TALLINNA TEHNIKAKÕRGKOOL
TTK UNIVERSITY OF APPLIED SCIENCES

Darja Bon

MEN'S DRESS TROUSERS WORKMANSHIP

THESIS

Faculty of Clothing and Textile

Technical Design and Technology of Apparel

Tallinn 2014

TABLE OF CONTENTS

INTRODUCTION

The main aim of current thesis is to create a men’s dress trousers workmanship manual for apparel and textile technology students. The manual is written in English, so professional vocabulary is applied throughout the work and introduced for non-native English speakers. The aim of the thesis is not to provide innovative manufacturing techniques, but to give an overview of what is offered in retail nowadays.

The topic was given by Hochschule Albstadt-Sigmaringen by the request of author. Manual is made to complete Men’s Manufacturing laboratory project, which is currently covering men’s suit jacket workmanship. Workmanship manual is also a part of integration opportunity for non-german speaking textile and apparel faculty exchange students, who can take part of more speciality lectures. However origin of student is not relevant, because everyone who is working in garment industry and is dealing with manufacturing and foreign factories, can find this topic relevant for themselves.

Thesis consists of three main parts. First part describes the overall design of trousers. Design of style is based on men's dress trousers selection in the retail stores. Pants offered in shops are investigated. Also available respective tailoring literature, is studied. As the result the most common pant design is determined. Choice was made based on silhouette, front and back pockets and the waistband workmanship. This chosen men's dress trousers workmanship is described in following work. In design chapter detailed sketches of trousers are shown and described. Technical description of the final trousers style is provided.

Second part part of the manual, shows the pattern creation process of trousers. A basic pattern of pants is developed and creation method is described. Pattern is finalized after amendments of first fitting are applied. Pattern piece creation is crucial when choosing a workmanship, so student knows how to create their own pattern pieces. All patterns are made using Gerber Technology Pattern Design program. And sketches drawn with Adobe Illustrator and Kaledo style by author.

In the third part, the workmanship of trousers is introduced. Step by step sewing technology is described and cross-sections are shown where needed.

As a summary of thesis, the results are outlined and suggestions pointed out.

1. DESIGN OF TROUSERS

1.1. Anatomy of Men's Trousers

Essentially all dress trousers are alike. They have split lined waistband, fly front, back and front pockets and they are lined to the knee.

Most common are the flat front trousers with French fly, slanted front pockets and single- or double- welted back pocket. This design is widespread and popular, due to its clean silhouette, easily accessible front pockets and triple closure front which keeps the stress off the zipper and easy workmanship. This style is popular within all price ranges, with main difference of materials and finishes.

Waistband of dress pants is always lined. The prevailing style is clean finish, which implies as less visible stitch lines as possible. Back pockets on dress trousers are always set in pockets as patch pockets are never used for dress pants. Most common style is buttoned through double welted back pocket, which comes with or without a tab. Second most common style is single welted back pocket. And rarely seen but worth mentioning is a slashed pocket with a flap.

Second popular style is with on-seam side pockets and welted back pocket with a tab. The main difference from previous style, is on the waistband. Trousers don't have extended waistband tab, that is why fly shield closure is on the level of waistband to give maximum support possible for centre front.

Trousers with pleated front have lost their popularity. Since most of the suits are slim cut, pleated trousers are seldom sold. Pleats can be seen mostly on tuxedo pants, because traditionally they are worn on natural waist. The concept of pleated trousers has changed over the years. Pleats were originally added to obtain comfortable width for wearer and accentuate creases. These days some brands are adding pleats to slim fit low rise pants, which makes wearers hips look wider and pleats pull open.

"The details of the cut of a pair of trousers vary from season to season, and in addition the basic cut changes about every ten years" [1]. Pants come flat front (also called plain front) or with single-, double- or tripple pleat (Figure 1).

Style and silhouette is determined mostly by the cut of the suit and wearer's body type. "If the pant is sold as a part of a nested suit, then the cut of trousers relates to proportion and silhouette of the garment" [3]. Silhouette of pleated trousers is wider, whereas flat front trousers can be cut close to the body.

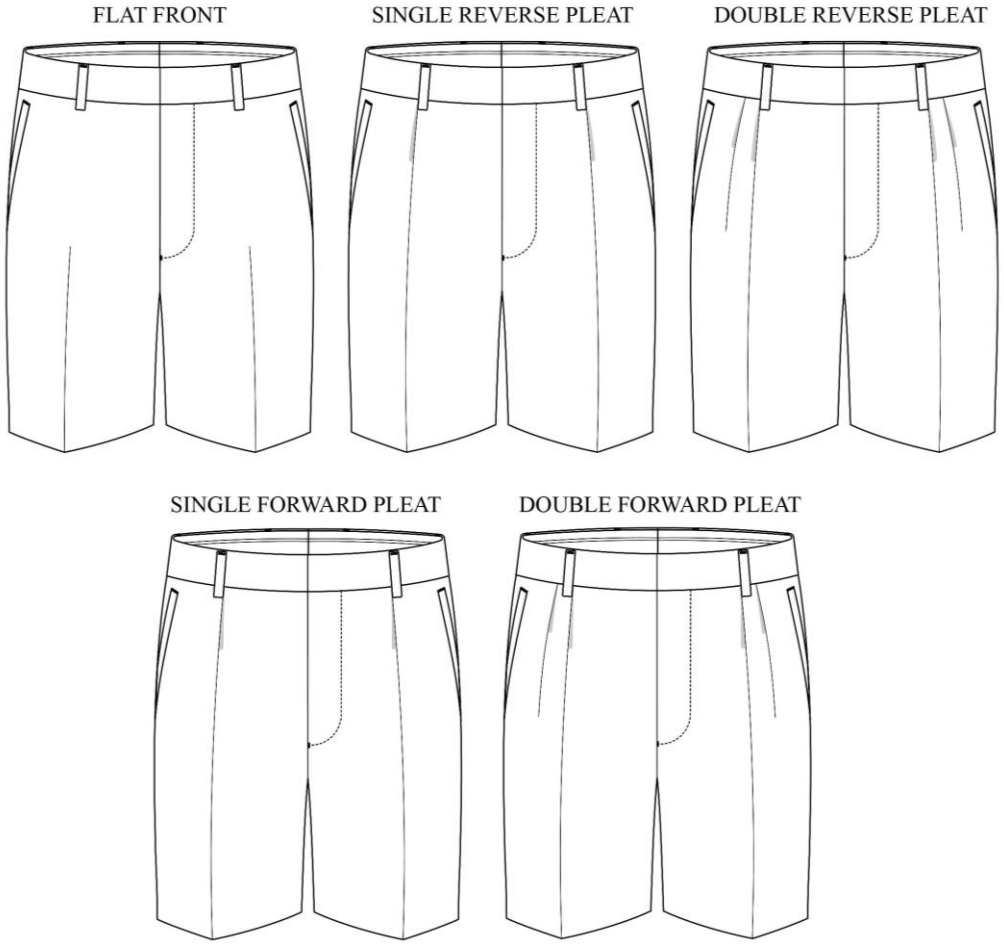


Figure 1. Trouser fronts

"Flat front trousers are considered more modern, but pleats will be a touch more forgiving should your waistline expand over time." [2] For large men, with thick thighs and wider waist, pleated trousers are considered more flattering, while fit body type is believed to look good in all trouser silhouettes. For better understanding of design and construction elements of trousers, it is important to give an overview of main components of men's pants. Figure 2 shows outer details of men's trousers, the illustration is explained in table 1.

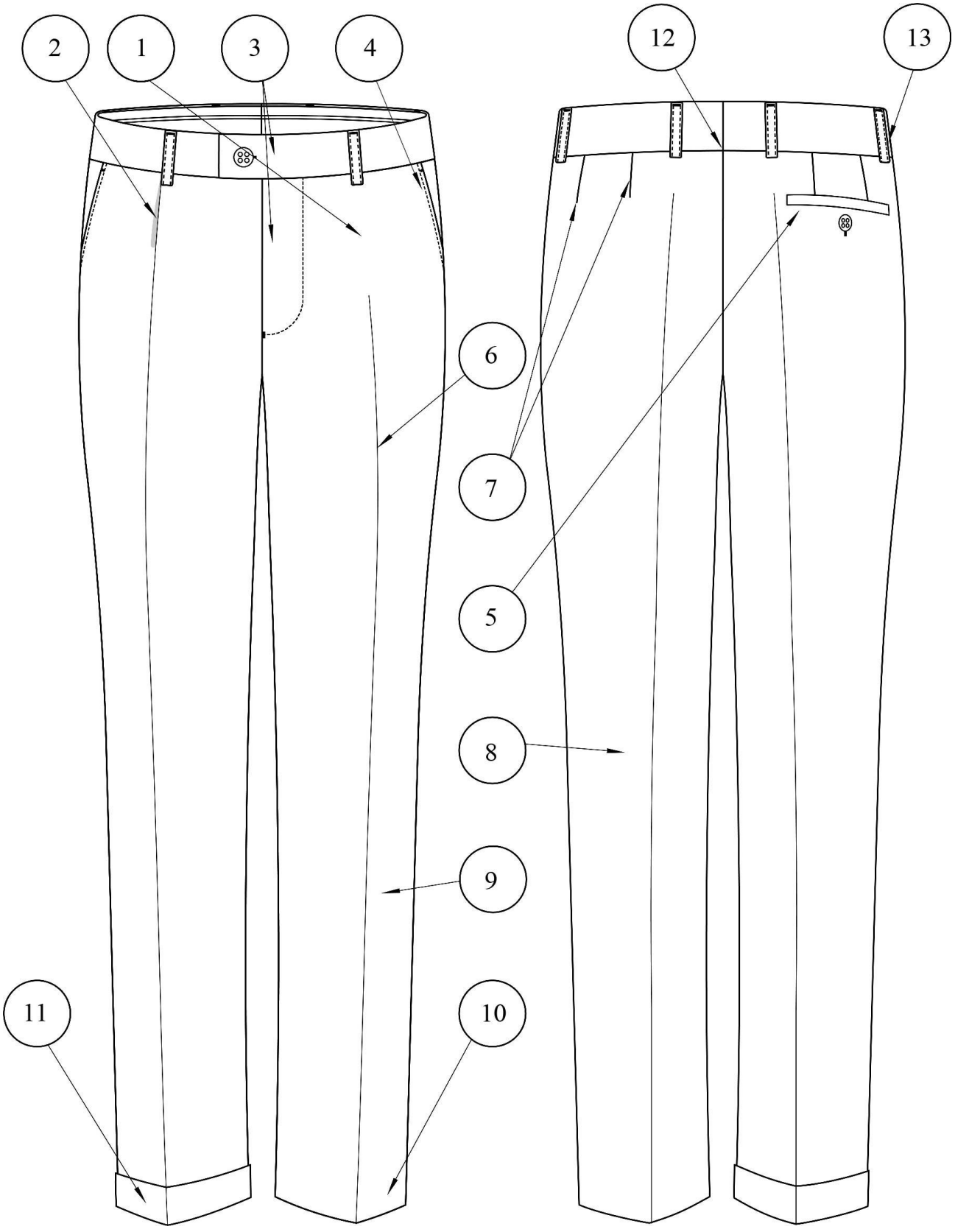


Figure 2. Trousers outer details

Table 1

Men's trousers outer details

No	Detail	Characteristics
1	2	3
1	Flat front	When silhouettes started to slim down and waistlines got lower, plain front trousers became the most popular pant style offered in retail. Historically, pants were never worn on hip, even when they were cut slim. Influence of the trend that started in 1990s, which implied wearing trousers on hipline rather than waist, also impacted the steady design of men's dress attire. Therefore it is believed that flat front is more usual for modern slim-line suits. Trousers waistline is usually lowered from natural waistline and lacks of shaping elements on the waist (darts or folds). The term flat front is not used for active wear or jeans [4]. It is only used for describing dress pants.
2	Pleated front	Pleats are folds in the fabric folded at the waistline below the waistband. Trousers with pleats must be worn on the waist, not the hips, or the pleats will pull open. [3] For the same reason, they need to be fuller in the thigh, with legs that taper to a narrower ankle, which makes them generally inappropriate for contemporary slim-cut suits. [2] Nowadays, if trousers have pleats, then usually, it is one pleat to each leg. However two and three pleats on each side is also considered as a norm, although in case of three pleats, it would be considered very fashion- forward and flamboyant, thus not very suitable for business attire. [3] Forward pleated pants can be single-, double- or triple pleated. Forward pleats are considered as an obsolete style, and are associated with English cut, since they preferred to wear forward pleats because they considered this pleat style to fall more elegantly and make crease sharper. These days, if one wishes to have forward pleats, they have to be added to bespoke trousers, because stores seldom sell this style. Reverse pleat is the most common style these days for pleated trousers. In this style pleats open toward side seam. If any pleated styles can be found in retail, then it is single reverse pleated trousers, which create near flat-front effect. This style gives the wearer enough ease for movement, while still looking relatively plain like flat front pant. “For a good fit pleated trousers should be worn on natural waistline. Well-placed pleats, help pants drape better and make legs look longer” [6].

Table 1 continued

1	2	3
3	Front fly	"Fly is a fabric flap that hides the closure system of a garment /.../ the fly presents a smooth appearance and conceals the buttons, zippers etc"[4]. "On menswear, the zipper laps left over right. The zipper is sewn to a separate facing on the overlap and to fly shield on the underlap. This combination of a wide fly, a separate facing, and a fly shield produces a stronger, more durable placket" [9]. Most common fly style for dress trousers is the French fly. It is a trousers closure with zip that has extended tab waist and interior anchor button (sometimes also called jigger button). "The zipper is attached to an extended waistband, which takes stress off the zipper and ensures that the front lies flat" [3]. Fly can also be with buttons instead of a zipper on centre front, but it's considered more of an old tailoring style. Because it is known that many tailors are avoiding any synthetic or metal fastenings in their suits. Most trousers in mass production are still with French fly, and it is so for a reason. This placement of fasteners give great support for zipper and front of trousers, because it is the point on the garment which is getting a lot of pressure from fluctuating waistline, sitting and pulling, while this centre front is also always on display. These days, trousers rarely have buttons on the waistband, especially ones with extended waistband and are closed with hook-eye closure, to achieve complete plain and seamless clean look.
4	Front pockets	Men's trousers have two front pockets. Most common style is slanted pocket, which is sometimes also called quarter-top- and French pocket. Nowadays, almost all the trousers in retail have slanted front pockets. Set-in pockets- single or double welted, are also used. Another common style is also on-seam pocket. On-seam pocket is a type of pocket located directly on the seam of the pants. [3] There is no general rule about keeping hands in trouser pockets, however in Germany it is regarded as bad manners, while English men can feel free keeping their hands in (front) pockets without seeming rude and inappropriate. [1] However, bulkiness from keeping all of man's belongings in pockets is never flattering and should be avoided.

Table 1 continued

1	2	3
5	Back pockets	Back pockets, sometimes called besom pockets, can be on the back of both sides of the trousers, or only on wearer's right. Hind pockets may vary, but they are always slashed (also called slit, jetted or set in) pockets. It means that pocket is inserted on garment through a slash in shell fabric. Back pocket can be: • single welt button through pocket; • double-welted button through pocket (with a working buttonhole or a button tab) • welt pockets with a flap. In retail, when slashed front and back pockets do not have buttons or a tab for closure, the pockets are stitch closed, so they will not stretch while trying in store and to keep a neat and clean look.
6	Creases	Crease runs along centre front grain line of the trousers. It is not known how creases first appeared, however it happened in the first decade of 20th century. [8] On flat front trousers crease is preferably pressed from thigh line height (about crotch level) to hem, along centre of the leg. This kind of pressing is widely used, because thigh is flattening the crease, creating an untidy look. Creases on back legs run along centre leg usually until lower edge of the back pocket. On pleated trousers the crease runs from waistband to hem being on the edge of trouser pleat, fold will keep crease sharp, and ease width in trousers will not straighten the crease.
7	Back darts	Trousers have one or two darts on back trouser. Depending on wearer's body shape, needed depth of a dart is applied.
8	Back trousers	Back half of the trouser leg
9	Front trousers	Front half of the trouser leg. Front trouser is always lined to the knee.
10	Plain hem	Trouser bottom is finished with a plain hem or a cuff. Plain bottoms are associated with flat slim cut pants, however they can also be often seen on pleated trousers of English suits. General rule with plain hem bottoms is that they do not have a visible stitch line on the outside, all the hemming is done with blind-stitch. Seam allowance is around 4,0 cm high to provide additional lenght if alteration of pant lenght is needed.

Table 1 continued

1	2	3
		Traditionally cuff-less trousers are worn with a slight break on front crease. Break is a point where the pants leg hits the instep of the foot. [4] A perfect unbroken crease means that pants are too short." The hem should slope slightly downward toward the heel, stopping about 2, 5 cm above the shoe welt" [2]. Width of trouser bottom should cover the shoelaces. Some trousers can come with open bottom, it means that pant legs do not have finishing (neither cuff nor hem) and the length can be adjusted for wearer's needs.
11	Cuff	The cuff, or turn up, as they are called in British English, is a folded-back continuation of the pants leg. "Cuffs, which go in and out of fashion for business attire, generally range from 3,0 to 5,0 cm, remaining the same depth around the leg of the pant but being canted ever so slightly in the front to allow for what, in an un cuffed pants leg, would be the break against the shoe. The general rule for depth is: the taller the man, the deeper the cuff" [4]. Trousers with cuffed hem, make one appear look shorter, as any vertical stripes on clothes do. Thus it is believed, that shorter men should avoid cuffs. "Turn- up is a nice addition, if one's pants have folds, because a cuff's added weight keeps your pant creases sharper and straightens the trouser leg" [2]. However it is not a rule that pleated trousers have to be cuffed, nor it is a rule that cuffs should not be added to flat front trousers." Only trousers that should never be cuffed are ones worn with morning coat, tuxedo and tailcoat" [1]. A cuff requires extra material to create and therefore adds more weight to the trouser leg, making the trousers hang and drape very well from the wearer's body. And, of course, it adds additional costs to make because it increases the fabric consumption.
12	Split waistband	The main difference between men's dress- and casual pants, or women pants, is that dress pants have lined split waistband. Seam allowance (also called outlet) on seat seam is uneven, it tapers toward fork seam. Upper part of seat seam is adjustable due to the outlet, giving the opportunity to change the pants on the back and waistline if needed.
13	Belt loops	„Narrow, vertical strips of cloth that are attached to form loops over the waistband of pants to help secure the positioning of a belt. Usually pants feature five to seven loops made of the same fabric as the rest of the pants. Not common in ready-to-wear pants before World War I, when the practice of wearing suspenders was prevalent" [4]. Usually six loops are the norm, but some trousers also have 7 loops it can be a designers choice, but also men with wider waistline might need more belt loops to keep the belt in place.

Table 1 continued

1	2	3
13	Belt loops	Usual placement of belt loops is: • Two in front, next to the crease; • On hind leg detail next to side seam, or 1,0- 2,0 cm towards center back; • Two on back, where it is more suitable for better support of the belt; • In case of 7 belt loops, 7th belt loop is sewn on center back on the waistband split. It is a known rule, that when trousers have belt loops, a belt should be worn. Some trousers have adjusters on waistband next to side seam. Pants with adjusters are rarely seen in retail and is considered a tailoring detail, thus only luxury fashion brands like Hugo Boss, Brooks Brothers and similar brands, are using this detail. Adjusters are also added on tuxedo pants, because no belt is worn with formal wear.

Trousers have a lot of details on the inner side. Figure 3 shows details of men's trousers on the inside. Illustration is explained in Table 2, which is also giving a short overview of their purpose.

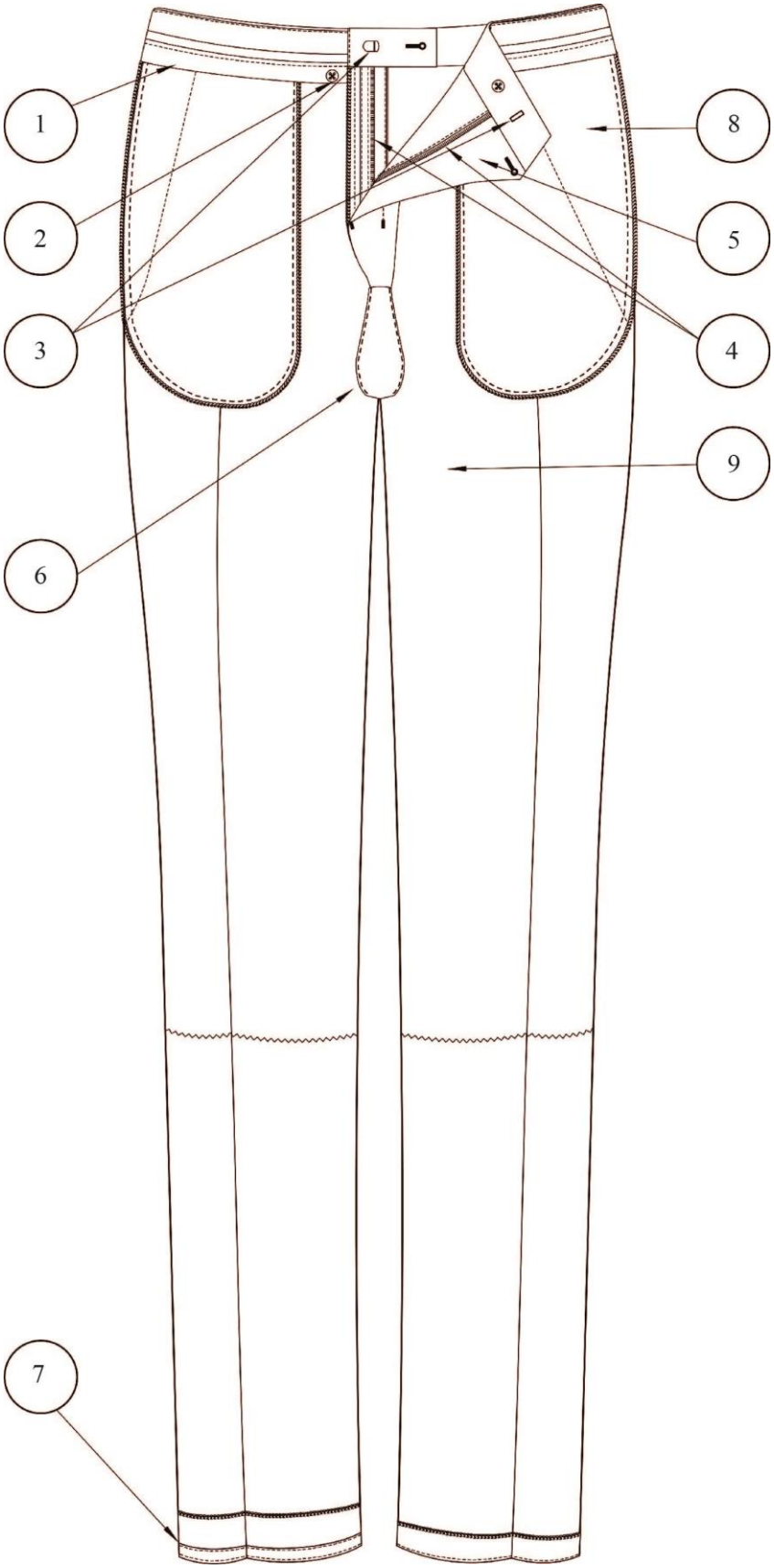


Figure 3. Men’s trousers inner details

Table 2

Men’s trousers inner details

No	Detail	Characteristics
1	2	3
1	Waistband lining	„Waistband is lined to maintain its shape“ [2]. Waistband lining is usually made from bias pocketing fabric, often with a satin strip and pick stitching for decoration and with a stiff woven non-fusible interlining in between layers of shell fabric. Retailers offer trousers with different waistband lining solutions- from very cheap, which do not have a lower flap, so one can see seamline from sink stitching in waistband seam shadow; to more expensive with rubberised ribbon sewn into the lining, to keep wearer's shirt tucked in, and a flap, that hides all waistband seams.
2	Anchor button	Anchor button is situated inside trousers on the waistband. Its position depends on the fly shield. The button can be on the lower part of the curtain fold or on same level with front button or hook. When situated on the same level with waistband closures the support is greater and tension of front closure is divided more evenly, it may cause bulkiness and uncomfort when wearing. When anchor button is placed on the lining of the waistband, the button is less protruding and front of the trousers is sharper, only misadvantage of this placement is the possibility that it is not as firmly attached as on waistband.
3	Hook and bar closure	Hook and bar closure provides cleaner look, by giving the support of the button, but stays unseen on the front of the waistband. Hook and bar closure is very popular nowadays, almost all brands are using it, paired with belt loops without visible stitchlines and slanted pockets without topstitching. The reason for it is that it provides sleek and clean finish, that is so higlhy valued.
4	Zipper	Zipper is attached to fly, it enables wearer to open and close fly more easily and also is flatter and stronger than buttons. Historically, before 1830s, instead of a fly, trousers had a fall, which was a rectangular fabric flap on front, fastened with buttons. However zippers came into wide use after 1930ties. [4]. On men's dress trousers, most commonly a tonal coil zipper with a plain puller is used.

Table 2 continued

1	2	3
5	Fly shield/ fly bearer	Fly shield has many functions, it prevents wearer from direct contact with the zipper. Also balances pressure evenly on the front providing smooth and clean front with a help of an anchor button. Fly shield is sometimes also called a bearer, as a reference to its anchor button and zipper bearing function.
6	Fork lining	Fork lining adds comfort for wearer, with covering fork seam allowances, prevents fraying between legs and, provides clean finish to inside of the trousers.
7	Bottom kick tape	Trousers bottom tape is used to prevent bottom from fraying. Bottom tape is added to trouser bottoms when bottoms are plain hemmed. Tape can run around bottom opening or only be situated on hind trouser bottom part.
8	Pocket bags	Pocket bags are made from tightly woven cotton fabric. The colour should complement or be tonal with other parts of inside trousers, usually it is the same colour as waistband lining and fly shield lining. Raw edges of pockets can be finished with a binding, French seam, lockstitch and overedge stitch combination or a safety stitch. The choice depends on the inner design of trousers and price range of the product. Many companies, like Zara and H&M are using polyester silky fabrics for dress trousers pocketing, on more expensive trousers tightly woven cotton pocketing fabric is used as it is more durable. Front and back pockets should have the same edge finish.
9	Knee lining	"Trousers of good quality are lined down to the knee" [1]. „The lining ensures durability and comfort“ [2]. Usually the most suitable lining is made from viscose, it is smooth and skin friendly. To lower the cost, many companies are using polyester for lining. Sometimes acetate is used, but it is least desireable, because of its low strenght. Knee lining fabric is 70- 75 cm wide, lower edge finish of the lining can be left with selvage or cut with pinking shears, but never overedged or hemmed. Knee lining is also a part of design element, it is usually in same colour as pocket bags and waistband lining, or the same colour as trousers.

1.2. Materials

Materials have to be chosen according to their function in the garment. For creating trousers three different fabrics are needed: main (or shell) fabric, cotton pocketing and knee lining material. Fabrics and trims are one of the main components in the cost of the garment. Materials have to meet the target price and also quality requirements that are set for the trousers. Therefore fabrics used for a certain style are in correlation with the price of the final garment. When matching fabrics and trims, one has to be attentive regarding several aspects.

Firstly fabrics and trims have to be chosen according to the make of the trousers, considering overall look, target group and final cost. With high quality materials, expensive workmanship, is made. E.g. when fine wool is used for shell fabric, then it is not appropriate to use safety stitch finishing for the pocket bags. Second, materials used together have similar shrinkage percentage, so different parts react to pressing the same way.

Also fibre content, weave and finishing should be kept in mind, since it improves greatly properties of the fibre.

1.2.1. Main Fabric

As dress trousers are a part of a suit, the same fabric as for suit jacket is used for trousers. Most widely used fabric is wool. This fabric from animal fibres is easy to shape because of its keratin build, with steam and heat fabric can be durably shaped. [5] Elasticity of fibre provides a fast recovery from light creasing during wearing and wools hygroscopic nature keeps wearer comfortably dry.

Despite of all the great properties wool has, it dries slowly, and it is not as strong as most of other fibres and therefore not very durable. To increase durability, wool is blended with different fabrics. "Wool is excellent for blending with synthetic fibres, such as polyester, acrylic, and nylon. Both fibres are complemented in the mixture; the tendency to felting is reduced and the aftercare characteristics are enchanced. In addition, durability is improved. So long as the proportion of wool is greater than 50%, then its good clothing comfort properties are retained /.../ Wool is also blended with silk, cotton, and especially with fine hair fibres"[5].

1.2.2. Pocketing Fabric and Knee Lining

Pocketing, shield lining and fork lining are made from the same cotton fabric. This vegetable fibre is chosen because of its suitable properties. "Cotton is very comfortable next to skin because of its fineness and softness“ [5].

Since woolen fabric is elastic and prone to bagging, men's trousers are made with front lining, because knee area is affected the most during wearing, especially sitting. Knee lining is usually made of viscose, it feels comfortable next to skin. Some of the cheaper trousers have polyester lining, which is more durable and cheaper, but less skin friendly than viscose lining.

1.2.3. Interlinings

Primary purpose of interlinings is to reinforce the shell fabric, it prevents details prone to stretching from losing their shape. Interlining should always be chosen in compliance with shell fabric, and tested on main fabric before use.

Two different types of interlinings are used for trousers:

- Fusible nonwoven interlining, with dot coated glue (Figure 5);
- Preforated fusible interlining, with continuous glue coating (Figure 4).

Waistband width is determined by waistband interlining. Preforated fusible interlining of trouser waistband is with continuous glue coating, it is creating a stiff and durable finish and preventing waistband from curling. Perforation slots are for shaping a straight waistband, since by these slots seam allowances are folded.

Fusible nonwoven interlining with dot coated glue is for strenghtening pocket openings, fly front, -facing and -shield. Also pocket welts are stabilized with fusible interlining. Dot coating retains elasticity of fabric, so it is not seen on the outer side of the garment. For pocket mouth openings, it is better to use stitch bonded interlining, since they are considered very stable. [5]

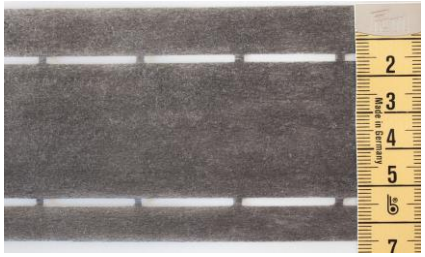


Figure 4. Perforated fusible waistband interlining

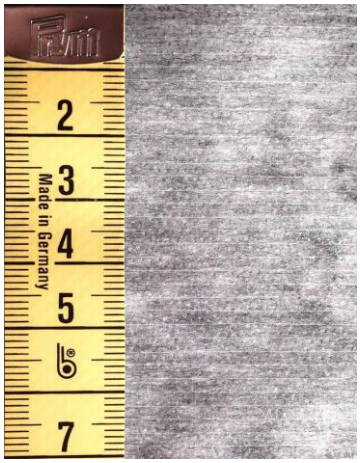


Figure 5. Stitch bonded nonwoven fusible interlining

1.2.4. Trimmings and Fastenings

"A garment is made not only from the apparel fabric but also various accessory items. These have to be chosen in a way that they complement the outer fabric both aesthetically, in terms of decoration, and practically, in terms of ensuring that the garment performs as expected in its intended end use"[5].

For mens trousers special straight waistband lining is used (Figure 6). No pattern piece is needed for waistband lining, it comes in a ban roll and is cut according to lenght and workmanship of waistband, waistband lining is shorter than waistband pattern piece. Lining comes with different constructions, which were described in trousers anatomy chapter.

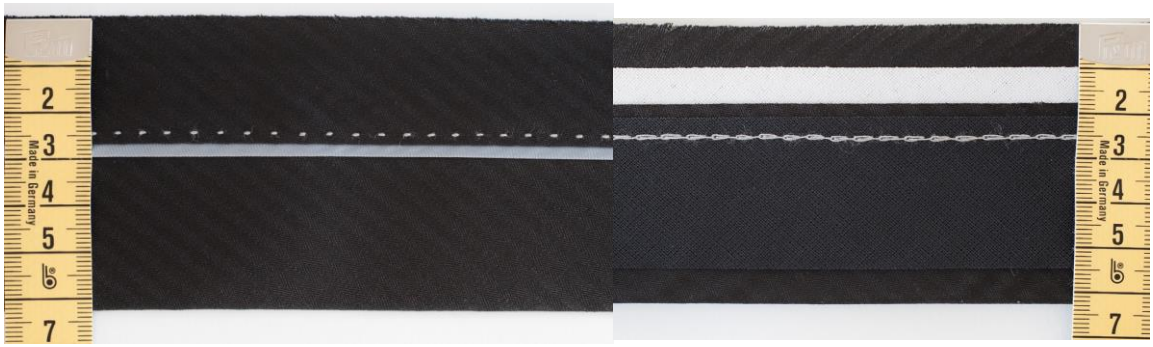


Figure 6. Waistband lining face side (left) and wrong side (right)

Binding tape (Figure 7) is cut on bias and used for finishing raw edges of seam allowances. It provides a clean finish and makes seams lie flat. Binding is usually made of knee lining fabric complements or is tonal with pocketing, waistband and knee lining details.

Figure 7. Binding tape

Plain hems are finished with bottom kick tape (Figure 8). It is a sturdy tape, that provides protection for trouser hems from fraying while wearing. Tape is sewn on with denser edge towards shoe.

Figure 8. Bottom kick tape

Main closure for trousers is a coil zipper (Figure 9) which is situated on centre front. It is from 16 cm to 20 cm long, depending on the position of waist of the trousers, therefore the lenght of the fly.


Figure 9. Coil zipper

Hooks and bars (Figure 10) are used only on waistband (never as an anchor buttotn), instead, or in a combination, with the buttons. It provides a firm and durable closure.

Figure 10. Hook and bar closure

Buttons (Figure 11) are mostly dyed to match (DTM) with trousers. They are seldom in complementary colour on dress trousers. Usually plastic buttons are used, diameter 1,5 cm. Buttonholes for pants are always with an eyelet. Same buttons as on waistband are also used for anchor button and back pocket button.

Figure 11. Plastic sew-through button

Thread used for trousers is DTM and depending on the fabric weight, usually No 120. All threads have to be tonal with fabric they are sewn on. E.g. when sewing pocket facings on pocket bag of different colour, bobbin and needle thread have to be different colour.

For overedgeing, texturized thread can be used. It creates smooth finish, covers raw edges well and will stay unseen and flat when pressing seam allowances.

1.3. Trousers technical description

Men's flat front dress (Figures 12 and 1) trousers with zipper fastening and French fly. Extended waistband is lined on the inside and has double closure: two hook and bars, first on center front and second on the waistband extension. An anchor button is sewn on waistband lining and is fastened to bearer. Six belt loops on the waistband are attached to upper edge with bartacks. Front of the pants is lined to the knee. Trousers have two slant side pockets with topstitching and bar tacks in the

beginning and the end. Trousers have two darts on back and single- welted buttoned through back pocket is on wearer's right. Pant bottoms are finished with plain hem (single turn hem) and kicktape.

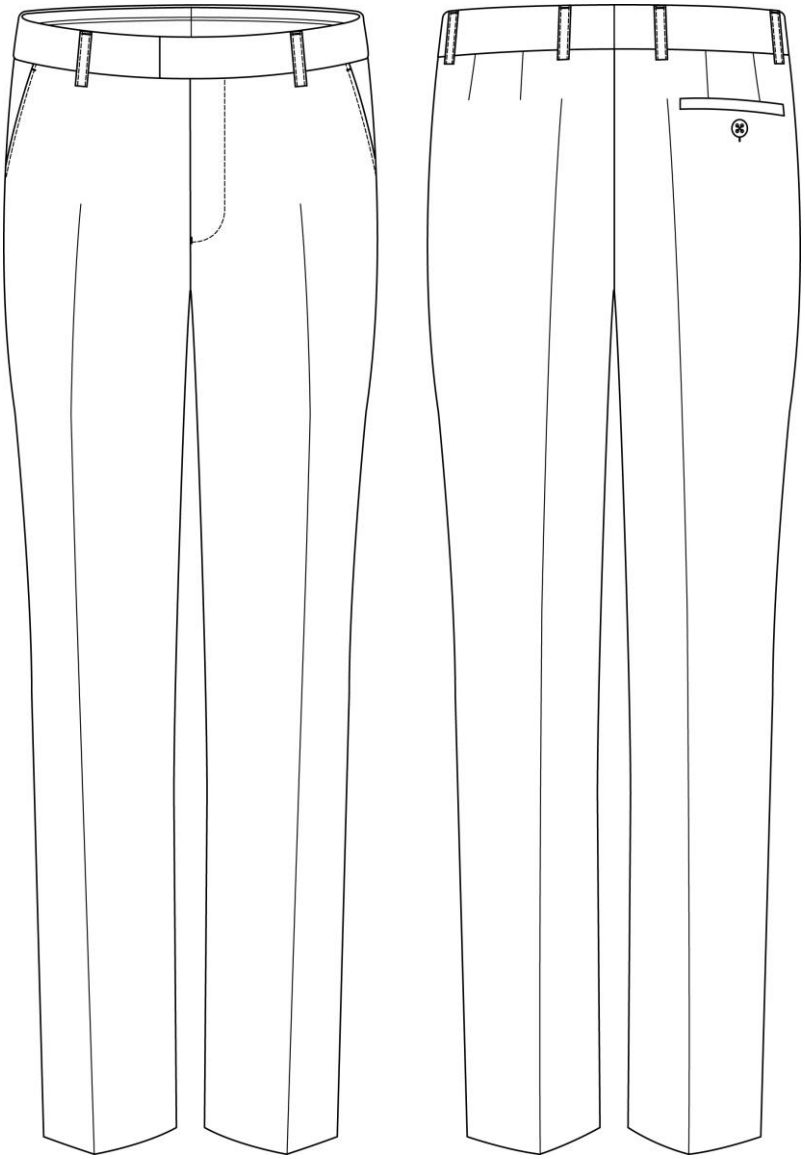


Figure 12. Men’s dress trousers technical sketch

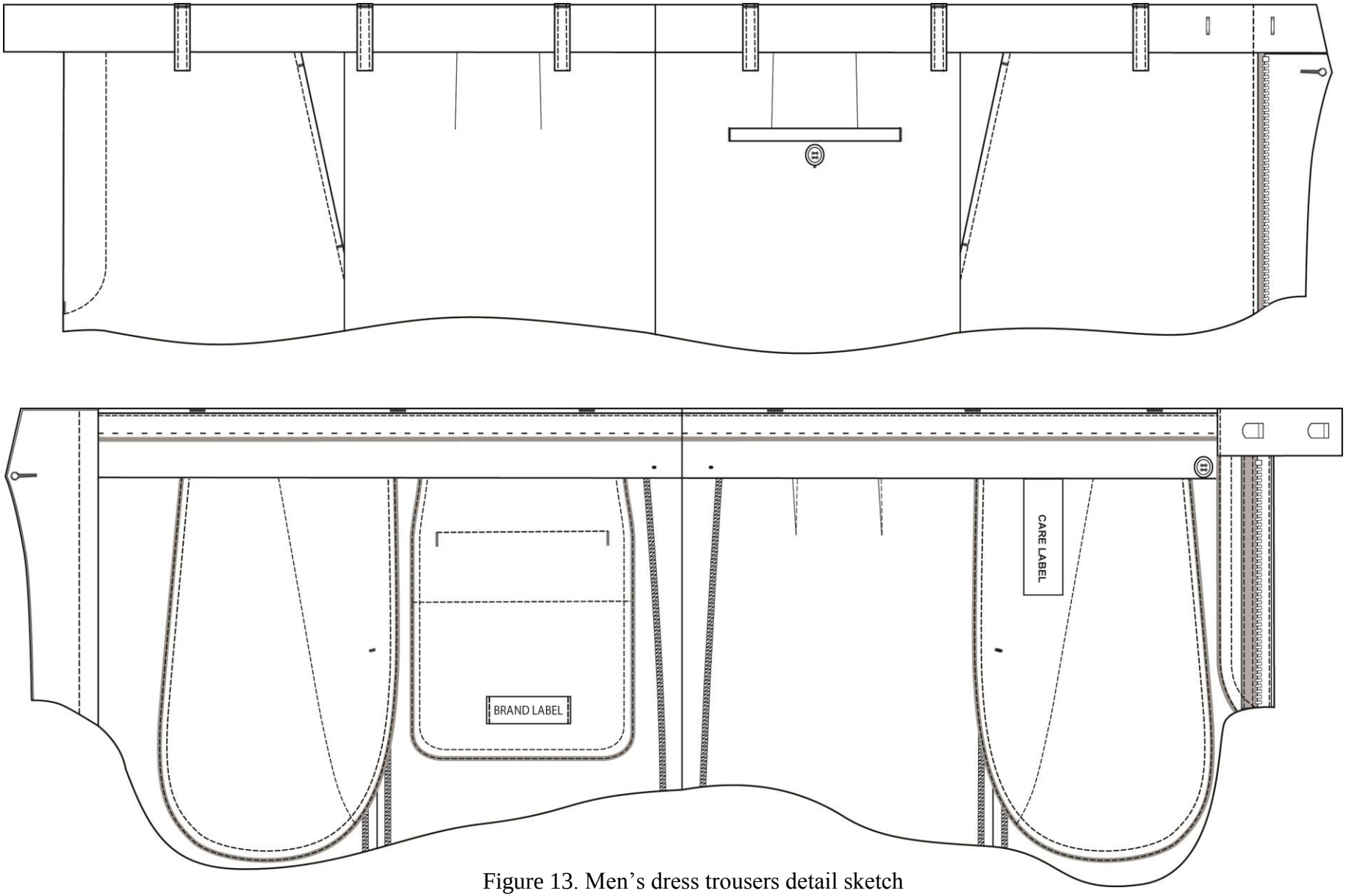


Figure 13. Men’s dress trousers detail sketch

2. PATTERN CREATION

Trousers pattern is based on German pattern drafting system of M.Müller & Sohn. This method is based on proportional calculations of body measurements and therefore it is very precise and garments well fitting.

For trousers a block pattern for German men's size 98 is created. Size is chosen from M.Müller & Sohn's men's measurement chart by request of Hochschule Albstadt- Sigmaringen. Size is labelled as slim body type, which is characterized by slim waist and long legs.

For creating style pattern, a basic pattern has to be constructed. On basic pattern front and back trouser details are created, based on which style pattern and additional pattern pieces are constructed.

2.1. Body Measurements

For pattern creation of trousers, only lower body measurements are required (Table 3). Additional measurements needed for making the pattern are calculated from these body measurements. Calculations are shown in Table 4. To see measuring points for men's bodies, see Appendix 1.

Table 3

Body measurements of size 98. [10]

Point of measurement	Abbreviation	Measurement, cm	½	¼
1	2	3	4	5
Height	Bh	183,0	n/a	n/a
Hip circumference	Hc	102,0	51,0	25,5

Table 3 continued

1	2	3	4	5
Waistband circumference	Wbc	86,0	43,0	21,5
Side lenght	Sl	110,5	55,3	27,7
Inseam	Ins	83,0	41,5	20,8
Rise	R	27,5	13,8	6,9
Knee circumference	Kc	35,0	17,5	8,8

Table 4

Calculated measurements for size 98 basic pattern construction

Measurement	Abbreviation	Calculation	Value	½	¼
Front width	Frw	¼ Hc- 1,5	24,0	12,0	6,0
Seat width	Sw	¼ Hc- 5,0	20,5	10,3	5,2
Front seat width	FrSw	1/10 Hc_2+ 1,0	6,1	3,1	1,5
Back seat width	BkSw	Sw- FrSw	14,4	7,2	3,6
Back width	Bkw	¼ Hw+ 3,5	29,0	14,5	7,3
Overall back width	OBkw	Bksw+ Bkw	43,4	21,7	10,9
Hem width	Hw	n/a	40,0	20,0	10,0
Knee height	Kh	½ Ins + 1/10 Ins - 2	47,8	23,9	11,9

2.2. Basic Pattern Construction

For pattern creation M. Müller & Sohn pattern drafting method of men's trousers with a dart is used. [11] Pants pattern is created without seam allowances, which is a suitable method for constructing pattern with a CAD (computer aided design) program, since seam allowances can be

added after finishing pattern easily. Constructing method is described in Table 5 and created pattern is shown on Figure 14. First front leg of the pant is constructed. On front piece, back leg is created.

Table 5

Men's trousers basic pattern construction method

Section	Direction	Point of measurement	Calculation	Value, cm
1	2	3	4	5
Front				
A-V	↑	Sideseam	Body measurement	110,5
A- K	↑	Knee height	½ Ins + 1/10 Ins- 2,0	47,8
A- S	↑	Inseam	Body measurement	83,0
S- P	↑	Hip height	1/10 Hw_2 + 3,0	8,1
A, K, S, P, V	→	Draw horizontal lines	n/a	n/a
P- P_1	→	Half of the front width	¼ Hw- 1,5	24,0
P_1- V_1	↑	Connect points with a line	n/a	n/a
P_1- S_3	↓	Connect points with a line	n/a	n/a
P_1- P_2	→	Front seat width	1/10 Hw_2+ 1,0	6,1
P_2- P_3	←	Crease line	½ (P_1- P_2)	15,1
P_3- V_4	↑	Connect points with a line	n/a	n/a
P_3- A_1	↓	Connect points with a line	n/a	n/a
A_1- A_2	←	½ leg opening	¼ Al- 1,0	9,0
A_1- A_3	→	½ leg opening	¼ Al- 1,0	9,0
A_2- A_4	→	Tapering side seams	Constant	0,5
A_3- A_5	←	Tapering side seams	Constant	0,5
P- A_4	↘	Connect points	n/a	n/a
P_2- A_5	↙	Connect points	n/a	n/a

Table 5 continued

1	2	3	4	5
K_1- K_3	→	Point for constructing curved side seam	n/a	1,7
K_2- K_4	→	¼ trouser leg width	K_3- K_2	10,5
S_3- S_4	↑	Creating curve of the crotchline	½ (S_2- S_3)	2,8
S_2- S_4	↖	Creating curve of the crotchline	Connect points	-
P_1- P_4	→	Crotchline	Constant	0,5
V_1- P_4	↘	Connect points and lenghten until crotchline	n/a	n/a
V_1- V_2	←	Half of waist width	¼ Wbc + dart (2,0 cm)- 1,5	22,0
V_2- V_3	↑	Start of the side seam	Constant	0,7
V_4- SV	→	½ dart depth	n/a	1,0
V_4- SV_1	←	½ dart depth	n/a	1,0
V_4- SV_2	↓	Dart lenght	n/a	8,0
Back				
A- A_2	←	Widening trouser leg	Constant	2,0
A_1- A_3	→	Widening trouser leg	Constant	2,0
K- K_2	←	Widening trouser leg	Constant	2,0
K_1- K_3	→	Widening trouser leg	Constant	2,0
P- P_1	→	Moving centre back	n/a	1,0
P_1- P_2	←	Side seam position	½ (Tol+ Tosml)	21,7
P_2- S_2	→	Back width	Bkw	29,0
S_2- P_4	→	Back seat width	BkSw	14,4
S- S_1	↑	Hip line starting point	Depends on the body	2,5
P_2- P_5	↗	Back hip width	¼ Hc+ 2,5...3,5	28,2

Table 5 continued

1	2	3	4	5
A_2- V	↑	Side lenght of back trousers	Equal to front side lenght	111,2
A_3- S_3	↑	Inseam of back trouser	Inseam of front trouser- 0,7	82,6
V_1- V_2	↗	Waist line lenght	Frw- 2,0 (dart)	20,0
V_2- V_3	↙	½ waistband circumference	½ Wbc+ 3,0 (dart)	46,0
V_1- SV	↙	Apex of first back dart	½ (V_1- V_3)	13,0
SV- SV_2	↓	Lenght of the dart	n/a	9,0
SV_5- SV- SV_4	←→	Depth of the dart	n/a	2,0
SV- SV_1	↙	Apex of second back dart	¼ (V_1- V_3)	6,4
SV_1- SV_3		Lenght of fhe dart	n/a	9,0
SV_7- SV_1- SV_6	←→	Depth of the dart	n/a	1,0

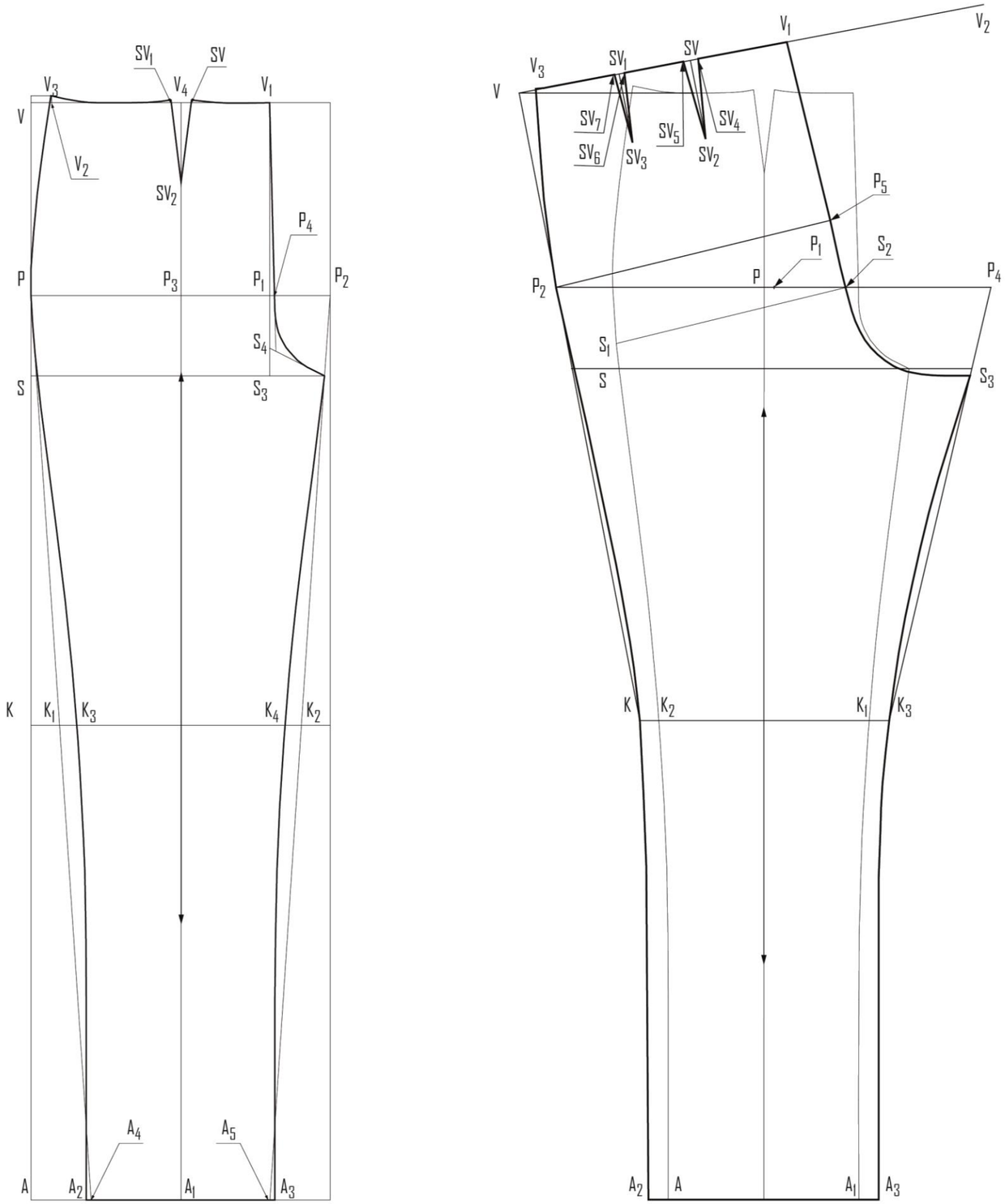


Figure 14. Basic pattern construction, scale 1:4

2.3. Style Pattern Construction

Due to basic nature of dress trousers, only minor changes are applied to basic pattern in order to get a style pattern. Main changes are concerning lowering of waistline. For creating style pattern, waist line of base construction is lowered 7,5 cm and made wider on back, to accommodate darts. Amendments applied can be seen on Figure 15.

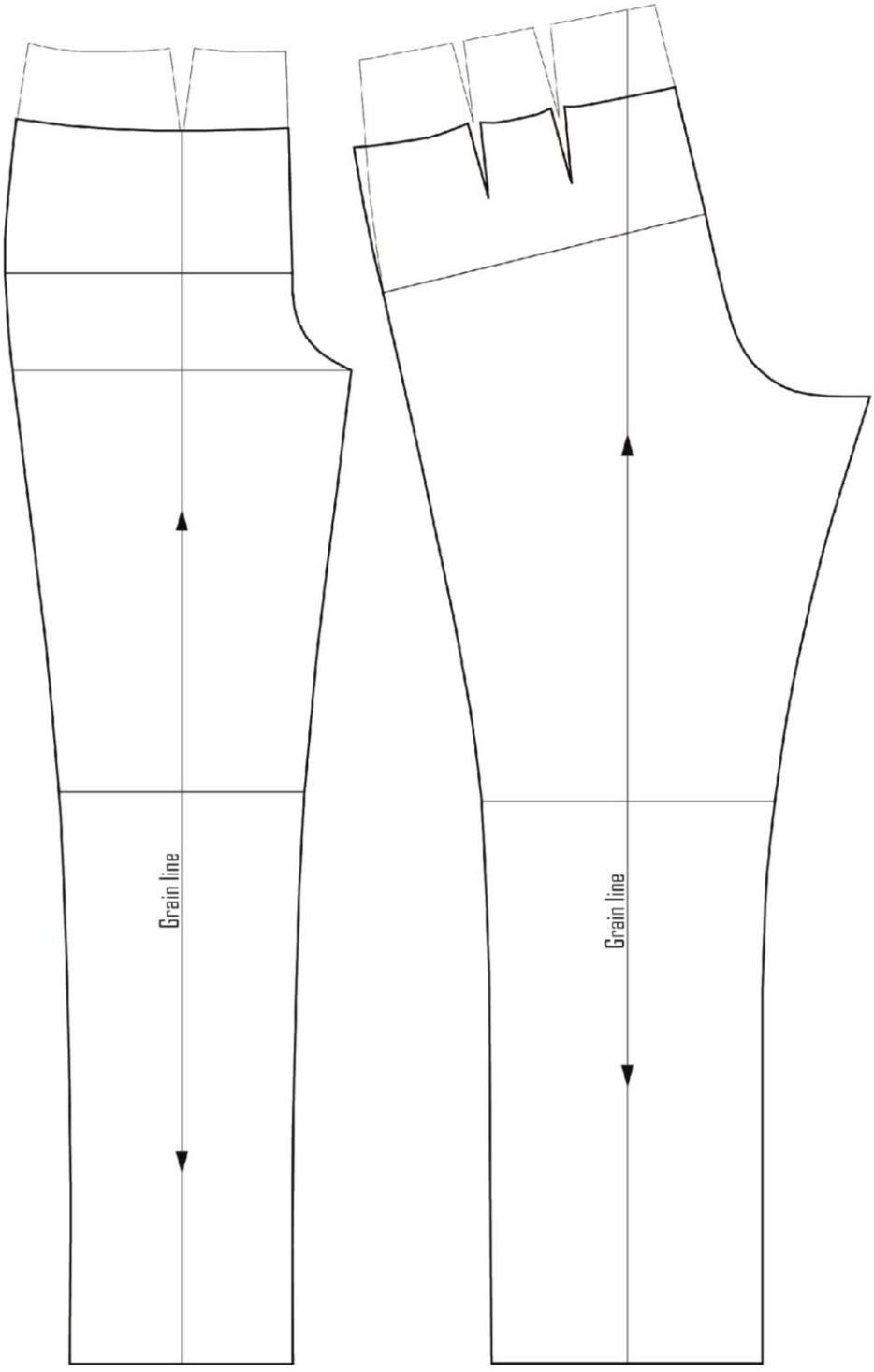


Figure 15. Basic pattern amendments for style pattern

2.4. Pattern Piece Development

Depending on design and workmanship of trousers, missing pattern pieces are drafted or traced from main pieces and the whole pattern is prepared for cutting and sewing. In the process of development seam allowances, notches and drill-holes are added according to style and workmanship.

Final pieces have to be completed with all the relevant information:

- Name of the model and piece,
- Size,
- Fabric,z
- Detail count,
- Grain line.

All important lines from basic pattern, like grain-, crease-, knee-, hip- and crotch line, are kept on pieces, so changes can be applied or new patterns developed from pattern piece if needed.

2.4.1. Main Details Development

All pieces are traced from front and back trouser pieces. Main seam allowances on these pieces are 1,0 cm and 4,0 cm on hem. Notches are added on bottom and waistline to mark crease position on centre of legs. Knee position for balanced side seams, and turn of plain hem, to ease hemming is also determined with notches.

Although side- and inseam allowances are busted (pressed open), the corners of seam allowances in crotch area are not mirrored because it will make more difficult to overedge.

On front piece (Figure 16. Detail 1) is added in addition:

- Pocket slant with dashed line and beginning and end marked with notches;
- Fly end is marked on centre front with a notch;
- Knee lining edge with notches, for positioning knee lining piece.

On back piece (Figure 16. Detail 2) is added in addition:

- Back pocket slash position marked with drill holes;
- Back pocket welt shape with dashed line;
- Dart position with notches on waistline and drillholes on end;

- Outlet of 3,0 cm on seat seam, that is tapering towards crotch to 1,0 cm both ends of uneven seam allowance are marked with notch to ease sewing.

As knee lining (Figure 16, Detail 3) is a short version of front trouser pattern piece, it is traced from the front piece. Knee lining lower edge does not include seam allowance, because edge is cut with pinking shears or left with selvage.

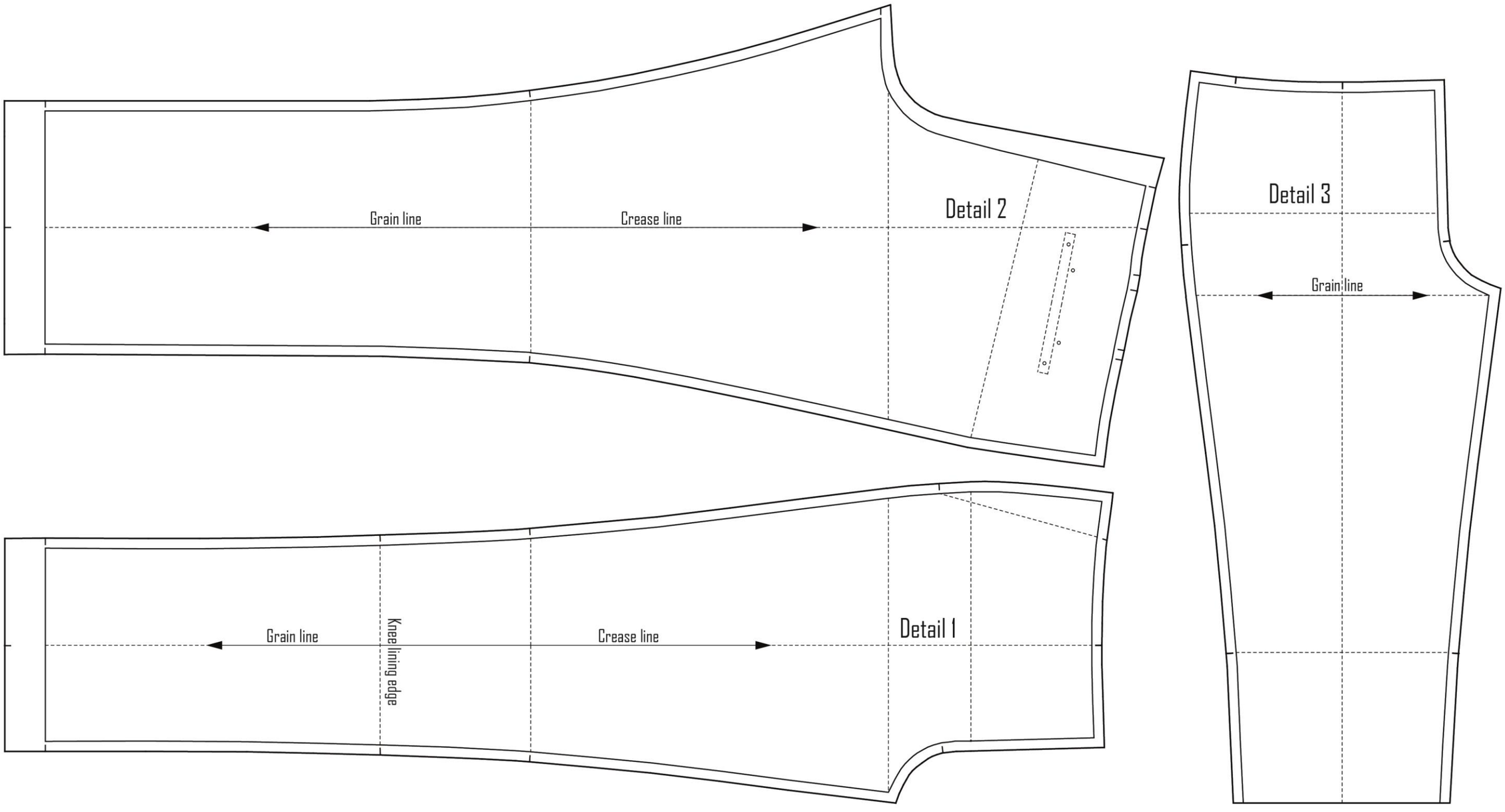


Figure 16. Developed main pattern pieces and knee lining piece, scale 1:4

2.5. Front Pocket Details Development

Front pocket is assembled from following pices (Figure 19):

- Pocket mouth interlining (Detail 4),
- Pocket bearer (Detail 5),
- Upper pocket bag (Detail 6),
- Lower pocket bag (Detail 7).

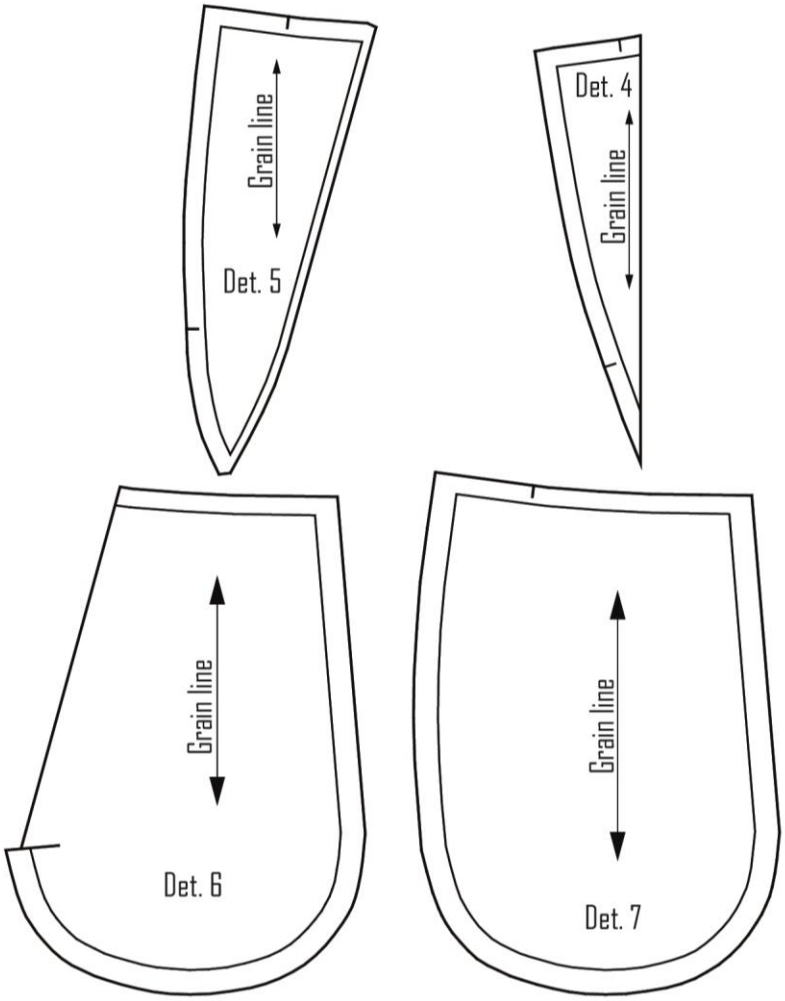


Figure 19. Front pocket pattern pieces, scale 1:4

Pocket mouth interlining is traced from front trouser leg detail. It is 1,0 cm deeper than pocket opening line (Figure 20). To provide support, grain line of interlining is cut on pocket opening line.

Pocket facing is folded from the front trouser corner. To allow easy access for a hand, pocket is slanted. Opening is from 16,0 cm to 22,0 cm long, depending on style and waist height. Pocket opening has to be long enough to accommodate a hand, while it should still stay above crotch line.

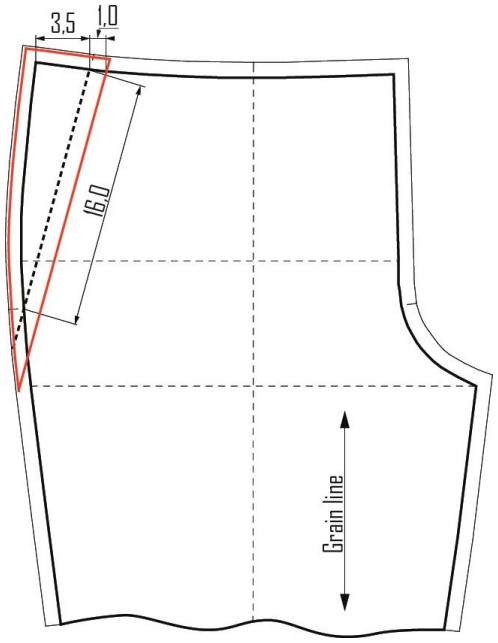


Figure 20. Pocket mouth interlining (red) and angled pocket opening (dashed line)

Pocket bags can be created either from two separately cut pieces, or from one folded piece. On this pattern, pocket bags are cut separately. Conventional pocket bag depth is about 30,0 cm from waist. Due to lowered waistline of this particular style, pocket bag is 24,5 cm deep (Figure 21). Edge of pocketing has to cover main piece side seam allowances, to create a clean finish. Firstly lower bag is constructed, and then the uppper. See pocket bag construction on Figure 21.

The lower pocket bag has a 2,0 cm deep cut, where pocket slant meets front detail side seam allowance. This cut provides turning ease for side seams.

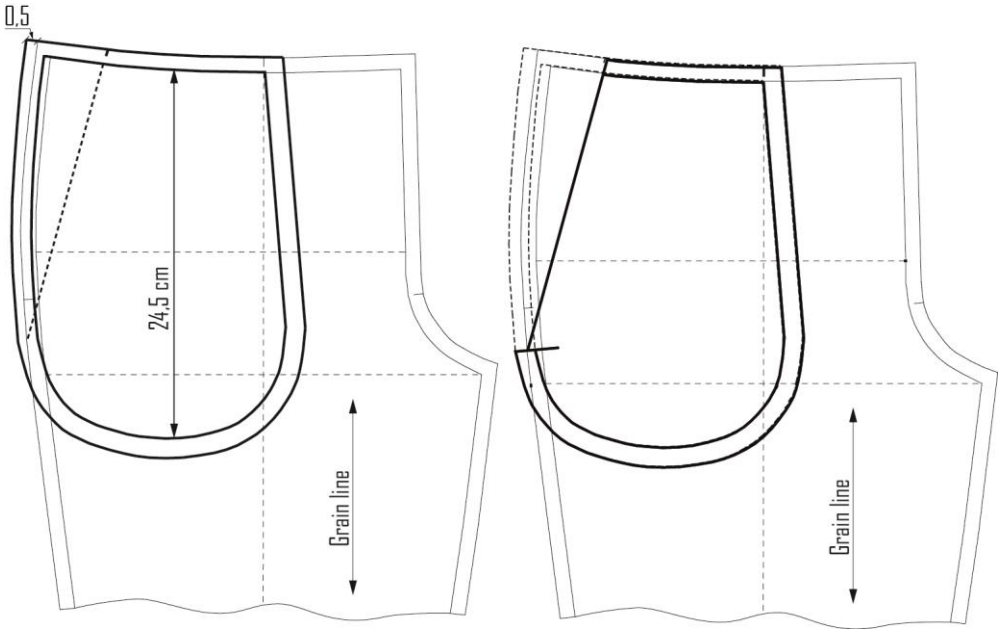


Figure 21. Developing lower (left) and upper (right) pocket bags

Pocket bearer is traced from front piece and lower pocket bag (Figure 22). It is 4,0 cm deeper than the pocket opening line, to hide the pocket bag when pocket is pulled open. Seam allowance on side seam and waistline is 1,0 cm. Side seam of pocket bearer is traced by side seam of front piece. Lower corner ends where it meets the pocket bag. Straight edge seam allowance is 0,5 cm for felling.

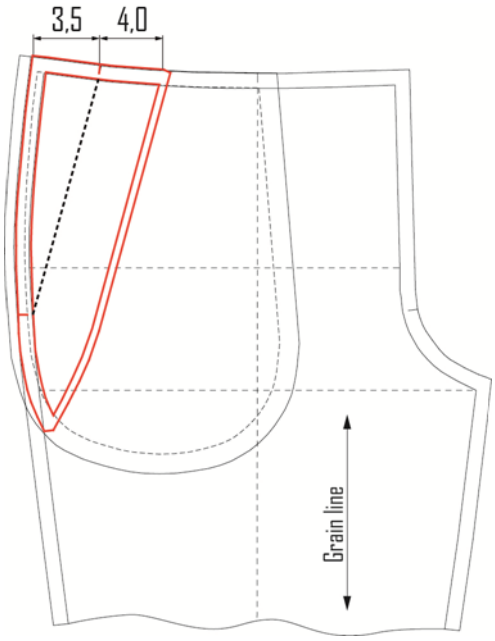


Figure 22. Front pocket bearer construction

Seam allowance of the pocket bags are from 1,0 to 1,5 cm according on edging of seam allowances. On this pattern, seam allowances are 1,5 cm, so it can be trimmed down if needed. On waist line seam allowance can be from 1,0 cm to 2,0 cm. Wider pocket bag seam allowance on waistline reduces bulk under waistband (if all seams are ending at the same line). In manufacturing seam allowance of 1,0 cm is better, since it is easier to align seam allowances for sewing.

2.6. Back Pocket Details Development

For sewing back pockets of the trousers, four additional pattern pieces are needed (Figure 23):

- Upper pocket bag (Detail 10);
- Lower pocket bag (Detail 11);
- Mouth interlining (Detail 8);
- Welt (Detail 12);
- Welt interlining (Detail 13);
- Pocket bearer (Detail 9).

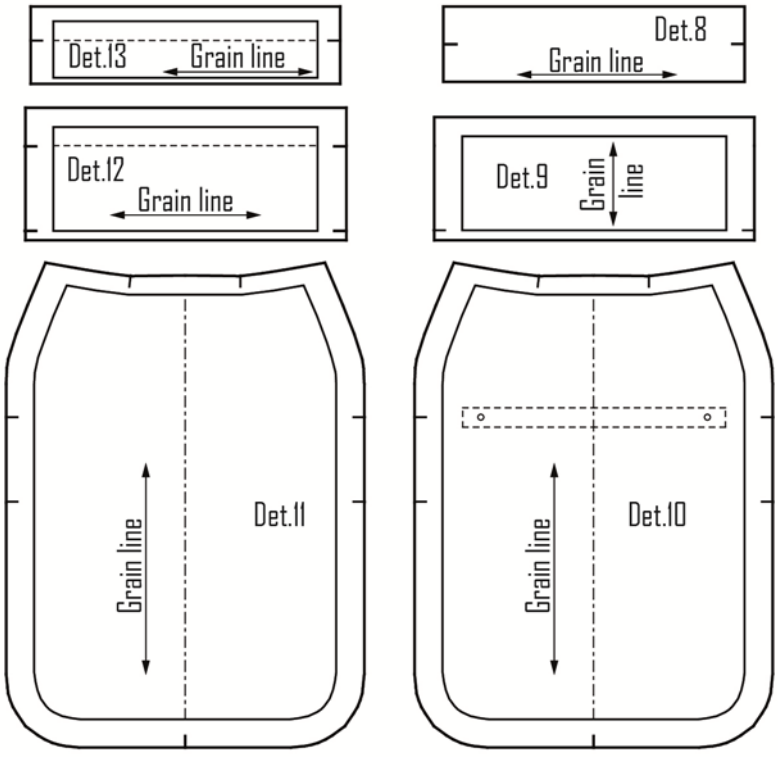


Figure 23. Back pocket pattern pieces, scale 1:4

Back pocket is situated on back detail 7,0- 6,0 cm down from waistline. The position depends on the waist height and trousers design. When pants have one back dart, it is situated in the middle of the pocket. Usually precise pocket placement is determined during first fitting.

Under pocket opening, an interlining can be fused, to strenghten opening and avoid puckering. If the fabric is not stretchy and thick, then no interlining is needed.

Back pocket bearer is 1,5 cm longer than welt extension on the inside, to reduce bulk. Grain line of bearer is vertical, as on trousers back part. Seam allowances are 1,5 cm on short edges, 1,0 cm on upper edge and 0,5 cm on lower edge.

Pocket welt has a horisontal grain line, to prevent from stretching. For stabilizing the welt, it is fused with interlining.

Pocket bags are constructed on back trouser detail. Width of the pocket bag is determined by pocket opening lenght, upper edge of pocket is traced by back detail waistline with closed darts (Figure 24). Pocket bags are attached to waistline and depth below pocket opening is 16,0 cm. Pocket bag is 16,0 cm wide and rounded to prevent gathering of dust. Upper pocket bag has two drill holes, to ease pocket bag alignment under trouser detail. Seam allowances on back pocket bags are as on front pocket bags: 1,5 cm overall and 1,0 cm on waist.

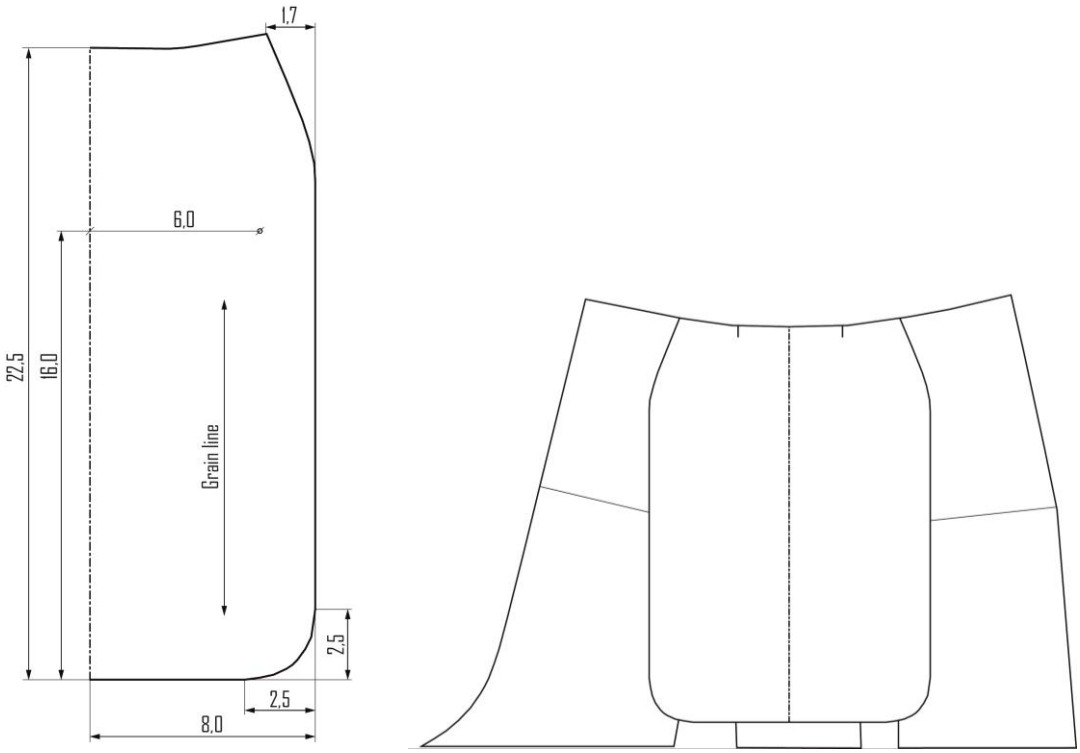


Figure 24. Back pocket bag (left) and upper edge construction (right)

2.7. Front Fly Piece Development

On men's trousers the zipper laps left over right. A separate facing, and a fly shield produces a stronger, more durable placket.

For sewing front fly of the trousers, four additional pattern pieces are needed (Figure 25):

- Fly facing (Detail 14);
- Fly shield (Detail 15);
- Fly shiled lining (Detail 16);
- Fly facing interlining (Detail 17);
- Fly shield interlining (Detail 18);
- Fork lining (Detail 19);
- Fly front interlining (Detail 20);
- Topstitching template (Detail 21).

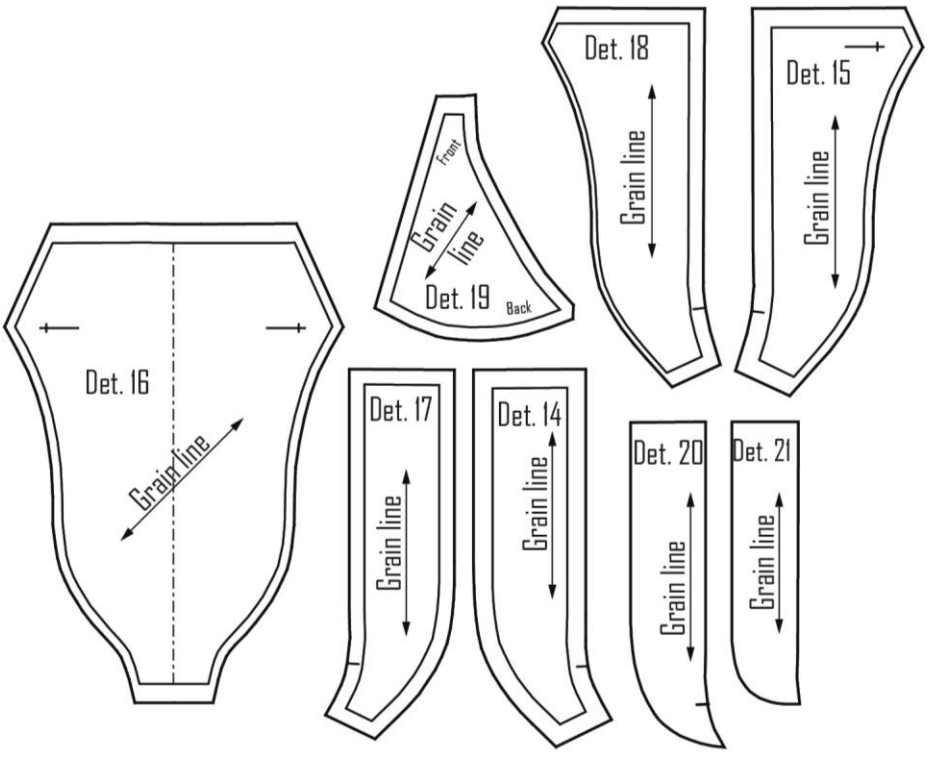


Figure 25. Front fly pieces, scale 1:4

Shield, and fly facing are constructed on centre front of the trousers. Widths of details depend on trousers topstitching and lenght depends on height of waist. Topstitching is usually 3,0 cm to 4,0 cm wide. On this style it is 3,5 cm, based on that fly facing and shield is constructed, as shown on

figure 26. Front shield is shaped and the peak is below waistband 1,0 cm, so it prevents the centre front from getting bulky. Anchor button of bearer is situated under waistline, on waistband lining on level of the peak, where the button hole is sewn. Fly shield lining piece is constructed based on shield piece, while all grain lines on fly piece vertical, shield and fork lining are cut bias, for elasticity.

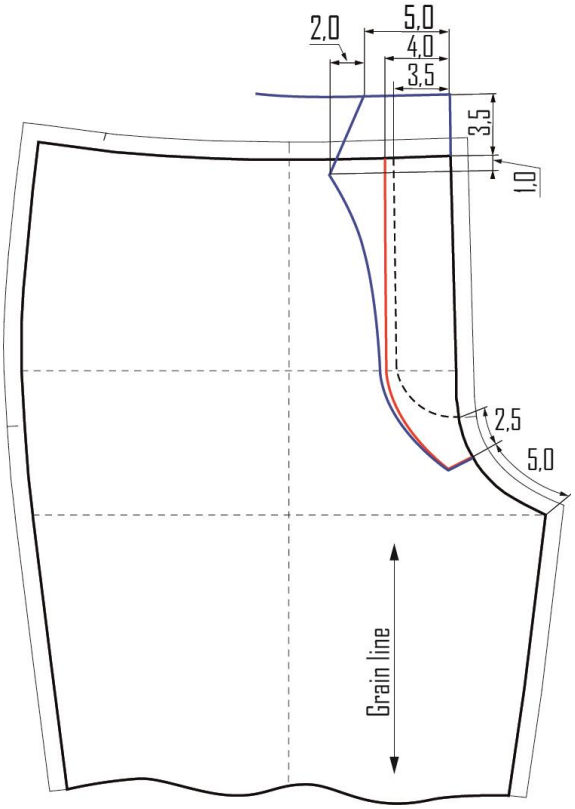


Figure 26. Fly topstitching template, shield and facing details construction

Fork lining is traced from front and back pieces (Figure 27). Seam allowances on fork lining is 1,0 cm. Front edge of the lining is half a size of lower edge of shield and facing. Therefore, when two details of lining are sewn together, front edge is joined with lower edge of fly facing and shield edges.

.

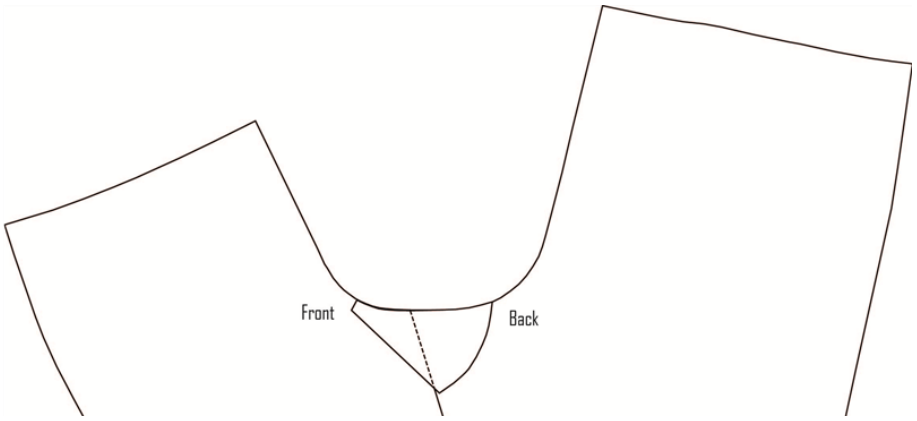


Figure 27. Fork lining construction

2.8. Waistband Pieces Development

For sewing the waistband, four additional pattern pieces are needed (Figure 28):

- Right waistband (Detail 24);
- Left waistband (Detail 25);
- Belt loop strip (Detail 22);
- Belt loop interlining (Detail 23);

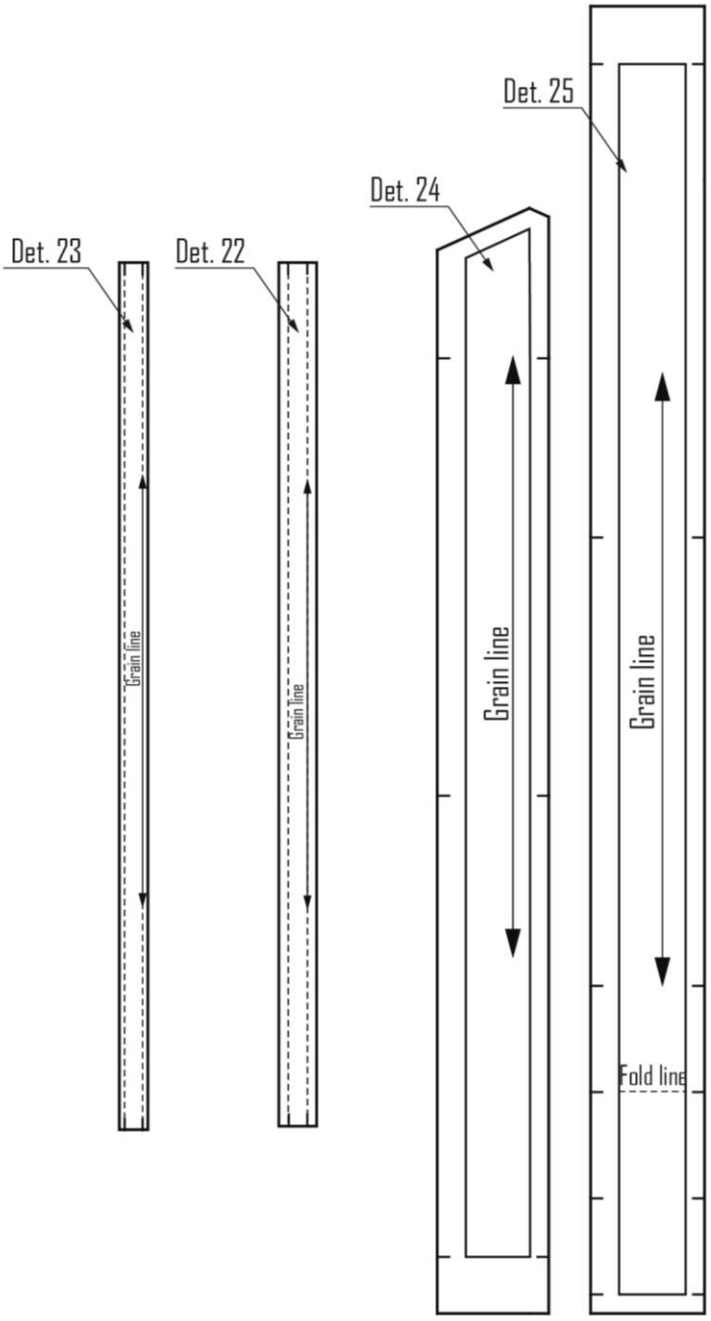


Figure 28. Waistband pieces, scale 1:4

On right waistband piece, shaped shield front is taken into account. And on left waistband piece, double lenght of waistband extension and front fly facing lenghts are added and marked with notches.

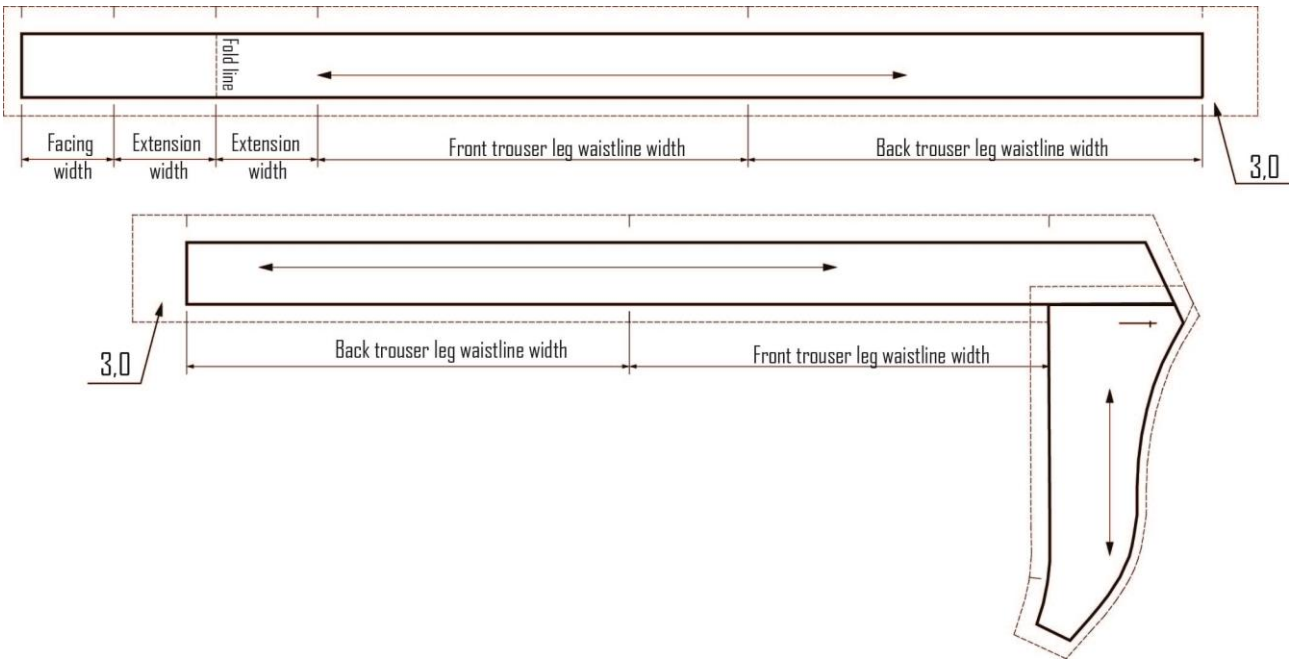


Figure 29. Waistband construction

3. TROUSERS WORKMANSHIP

3.1. Used Machines for Sewing Trousers

Trousers are sewn on several machines (Table 6). Main seams are closed and topstitchings are executed with lockstitch machine. Instead of lockstitch sewing machine, chain stitch can be used. Chain stitch is more flexible, but lockstitch is safer, because the seams are more durable. Also chain stitch consumes twice as much thread as lockstitch. Instead of bar tack machine, zig zag machine can be used. Hooks and bars be attached manually and also with a hook and bar attaching device.

Table 6

Used equipment

Nr	Equipment	Abbreviation	Stitch type	Function
1	2	3	4	5
1	Cutting machine	CM	n/a	Cutting out pattern pieces
2	Lockstitch machine	LSM	301	Joining fabrics
3	3-thread overedge machine	OEM	504	Enclosing raw edges
4	Safety stitch machine	SSM	401+503	Joining fabrics and enclosing raw edges
5	Blind stitch machine	BMS	103	Hemming
6	Eyelet buttonhole machine	EBM	401	Making buttonholes
7	Button sewing machine	BSM	n/a	Sewing buttons
8	Zig-zag machine	ZZM	304	Reinforcing pocket corners
9	Cutting machine	CM	n/a	Cutting out pattern pieces
10	Hook and bar attaching device	HBM	n/a	Attaching hooks and bars

3.2. Pattern Details

Detailed information of pattern pieces, that are used for pants, and described in previous chapter, is described in table 8. Fabrics used for cutting details, are shown in table 7.

Table 7

Fabrics used for cutting details

Marking	Fabric	Usage
a	Main fabric	Outer shell fabric
b	Pocketing fabric	Shield lining, pocket bags, fork lining
c	Knee lining	Knee lining fabric
d	Interlining	Reinforcing pocket openings and small details

Table 8

Pattern piece detail information for size 98

Nr	Detail	Detail code	Amount per garment	Fabric
1	2	3	4	5
Main pieces				
1	Front trouser	FF_TR_S1__FR	2	a
2	Back trouser	FF_TR_S1_BK	2	a
3	Front knee lining	FF_TR_S1_FRL	2	c
Front pockets				
4	Pocket mouth interlining	FF_TR_S1_PI	2	d
5	Pocket bearer	FF_TR_S1_PF	2	a
6	Upper pocket bag	FF_TR_S1_PU	2	b
7	Lower pocket bag	FF_TR_S1_PL	2	b
Back pocket				
8	Under pocket interlining	FF_TR_S1_BPI	1	d

Table 8 continued

1	2	3	4	5
9	Pocket bearer	FF_TR_S1_BPF	1	a
10	Upper pocket bag	FF_TR_S1_BPU	1	b
11	Lower pocket bag	FF_TR_S1_BPL	1	b
12	Welt	FF_TR_S1_BPW	1	a
13	Welt interlining	FF_TR_S1_BPWI	1	d
Fly				
14	Fly facing	FF_TR_S1_FF	1	a
15	Fly shield	FF_TR_S1_FS	1	a
16	Fly shield lining	FF_TR_S1_FSL	1	b
17	Fly facing interlining	FF_TR_S1_FFI	1	d
18	Fly shield interlining	FF_TR_S1_FSI	1	d
19	Fork lining	FF_TR_S1_FRKL	2	b
20	Fly interlining	FF_TR_S1_FI	1	d
21	Fly topstitch template	FF_TR_S1_TSM	1	n/a
Waistband				
22	Belt loop strip	FF_TR_S1_BL	1	a
23	Belt loop strip interlining	FF_TR_S1_BLI	1	d
24	Right waistband	FF_TR_S1_RWB	1	a
25	Left waistband	FF_TR_S1_LWB	1	a

3.3. Workmanship of Men‘s Trousers

A variety of possible methods are available for trousers workmanship. Following description is applicable for men’s dress trousers with slanted front pocket, French fly and single-welt back pocket. Trousers workmanship is divided into different detail operations. Where applicable, cross-section of detail, is shown.

Table 9

Mens dress trousers workmanship

Op. Nr.	Operation	Seam allowance, cm	Used equipment
1	2	3	4
Pieces preparation			
1	Cutting trousers details	n/a	CM
2	Interface details: • Trousers front pocket openings (det. 1 and 4); • Left front trouser fly (det. 1 and 20); • Fly facing (det. 14 and 17); • Fly shield (det. 15 and 18); • Back pocket welt (det. 12 and 13); • Belt loop strip (det. 21 and 22); • Waistband pieces (det. 23 and 24 with perforated waistband interlining).	n/a	FM
3	Place knee lining, wrong sides facing, on top of each other. Overedge raw edges of front trousers with knee lining: • Inseams, • Side seams, • C.f. details.	n/a	OEM
4	Overedge back trousers: • Inseam, • Side seam, • Seat seam.	n/a	OEM
5	Overedge longer edge of fly facing	n/a	OEM
6	Press creases on centre of leg along grainline into front and hind trousers: • Fold pant leg in half, align knee notches and crease notch on waistline and hem; • Press shield lining in half by notches NOTE: If wanted, shaping with stretching and shrinking can be applied for better fit (Appendix 2)	n/a	Iron

Table 9 continued

7	Press belt loops: • Fold belt loops and iron them by notches.	n/a	Iron
8	Sew belt loop strip: • Place ironed belt loop strip under machine with seam allowances facing machine bed; • Sew along the strip.	n/a	BSM
9	Cut belt loop strip into 6 equal pieces	n/a	Scissors

Table 10

Cross-section of back single welted pocket

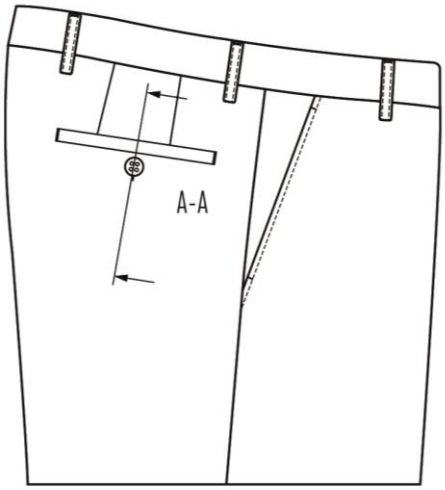
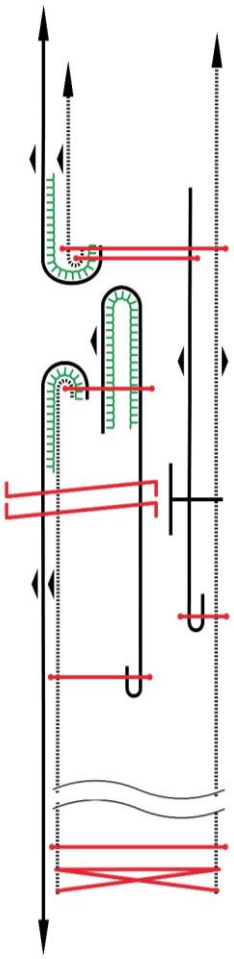
Posititon	Sketch	Cross- Section	Symbols
A-A			Main fabric Pocketing fabric Woven interlining Stitch 301 Stitch 504 Buttonhole Button Right side of fabric

Table 11

Single welt back pocket workmanship

Op. Nr.	Operation	Seam allowance, cm	Used equipment
1	2	3	4
1	Sew darts on hind trousers: • Fold trousers back piece face to face, match notches on waistline edge and drill hole on fold line; • Stitch from raw edge toward the apex (end point of the dart); At the end of the dart, stitch off the thread, do not backtack.	n/a	LSM
2	Press darts: • Intake (space between dart line and stitch line) of the dart has to be ironed towards centre back; • To avoid pressing imprint on the outside of the trousers, press on a soft surface.	n/a	Iron
3	Fuse interlining under back pocket opening line.	n/a	Iron
4	Fold pocket welt and pocket facing according to notches and press: • Welt 2,0 cm from upper, and 0,5 cm from lower edge; • Facing is ironed 0,5 cm from lower edge	n/a	Iron
5	Indicate pocket position on the correct side of the back trouser leg: • Connect pocket drill holes and elongate from both sides 1,0 cm; • Mark a parallel line 1,0 cm below pocket opening line, for placing the welt edge; Total lenght of back pocket is 14,0 cm. Mark pocket ends with vertical line on both sides.	n/a	Chalk
6	Place upper pocket bag under pocket opening of back trouser detail and pin it in place: • Align drill holes of upper pocket bag and hind trouser.	n/a	n/a
7	Sew welt: • Place welt, right sides facing, on the back trouser. Folded edge of tthe welt against lower parallel line of pocket opening; • Start seam line with a backtack and sew parallel to the pocket opening 1,0 cm from welt edge, pocket width 14 cm.	1,0	LSM
8	Sew pocket facing: • Place blind, right sides facing, with its raw edge against welt seam line, and sew parallel.	1,0	LSM

Table 11 continued

1	2	3	4
9	Cut pocket opening: • Wrong side up, examine the work to be sure the stitched lines are parallel and begin and end evenly; • Cut down the centre of the pocket opening between two seam lines, holding the welt and facing out of the way; • Leave 1,0 cm uncut from both ends; • At ends, cut the opening diagonally toward the seam ends (close to the last stitch).	n/a	Scissors
10	Face up, push the welt and facing through the opening.	n/a	n/a
11	Wrong side up, press welt and facing into place.	n/a	Iron
12	Secure pocket corners: • With the garment face up, fold hind trouser detail and pocket detail fabric back to expose triangle and welts; • Push cut triangles from edge of the pocket slash; • Stitch across the end one time as closely as possible, catch pocket welt and triangles in seam; • Repeat on the other side.	1,0	LSM
13	Fell inner extension of welt on the upper pocket bag.	0,1	LSM
14	Place pocket bearer on lower pocket bag: • Upper raw edge of the bearer aligned with upper welt seam allowance; • Bearer aligned under pocket opening	n/a	n/a
15	Fell folded lower edge of pocket bearer on lower pocket bag	0,1	LSM
16	Sew pocket bag: • Sew seamline closed; • Finish seam allowances (overedge, binging or lockstitch).	1,5	LSM
17	Secure pocket opening: • Fold away hind trouser from pocket bag; • Sew along rectangular pocket opening shorter sides of the rectangular and upper longer side through both pocket bags; • Seam line is 0,1 cm from the opening folded edge.	0,1	LSM
20	Make final pressing: • Fold away back trouser detail and press pocket bag; • Fold away pocket bag and press hind trouser lightly.	n/a	Iron

Table 12

Front slanted pocket cross- section

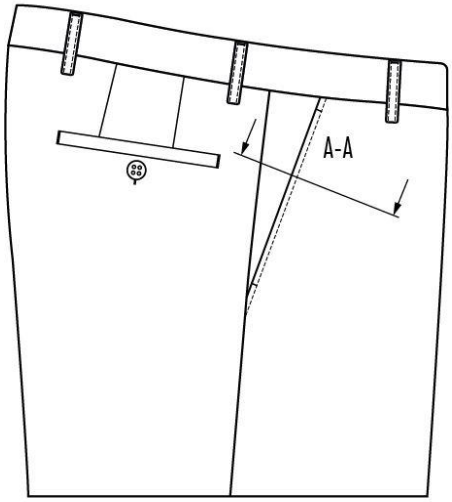
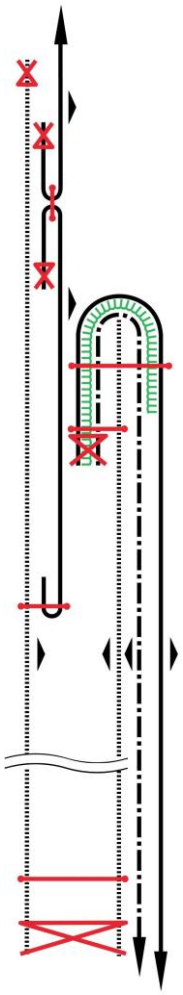
Posititon	Sketch	Cross- Section	Symbols
A-A			Main fabric Pocketing fabric Knee lining Woven interlining Stitch 301 Stitch 504 Right side of fabric

Table 13

Front slanted pocket workmanship

Op. Nr.	Operation	Seam allowance, cm	Used equipment
1	Overedge side edge of pocket bearer until lower notch.	n/a	OEM
2	Fold pocket facing raw edge inward 0,5 cm and press.	0,5	Iron
3	Fell folded edge of pocket facing on the inside of the lower pocket bag.	0,1	LSM
4	Cut lower notch on side seam of front trousers deeper, to be 1,0 cm, so the pocket mouth can be folded.	n/a	Scissors
5	Fold slanted pocket mouth line: • Fold pocket openings according to notches and press diagonal pocket mouth.	n/a	Scissors
6	Place upper pocket bag's diagonal cut edge under folded pocket openings ironed crease.	n/a	n/a
7	Secure pocket bag: • Fold front trouser over pocket bag; • Topstitch pocket mouth from waistline to side edge. NOTE: Mind the cut on the side of the upper pocket bag, keep lower part of the cut folded away, avoiding catching it in seam.	0,7	LSM
8	Sew folded front trouser corner (that lies under upper pocket bag) to upper pocket bag (creating pocket mouth facing).	0,5	LSM
9	Close the pocket bag by stitching around the curved edge of the pocket bag until notch.	1,5	LSM
10	Finish pocket bag edge (the whole bag, from waistline to waistline) with binding, overlock, safety stitch or French seam.	n/a	n/a
11	Secure s.a.: • On side seam through pocket facing s.a., inner pocket bag s.a. and side seam s.a. with three back-forth stitches between upper and lower side notch. That way the pocket is secured in place and it is easier to sew front and back trousers.	n/a	LSM
12	Cut upper pocket bags notch deeper to be 2,0 cm NOTE: It is needed to bust the side seams.	n/a	Scissors

Table 14

Fly and waistband cross-section

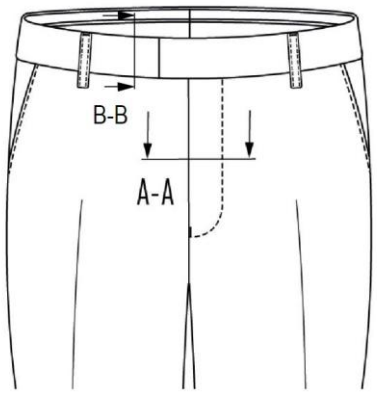
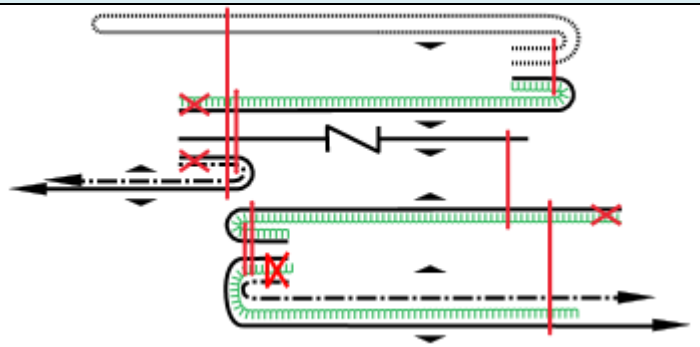
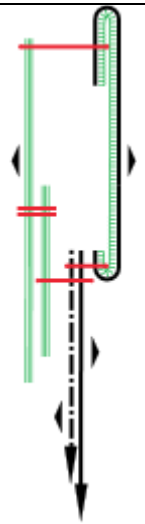
Sketch	Position	Cross- Section	Symbols
	A-A		Main fabric Pocketing Fabric Knee lining Woven Interlining Waistband lining Stitch 301 Stitch 504 Right side of fabric
	B-B		

Table 15

Front fly and waistband workmanship

Op. Nr.	Operation	Seam allowance, cm	Used equipment
1	2	3	4
1	Sew fly facing on centre of front trouser detail (from upper waist line to notch). NOTE: It is important s.a. to be 0,7 cm, otherwise left side will not overlap right side and zipper will stay exposed.	0,7	LSM
2	Fell s.a. to facing from waistline to notch	0,2	LSM
3	Sew fly shield on right detail: • Place zipper, right side of zipper facing front detail's right side; • Place shield on zipper, face to face with front trouser; • Align zipper and shield edge with c.f.; • Sew along the c.f. until notch.	1,0	LSM
4	Iron s.a. towards side seam of trousers.	n/a	Iron
5	Join front trouser details: • Start sewing 2,5 cm above the fork until the notch; • Sew two seams to the same seam line.	1,0	LSM
6	Sew zipper on fly facing: • Pin c.f. closed and align zipper under fly facing, pin facing to zipper; • Unpin c.f. and open zipper; • Sew zipper on fly facing with a topstitch along zipper tape edge. NOTE: Also second stitch line can be sewn 0,4 cm towards coil, to secure zipper safely in place.	0,1	LSM
7	Sew trousers in- and side seam of both legs.	1,0	LSM
8	Bust the in- and side seams.	n/a	Iron
9	Sew labels onto the waistband with a topstitch.	0,1	LSM
10	Sew lining on right waistband detail: • Place upper edge of waistband lining on upper s.a. of waistband (face sides up on both); • Lining has to be shorter than waistband detail 4,0 cm, so it will be caught under shield lining seam, but will not create bulk on edge of the shield; • Sew along waistband lining upper edge creating a lap seam (overlap of w/b lining and w/b has to be 1,0 cm).	0,1	LSM
11	Press waistband along fusible tape slots	n/a	Iron

Table 15 continued

1	2	3	4
12	Sew belt loops onto trousers waistline with one seam	0,5	LSM
13	Sew waistband on right half of trousers	1,0	LSM
14	Sew shield lining on waistband: • Place shield lining on right side of shield, match shaped edges; • Sew along the waistband edge of shield; • Sew fly shield lining on shield; • Sew fly shield lining until fly lower notch	0,5	LSM
15	Turn shield details, press it so the seam is rolled towards shield, creating 0,1 cm border.	n/a	Iron
16	Fell shield on c.f.: • Push s.a. toward side seam; • Topstitch through right trousers detail (zipper, shield and shield lining); • Sew from right side of the trousers.	0,2	LSM
17	Sew lining on left waistband details: • Place upper edge of waistband lining on upper s.a. of waistband (right sides facing up on both); • Sew along lining upper edge, creating a lap seam	0,1	LSM
18	Sew waistband on the left half of trousers: • Sew until c.f.; • Sew tab extension (from outer edge to c.f.), when reaching c.f. backtack the seam. • Align waistband extension and fly facing s.a. • Fold waistband extension s.a., which is aligned with fly facing, inward, so when sewing, it creates folded edge. • Sew extension facing part with facing (from c.f. until the end of fly facing).	1,0	LSM
19	Turn right side out and press corners of the w/b extension	n/a	Iron
20	Attach hooks and bars: • First bar to the middle of waistband, through upper layer, on the right detail above the zipper; • First hook on the tab facing the bar; • Second hook to the middle of waistband, through the upper layer, on the right detail to the end of the tab extension (1,5 cm from the edge); • Second bar facing the second hook.	n/a	HBM
21	Fell the w/b extension folded facing edge on waistband lining: • Topstitch the folded edge to waistband lining.	0,1	LSM
22	Topstitch left trousers detail on c.f. using template.	n/a	LSM

Table 15 continued

1	2	3	4
23	Sew seat seam and the fork with double seam: • Start from previously sewn fork (s.a. 1,0); • Sew until the end of the waistband, minding the outletlet on seat seam (s.a. 3,0).	1,0 to 3,0	LSM
24	Sew fork lining pieces together.	1,0	LSM
25	Fold fork lining s.a. and topstitch piece. Leave front edge unstitched, it twill be joing with fly shield and facing edge	0,7	LSM
26	Sew upper lining edge to the fly shield and facing: • Place fork lining face to face with shield lining; • Sew through fork lining front edge, zipper tape, shield and fly facing lower edges.	1,5	LSM
27	Turn fork lining in place and press s.a. toward the lining.	n/a	Iron
28	Attach fork lining at three points with backtacking to seam allowances: • At seat seam fold lining over s.a. and backtack through all layers; • At leg inseams tack corners to back leg s.a.	n/a	LSM
29	Secure fly shield and fly facing: • Backtack (two stitches) through both details on the lower curve (at the level of fly notch).	n/a	LSM
30	Sew belt loops to the trousers: • Pull belt loop down, sew 1,0 cm below waistband; • Do not stitch through lining.	0,7	LSM
31	Sink stitch waistband in seam shadow: • Right trousers from folded edge of shield lining until the end of the back pocket bag c.b. edge; • Left trousers 6,0 cm from c.f. until the end of the back pocket bag c.b. edge.	n/a	LSM
32	Sew bar tacks: • On c.f. starting of the fly opening; • Front pocket openings- 1,0 cm below waistband and crosswise, where the pocket opening meets side seam; • Back pocket welt shorter edges; • Upper edge of all belt loops (bar tacks should not be seen on the outer flap of the lining). Belt loops should be folded and bartacked on fold. NOTE: Bartacks should not be situated on waistband lining, all upper edge bar tacks of belt loops must be located on shell fabric that is folded in.	n/a	ZZM/ BTM

Table 16

Hemming and finishing trousers

Op. Nr.	Operation	Seam allowance, cm	Used equipment
1	Sew button holes: • On the fly shield; • Back pocket (1,5 cm below pocket welt).	n/a	BHM
2	Sew buttons: • On waistband lining for the shield; • On back pocket bearer, facing the buttonhole.	n/a	BAM
3	Overedge trousers bottom raw edge.	n/a	OEM
4	Measure and mark position of kick tape: • 4,0 cm above overedged edge; • Place trouser bottom tape on the face side of the leg, denser side of the ttape upwards.	n/a	Chalk
5	Overlap tape cut ends: • Overlapping on inseam of the trouser leg; • Fold upper part of the overlapped tape 1,5 cm; • Overlap folded tape ends 1,0 cm.	0,1 and 0,2	LSM
6	Fold and press hem in place: • Upper side of the tape has to jut out from the hem fold 0,1 cm.	n/a	Iron
7	Sew along upper overedged edge of hem, overlapping stitches on inseam of pant leg.	0,5	BSM
8	Make the final, thorough pressing for the whole pant	n/a	Iron

SUMMARY

The manual was fulfilled for Hochschule Albstadt-Sigmaringen by the author. Manual was made for Men's Manufacturing laboratory project, as an addition to men's jacket. Workmanship manual is also a part of integration opportunity for non-german speaking textile and apparel faculty exchange students, who can take part of more speciality lectures.

As an outcome of this thesis, men's dress trousers workmanship manual has been created. Trousers of different brands were inspected- from premium brands like Hugo Boss, Strellson, Windsor and Marc'o'Polo, to fast fashion chain stores like H&M, Re-Reserved, C&A and Zara. As the result most common pant designs were determined and based on that one style was chosen for workmanship manual.

As stated in introduction, the aim of the thesis was not to develop an innovative manufacturing technique, but to give and overview of what is most commonly offered in mass production. The pant manual is made to be used for Men's manufacturing lecture.

Work consist of three parts. In first, pant design part, different trousers designs were selected based on the selection offered in retail. Trousers parts were shown on sketches and described in following tables.

In second part pattern construction was shown and amendments for style pattern and pattern pieces were stated and included on sketches. In the third part, the workmanship of trousers is introduced, cross sections of most important details shown and step by step sewing technology is described.

The main difficutly, while creating this manual, was to determine correct apparel terminology, and distinguish between manufacturing and tailoring workmanship process.

Due to time boundaries, assembly illustrations were not included in the manual, however step by step sketches can be be considered as the future development of the work. In addition other popular trouser styles, not included in this manual, can also be developed in a similar manner.

From this workmanshio and pattern basis other men’s pants can be created. Whether for a similar dress pants style, or womenswear (provided right fly front is overlapping left).

From this basic trouser design also other styles can be developed.

RESÜMEE

Käesoleva lõputöö tulemusena valmis detailne ülevaade meeste ülikonnapükste disainist, konstruktsioonist ning ühe püksipaari töötlemise tehnoloogiast. Töö on tehtud Hochschule Albstadt-Sigmaringeni tellimusena, rõivaste tootmistehnoloogia loengu õppematerjaliks. Inglisekeelne õpiobjekt arendab rõiva tehnoloogiat õppivate õpilaste erialast võõrkeelset sõnavara ja erialaseid teadmisi ning seeläbi aitab säilitada õpilaste konkurentsivõimet tööturul ning annab mitmekülgseid teadmisi. Kuna töö eesmärgiks on luua õppematerjal enimlevinud töötlemise tehnoloogia kohta, põhineb mudel juba olemasolevatel, eri hinnagruppides pakutavate, pükste õmblemise lahendustel.

Esimeses osas on kirjeldatud meeste ülikonnapükste üldist ehitust, info on kogutud poes pakutavast toodangust ning erialasest kirjandusest. Detailide iseloomustus on esitatud tabelite ning joonistena. Samuti on väljatoodud ka kõige sagedamini kasutatavad materjalid. Esimese osa põhjal tekib üldine arusaam ülikonnapükste olemusest ning see osa juhatab sisse järgnevad peatükid.

Teises töö osas on kirjeldatud pükste õmblemiseks vajaliku tehnoloogia alusel loodud lõikest. Kõigepealt on konstrueeritud põhilõige, ning sellest on loodud moekohane lõige. Pärast maketi proovi, loodi pükstele vajalikud lisadetailid ning nende lekaalid.

Töö kolmandas osas on antud lühiülevaade kasutatavatest masinatest. Vajalike lekaalide loetelu, ning pükste töötlemise järjekord. Selle põhjal on loodud ka püksipaari näidis.

Välja saab tuua mitmeid ettepanekuid edasiseks töö arenduseks. Näiteks sellele enimlevinud tehnoloogiale saab lisada ka harvemini kasutusel olevaid tehnoloogiaid, luua uusi alternatiivseid disaine ning tehnoloogiaid töötlemiseks. Töö edasise arendusena on võimalik luua tööstuslikku tootmist ning rätsepatööd ristavaid tehnoloogiaid.

LIST OF REFERENCES

[1] B. Roetzel, Gentelman. A timeless guide to fashion. London: Thames and Hudson Ltd, 1996, p. 216.

[2] M. P. Londrigan, Menswear. Business to style. New York: Fairchild Books, 2009, p. 443.

[3] Esquire, The handbook of style. A mans guide to looking good. London: Hearst Books, 2009, p. 223.

[4] M.L.Gavenas. The fairchild encyclopedia of menswear. New York: Fairchild Books, 2008, p. 419.

[5] H. Eberle, M. Hornberger, R. Kupke, A.Moll, H.Hermeling, R. Kilgus, D. Menzer, W. Ring, Clothing Technology. From fibre to fashion, Fifth edition, Haan-Gruiten: Europa-Lehrmittel, 2008, p. 243.

[6] D. Peres, Details Men's style manual, London: Gotham Books, 2007, p. 272.

[7] Meister Schneider. Schnitt-technik. Die hohe schule der handwerkskunst prominenter herrenschneider. München: Rundschau, 2007, p. 262.

[8] J. Peacock, Men's fashion: The complete sourcebook. London: Thames and Hudson, 1996, p. 216.

[9] C. Shaeffer, Sewing for the apparel industry, Second edition, New York: Pearson, 2012, p. 323.

[10] System M.Müller & Sohn. Deutsche Beikeleidungs- Akademie München, München: Rundschau, 1995, p. 31.

[11] System M.Müller & Sohn. HAKA-Schnittkonstruktionen nach M.Müller & Sohn, Third edition, München: Rundschau, 2000, p. 238.