
Butler Parachute Systems, Inc.

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General Canopy Folding and Packing Instructions for H-X Series Personnel Parachute Canopies Utilizing A Freebag Deployment System

**Manufactured by
Butler Parachute Systems, Inc.**

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This manual is contains the information to pack BPS HX Series canopys into the BPS Freebag Deployment system and is divided into three parts. Part one contains information concerning the HX series canopy and general information for the parachute rigger. Part two contains specific instructions for preparing the canopy for placement into the freebag. Part three contains specific instructions for placing the canopy into the freebag and stowing the suspension lines.

This set of instructions is for the the normal flaking, folding and line stowage of Butler canopies equipped with a BPS freebag deployment bag. The H-X Series Canopies utilize the BAT Sombrero Slider™ (patent pending) which is a major advancement in parachute technology. Most of what you will see is routine. However, we do utilize a slightly different method to flake and fold the skirt. We also require that a break tie be used to form a loop to keep the pilot chute bridle centered on the vent lines. Furthermore, we use an “incremental tear-strip bridle” which must be properly assembled and packed. None of our parachute canopies have been tested without these features and we feel that they each add a small increment of reliability to our parachutes (and to any other round parachute for that matter).

All H-X Series personnel parachute canopies manufactured by Butler Parachute Systems, Inc. have been approved under TSO C23d with limitations appropriate to the particular canopy size. All canopies manufactured by Butler Parachute Systems, Inc. will have a warning stamped on the data panel similar to the one shown here. This data must be shown on the packing data card and on the outside of the pack for items approved under TSOC23d in any category.

OPERATING LIMITATIONS FOR BPS CANOPIES

Basis for Limitation ->		(US/FAA) *	(US/FAA) *	(BPS) **	(BPS) **	(BPS) **	(BPS) **	(DOD) ***	(BPS) **
BPS Canopy Model	Authorized Under FAA TSO C23 Revision	Maximum Permitted Gross Weight @ 150 KEAS	Maximum Permitted Gross Weight @ 170 KEAS	Maximum Recommended Gross Weight @ 150 KEAS	Maximum Recommended Gross Weight @ 165 KEAS	Maximum Recommended Gross Weight @ 170 KEAS	Maximum Recommended Gross Weight @ 190 KEAS	Maximum Recommended Gross Weight @ 225 KEAS	Maximum Demonstrated Structural Overload
350 LoPo	C23d	220 lb.	n/r	175 lb.	175 lb.	n/r	n/r	n/a	264 lb. @ 180 KI AS
450 LoPo	C23d	285 lb.	n/r	235 lb.	235 lb.	n/r	n/r	n/a	345 lb. @ 180 KI AS
550 LoPo	C23d	350 lb.	n/r	300 lb.	300 lb.	n/r	n/r	n/a	420 lb. @ 180 KI AS
XTC-500	C23c, Cat.B	254 lb.	n/r	254 lb.	n/r	n/r	n/r	n/a	300 lb. @ 175 KI AS
HX-300	C23d	250 lb.	250 lb.	175 lb.	175 lb.	n/r	n/r	n/a	300 lb. @ 180 KI AS
HX-400	C23d	340 lb.	340 lb.	235 lb.	235 lb.	235 lb.	235 lb.	n/a	400 lb. @ 205 KI AS
HX-500	C23d	440 lb.	416 lb.	310 lb.	310 lb.	310 lb.	310 lb.	n/a	500 lb. @ 205 KI AS
HX-500/24	C23d	440 lb.	416 lb.	310 lb.	310 lb.	310 lb.	310 lb.	n/a	500 lb. @ 205 KI AS
HX-600	C23d	550 lb.	500 lb.	382 lb.	382 lb.	382 lb.	382 lb.	n/a	600 lb. @ 205 KI AS
USAF 28'	C23b ***	275 lb.	275 lb.	275 lb.	275 lb.	275 lb.	275 lb.	275 lb.	unknown

NOTES:

- * US FAA regulations under TSO C23d allow the parachute to be certificated for any weight up to that which results in a rate-of-descent of 24 ft/sec at sea level. BPS uses this weight to set our requirements for structural overload testing (+20% speed & +20% weight). However, we recommend a lighter maximum gross weight (resulting in 20 ft/sec) in order to reduce the potential for landing injuries.
- ** BPS recommended weight limits for all canopies (except 28' military) are based on 20 ft/sec. at sea level to reduce the potential for landing injuries. Outside of the US, the manufacturers recommendations become the governing factor. Based on the consistency of our testing results, we feel very comfortable with a demonstrated structural overload test speed at approximately 8% to 10% beyond the recommended maximum deployment speed.
- *** The recommendation for 28' military canopy is based on structural limitations and 24 ft/sec. at sea level (with 4-line release device activated!). US Military parachutes are considered by the FAA to be equivalent to C23b, Standard Category.

General Information for the Parachute Rigger

Butler Parachute Systems, Inc. spares no effort in making this the finest emergency parachute available; however, parachute riggers in the field must also do their part to educate the users so that they may benefit fully from the advantages that this system offers. In addition, the parachute rigger has a moral responsibility to the user of a parachute to aid that person in understanding his parachute and its use. It is suggested that you review the basic procedures contained in the owner's manual with the customer and answer any questions he may have concerning the use, care and maintenance of this assembly. It is also suggested that you require the customer to actually pull the ripcord himself before each repack.

Maintenance and Repairs

All routine maintenance and minor repairs that do not affect airworthiness may be performed by any FAA Licensed Senior Parachute Rigger (or foreign equivalent) with the proper facilities and equipment.

CAUTION

Any components requiring major repairs or alterations that may affect airworthiness must be returned to the manufacturer or a designated representative

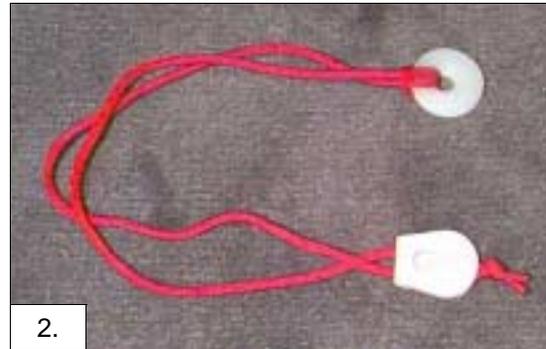
Tools Required for General Inspection & Packing

- 2 or 3 ea. pull-up cords 36" long; made from MIL-C-5040, Type 3, sheathing only
- 2 or 3 ea. temporary pins with safety flag
- 4 to 6 packing weights; minimum weight 1 lb.
- 1 ea. packing paddle
- 1 ea. tacking needle with waxed 6-cord or equivalent
- 2 ea. fabric clamps per Parachute Industry Association Technical Standard 108 (PIA TS 108)
- 1 ea. spring scale per PIA TS 108
- 80# Break Tape per MIL-T-5661, Type 1, 1/4"

Recommended Special Tools

In addition to the tools listed above, BPS recommends the following special tools for packing the canopy into the BPS Freebag:

1. An 18" bodkin with 36 inches of gutted 550 cord attached to one end (Figure 1). Used to stow suspension lines in freebag flutes.



General Inspection and Packing Procedures for Butler Parachute Systems H-X Series Parachute Canopies

These instructions assume that the parachute has already been inspected and assembled in accordance with the appropriate instructions which are issued for each type. Throughout these packing instructions the pack tray and the harness are oriented with the wearer face down, head toward the apex of the canopy. Inspect the following items prior to packing:

- Record serial number, date of manufacture and manufacturer of all components.
- Check layout and line rotation. Line #1 and its next adjacent line going counter-clockwise (#1 & 24 for example) are on top with the center mesh vent on top when laid out correctly. Perform a standard "4-line check" as a minimum.
- Pilot Chute - snags, spring, solid ferrules, cloth and mesh in good condition.
- Incremental Bridle – inspect as noted in Figure 1.
- Apex - lateral band, straighten vent hem.
- Canopy - radial seams and cross seams, general condition.
- Perform a 40# strength test on MIL-C-44378, Type 1 Cloth using the methods of PIA TS 108 in randomly selected location. Mark test location with date and rigger symbol or loft ID.
- Lower lateral band - skirt hem, line attachments.
- Suspension lines - snags, kinks, stitching.
- Connector links - general condition, threads not exposed, barrel nut tight.
- Risers - general condition.
- Cross connectors - if required, present and good condition, proper orientation.

NOTE: When inspecting the connector links, ensure that all **Rapide Brand Links** actually have the name Rapide stamped on them and that they are the type with the smooth rounded ends on the

Introduction

Lay the parachute assembly on the packing table as though the wearer were fastened in the harness, face down, with their head towards the canopy. Release all fasteners, snaps, hardware, Velcro, and tackings on the container so that the assembly lays flat on the table. Stretch out the canopy and ensure that the back center gore (with mesh) is on top. See the table below for the proper gore. Once you are certain of proper orientation, apply adequate tension between the apex and connector links to hold the canopy and suspension lines taut for packing. Having done so, grab the skirt of the slider and pull it 3 to 4 feet towards the connector links.

CANOPY	BACK CENTER GORE
H-X 300	16
H-X400	18
H-X 500	20
H-X 600	22
H-X 500/24	24

CANOPY FOLDING AND FREEBAG INSTRUCTIONS

All BPS canopies that utilize a freebag deployment system also utilize an incremental bridle. This bridle is designed to allow the pilot chute and freebag to separate from the canopy after deployment. One end of the incremental bridle is split into two ends, with one end looped around the canopy vent lines, and the other end looped through the Type 4 loop located on the inside top of the freebag. For the system to work properly, it is imperative that the bridle be installed as shown below.

Figure 1. Prior to flaking and folding the canopy, ensure that the incremental bridle is attached as shown. One side of the split end is routed through the vents lines and double bartacked to itself forming a loop. The other side is passed through the loop in the inside of the freebag and double bartacked to itself to form a loop.



Before placing the canopy into the freebag, there are a few things to keep in mind: the shape of the container, where the pilot chute is going to be placed (upper or lower portion of container), and if the container is Cypres equipped.

As you place the canopy into the freebag, spread the canopy out where the pilot chute is going to be. This will form a soft pocket and keep the pilot chute from forming a bulge in the closed container. This also applies if there is a Cypres unit located in the pack tray. By forming a soft pocket, you will prevent the Cypres from pressing into the wearers back.

Also keep in mind that the stowed suspension lines will add thickness to the packed freebag. To prevent the suspension lines from making the freebag too thick for the container, place less canopy under the suspension line flutes.

The freebag used in the following illustrations is for a BPS two-pin container. The same procedures apply for a three-pin system.

Figure 2. After laying the canopy out on the packing table and applying tension, perform a continuity check to ensure proper routing of the suspension lines through the slider and rotation on the connector links.



Figure 3. With the slider positioned approximately half way down the suspension lines, flake the canopy in the usual manner.



Figure 4. Lay the canopy out with an equal number of gores on each side. This will leave the back center gore (with mesh) on top.

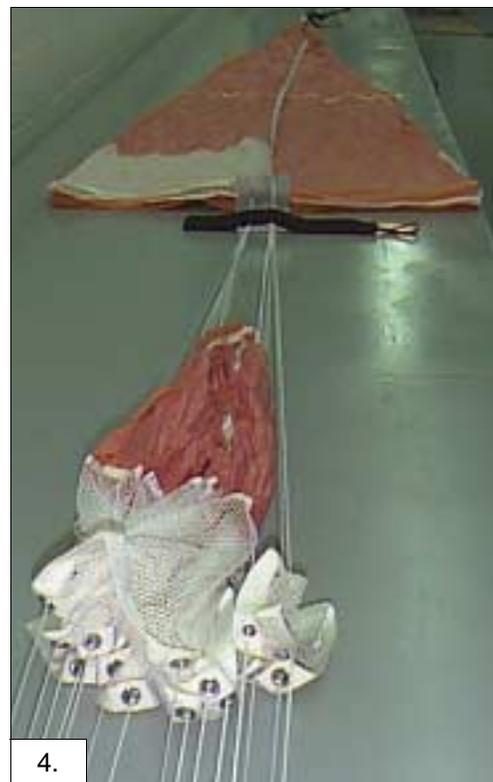


Figure 5. Holding the apex of the slider in one hand and the suspension line of the top center gore in the other, pull the slider up the suspension lines...



Figure 6. ...and place it into the wind channel of the canopy. Pull the slider apex up as far as it will go, ensuring the slider grommets are against the slider stops on the suspension lines.



Figure 7. After inserting the slider into the canopy, flake each gore of the slider into the corresponding gore of the canopy.



Figure 8. Slider flaked into corresponding canopy gores.

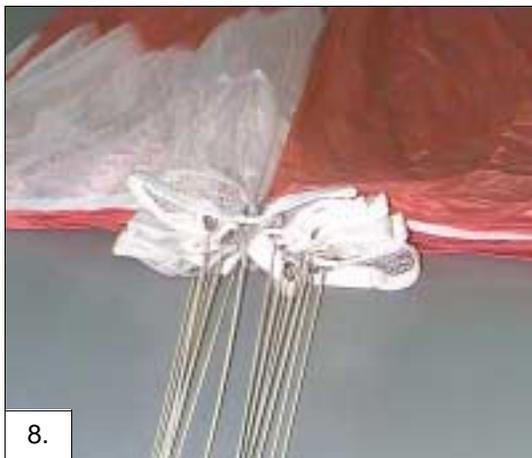


Figure 9. Starting on one side, fold each individual gore of the canopy 90 degrees, placing the skirt of each gore parallel to the radial seam.

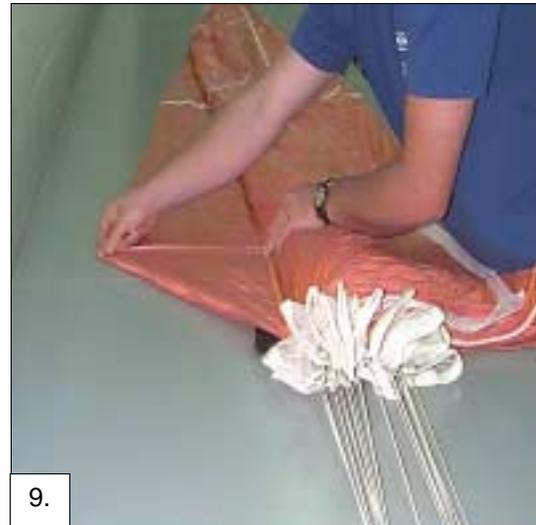


Figure 10. After 90 degree folding one side of the canopy, repeat on the opposite side.

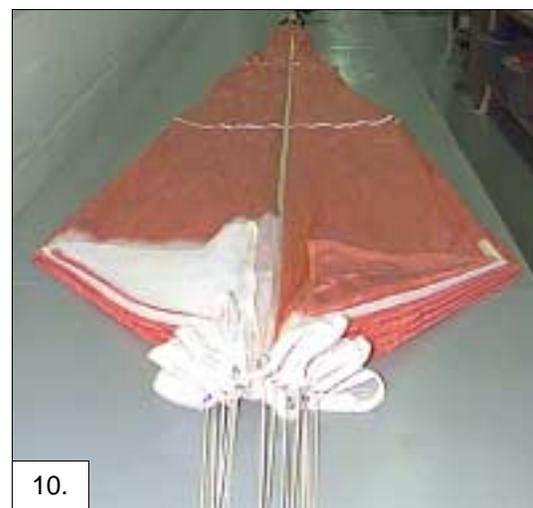


Figure 11. Begin long folding the canopy into fifths.



Figure 12. The first folds should generally be to the center without overlap.



Figure 13. The second folds should overlap the center.

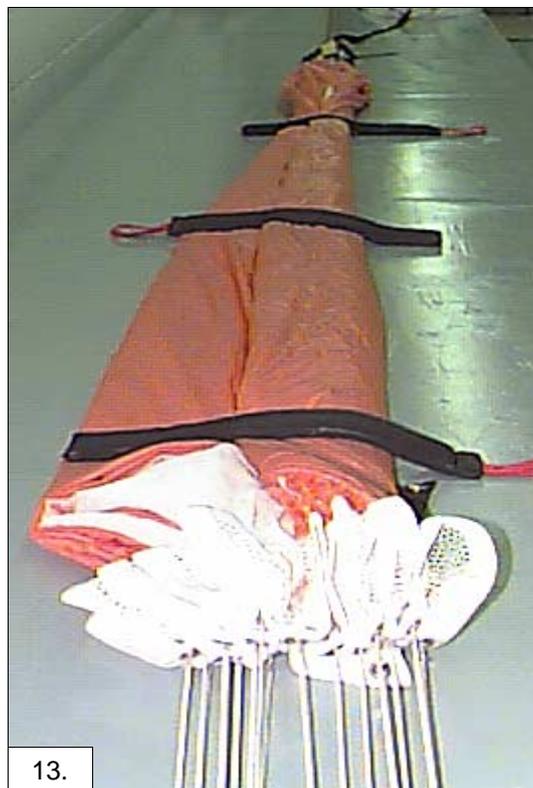


Figure 14. Canopy long folded; ready to stow in freebag.

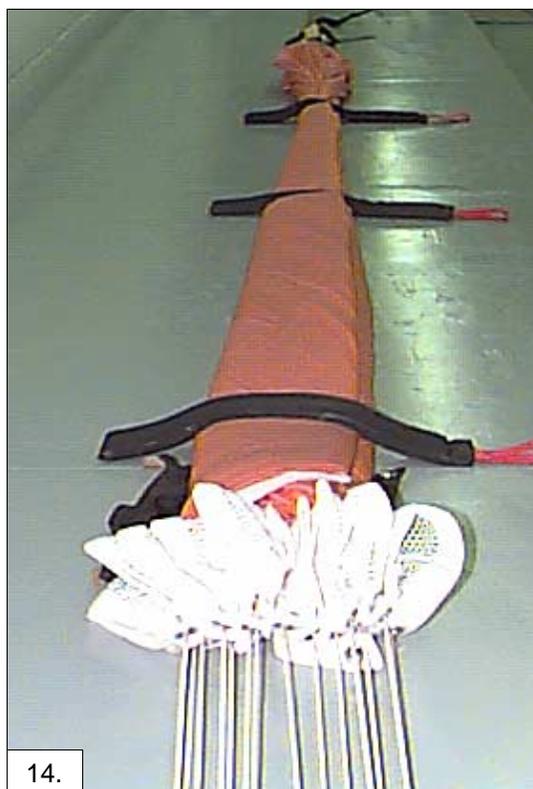


Figure 15. Prior to placing the canopy into the freebag, figure eight the incremental bridle and secure with a rubber band. Stowed in this manner, the bridle will still function normally, but will be prevented from knotting around the canopy during deployment.

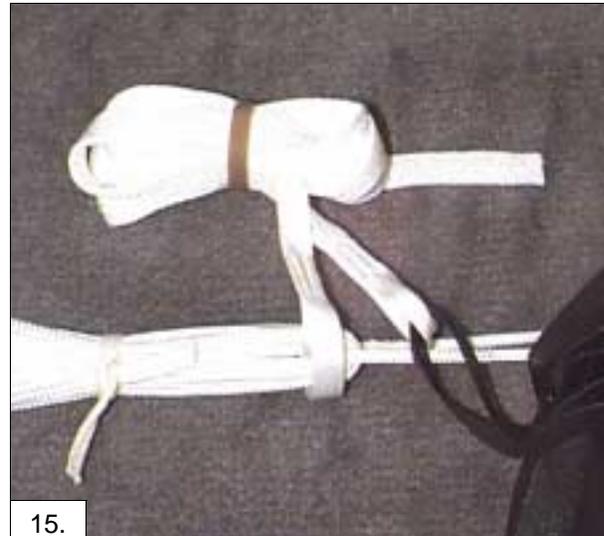


Figure 16. Prepare the freebag by zipping the zippers closed until they are even with the first freebag grommets and ensure the line stow flutes are facing up.



Figure 17. Holding the freebag open with one hand, place the canopy apex up into one corner.



Figure 18. With the apex placed into the top corner of the freebag, begin "S" folding the remainder of the canopy into the bag. Be sure to "stuff" the canopy into the corners to keep them full.



Figure 19. Continue "S" folding the canopy into the freebag.



Figure 20. When enough canopy has been S-folded into the freebag to reach the first grommet, insert a locking pull-up cord into the grommet from the underside of the freebag...



Figure 21. ...route the locking pull-up cord through the top grommet...



Figure 22. ...and secure the end to prevent the cord from pulling back through with either a knot or washer.



Figure 23. Pull the locking pull-up cord tight and lock in place with the cord-lock.



Figure 24. Top of canopy S-folded into the free bag with the first locking pull-up cord in place.



Figure 25. Zip the freebag zippers closed to the next grommet. "S" fold the canopy and lock in place in the same manner as you did before.



Figure 26. After "S" folding the canopy into the freebag, gather all of the suspension lines in one hand and place the canopy skirt into the mouth of the freebag.



27. Carefully holding the suspension lines at the mouth of the freebag...



28. ...rotate the bag AWAY from you so that the suspension line flutes are on bottom.

NOTE: As you rotate the freebag, you will be placing a one-half twist in the suspension lines. Later, as you prepare to stow the suspension lines, you will again rotate the bag. The rotation will be TOWARD from you, thus removing the twist.



29. Form a bight in the suspension lines, route the elastic closing loop through the grommet on the closing flap, and form the first locking stow.



30. Form another bight in the suspension lines, route the elastic closing loop through the other grommet, and form the second locking stow



31. After forming both locking stows, reach into the corners of the freebag and fluff up the canopy in order to fill the corners.



32. Prepare to stow the suspension lines by rotating the freebag TOWARD you. To reduce the freebag thickness that will result from stowing the suspension lines, press down on the suspension lines flutes to compress the canopy in the freebag.



Figure 33. Begin stowing the suspension lines by placing the lines on top of the first stowage flute to measure the correct amount to be stowed. Allow enough for the bight to extend from the top of the flute 1/2" to 3/4".

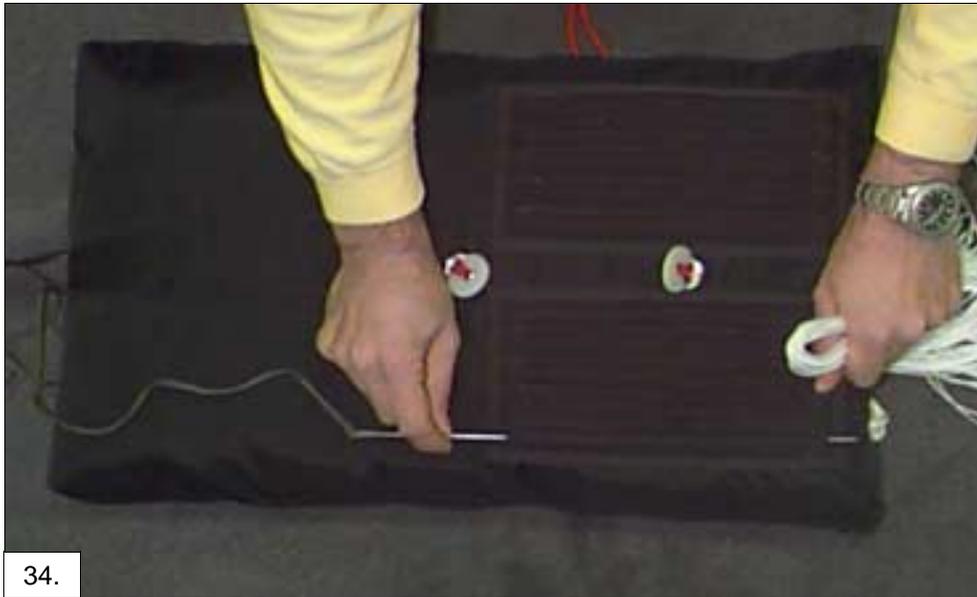


Figure 34. Holding the suspension line bight in one hand, pass the long fid through the first flute, through the suspension line bight, and back through the flute.



Figure 35. Taking care not to twist the lines, pull the first suspension line bight into the flute.



Figure 36. Measure the second bight the same way you did the first.

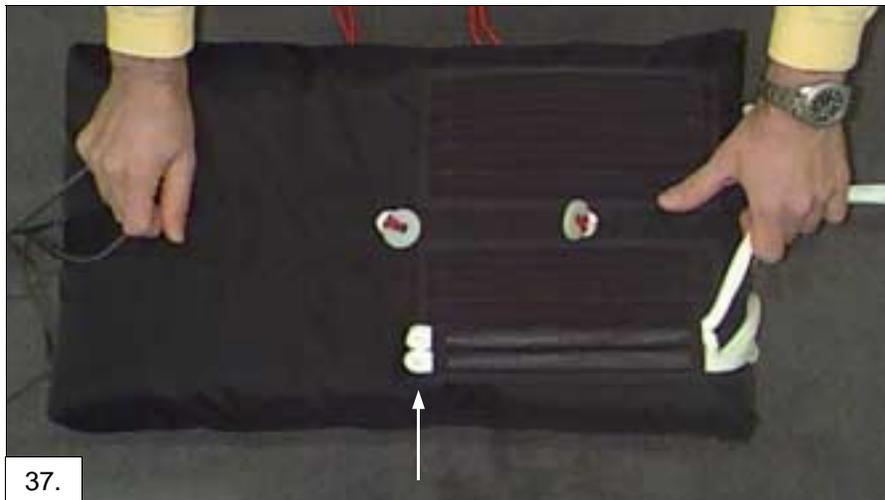


Figure 37. Continue stowing the suspension lines, leaving 1/2" to 3/4" exposed at the top of the flutes.



Figure 38. After filling all the flutes on one side, continue stowing the lines in the next set of flutes. Note: As you measure and form the next bight, allow enough line to reach from the last flute you stowed to the first flute of the next set.



Figure 39. Stow the remainder of the suspension lines in the second set of flutes until you have approximately 12 inches of line remaining between the freebag and the connector links.



40.

Figure 40. Suspension lines stowed; freebag ready to place in packtray.