak load captured for **each** test. Any single peak load that does not meet or exceed the required WLL or MBS for that pick equals failure of

the **entire** harness. Result shall be shown as PASS or FAIL at conclusion of report along with the date of the test and name of supervisor.

End of Climbing Sutra test for Two Point Performer Flying Harnesses.