

Standard

Aerodynamic Decelerator and Parachute Drawings

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American National Standard

Aerodynamic Decelerator and Parachute Drawings

Sponsor

American Institute of Aeronautics and Astronautics

Approved 16 May 2001

American National Standards Institute

Adopted 23 April 2001

Department of Defense

Abstract

This AIAA Standard establishes terminology for 260 terms critical to communication about the design and function of parachutes. It further sets requirements for the graphic description of materials, stitching, seams, view, and projections, with related dimensions and tolerances, all of which are consistent with current procurement practice. Many figures are included to illustrate the requirements. Additional illustrations of several types of parachutes are provided in an appendix. This drawing standard refers to federal and military specifications which, as of the time of this revision, are either equivalent to existing commercial specifications or are in the process of being converted to commercial specifications. The federal or military specification should be considered a reference only.

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Standard for aerodynamic decelerator and parachute drawings / sponsor,
American Institute of Aeronautics and Astronautics ; approved 16 May 2001 [by]
American National Standards Institute.

p. cm.

"ANS / AIAA S-017A-2000"

Includes bibliographical references.

ISBN 1-56347-466-2 (softcover) ISBN 1-56347-467-0 (electronic)

1. Parachutes--Drawings--Standards--United States. I. American
Institute of Aeronautics and Astronautics.

TL753.S73 2000
629.134'386—dc21

99-089291

Published by

American Institute of Aeronautics and Astronautics
1801 Alexander Graham Bell Drive, Reston, VA 20191

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Printed in the United States of America

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Foreword

The purpose of this standard is to help government and private organizations prepare parachute drawing details in a reasonably uniform format. For parachute drawings, it offers guidelines on exceptions to basic drawing standards; general notes; views and projections, seams and stitching, identification markings; and finished and pattern dimensions. Every attempt has been made to base this standard on widely-accepted usage by government and industry. By following the requirements and recommendations of this standard, developing groups will help create consistent parachute drawings which will enhance their usefulness in design and manufacturing applications.

This AIAA Standard was prepared by the AIAA Aerodynamic Decelerator Systems Committee on Standards, functioning as a subcommittee of the Technical Committee of the same name. A standard used by Sandia Laboratories was proposed as a starting point. The official DoD adoption notice is reprinted on page vi.

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A revision of this Standard was made in 1999 by the members of the Specifications and Standards Team, comprised of:

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The Standards Executive Council accepted the document for publication in January 2001.

NOTICE OF
ADOPTION

ADOPTION NOTICE 1
3 January 1992 for
ANSI/AIAA S-017-1991
20 December 1991

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Title of Document: Standard for Aerodynamic Decelerator and Parachute Drawings

Date of Specific Issue Adopted: 20 December 1991

Releasing Non-Government Standards Body: American Institute of Aeronautics and Astronautics (AIAA)

Custodians:

Army – GL
Navy – OS
Air Force – 16

Military Coordinating Activity:

Army – GL
Project (DRPR – 0321)

Review Activities:

Army – AR, GL, TR
Navy – AS
Air Force – 11, 82
DLA – GS

AMSC N/A

FSC DRPR

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1 Introduction

This drawing standard refers to federal and military specifications which, as of the time of this revision, are either equivalent to existing commercial specifications or are in the process of being converted to commercial specifications. The federal or military specification should be considered a reference only.

This Standard supplements the requirements of Mil-T-31000, "Product Drawings and Associated Lists," for drawings with conventions for textile drawings used for parachutes and components. Uniform practices for stating and interpreting these conventions are established herein.

Where drawings are based on this Standard, this fact shall be noted on the drawings or in a document referenced on the drawings. References to this Standard shall state "ANSI/AIAA-S-017A-2000

This Standard is intended to supplement rather than replace Mil-Std-100 and the following American National Standards:

American National Standard Y14.2M *Line Conventions and Lettering*, New York, 1979

American National Standard Y14.3 *Multi and Sectional View Drawings*, New York, 1975

American National Standard Y14.5M *Dimensioning and Tolerancing*, New York, 1982

American National Standard Y14.26.3 *Computer-aided Preparation of Product Definition Data (including Engineering Drawings), Terms and Definitions*, New York, 1975

The following standards and specifications are also referenced in this Standard: Fed-Std 751, Mil-I-6903, and Mil-F-21840. In the event of a conflict between the text of this Standard and the references cited, the text of this Standard shall take precedence.

The figures in this Standard are intended only as illustrations to aid the user in understanding the principles and methods of representing textile drawings given in the text. The absence of a figure illustrating the desired application is neither reason to assume inapplicability nor basis for rejection of the drawing. In some instances figures show added detail for emphasis, in other instances figures are incomplete by intent.

Notes herein in capital letters are intended to appear on finished drawings. Notes in lower case are explanatory only and are not intended to appear on drawings. Notes as given are generic in nature and should be adapted to the specific end-item requirements.

2 Definitions

The following is a glossary of parachute drafting terms:

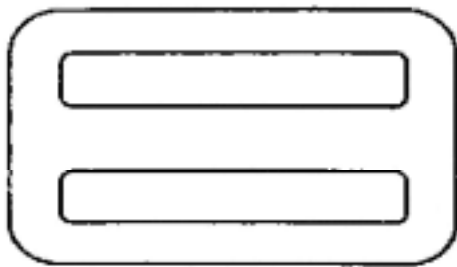
Accordion folding see Folding, accordion

Actuator, automatic parachute

A device that automatically withdraws the ripcord from a parachute.

Adapter, harness strap

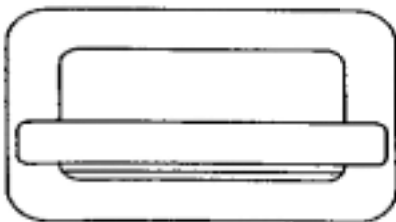
A rectangular metal fitting with a cross bar. It is incorporated in a parachute harness to permit proper adjustment of webbing.



Harness Strap Adapter

Adapter, harness, quick fit

An adapter with the fixed crossbar replaced by a floating friction grip. The adapter is incorporated in a harness web to permit quick adjustment. Also called a friction adapter.



Quick Fit Harness Adapter

Adjuster see Adapter, harness

Air bags

Flexible, gas-filled bags that are inflated during load descent and valved to release their pressure upon ground contact to absorb impact forces.

Airfoil

Two dimensional shape defining the chordwise section of wing.

Apex

The center and topmost point of an inflated parachute canopy.

Backstitch

Used to anchor a row of stitching by sewing back over the end of original stitching a short distance.

Bag, deployment

A fabric container, containing a parachute canopy, often enclosed in a parachute pack. Sometimes, the container or parachute pack also serves as a deployment bag.

Ballute

A balloon-shaped ram air-inflated decelerator, commonly used to stabilize and decelerate bombs.

Band, lateral

A continuous circumferential tape or webbing reinforcement sewn across the radial seams of some canopies to limit the extent of canopy fabric damage due to deployment or inflation stresses.

Band, pack-opening see Elastics, pack-opening

Band, pocket

A tape, webbing, or line attached at the outside of the skirt, across radial seams, in a manner that causes the gores to be pulled outward at inflation, thus improving the opening characteristics of the canopy. Also called a quick-opening band or taschengurt.

Band, reinforcement

Reinforcing tape, webbing, or ribbon, located in varied positions to reinforce weak points of construction in a drag-producing surface.

Band, retainer

A rubber band used to hold folded suspension lines or static lines to the deployment bag.

Band, skirt

A reinforcement tape or webbing usually sewn into the skirt hem.

Band, vent

A reinforcement tape or webbing usually sewn into the vent hem.

Bartack

A concentrated series of zigzag-like stitches used to reinforce points of stress.

Bias cut

A diagonal cut across fabric; that is, at a 45-degree angle from the warp and fill, so that the warp and fill threads will be located at a 45-degree angle to the vertical centerline of the gore.

Bight see Stow.

Binding

A piece of tape or fabric folded over and stitched to a raw edge of the fabric to prevent fraying or raveling.

Bottom, false

A piece of pack fabric stitched to the inside of a pack for the purpose of retaining the pack frame; it also serves as a base for stitching of the suspension line retaining loops.

Brakes, deployment

Used on ram air canopies, deployment brakes are intended to prevent forward canopy surge during opening. Lines attached to the rear portion of the canopy are pulled down and locked until after stable descent has been established.

Breakcord

A thread or tape, tied between parachute components, which is intended to break under desired load during deployment.

Bridle

The arrangement of cords attaching the pilot chute to the apex of one or more parachute canopies, or to the deployment bag or bags containing those canopies.

Buffer

Tape or webbing, usually cotton, between the load-bearing layers of webbing and hardware, used to prevent chafing of the webbing.

Bungee cord

An elastic cord with a braided cover.

Butterfly see V-tab.

Cable, ripcord

A flexible cable joining the locking pins and the ripcord grip.

Canopy

The portion of a parachute consisting of the drag-producing surface (cloth area) and the suspension lines extended to a mutual confluence point.

Canopy release see Release, canopy.

Cascade line

A line on ram air canopies that attaches between the upper portion of a suspension line and the canopy for the purpose of helping to hold the airfoil shape.

Cell

A single, inflatable chamber of a ram air canopy.

Channel, parachute canopy

The space or opening through which the suspension lines are passed. It is formed by the overlapping of the fabric in the main seams, or by the addition of cover tape to the drag-producing surface.

Chord

The distance from the leading edge to the trailing edge of a ram air canopy.

Clevis

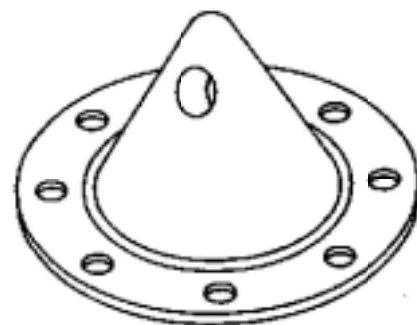
A U-shaped metal fitting with a hole in each end to receive a pin or bolt. It is used on cargo parachutes and heavy drop kits.

Clip, safety

A U-shaped metal fitting used to prevent the accidental opening of the parachute harness release.

Cone, pack (locking cone)

A small, cone-shaped metal post sewn to one of the side flaps of the deployment bag, used in conjunction with ripcord locking pins and grommets.



Locking Cone

Connector strap, cross

Webbing sewn or connected across the riser webbing to prevent opening malfunctions.

Construction, bias

A type of construction for drag-producing surfaces in which the fabric is cut and arranged in the gores so that the yarns and seams make an angle of other than 90 degrees (usually 45 degrees) to the centerlines of the gores.

Construction, block

A type of drag-producing surface construction in which the fabric is cut and arranged in the gores so that the warp yarns and section seams make an angle of 90 degrees to the centerline of the gore and are parallel to the skirt hem.

Container see Bag, deployment.

Control line

A line similar to a suspension line that runs from the load or parachutist to a steerable canopy and is used for canopy direction or glide angle control.

Cords see Line, suspension.

Cord, arming

A cord that pulls the firing wire out of a reefing line cutter or other actuating device, thereby arming the device.

Cord, elastic

Cord made of elastic with a braided cover, used in pack opening elastics and other applications.

Cord, shock

An incorrect term on drawings. See Cord, elastic

Cross connector strap see Connector strap, cross.

Cross seam

The seam that joins panels to form a gore. In bias-constructed parachutes, also called a diagonal seam.

Cutter, reefing line

A device designed to cut through the reefing line of a canopy.

Crown the portion of the main canopy fabric surface near the apex.

Dart a short, tapered seam.

Denier

A unit of measurement of textile fibers, expressed in terms of weight (in grams) per 9,000 meters of the fiber, e.g., if the weight is 55 grams, it is called 55 denier.

Diameter, constructed

A designation of the size of a parachute canopy, based upon design dimensions. This is the distance between points where the maximum constructed width of opposing gores intersects the radial seam.

Diameter, nominal

The computed diameter designation of any design of parachute canopy which equals the diameter of a circle having the same total area as the total cloth area of the drag-producing surface. The total cloth area is based on the surface area and includes all openings in the drag-producing surface, such as slots and vents. Since it refers to all canopies on a common basis (i.e., surface area), this method of diameter designation is preferred for comparison of different designs of parachute canopies.

Diameter, projected

The mean diameter of the inflated canopy, measured in the plane of the maximum cross-section area. On canopies where the fabric curves out between the suspension lines, the projected diameter is the mean diameter of the inner and outer diameters.

Diaper see Skirt Hesitator.

Disconnect, ground

A device that releases the parachute canopy from the suspended load upon ground contact.

D-ring

A metal fitting shaped like a D into which snap connectors are hooked.



D-Ring

Duck

Fabric that is similar to canvas.

Edge distance

The space from the outer row of stitching to the edge or fold of the fabric, tape, webbing or cord.

English fell seam

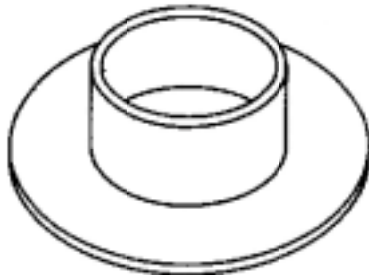
Seam type LSb-2 of Fed-Std-751.

Eye

A small, steel-wire loop attached to the deployment bag, into which is fastened a hook on a pack-opening band.

Eyelet

A small metal reinforcement for a hole in fabrics, similar to a grommet but thinner and smaller and with no washer. The eyelet is used to reinforce lacing holes in small covers.



Eyelet

False bottom see Bottom, false.

Fastener, glove

A small metal fastener consisting of button with socket and stud with eyelet.

Fastener, directional

A snap fastener which can be engaged or released only in one direction. Also called a "lift-the-dot" fastener.

Fastener, non-directional

A snap fastener which can be engaged or released by applying pressure or pull from any angle.

Fastener, parachute pack

A metal fitting attached to a pack flap and designed to fit over a locking cone.

Fastener, slide

A zipper.

Fastener, snap

A small metal fastening device consisting of a button, socket, stud, and eyelet.

Fastener, tape

Woven nylon tape consisting of two mating strips, hook and pile, that form a closure when pressed together; usually Mil-F-21840

Fastener, "Tri-lock"

A button-type fastener that provides for release in only one quadrant. It serves the same purpose as a "Lift-the-Dot" fastener but provides a smoother surface.

Federal stock number (FSN)

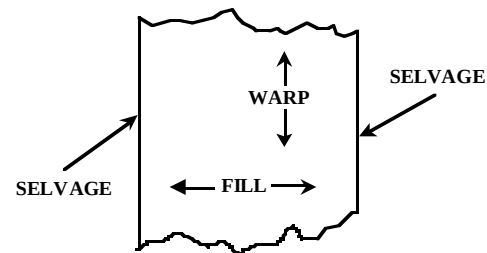
A number that is assigned to each end item in the government supply system.

Felt

A textile material used for padding.

Filling

The threads that run across the width of the cloth as it comes from the loom; also called fill.



Filling

Flap, pack

A fabric extension, on a side or end of the pack, designed to enclose and protect the canopy. Flap nomenclature may be subdivided into corner, end, and side flaps.

Flaring

Method of splitting, taping, and stitching the end of the webbing to widen it and prevent it from slipping through a hardware fitting or adapter.

Folding, accordion

Folding a canopy into folds of uniform length, accordion fashion, before it is placed into the pack.

French fell seam

Seam type LSc-2 of Fed-Std-751.

Friction adapter see Adapter.

Gauge

The space between needles on a multiple-needle sewing machine.

Gore

The portion of the drag-producing surface contained between two adjacent suspension lines or radial seams.

Grip see Handle, ripcord.

Grommet

A metal eyelet and washer, used as a reinforcement around a hole in fabric.

Handle, ripcord

A metal loop designed to provide a grip for pulling locking pins from the locking cones of ripcord-actuated parachutes.

Hardware

All metal fittings used on parachutes, parachute systems, and suspended loads.

Harness

An arrangement of webbing, with metal fittings, designed to conform to the shape of the load in order to secure it properly, and to properly distribute the opening shock and the weight of the load.

Hem

Fabric folded back upon itself and sewn in this position to form the peripheral edge of fabric.

Hesitator loop see Loop, stow.

Hesitator, skirt

A device that restricts the skirt of the drag-producing surface, thus preventing inflation until the completion of the snatch force, at which time the hesitator line breaks and allows inflation of the canopy. Also called a diaper.

Hook, pack-opening elastic

Small, formed, steel-wire devices attached at both ends of pack-opening elastics. These are hooked into the eyes sewn on the pack.

Housing, ripcord

A flexible metal tubing in which the ripcord cable is installed.

Ink, parachute marking

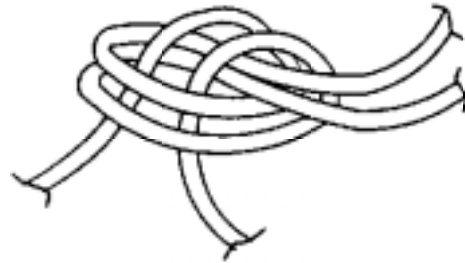
Usually blue ink, Mil-I-6903, for identification marking of parachute textiles.

Keeper (pack, harness, suspension line, etc.)

Small strip of tape, cord, or webbing used to retain an object.

Knot, binder

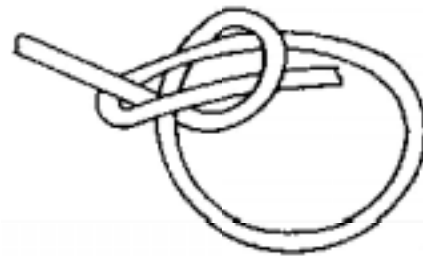
Frequently used with square and/or surgeon's knots to terminate double-strand hand tacking.



Binder Knot

Knot, bowline

Sometimes used at the bottom of steering control lines and other miscellaneous applications.



Bowline Knot

Knot, cinch

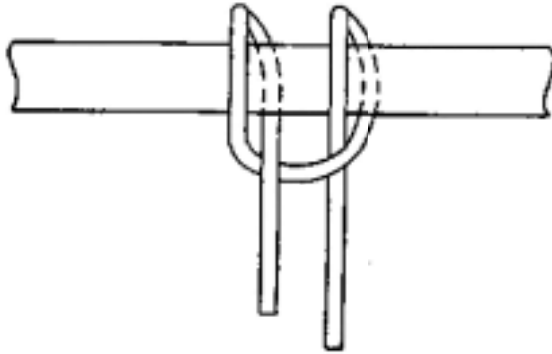
Frequently used to temporarily cinch up deployment bags prior to installation of final means of locking.



Cinch Knot

Knot, clove hitch

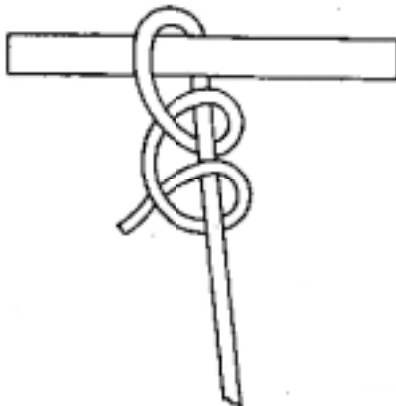
Frequently used to tie suspension lines to links.



Clove Hitch Knot

Knot, half hitch

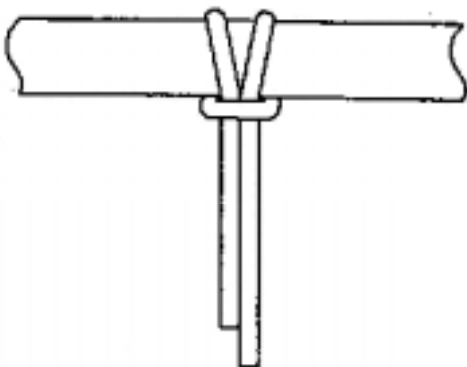
Frequently used to tie suspension lines to links.



Two Half Hitch Knots

Knot, lark's head

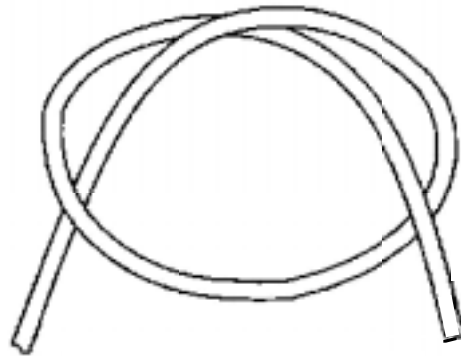
Frequently used to tie pilot chute bridles to the canopy apex and other similar applications with bridles.



Lark's Head Knot

Knot, overhand

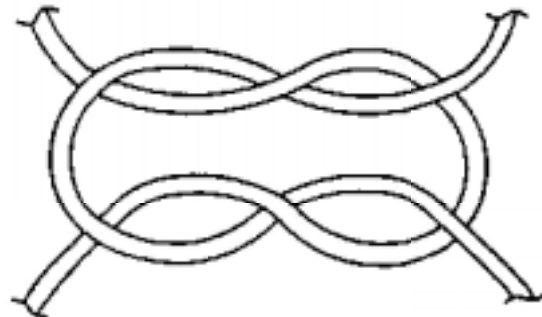
Frequently used with square and/or surgeon's knot to terminate single-strand hand tacking.



Overhand Knot

Knot, square

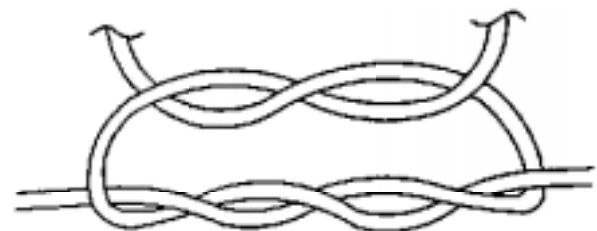
Frequently combined with surgeon's knot to terminate double-strand hand tacking.



Square Knot

Knot, surgeon's

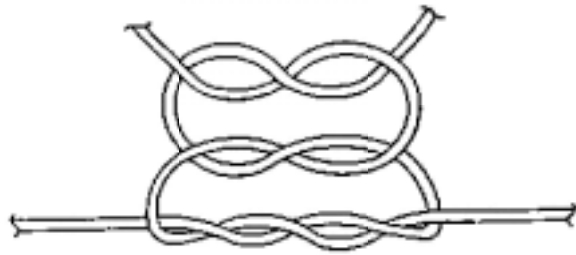
Frequently combined with square knot to terminate double-strand hand tacking.



Surgeon's Knot

Knot, surgeon's / square

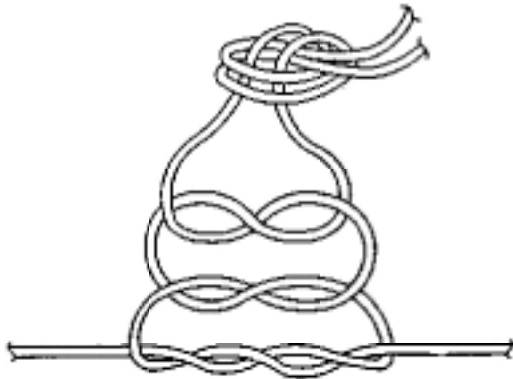
Frequently used knot combination to terminate double-strand hand tacking.



Surgeon's / Square knot

Knot, surgeon's / square / binder

Frequently used knot combination to terminate double-strand hand tacking.



Surgeon's / Square / Binder Knot

Line, anti-squid

A line attaching suspension line connector links to canopy vent lines on some parachute assemblies. The anti-squid lines are shorter than the suspension lines and prevent the main canopy from squidding by bearing the load of the drogue parachute until the main canopy is fully inflated. Also called a Pull-Down Vent Line.

Line, center

A line that connects the canopy apex to the riser to pull the apex down and spread the skirt.

Line, guide or control

One or more parachute lines that run from a slot or orifice in a steerable canopy to the harness, providing steerability.

Line, pull-down vent see Line, anti-squid.

Line, reefing

A length of cord or line passed through rings on the skirt of the drag-producing surface to delay or control opening of the canopy.

Line, shroud

An incorrect term on drawings. See Line, suspension.

Line, static

A line, cable, or webbing, one end of which is fastened to the pack, canopy, or deployment bag, and the other to some part of the launching vehicle. It is used to open a pack or to deploy a canopy.

Line, suspension

Cords or webbings of nylon or other textile materials that connect the drag-producing surface of the canopy to the harness. They provide the means for suspension of the person or load from the inflated drag-producing surface.

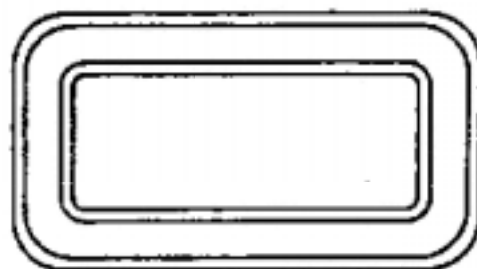
Line, vent a line that crosses the canopy apex.

Line stowing

The process of drawing the suspension lines into suspension-line retaining loops in the parachute pack to prevent entanglement of the lines during opening of the canopy. Stows may be held by retaining loops or rubber bands, or may be tied to stow straps.

Link, connector

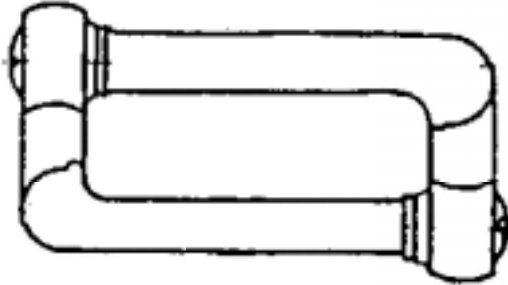
A rectangular metal fitting used to connect ends of risers or lift webs to suspension lines. The suspension lines are tied and sewn to one part of the link, and the webs are stitched to the other part. The design of the link may vary in size and shape according to the intended use.



Connector Link

Link, connector, separable

Any connector link comprised of readily separable elements, which may be used to facilitate assembly of parachute canopies to a riser system.



Separable Connector Link

Loop, locking

Loop sewn to a deployment bag flap to retain the canopy within the pack until after the suspension lines have deployed. Usually, the last stow of lines nearest the canopy is used to lock the loop.

Loop, retaining

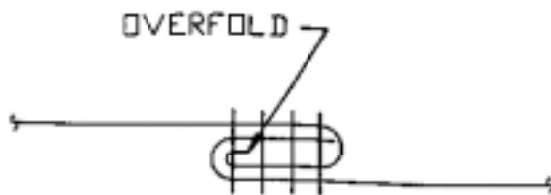
Loop of webbing or tape used to hold folded lines or excess webbing in position.

Loop, stow

Webbing loop on the deployment bag or pack designed to hold suspension lines in place on packed parachutes.

Overfold

An excess of fabric within the seam in which the edge of the material is tucked back onto itself and caught by at least one row of stitching.



Overfold

Pack (pack assembly)

Usually denotes the container alone. When so used, it is defined as a container that encloses the canopy and provides a means of opening to allow deployment of the canopy.

Pack flap

A fabric extension on a side or end of the pack body designed to enclose and protect the canopy.

Pack frame

A rigid or flexible frame used to maintain desired pack shape.

Pack opening band

A cloth covered spring or group of springs with hooks on each end that is used to pull back parachute container flaps to allow deployment of the parachute.

Panel

An individual section of fabric that is sewn to other fabric sections, using cross seams, to form a gore. Used interchangeably with Section.

Parachute

An assembly consisting of a canopy and/or some or all of (but not limited to) the following parts: risers, bridles, deployment bag, pilot chute, drogue chute, release device, harness, cushioning, and hardware. The pack and attaching webbings (harness) are considered to be parachute components when they are not an integral part of the suspended load.

Parachute, aerial delivery

A parachute designed to deliver equipment and supplies from an aircraft in flight. It is used synonymously with the term "cargo chute."

Parachute, approach, landing

A parachute used in flight to improve jet aircraft flight characteristics during normal landing approach, or in approach under marginal weather conditions.

Parachute, attached type

A parachute, the pack of which is so attached to an aircraft that the canopy deploys from the pack as the load falls away.

Parachute, back type

A personnel parachute attached to the back and shoulders.

Parachute, chest type

A personnel parachute attached to the chest.