



VINYON MELAMINE BAMBOO MOHAIR OLELFIN YARN PLY Z-TWIST MONOFILAMENT YARN WARP ENDS TWILL WEAVE SELVEDGE

APPAREL PRODUCTION TERMS and PROCESSES

Janace E. Bubonia



BLOCK REVERSE ENGINEER DRAFT DIGITIZE SAMPLE LAYUP BUNDLE FABRIC FALLOUT TOLERANCE SPECIFICATION TOGGLE



SLICKERS SHAWLS TRENCH COATS BATHROBES BODY SHAPERS LEGGINGS CUFFLINKS POCKET SQUARES VESTS SLACKS SKORTS



Apparel Production Terms and Processes



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Apparel Production Terms and Processes

Janace E. Bubonia

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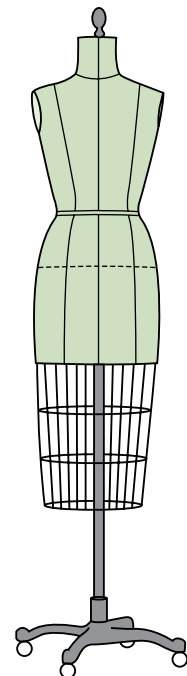
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I am honored and grateful for the opportunity to revise and develop a book that has been such a significant contribution to the field. As the author of Apparel Production Terms and Processes, I would like to dedicate this book to the original authors Debbie Ann Gioello and Beverly Berke, who created the first edition in 1979.

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The apparel industry's global supply chain is dynamic and is continuously evolving due to advances in technology and communications that are changing the way products are developed, produced, and distributed. These advances continually prompt revisions to existing terms and produce a need for new vocabulary. *Apparel Production Terms and Processes* is a reference for educators, students, industry professionals, and consumers interested in learning more about terminology and materials used in the mass production of apparel products. It is important to note that this edition is not a resource for couture or home sewing terminology and techniques, as garments resulting from these classifications do not utilize mass production techniques.

This new edition includes materials and terms relating to the mass production of raw materials; design and product development; patternmaking; garment details and component parts; assembly; production and manufacturing; labeling regulations; packaging and finishing; testing; and quality control. Chapters are presented in a progression that relates to the flow of the production process or the route of the garment from its origin through development to completion. Terms are grouped according to subject by use or application. Each chapter opens with a brief introduction followed by terms that are listed

alphabetically, in some cases alphabetically under general headings, or in logical order of process. For items that go by more than one name, alternate terms are given—for example, **Decorative Elastic** or **Fancy Elastic**. Terms are defined and illustrated with photographs or drawings for clarification where applicable. Photographs, illustrations, and tables accompany the definitions to reinforce the written descriptions and provide visual recognition. Lists of use or examples follow many definitions to provide the reader with an easy way to assimilate the facts. Because of space limitations, some judgment regarding information to be included within each chapter was required. If a particular definition contains another entry term that may further help the reader grasp the definition, that other entry term is indicated in italics.

An industry resource guide has been added at the end of the book to provide a means for contact and gathering additional information. This guide is divided into categories that follow the organization of content within the book. Metric conversion tables have also been included to provide quick access to common calculations. An index with the latest ASTM stitch and seam classifications and an alphabetical cross-referenced index at the end of the book will help the reader to locate specific terms.

A C K N O W L E D G M E N T S

Thank you to everyone who made this new edition a reality. To the staff of Fairchild Publications including: Executive Editor Olga Kontzias; Editorial Development Director Jennifer Crane; my Development Editor, Karen Fein; and Production Editor Jessica Rozler.

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Thank you to my loved ones and close friends for your inspiring words, unwavering support, and endless encouragement during the development of this book.

I would also like to convey my sincere appreciation to the readers of past editions, whose support and acceptance led to this new edition.

LEVI STRAUSS & CO.
SAN FRANCISCO, CAL.

ORIGINAL RIVETED CLOTHING



W 34

Garment Labels

Garment labels are sewn or printed in garments and contain information required by law regarding fiber content, country of origin, manufacturer identification number, care instructions, and voluntary information identifying size and brand. Garment labels should be affixed and legible for the useful life of the apparel item. Garment labels are selected based on location of label (interior or exterior application); type and design of the garment; contact with the wearer's skin; intricacy or simplicity of the label content (logo, graphic art, words, and so on); garment fabric, brand, quality, and price point; and information to be disclosed.

LABEL TYPES

Garment labels are created by manufacturers from both natural and synthetic fibers and can be woven or printed. Woven labels are more durable and maintain their appearance and legibility longer than printed labels after repeated laundering or drycleaning. Materials used for sew-in labels include acetate, cotton, bamboo, polyester, leather, suede, PVC (polyvinyl chloride), silicone, or rubber.

Ribbon or tape refers to a narrow width of woven fabric that is put up on a continuous roll and available in ¼-, ½-, ¾-, 1-inch (0.6-, 1.3-, 1.9-, 2.5-cm), and larger widths.



Woven Label Material produced with a loom using damask, satin, twill, or plain weave construction with a minimum of two different-colored sets of yarns, wherein information about the garment is woven as part of the fabric's construction; solid colored labels produced with a loom utilizing a plain, twill, or satin weave construction that are printed with label content. Plain or twill woven labels are referred to as taffeta because they do not contain sheen. Woven labels can be affixed to the inside or outside of a garment. The tapes are cut into individual labels, finished and sold in minimum put-ups of 1,000 pieces or by the 100-yard or 100-meter roll.



Printed Label Blank satin, twill, or plain weave or non-woven fabric or tapes used for garment labels, wherein the label content is screen printed or rotary printed on the continuous roll. Printed labels are affixed to the inside of garments. The tapes are cut into individual labels and sold in minimum put-ups of 1,000 pieces or by the 100-yard or 100-meter roll.



Tagless Label (Heat Transfer Label) Label information is thermally transferred directly to the inside of a garment rather than stitched. Tagless labels are soft against the skin and do not cause irritation like some sew-in labels.



Leather and Imitation Leather Label Leather or faux leather material is embossed or printed with a brand name or logo, then die cut into individual labels and sold in minimum put-ups of 1,000 pieces. Leather and imitation leather labels are sewn to the inside or outside of a garment.



Suede and Imitation Suede Label Suede or faux suede material that is printed or embossed, then die cut into individual labels and sold in minimum put-ups of 1,000 pieces. Suede and imitation suede labels:

- Are embossed or printed with brand names or logos
- Are printed to indicate the size of a garment
- Provide information regarding fiber content, manufacturer identification number, country of origin, and care
- Are sewn to the inside or outside of a garment



LABEL TYPES (continued)

Molded PVC, Rubber, and Silicon Labels Polyvinyl chloride, synthetic rubber, or silicone is injection molded to create a three-dimensional brand label where the surface can have embossed and depressed portions that form a brand name or logo. These labels are sewn to the outside of a garment and are cut into individual labels and sold in minimum put-ups of 1,000 pieces.



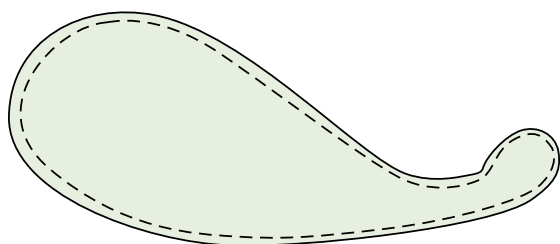
Rubber Tape Label Thin, clear film of synthetic rubber tape that is printed or embossed, then cut into individual labels, finished, and sold in minimum put-ups of 1,000 pieces or by the 100-yard or 100-meter roll to be sewn into garments. Rubber tape labels are affixed to the inside of garments.



LABEL CUTS AND FOLDS

Garment labels can be cut and folded in a variety of ways, depending upon the desired look, brand, quality desired, comfort of the wearer, and price point.

Die Cut The use of a *metal die charge* (form with a sharp edge for cutting) and pressure to cut leather, suede, and other fabrics to the desired shapes and sizes for garment labels. Die cutting allows labels to be cut in unique shapes.

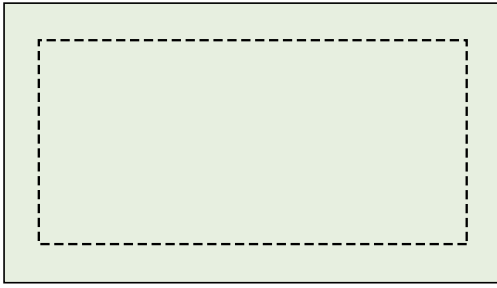


Die cut label

Fuse Cut The use of heat and pressure to cut synthetic fiber fabrics or ribbons (tapes) into labels. Heat seals the edge of the thermoplastic fibers and prevents the label from fraying during wear and refurbishment of the garment.



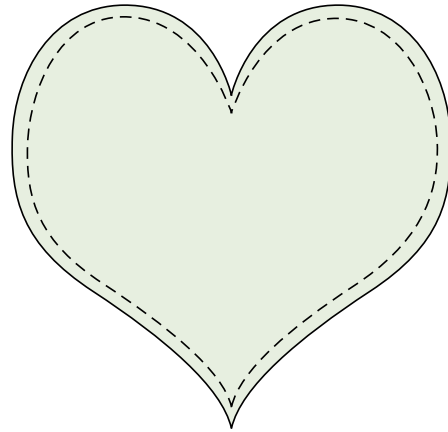
Fuse cut label



Straight cut label

Straight Cut The process of cutting a label and finishing it by turning back all of the raw edges so they can later be sewn to a garment, preventing the label from raveling during wear and refurbishment.

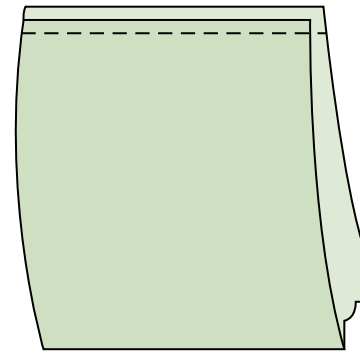
Ultrasonic Cut The process of cutting woven labels using sound wave vibrations. Ultrasonic cutting provides a smooth soft edge but can only be used to cut one edge or side of a label.



Laser cut label

Laser Cut The process of cutting woven garment labels using a focused laser beam to provide great precision. Laser cutting allows for unique-shaped labels to be cut. The raw edges are sealed to prevent fraying and raveling during wear or refurbishment.

Center Fold A printed or woven label folded in half to form a loop in a vertical or horizontal orientation and stitched into a garment at the open end. Labeling information is woven in or printed on the front or both sides of the loop.

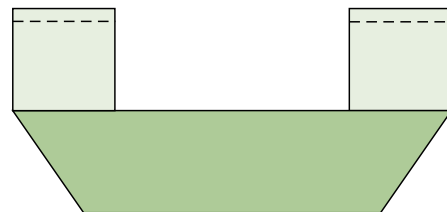


Center fold label



End folds on label

End Folds A woven label that is finished on the top and bottom edges with the raw edges at the right and left ends. The raw edges are folded back to lie under the body of the label, and are stitched down at the left and right ends, or tacked at the four corners to affix the label to the garment and prevent fraying during wear and refurbishment.



Miter fold label

Miter Fold A woven label that is finished on the top and bottom edges with the raw edges at the right and left ends. The raw edges are folded back at right angles to form a U shape. The raw edges are then stitched into the garment to prevent fraying during wear and refurbishment.

PRICE CLASSIFICATIONS FOR LABELS

Labels for garments are cues to quality and brand image. Price classifications for different types of labels include:

Low Cost

- Taffeta plain woven and printed
- Taffeta twill woven
- Twill printed
- Satin printed
- Nonwoven printed
- Heat transfer

Moderate Cost

- Satin woven and printed
- Twill printed
- Imitation leather
- Imitation suede
- Rubber tape label
- Nonwoven printed
- Heat transfer

Expensive

- Damask woven
- Leather
- Suede
- Molded PVC, rubber, and silicone

GOVERNMENT LABELING REGULATIONS FOR TEXTILE APPAREL PRODUCTS

In the United States, the Federal Trade Commission (FTC) has enacted laws regarding how apparel items must be labeled. The FTC enforces these labeling rules for all apparel products sold in the United States, whether manufactured domestically or imported. The Code of Federal Regulations (CFR) contains the following sections:

- 16 CFR 300: Rules and Regulations Under The Wool Products Labeling Act of 1939

- 16 CFR 303: Rules and Regulations Under The Textile Fiber Products Identification Act
- 16 CFR 423: Care Labeling of Textile Wearing Apparel and Certain Piece Goods as Amended
- 19 CFR 134: Country of Origin Marking

All labeling information should be presented in English. Some companies will provide an additional translation such as Spanish or French.

Fiber Content

Fiber content is the delineation of fiber types and weights listed in percentages on the front or back side of a garment label or in descriptions. Rules for listing fiber content are very specific in that any part of an apparel item made from fiber, yarn, or fabric must be disclosed on a label. Exceptions of garment components that do not have to be listed but are made of fiber, yarn, or fabric include linings (unless for warmth), trim, small amounts of ornamentation or decoration, and thread. The FTC defines trim as “collars, cuffs, braiding, waist or wristbands, rick-rack, tape, belting, binding, labels, leg bands, gussets, gores, welts, findings [including] elastic materials and threads added to a garment in minor proportion for structural purposes; and elastic material that is part of the basic fabric from which a product is made if the elastic does not exceed 20 percent of the surface area.” (Federal Trade Commission & Bureau of Consumer Protection, 2008, p. 8). On a garment label, a 3-percent tolerance is allowed on all fibers, except for wool. The 3 percent provides for any slight inconsistencies that may occur during manufacturing of textile products. Rules for fiber content disclosure on garment labels include:

- All fibers must appear in the same font style or type and be of equal size, easily legible, and readily visible to the customer.
- Generic fiber names or trademark names must be accompanied by their generic equivalents and listed in numeric percentages in descending order with the largest percentages first, followed by the lowest. For example, “98% Cotton, 2% Lycra® Spandex.”
- Fiber names cannot be abbreviated.
- When a garment is composed of only one fiber such as 100 percent cotton, it can be listed on the label as “All Cotton.”
- Fibers composing 5% or more should be listed, while all others below 5% should be listed as “other.” Following are exceptions to 5% rule:
 - When the fiber less than 5% serves a significant function, such as spandex for stretch or elasticity. The functional significance does not need to be disclosed on the label.
 - Wool fiber must always be revealed by name and percentage of weight, even when it is less than 5%. If the fiber has been recycled it must be listed as “Recycled Wool.”

(continued) GOVERNMENT LABELING REGULATIONS FOR TEXTILE APPAREL PRODUCTS

- When several nonfunctionally important fibers are each less than 5%, the percentages of these fibers can be added together and listed as “other,” even if their aggregate total is greater than 5%. For example, the fiber content may be listed as 80% Cotton, 10% Silk, 2% Spandex, 8% Other. In this situation, the *other* fibers are listed last even though their aggregate total is greater than the 2% Spandex.
- “*Exclusive of Decoration*” can be used on a garment label rather than disclosing the fiber content when decorative designs integral to the fabric or decorative trim (e. g., embroidery, appliqué, overlay, or attachment) do not exceed 15% of the surface area of the garment. For example, 60% Cotton, 40% Polyester, exclusive of decoration.
- When the decoration of a garment exceeds 15% of the surface area the fiber content must be disclosed. For example, Body–100% Wool, Decoration–100% Silk.
- “*Exclusive of Ornatmentation*” can be used on a garment label rather than disclosure of the fiber content when “any fibers or yarns imparting a visibly discernable pattern or design to a yarn or fabric” are not greater than 5% of the garment’s fiber content (Federal Trade Commission & Bureau of Consumer Protection, 2008, p. 10).
- When the ornamentation of a garment exceeds 5% of the fiber weight of the garment, fiber content must be disclosed. For example, Body–100% Wool, Ornatmentation–100% Silk.
- When the filling, lining, interlining, or padding is included in an apparel item for the purpose of adding structure, it does not have to be disclosed unless it contains wool fiber.
- When filling, lining, interlining, or padding is included in an apparel item for the purpose of adding warmth, the fiber content must be disclosed. For example, Shell: 90% Cotton, 10% Silk, Lining: 100% Polyester; Shell: 100% Nylon, Filling: 100% Polyester; Shell: 100% Cotton, Interlining: 100% Cotton.
- When garments are composed of different sections having different fiber contents, each portion must be disclosed separately. For example, Body: 60% Wool, 40% Mohair, Sleeves: 100% Wool.
- Fabrics containing pile must either disclose the fiber content of the whole product or list the pile fiber separate from the backing, but the ratio between the pile and backing must be disclosed. For example, 60% Polyester, 40% Rayon; 100% Rayon Pile, 100% Polyester Back (Back is 60% of fabric and pile is 40%).
- Specific types of premium or luxury fibers can be disclosed, but specific percentages must be included. For example:
 - A garment made entirely of Egyptian cotton can be disclosed on a label as 100% Cotton, or 100% Egyptian Cotton. If the garment contains only a portion of Egyptian cotton it can be listed as 100% Cotton or 60% Egyptian Cotton, 40% Cotton.
 - A garment made from the hair of an alpaca, Angora goat, camel, Cashmere goat, llama, or vicuna or fleece from a lamb or sheep can be disclosed on a fiber content label as wool or labeled with the specialty fiber name. For example 100% Wool; 100% Cashmere.
 - When a fur fiber is incorporated and is greater than 5% of the total fiber weight of the garment, the name of the animal can be used on the label to disclose the content, or the fur fiber can be used as long as the hair or fur fiber would not be classified as wool (see previous bullet). For example, 60% Wool, 40% Fur Fiber; 80% Cotton, 10% Silk, 10% Angora Rabbit Hair.
- When reclaimed or recycled fibers are used, this must be disclosed on the garment label. For example, 70% Recycled Wool, 30% Acrylic.

The FTC has designated specific names to be used for man-made or synthetic fibers. The International Organization for Standardization (ISO) lists some man-made fibers differently, and although they are not listed by the FTC, they are acceptable for use in compliance with fiber identification disclosure laws (Federal Trade Commission, 2009). Some examples include:

- ISO uses Viscose or Modal, FTC uses Rayon
- ISO uses Elastane, FTC uses Spandex
- ISO uses Polyamide, FTC uses Nylon
- ISO uses Polypropylene, FTC uses Olefin
- ISO uses Metal Fibre, FTC uses Metallic

Country of Origin

The **country of origin** must be identified in English on garment labels to disclose where the product was produced. Country of origin must appear on the front of the label and not be covered by any other garment label.

- Country of origin must be accessible, legible, and easily visible.
- If products are made in the United States from imported materials, the label must state this. For example, “Made

in the U.S.A. of imported fabric”; “Made in U.S.A of fabric made in Italy”; “Fabric made in Italy, cut and sewn in U.S.A.”

- Both portions of production must be disclosed on a garment label if a product is processed or manufactured in the United States and another country. For example, “Assembled in the U.S.A. of imported components”; “Made in Costa Rica, finished in U.S.A.”

GOVERNMENT LABELING REGULATIONS FOR TEXTILE APPAREL PRODUCTS (continued)

Manufacturer, Importer, or Dealer Identification Number

Garment labels must contain the company name or the **registered identification number (RN)** of the manufacturer, importer, or broker handling or distributing the merchandise. The RN is found on either the front or backside of the label. **Wool products labeling** or **WPL** numbers at one time were issued to companies that manufactured wool products. Although WPL numbers are no longer issued, they can still be seen today. The FTC is responsible for issuing and monitoring the use of RN numbers to U.S. companies involved in manufacturing, importing, distributing, and marketing textile products, including wool and fur. RN numbers are not issued to companies outside the United States. Rules for identifying the manufacturer, importer, or dealer on a garment label include:

- RN, WPL, or company name must be legible and easily visible.
- RN or WPL must appear immediately before the registered identification number on a garment label.
- Only one RN number is issued to a company, and it cannot be transferred or reassigned.
- When a company name is used rather than a WPL or RN number, the full name by which the company conducts business must be stated on the garment label. "It cannot be a trademark, trade name, brand, label, or designer name—unless that name is also the name under which the company is doing business." (FTC & Bureau of Consumer Protection, 2008, p. 23).
- When a product is imported, the label can identify any one of the following:
 - Manufacturer's name
 - Importer's name or RN or WPL number
 - Wholesaler's name or RN or WPL number
 - Retailer's name or RN or WPL number

Care Label

A garment **care label** is required by law to be permanently affixed to the garment and legible for its useful life, to provide the customer with a guide to refurbishing the garment on a regular basis without causing damage to the product. Manufacturers and importers are required to provide either drycleaning or washing instructions for textile apparel products. If damage can be caused to a product by using sensible cleaning procedures, warnings must be provided on the care label using words such as "Do not," "No," or "Only" to alert the customer. Warnings must be stated for sensible procedures to use in the routine refurbishment of laundered or drycleaned items. Reversible garments that do not contain pockets can be exempted from the requirement for the care label to be permanently affixed for the useful life of the garment. Nevertheless, the care instructions for the product must appear on a hang tag, packaging, or other easily visible place for the customer to view the refurbishment procedures prior to purchase.

The American Society for Testing and Materials (ASTM) developed ASTM Standard D5489-07, Standard Guide for Care Instructions on Textile Products, which designates the care symbols in the **ASTM Guide to Care Symbols** and outlines the order in which they should appear on garment care labels. **Care symbols** are icons developed specifically to represent procedures used in cleaning textile








































and apparel products, to guide or instruct a person how to safely refurbish a product. As of 2010 these symbols are not required by law to be used on labels but can appear in conjunction with written English terms or on their own.

Washing

Washing is a method for removing soil and stains from garments using water and detergent or soap and agitation. **Washing instructions** must include the washing method and water temperature and can be accompanied by any modifications to the normal process. Washing warnings must also be included if damage can occur when routine sensible procedures are used. Washing instructions for apparel include:

- Washing method
 - Hand wash or machine wash
 - Water temperature such as cold, warm, or hot. If the hottest water, up to 145 degrees Fahrenheit (63 degrees Celsius) will not harm the product, wash temperature does not have to be stated.
 - Wash modifiers include:
 - Gentle/delicate cycle
 - Durable press cycle
 - With like colors

(continued) **GOVERNMENT LABELING REGULATIONS
FOR TEXTILE APPAREL PRODUCTS**

ASTM GUIDE TO CARE SYMBOLS																		
 Wash	Machine wash cycles  normal  permanent press  delicate / gentle	 hand wash	Warning symbols for laundering  do not wash  do not bleach  do not dry (used with do not wash)  do not iron															
	Water temperatures (maximum) symbol (s) <table border="1"> <tr> <td>(200F)</td> <td>(160F)</td> <td>(140F)</td> <td>(120F)</td> <td>(105F)</td> <td>(65F-85F)</td> </tr> <tr> <td>95C</td> <td>70C</td> <td>60C</td> <td>50C</td> <td>40C</td> <td>30C</td> </tr> <tr> <td>●●●●</td> <td>●●●</td> <td>●●</td> <td>●●●</td> <td>●●</td> <td>●</td> </tr> </table>		(200F)	(160F)	(140F)	(120F)	(105F)	(65F-85F)	95C	70C	60C	50C	40C	30C	●●●●	●●●	●●	●●●
(200F)	(160F)	(140F)	(120F)	(105F)	(65F-85F)													
95C	70C	60C	50C	40C	30C													
●●●●	●●●	●●	●●●	●●	●													
 Bleach	 any bleach when needed  only non-chlorine bleach when needed																	
	Tumble dry cycles  normal  permanent press  delicate / gentle  line dry / hang to dry  drip dry  dry flat	Tumble dry heat setting  any heat  high  medium  low  no heat / air	Additional instructions (in symbols or words)  do not wring  do not tumble dry  in the shade (added to line dry, drip dry, or dry flat)  no steam (added to iron)															
 Iron	Iron—dry or steam  200 C (390 F) high  150 C (300 F) medium  110 C (230 F) low																	
	Dryclean - normal cycle  any solvent  any solvent except trichloroethylene  petroleum solvent only  do not dryclean	Dryclean - additional instructions  short cycle  reduce moisture  low heat  no steam finishing																

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- Wash separately
- Wash inside out
- Rinse temperature such as cold rinse or warm rinse
- Rinse thoroughly
- Wipe clean with damp cloth
- Spot clean
- Wash before wearing

- Washing warnings
 - Do not wash
 - Do not spin
 - Do not wring
 - Do not commercial launder
 - To retain flame resistance, use detergent not soap

GOVERNMENT LABELING REGULATIONS FOR TEXTILE APPAREL PRODUCTS (continued)

Bleaching

Bleaching instructions should include the type of recommended bleach accompanied by any warnings if damage could occur when routine sensible procedures are used.

Chlorine bleach is made of sodium hypochlorite and water and available in liquid form only. **Nonchlorine bleach** is an oxygen bleach available in liquid (hydrogen peroxide and water) or powder (sodium perborate or sodium carbonate) form. If no bleach is specified, the customer can use either type without causing damage to the garment. Bleaching instructions for apparel include:

- Bleach method
 - Bleach when needed (used when all bleach types can be safely used without damaging the garment)
- Bleach warnings
 - Do not bleach
 - Nonchlorine bleach only

Drying

Drying is the removal of remaining moisture contained in the garment fabric after it is washed. Moisture is evaporated through exposure to indoor or outdoor air or machine drying. **Drying instructions** must include the method and temperature and can be accompanied by any modifications to the normal process. Drying warnings must also be included if damage can occur when routine sensible procedures are used. Drying instructions for apparel include:

- Drying method
 - Tumble dry
 - Drying temperature such as no heat, low, medium, high, durable press or permanent press cycle
 - Drip dry
 - Dry flat
 - Line dry
 - Drying modifiers include:
 - Remove promptly
 - Line dry away from heat
 - Reshape, dry flat
 - Dry until damp then line dry or dry until damp then dry flat
 - Dry with three tennis balls (used to fluff filling in ski jackets and similar items that contain padding that can become matted during cleaning)
- Drying warnings
 - Do not dry
 - Do not machine dry
 - Do not tumble dry
 - No heat

Ironing and Pressing

Ironing and **pressing** are methods used to remove wrinkles from garments using dry heat or heat and steam.

Ironing or pressing instructions should include the temperature accompanied by any warnings if damage can occur when routine sensible procedures are used. Ironing or pressing instructions for apparel include:

- Ironing or pressing method
 - Temperature, such as cool, low, warm, or hot
 - As needed
 - Iron damp
 - Steam press
 - Steam iron
- Ironing or pressing warnings
 - Do not iron
 - Do not iron decoration
 - Use press cloth
 - Iron on wrong side only
 - Do not steam
 - No steam
 - Steam only

Drycleaning

Drycleaning is a process that uses perchloroethylene, petroleum, or fluorocarbon solvents to remove soils and stains from textile wearing apparel. Moisture is commonly added to drycleaning solvent to achieve up to 75% relative humidity in order to remove water-soluble soil and stains. Once the garments are cleaned with the solvent, it is recovered through means of drying at temperatures up to 160 degrees Fahrenheit (71 degrees Celsius), followed by steam pressing or finishing. **Drycleaning instructions** should state dryclean, professionally dryclean, commercially dryclean, or leather clean and be accompanied by any warnings if damage can occur when common solvents and routine sensible procedures are used. Drycleaning instructions for apparel include:

- Dryclean, professionally dryclean, or leather clean
- Solvent type:
 - Perchloroethylene
 - Petroleum
 - Fluorocarbon
- Drying temperatures, such as cool or warm
- Drying method such as tumble dry or cabinet dry
- Drycleaning modifiers include:
 - Short cycle
 - Minimum extraction
 - Reduced moisture

(continued) GOVERNMENT LABELING REGULATIONS FOR TEXTILE APPAREL PRODUCTS

- Drycleaning warnings
 - Do not dryclean
 - No steam
 - Steam only
 - Do not use perchlorethylene solvent
 - Do not use petroleum solvent
 - Do not use fluorocarbon solvent
 - Do not tumble
- 16 CFR 1615: Standard for the Flammability of Children's Sleepwear Sizes 0–6X
- 16 CFR 1616: Standard for the Flammability of Children's Sleepwear Sizes 7–14

These standards for loose-fitting and tight-fitting children's sleepwear must be adhered to. If the care instructions are disclosed on the back of the label, the words "Care Instructions on Reverse" must be stated on the front of label. Care warnings must be stated on the garment label and permanently affixed for the useful life of the product and include "precautionary instructions to protect the items from agents or treatments which are known to cause deterioration of their flame resistance. If an item has been initially tested under §1615.4(g)(4) [or initially tested under §1616.5(c)(4) *Laundering*,] after one washing [and drying], it shall be labeled with instructions to wash before wearing (CPSC, 2009, §1615.4(g)(4) and §1616.5(c)(4))."

Care Disclosure Requirements for Children's Sleepwear

The Consumer Products Safety Commission (CPSC) requires additional information to be disclosed on garment labels for children's sleepwear because of flammability regulations. These include the following:

VOLUNTARY LABEL INFORMATION FOR TEXTILE APPAREL PRODUCTS

Not all information contained on garment labels is required by law. However, brand and size information provide valuable assistance to customers when making clothing purchases.

Brand Designation

Disclosure of the brand name or logo on garment labels is important for identification, name recognition, and promotional purposes. Many customers shop and purchase specific apparel brands based on their knowledge of a brand's fit, quality level, garment design and construction techniques, status, or price point. These labels also serve as constant reminders of brands customers like and identify with, whether they are shopping in a store, looking in their closet, or viewing a brand label on another person.

Size Designation

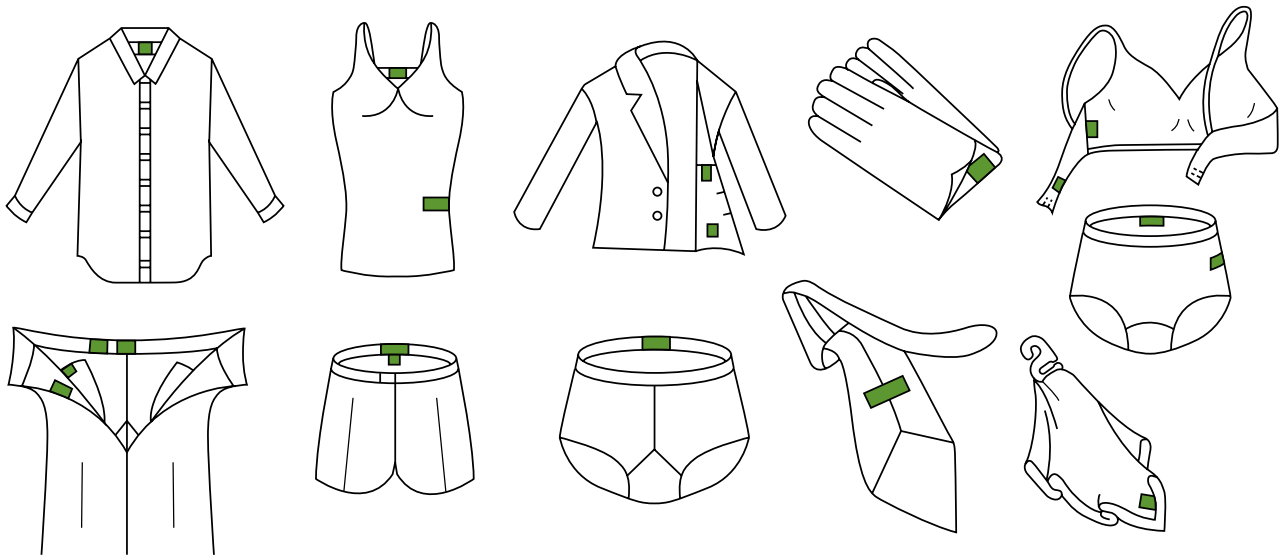
Although there is no law requiring size to be disclosed on apparel product labels, it is vital for consumers. **Size** designates the overall combination of garment component dimensions for various ages and figure types and groups them into particular categories. Body dimensions within individual garment sizes can range from one manufacturer to another. Size can be designated by numerals, letters, or words.

- XS, S, M, L, XL, XXL
- X-Small, Small, Medium, Large, X-Large

- One size fits all
- One size fits most
- *Women's* designates full figure adult females using even numbers followed by W. Sizes in this range typically include 14W to 24W.
- *Misses* uses even number sizes and typically includes 0 to 20.
- *Petite* (women under 5'5" [165 cm] in height) and *tall* (women over 5'6" [167.6 cm] in height) are additional size designations used for women's apparel.
- *Junior* sizing uses odd numbers, typically ranging from 1 to 17.
- *Men's* sizing is based on body measurements in inches. Suits and jacket sizes typically range from 32 to 50; pant sizes typically range from 28 to 40; tailored dress shirt sizes typically include neck circumference ranges from 14 to 18½ with sleeve lengths ranging from 30/32 to 34/36.
- *Short* (men under 5'7" [170.2 cm] in height), *regular* (men 5'8" to 5'11" [172.7 cm to 180.3 cm] in height), and *tall* (men 6' [183 cm] and over in height) are additional size designations used for men's apparel.
- See Chapter 4 for infant and children's sizing as well as bra sizing for women.

PLACEMENT OF LABELS IN WEARING APPAREL

Garment labels featuring the information required by law must be securely affixed to the apparel item. The location of labels must be clearly marked and easy for the customer to find. All required and optional information can be contained in one label or in several labels attached to the garment.



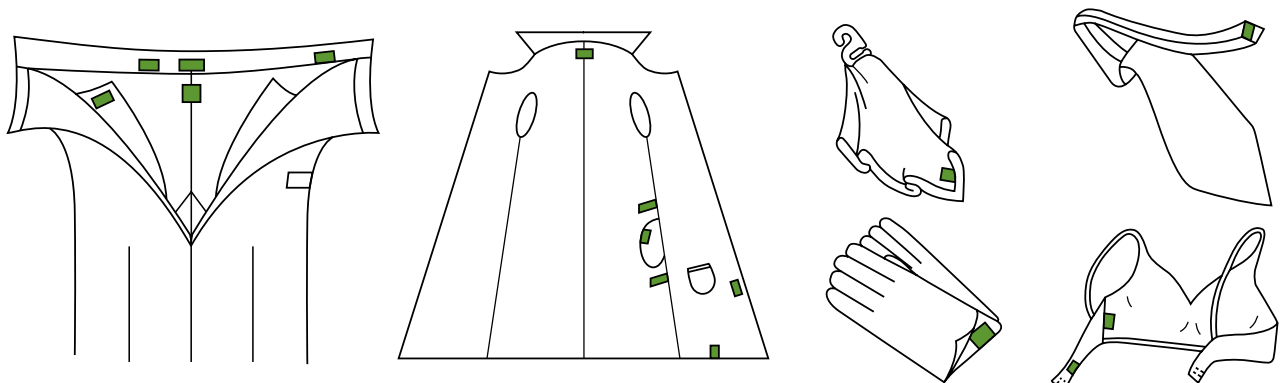
Options for **brand placement** inside apparel items

Characteristics of labels placed in garments with a neck include the following:

- Brand labels are typically found at the inside center back of the neck. They can also be affixed to various locations on the outside of a garment.
- Country of origin labels must be attached to the inside center of the neckline or in close proximity to another label placed at the midpoint between the shoulders. If one label contains all of the required information by law it must be attached in this area.
- Fiber content, manufacturer identification number, and care instructions can be attached to the side seam.

Labels placed in garments with a waist can be characterized as follows:

- **Garment labels** are found on the inside of the waistband or waist area.
- **Brand labels** are typically found on the inside of the waistband or waist area. They can also be affixed to various locations on the outside of a garment.



Placement of **label information** inside apparel items

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ASTM Stitch Classifications

A **stitch** is a loop formation made by interlocking one or more threads by machine or by hand to produce seams or surface decoration. The process of forming a series of stitches is known as **stitching**. Stitches may be concealed within or may show on the face of the garment. Stitch types are referred to in terms that describe their configuration or effect.

STITCH SPECIFICATIONS

Production engineers require a numbered specification to avoid confusion in production operations. The industry follows **ASTM D6193-11 Standard Practice for Stitches and Seams**, formerly Federal Standard 751a, to classify stitches and seams. This standard divides stitches into six classifications. Each **stitch class** is identified by the first digit of a three digit number, 100 through 600. Individual stitches are further identified by a second and third digit denoting their concatenation (series of thread configurations). ASTM D6193-11 stitch classes include:

- 100 Single-Thread Chain Stitches
- 200 Hand Stitches
- 300 Lock Stitches
- 400 Multithread Chain Stitches/Double Locked Chain Stitches
- 500 Overedge Stitches
- 600 Cover Stitches

This standard also includes an Appendix: Sewn Applications for Buttons/Snaps/Hook and Eye Attachments, Buttonhole Stitching, Bartack/Reinforcement Stitching, Tacking, Specialty Stitching/Seams and Guide to Count Stitches Per Inch.

Industrial sewing machines are typically designed to produce one type of stitch. Machines are equipped with numbered stitch size regulators that can be set to sew a selected number of **stitches per inch (SPI)** or **stitch density**. The set number is an approximate indicator of stitches per inch. The setting is a starting point and is tested for accuracy and performance. Factors that influence the stitch performance include:

- Type and weight of fabric
 - Number of plies being sewn
 - Thread size
 - Type of machine
 - Stitches per inch
- Zigzag, buttonhole, and hem stitch machines as well as special attachments that operate with a side-to-side motion of the needle, produce **stitch bite**. Bite indicates the width of the track or stitching pattern. Blind stitch machines produce a variety of stitch configurations that hold garment plies together without visible stitching on the face of the garment. The type and size of machine stitches selected depends on:

- Design and style of the garment
- Use and function of garment
- Care of garment
- Life of garment
- Type and weight of fabric
- Placement of stitch
- Availability of machine
- Construction technique
- Method of production
- Quantity of garments produced

SINGLE-THREAD CHAIN STITCHES (100 CLASS)

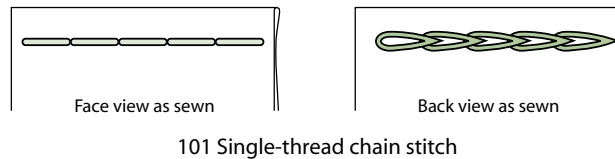
A category of stitches in which a single thread passes through a ply or plies of fabric and interloops with itself on the opposite surface. This loop formation produces a flexible stitch. Single-thread stitches can unravel if they are broken or cut, and can be removed by pulling on an unlocked thread end. A sewing operator can regulate the stitch length.

Single-thread stitches are used for:

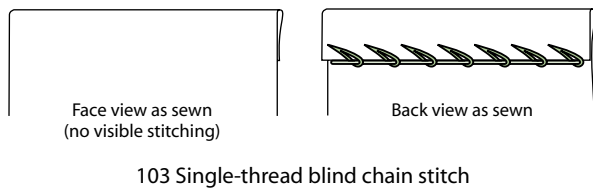
- Blind hems of skirts, pants, jackets, and dresses
- Light construction
- Attaching trim
- Basting
- Making a stay chain to anchor linings or to form belt carriers

The 100 class contains stitch types 101 through 105. The most commonly used stitches within this class are:

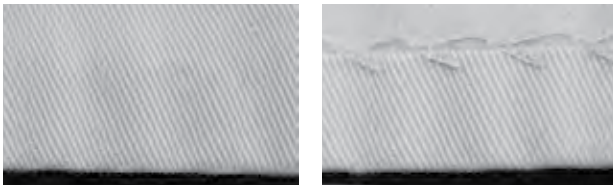
- 101 Single-thread chain stitch
- 103 Single-thread blindstitch
- 104 Saddle stitch



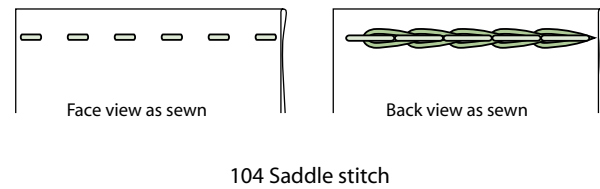
101 Single-thread chain stitch



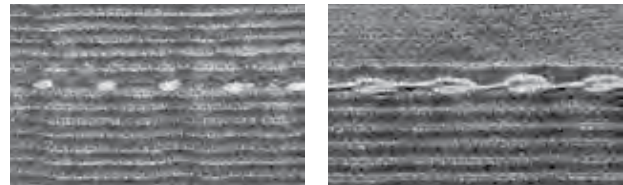
103 Single-thread blind chain stitch



103 Single-thread blind chain stitch (face and back views)



104 Saddle stitch



104 Saddle stitch (face and back views)

HAND STITCHES (200 CLASS)

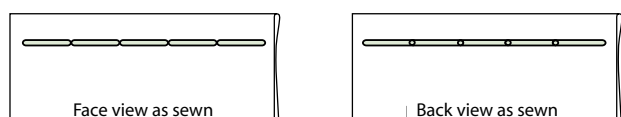
A category of stitches created by hand or by machine to imitate handwork. One or more needle threads pass through a ply or plies of fabric as a single line of thread that interloops on itself or is secured by passing in and out of the material to show alternately on the face and reverse of the garment. Hand stitches are very labor-intensive and expensive, so their use is quite limited in mass-produced apparel. Machine imitated hand stitches require special equipment. In mass production, hand stitches are more common for decorative purposes than functional main seaming.

Simulated hand stitches are used for:

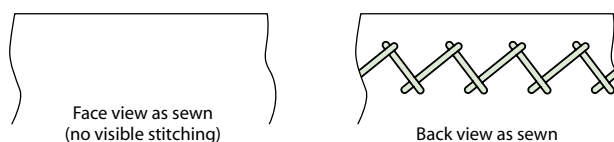
- Decorative stitches that show on the face of the garment
- Saddle stitches
- Running stitches

The 200 class contains stitch types 201 through 205. The most commonly used stitches within this class are:

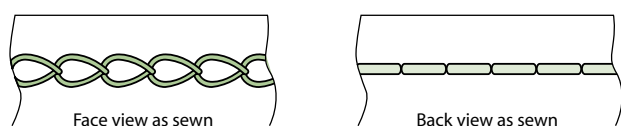
- 202 Backstitch or prick stitch
- 203 Decorative chain stitch
- 204 Catch stitch or herringbone stitch
- 205 Running stitch or saddle stitch



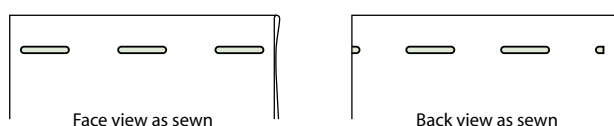
202 Back stitch or prick stitch



204 Catch stitch or herringbone stitch



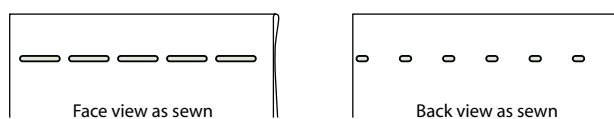
203 Decorative chain stitch



205 Running stitch



203 Decorative chain stitch (face and back views)



205 Saddle stitch

LOCKSTITCHES (300 CLASS)

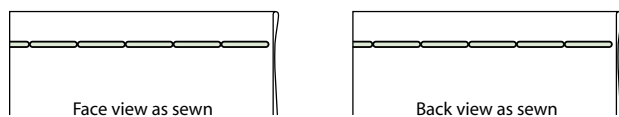
A category of stitches in which single or double needle threads and the bobbin thread interlace midway between the surface of the fabric ply or plies as they are fed through the machine to provide the same appearance on the top and bottom surfaces. Double needles may be spaced from $\frac{1}{16}$ to $\frac{1}{2}$ inch (1.6 to 12.7 mm) apart. Some in the industry consider lockstitches to be the standard or regular machine stitch. Length of the stitch can be regulated from 4 to 30 per inch depending on the individual machine. Lockstitches can be formed in a straight line or in a zigzag pattern. Zigzag lockstitches are formed through the combined action of the needle, moving from side to side, and the fabric feeding through the machine whereby the needle and bobbin threads interlace. A narrow bite is used for sewing seams, and a deep bite is used for finishing raw edges. Different industrial machines produce a wide variety of stitch patterns. Two stitches in the same direction and two stitches in the opposite direction form two-stitch zigzag stitches. Three-stitch zigzag stitches are formed by three stitches in one direction and three stitches in the opposite direction.

Lockstitches are used for:

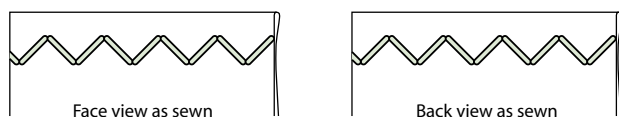
- Straight sewing
- Joining two or more plies of fabric
- Stitching a single ply of fabric
- Embroidery
- Attaching trim
- Top stitching
- Back tacking
- Attaching belt loops
- Attaching buttons
- Buttonholes
- Finishing raw edges
- Applying elastic
- Joining elastic fabric
- Decoration

The 300 class contains stitch types 301 through 316. The most commonly used stitches within this class are:

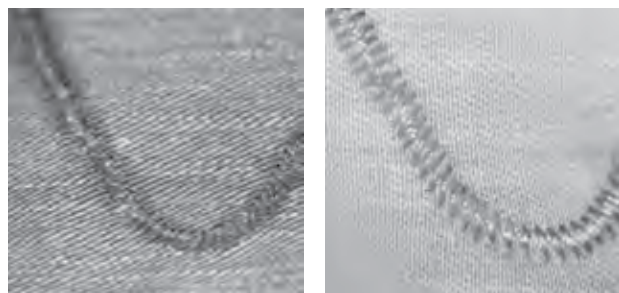
- 301 Lockstitch
- 304 Zigzag lockstitch
- 306 Lockstitch blindstitch
- 308 Two-stitch zigzag lockstitch
- 313 Lockstitch blindstitch
- 314 Lockstitch blindstitch
- 315 Three-stitch zigzag lockstitch



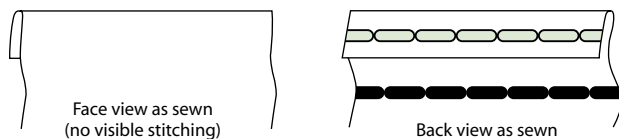
301 Lockstitch



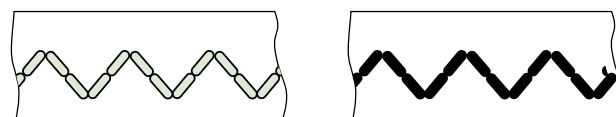
304 Zigzag Lockstitch



304 Zigzag Lockstitch (face and back views)



306 Lockstitch blind stitch



308 Two-stitch zigzag Lockstitch



308 Two-stitch zigzag Lockstitch (face and back views)



313 Lockstitch blind stitch



314 Lockstitch blind stitch



315 Three-stitch zigzag Lockstitch

MULTITHREAD CHAIN STITCHES OR DOUBLE LOCKED CHAIN STITCHES (400 CLASS)

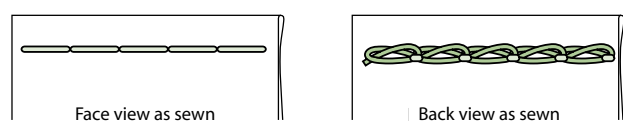
A category of stitches in which single or double needle threads and the bobbin thread interlace and interloop between the surface of the fabric ply or plies as they are fed through the machine, to provide the appearance of a lockstitch on the top and a chain-stitch formation on the bottom surface. Double needles may be spaced from $\frac{1}{16}$ to $\frac{1}{2}$ inch (1.6 to 12.7 mm) apart. This loop formation of the chain produces a flexible stitch, making 400 class stitches the strongest and most elastic of all of the stitch classes. Stitches do not unravel as easily if they are broken or cut because they are formed with two or more threads, unlike chain stitches, which are categorized in the 100 class. Stitch formation, size, bite, and spacing vary according to different machines. The stitch length can be regulated.

Multithread chain stitches are used for:

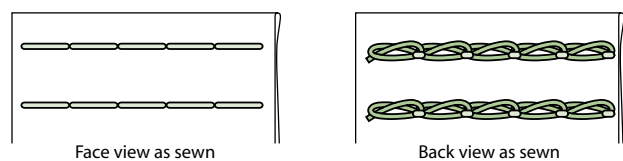
- Straight sewing
- Joining two or more plies of fabric
- Main seaming
- Hems on knit garments (with a double needle)
- Embroidery
- Attaching trim
- Creating permanent creases
- Attaching elastic

The 400 class contains stitch types 401 through 407. The most common stitches within this class are:

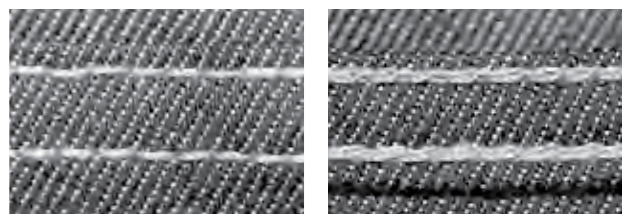
- 401 Two-thread or multithread chain stitch (single or twin needle can be used)
- 402 Cording stitch
- 404 Zigzag chain stitch (one-, two-, or three-stitch zigzag)
- 406 Two-needle bottom coverstitch
- 407 Three-needle bottom coverstitch



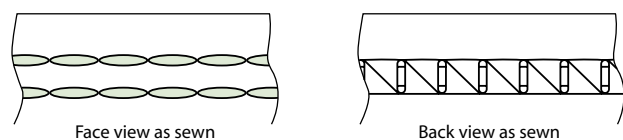
401 Single-needle two-thread chain stitch



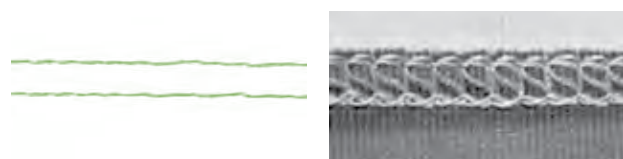
401 Twin-needle multithread chain stitch



401 Twin-needle multithread chain stitch (face and back views)



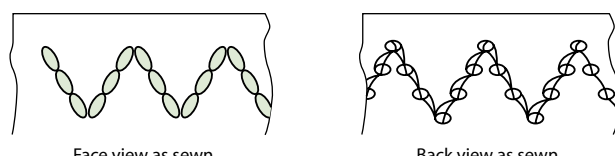
402 Cording stitch



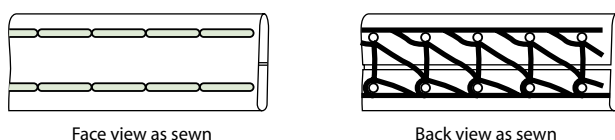
402 Cording stitch (face and back views)



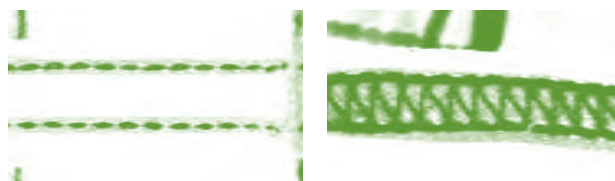
404 Zigzag chain stitch



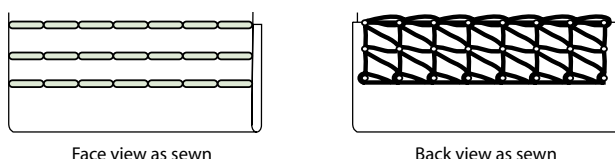
404 Three-stitch zigzag chain stitch



406 Two-needle bottom coverstitch



406 Two-needle bottom coverstitch (face and back views)



407 Three-needle bottom coverstitch

OVEREDGE STITCHES (500 CLASS)

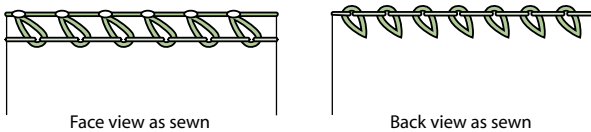
A category of stitches produced by interlocking one or more threads whereby threads enclose the raw edges of the fabric ply or plies. Stitch formation, size, bite, and spacing vary according to different machines and the type of fabric or effect desired. Overedge machine stitches may be used for purl edging and lettuce edging. Lettuce edging is a frilled, unturned edge, similar in appearance to lettuce leaves and is produced by stretching a knit fabric as it is fed into an overedge machine. A safety stitch is produced by the simultaneous sewing of two parallel independent rows of stitches. One row of lockstitches or multithread chain stitches is positioned at a specified distance from the overedge stitch formation. This combination of stitches provides strength and security or reinforcement should the lockstitch become cut or broken. Overedge stitches provide strength, durability, and elasticity. An increased seam allowance affords a measure of protection against seam slippage, which can be a problem if the thread tension is not set properly.

Overedge stitches are used for:

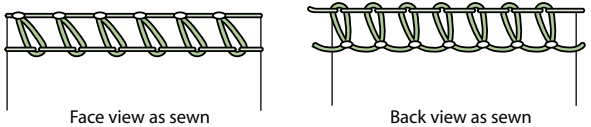
- Main seaming
- Finishing an edge
- Preventing fraying, raveling, or rolling of a seam edge
- Preventing raveling as a hem edge
- Joining garment seams of knit and stretch fabrics
- Joining elastic to a garment edge
- Joining a finished exposed seam made on the face of the garment for decorative or styling purposes
- Decorative hem finishes
- Finishing edges of collars, pockets, scarves, and ruffles

The 500 class contains stitch types 501 through 522. The most frequently used stitches within this class are:

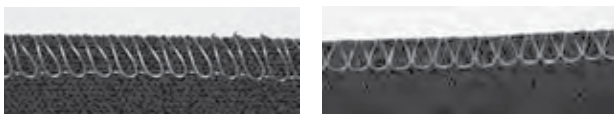
- 503 Two-thread overedge stitch (single purl on edge)
- 504 Three-thread overedge stitch
- 505 Three-thread overedge stitch (double purl on edge)
- 512 Four-thread overedge mock safety stitch
- 514 Four-thread overedge stitch
- 515 Five-thread overedge safety stitch



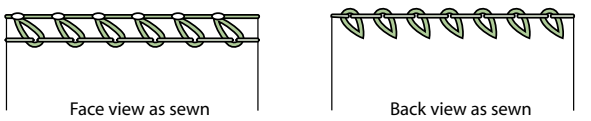
503 Two-thread overedge stitch with single purl on edge



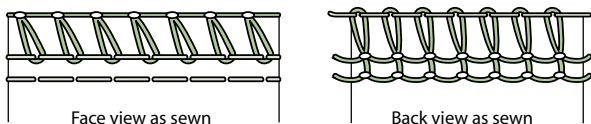
504 Three-thread overedge



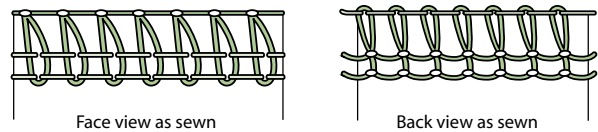
504 Three-thread overedge (face and back views)



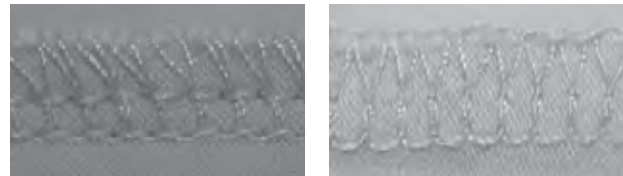
505 Three-thread overedge with double purl edge



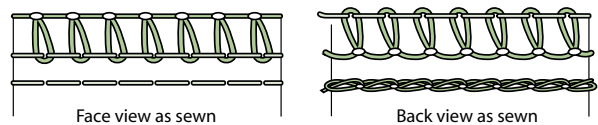
512 Four-thread overedge mock safety stitch



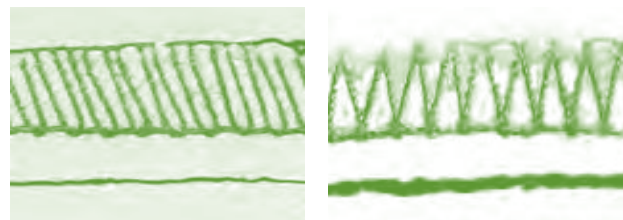
514 Four-thread overedge stitch



514 Four-thread overedge stitch (face and back views)



516 Five-thread overedge safety stitch



516 Five-thread overedge safety stitch (face and back views)

COVER STITCHES (600 CLASS)

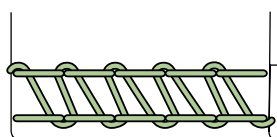
A category of stitches produced by interlooping two or more groups of threads whereby two of the groups of threads enclose the raw edges of both surfaces of the fabric plies. Threads are cast on the surface of the material and then interlooped with loops of thread formed on the backside of the fabric. Stitch formation, size, bite, and spacing vary according to different machines and the type of fabric or effect desired.

Cover stitches are used for:

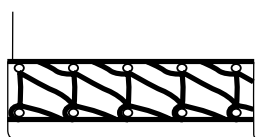
- Main seaming on knitted garments
- Decoration
- Main seaming on tight-fitting garments such as swimwear, shapewear, thermal underwear, and athletic apparel
- Sewing *flat seams*

The 600 class contains stitch types 601 through 607. The most commonly used stitches within this class are:

- 602 Two-needle four-thread cover stitch
- 605 Three-needle five-thread cover stitch
- 607 Four-needle flat seam cover stitch



Face view as sewn



Back view as sewn

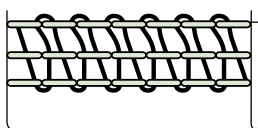
602 Two-needle four-thread coverstitch



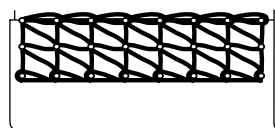
602 Two-needle four-thread coverstitch (face view)



602 Two-needle four-thread coverstitch (back view)

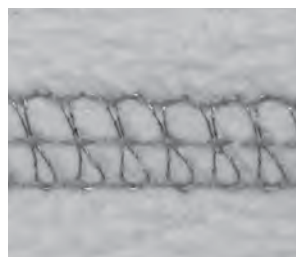


Face view as sewn



Back view as sewn

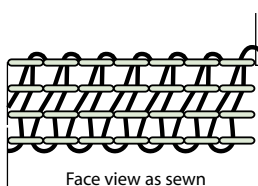
605 Three-needle five-thread coverstitch



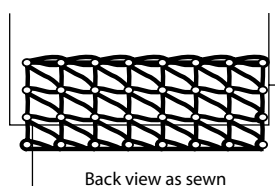
605 Three-needle five-thread coverstitch (face view)



605 Three-needle five-thread coverstitch (back view)



Face view as sewn

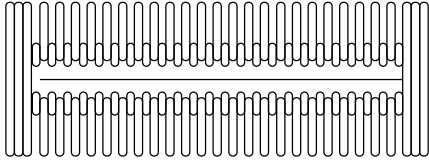


Back view as sewn

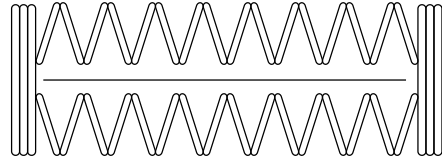
607 Four-needle flat seam coverstitch

BUTTONHOLE STITCHING

Stitched buttonholes are formed using purl or whip stitching. *Purl stitching* provides a range in appearance from very fine to coarse, depending upon the thread Tex selected. *Buttonhole gimp* or *reinforcement cord* is used for eyelet buttonholes to maintain shape and provide structure. Purl stitching is formed by a single needle thread that passes through the center of the buttonhole where the bobbin thread becomes entangled as the needle position moves from side to side. *Whip stitching* is a zigzag lockstitch that is formed by a single needle thread and a bobbin thread that interlace as the needle thread position moves from side to side. The stitch density is much higher for purl stitched buttonholes. The style of the buttonhole can vary from straight, eyelet-end, no-eye, or imitation (mock). Regardless of the buttonhole style, all ends must be tacked to avoid stitches from pulling out.



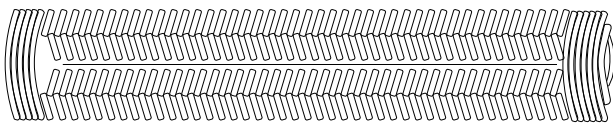
Straight buttonhole with purl stitching



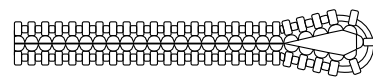
Straight buttonhole with whip stitching

Buttonholes are classified into two cut type constructions, cut-before or cut-after stitching. *Buttonholes cut-before stitching* commonly range in length from ½ inch (1.27 cm) to 1¾ inches (4.45 cm). This method produces a high-quality buttonhole that is very clean and consistent in appearance because the stitching covers the raw edges of the cut fabric. Buttonholes cut-before stitching are more expensive to produce and utilization is limited to bridge and designer priced garments sewn with fusible interlinings that provide enough stability to maintain their shape during stitching.

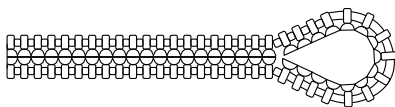
Buttonholes cut-after stitching typically range in length from ½ inch (1.27 cm) to 2 inches (5.08 cm). This method is the most common type of construction used for budget, moderate, and better priced garments and can be used on any knitted or woven fabrics regardless of softness, firmness, or interlining type. Buttonholes cut-after stitching do not always provide a clean smooth appearance and can sometimes show threads that were severed during the cutting process or yarns from the fabric that remain in the opening of the buttonhole due to a dull knife blade or improper machine settings.



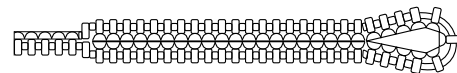
Straight buttonhole with flat square tacked ends



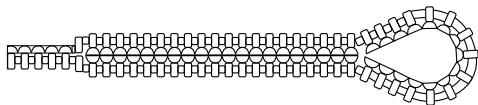
No-eye buttonhole with straight finished end



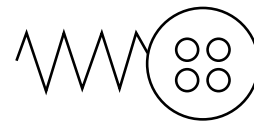
Eyelet-end buttonhole with fly bar tacked end



No-eye buttonhole with fly bar tacked end



Eyelet-end buttonhole with straight finished end



Imitation buttonhole

STITCH CONFIGURATIONS FOR ATTACHING BUTTONS, SNAPS, AND HOOKS AND EYES

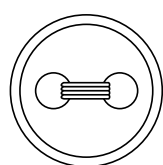
The number of stitches used for attaching buttons, snaps, and hooks and eyes varies from 6, 8, 12, 16, 24, or 32 stitches. The most commonly used stitch densities are 8, 16 or 32 stitches. Fabric weight and the number of holes in the button, snap or hook and eye determines the number of stitches used to attach it to the garment. See Table 24.1 for commonly used stitch densities by fabric weights.

TABLE 24.1
Commonly Used Stitch Densities by Fabric Weights

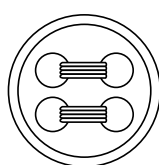
Fabric Weight	Stitch Densities
Extra light weight 1 to 3 oz/sq/yd (33.91 to 101.72 g/m ²)	• 6 or 8 stitches for hooks, eyes, snaps, and two hole or four hole flat or shank buttons
Light weight 4 to 6 oz/sq/yd (135.62 to 203.43 g/m ²)	• 8 stitches for hooks, eyes, snaps, and two hole flat or shank buttons • 16 stitches for four hole flat buttons
Medium weight 7 to 9 oz/sq/yd (237.34 to 305.15 g/m ²)	• 16 stitches for hooks, eyes, snaps, and two hole or four hole flat or shank buttons
Heavy weight 10 to 12 oz/sq/yd (339.06 to 406.87 g/m ²)	• 16 stitches for hooks, eyes, snaps, and two hole or four hole flat or shank buttons
Extra heavy weight 14 to 16 oz/sq/yd (474.68 to 542.49 g/m ²)	• 16 stitches for hooks, eyes, snaps • 16 or 32 stitches for two hole or four hole flat or shank buttons

A **crossover stitch** is a single stitch that appears on some four hole flat buttons that are continuously stitched in one operation. The crossover stitch is taken in order to move from one stitching area of the button to another. Crossover styles include C, S and Z. The most commonly used stitch configurations for buttonhole, snap, and hook and eye attachments include:

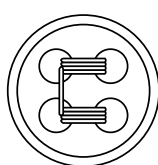
- Two hole vertical or horizontal stitching
- Four hole parallel stitching with or without a crossover stitch
- Four hole X pattern stitching with or without a crossover stitch
- Shank button with or without a stay button
- Button with neck wrapped thread shank



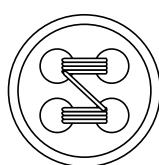
Two hole flat button with horizontal stitching



Four hole flat button with parallel stitching



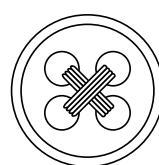
Four hole flat button with parallel stitching and C style crossover



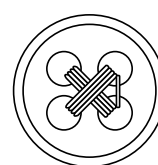
Four hole flat button with parallel stitching and S style crossover



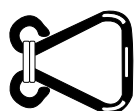
Four hole flat button with parallel stitching and Z style crossover



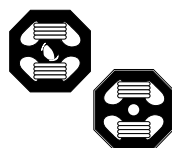
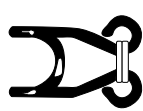
Four hole flat button with X pattern stitching



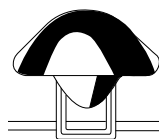
Four hole flat button with X pattern stitching and vertical crossover



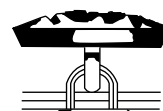
Hook and eye stitching



Snap with parallel stitching



Shank button with a stay button



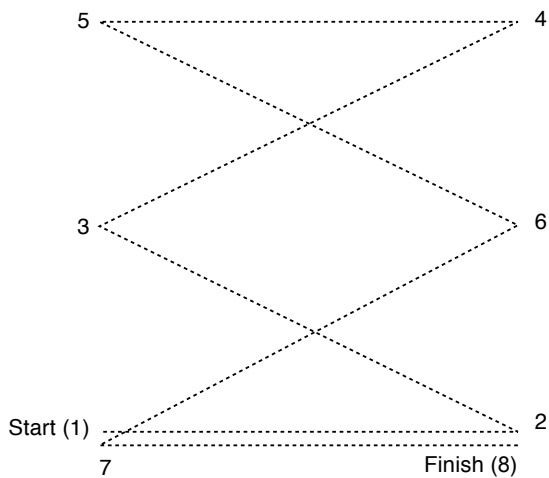
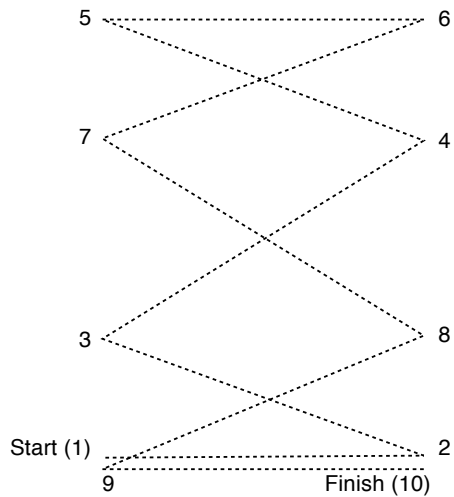
Shank button without a stay button



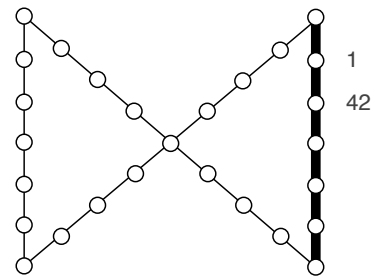
Button with neck wrapped thread shank

REINFORCEMENT STITCHING

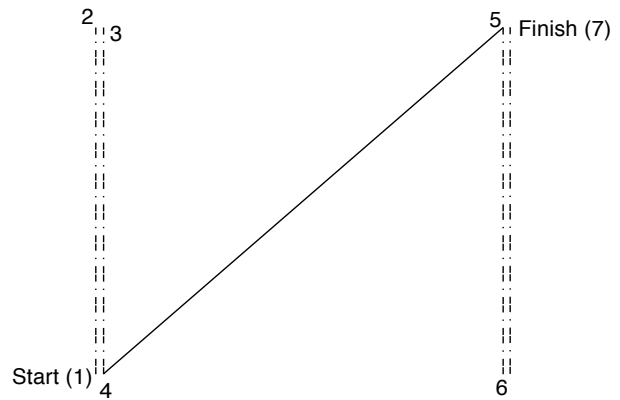
Reinforcement stitching provides increased security and strength in specific areas of garments. Two common types of reinforcement stitching include backstitching and bartacking. **Backstitching** is produced by reversing the stitch direction a minimum of three stitches at the beginning and ending of a stitch line to prevent stitches from unraveling causing *runback* and to provide additional strength. **Bartacks** are formed by a series of *whip stitches* used at the beginning or ending of stitch lines for attaching and securing belt loops or straps, for reinforcing pocket openings, side seams, fly closures, or buttonholes. Bartack applications may consist of 14, 21, 28, 36, 42, 56 or 64 stitches and can be formed using a W, X, Z pattern.



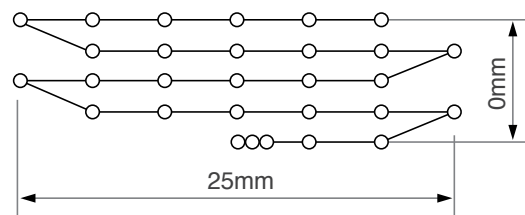
W bartack



X bartack



Z bartack



Beltloop bartack

PRODUCTION SEWING EQUIPMENT

Garment production requires a variety of machines to produce different types of stitches, seam constructions, and stitching details. Industrial sewing machines are characteristically designed to produce one type of stitch.

Bartacking Machine A sewing machine that produces a tightly packed zigzag stitch to reinforce areas of a garment that need extra strength. Bartacking machines are used for securing:

- Belt loops
- Pocket openings
- The base of fly front closures on jeans



Bartacking machine

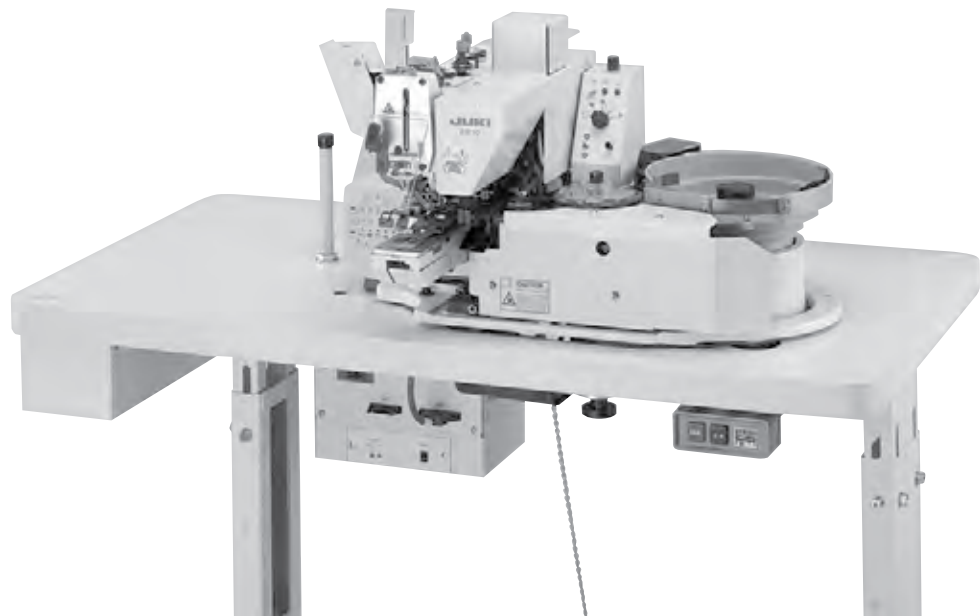
Buttonhole Machine A sewing machine that produces a stitched buttonhole. Buttonhole machines can produce:

- Stitched buttonholes
- Keyhole buttonholes
- Stitched eyelet holes



Buttonhole machine

Button Sewing Machine A sewing machine that stitches a button or sew-on snap to a garment.



Button sewing machine

PRODUCTION SEWING EQUIPMENT (continued)

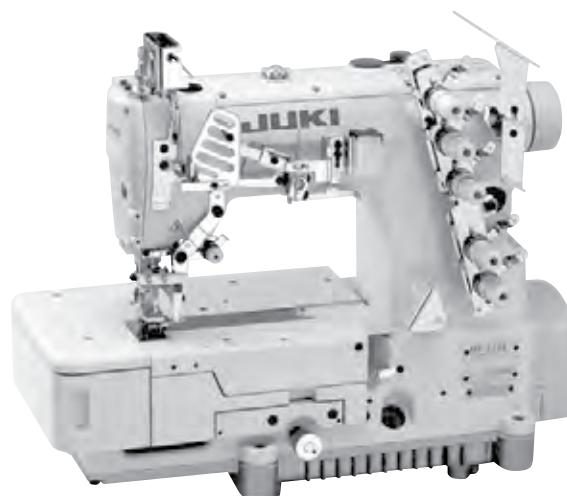
Chain-Stitch Machine A sewing machine that produces stitches formed either by one looper thread or by a looper thread and needle threads. Varieties of chain stitch machines include:

- Blind stitch
- Single-needle chain-stitch basting
- Flat-bed two needle double chain stitch
- Feed-off-the-arm lapseamer
- Feed-off-the-arm double chain stitch
- Feed-off-the-arm four-needle double chain stitch
- Feed-off-the-arm four-needle flatseamer



Chain-stitch machines

Coverstitch Machine A sewing machine that produces stitches formed by a looper thread and multiple needle threads that joins two plies of fabric while covering the raw edges.



Coverstitch machine

Lockstitch Machine A sewing machine that produces a series of straight stitches formed by interlocking a bobbin thread and needle thread. A twin needle can be inserted to create parallel rows of stitching simultaneously. Varieties of lockstitch machines include:

- Single-needle lockstitch
- Double-needle lockstitch
- Single-needle zigzag lockstitch



Lockstitch machine

Overlock Machine A sewing machine that forms stitches over the edge of a seam. When the fabric is passed through the machine, it stitches over the raw edges. Some machines are equipped with a knife blade that cuts the unneeded seam allowance away, then stitches over the cut edge.



Overlock machine

Reference

American Society for Testing and Materials. (2011). *2011 annual book of ASTM standards* (Vol. 07.02). Easton, MD.