

# MADE-TO-MEASURE PATTERN DESIGN POSSIBILITIES FOR WOMENS' CLOTHES

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## *Summary*

*The ever-changing appearance of garments and the fashion have compelled the tailors to incessant experimentation, transformations and better knowledge of the human body constitution. All this has determined the development of custom tailoring and various pattern design methods suitable to current fashion influences have appeared. Nowadays the most spread and most used methods are the Decimal and the Müller-type pattern design method. That is why our article focuses on the analysis and comparison of both methods, which we applied on womens' outerwear. We analysed the advantages and disadvantages of each of the methods from the tailoring precision point of view, focusing especially on the relation between the human body constitution and its measurements.*

## **1 COMPARISON OF DECIMAL AND MÜLLER-TYPE PATTERN DESIGN METHODS**

The different parts of a garment are cut from the material using the adequate patterns. The basis of pattern design is the base pattern. Based on the analysis of womens' body constitution and its measurements the specific construction formulas, the base lines, secondary lines and auxiliary points of the design are obtained. All these are needed in order to build up, to draw the base pattern. The base lines form the frame of the base pattern.

The base patterns are created using standardized size-chart data or individual body measurements. The human body is considered to be symmetrical, that is why it is sufficient to design half of a garment. According to this, the base lines of the base pattern are drawn between the central back-line and the central fore-line. The base lines determine the important parts of the human body from the tailoring point of view. They are usually horizontal and vertical lines, respectively inclined lines in some places, because of the spatial positioning of the human body [1]. Secondary lines and auxiliary points are also needed to draw the base pattern, in order to obtain its appropriate frame and adequate form. The position and dimension of base lines are determined by the construction formulas. The constructional lines of a base pattern are drawn as thin lines, while the outlines are thicker.

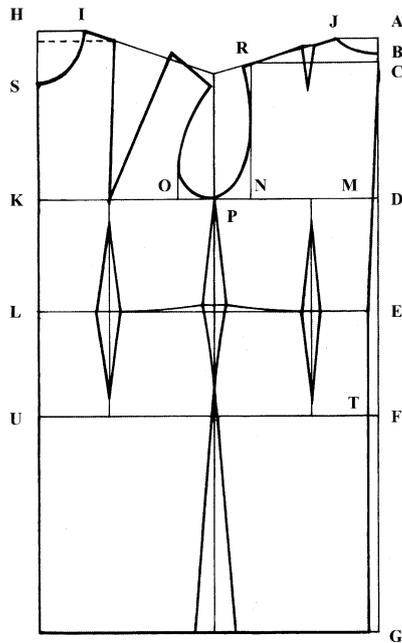
Based on the proportional division of the human body, the characteristics of its constitution and the necessary easy-fitting additions, the construction formulas are obtained, which we apply in order to calculate the specific measures of the pattern. With the help of these calculations a proportional base pattern is designed [1], [2], [3].

For the design of a base pattern for womens' clothes we applied the following measurements:

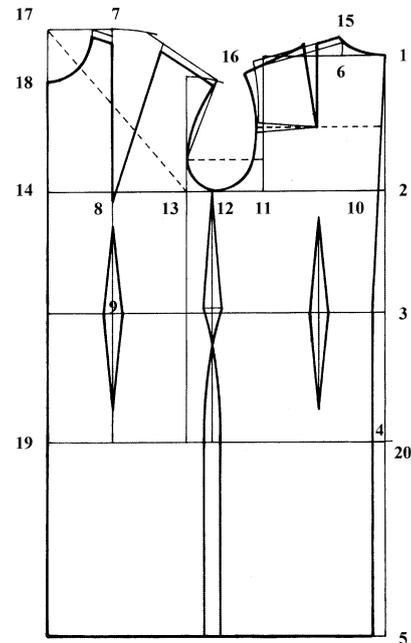
Body height (bh)	164 cm	Hip circumference (h)	100 cm
Bust circumference (b)	96 cm	Shoulder width (sw)	13 cm
Waist circumference (w)	74 cm	Garment length (gl)	90 cm

These measurements correspond to the ones of womens' medium body constitution.

The base pattern constructed with the Decimal pattern design method is shown in Fig.1, while the base pattern constructed with the Müller-type pattern design method is shown in Fig.2.

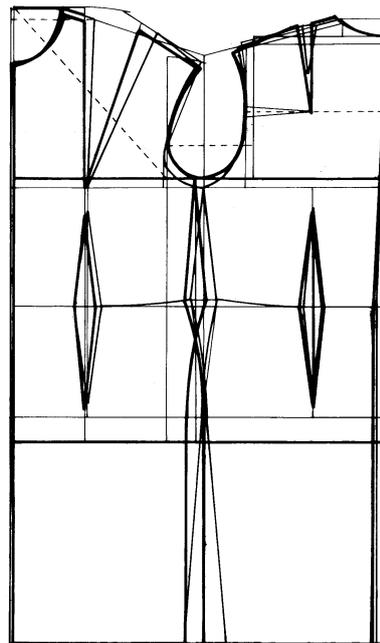


**Fig.1.** Decimal base pattern design



**Fig.2.** Müller-type base pattern design

In order to analyse both pattern design methods we compared the construction formulas [1], [2] (Tab.1.) and superposed the base patterns, as shown in Fig.3. The Decimal base pattern is drawn with thin outlines, while the Müller-type base pattern is drawn with thicker outlines.



**Fig.3.** Comparison of Decimal and Müller-type base pattern designs

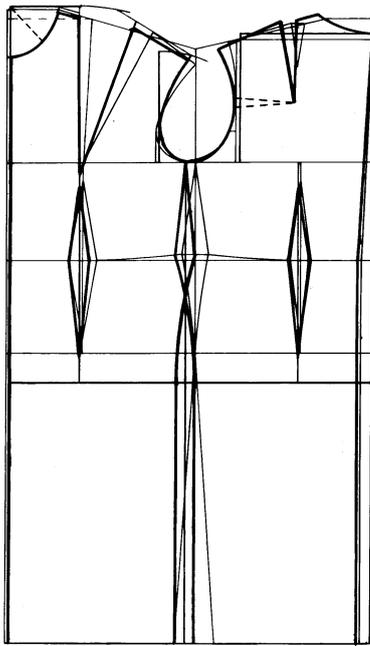
Main measures								
Müller-type pattern design method				Decimal pattern design method				
Symbol		cm		Symbol		cm		
<b>bh</b>		164		<b>bh</b>		164		
<b>b</b>		96		b		96		
<b>h</b>		100		<b>hb = b/2</b>		48		
<b>w</b>		74		h		100		
				<b>hh = h/2</b>		50		
				w		74		
				<b>hw = w/2</b>		37		
Additional measures								
Müller-type pattern design method				Decimal pattern design method				
Sym- bol	Name		Calculation	cm	Sym- bol	Name	Calculation	cm
1-2	Armhole depth	<b>ad</b>	$1/10 \mathbf{b} + 10,5 + 1$	21,1	BD	Bustline position	$\mathbf{bh}/10 \times 1,25 + \mathbf{hb}/10 - 2,8$	22,5
1-3	Back length	<b>bl</b>	$1/4 \mathbf{bh} - 1$	40,0	BE	Bustline position + waistline position	$\mathbf{BD} + (\mathbf{bh}/10 \times 1,25 - 3)$	40,0
1-4	Hip depth (7 <sup>th</sup> cervical vertebra – hipline)	<b>hd</b>	$\mathbf{ad} + \mathbf{bl}$	60,1	EF	Hip depth (waistline – hipline)	$\mathbf{bh}/10$	16,4
1-6	Neck width	<b>nw</b>	$(1/2 \mathbf{b})/10 + 2$	6,8	HI	Front neck width	$\mathbf{hb}/10 + 2,5$	7,3
					AJ	Back neck width	$\mathbf{hb}/10 + 2$	6,8
7-8	Bust depth	<b>bd I.</b>	measured	-	HK	Front height	$\mathbf{bh}/10 \times 1,25 + \mathbf{hb}/10 \times 2,5 - 6$	26,5
		<b>bd II.</b>	$1/4 \mathbf{b} + 3 \sim 5$	27,0				
7-9	Front height to waistline	<b>fh I.</b>	measured	-	HL	Front height to waistline	$\mathbf{HK} + (\mathbf{tm}/10 \times 1,25 - 3)$	44,0
		<b>fh II.</b>	$\mathbf{bl} + 4,5$	44,5				
10-11	Back width	<b>bw</b>	$1/8 \mathbf{b} + 5,5 + 0,5$	18,0	MN	Back width	$\mathbf{hb}/10 \times 2,5 + 7$	19,0
11-13	Armhole width	<b>aw</b>	$1/8 \mathbf{b} - 1,5 + 1,5$	12,0	NO	Armhole width	$\mathbf{hb}/10 \times 2,5 - 0,5$	11,5
13-14	Front width	<b>fw</b>	$1/4 \mathbf{b} - 4,0 + 1,5$	21,5	OK	Front width	$\mathbf{hb}/10 \times 5 - 2,5$	21,5
11-12	Back armhole width	-	$2/3 \mathbf{aw}$	8,0	NP	Back armhole width	$\mathbf{hb}/10 \times 1,5 - 1,5$	5,7
12-13	Front armhole width	-	$1/3 \mathbf{aw}$	4,0	OP	Front armhole width	$\mathbf{hb}/10 + 1$	5,8
15-16	Shoulder width	<b>sw</b>	$13 \text{ cm} + 0,3 + 1$	14,3	JR	Shoulder width	-	13,0
6-15	Back neckpoint position	-	constant	2,0	AB	Back neckpoint position	$\mathbf{hb}/10 \times 0,5$	2,4
17-18	Front neck depth	-	$\mathbf{nw} + 1,5$	8,3	HS	Front neck depth	$\mathbf{hb}/10 + 3,5$	8,3
19-20	Hip width	-	$1/2 \mathbf{h} + 3$	53,0	TU	Hip width	$\mathbf{hh}/10 \times 10 + 1$	51,0

**Tab.1.** Calculation of construction formulas

For the comparison of both pattern design methods to be well grounded, it needs to be analysed on cases in which the womens' body constitution deviates from the medium

constitution. Given the previous base pattern designs, we keep the main circumference measurements and we modify the value of body height. As a result, the constitution of a woman who has 152 cm body height will be relatively fatter, while the constitution of a woman who has 176 cm body height and the same circumference measurements will be relatively thinner, compared to the medium body constitution.

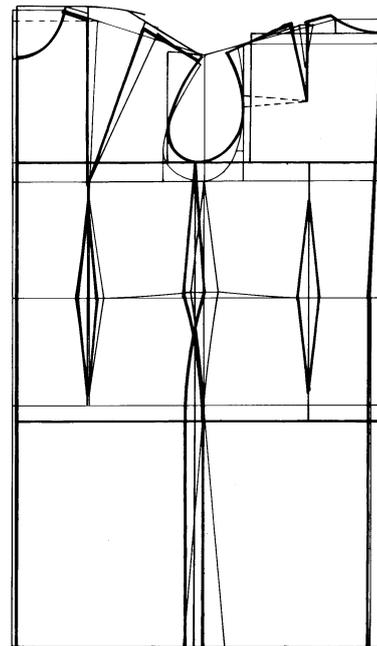
In the first case (152 cm body height) we superposed the base patterns designed with both methods, as shown in Fig.4.a. In the second case (176 cm body height) we superposed the base patterns designed with both methods, as shown in Fig.4.b.



Applied main measurements:

Body height	<b>152</b> cm
Bust circumference	96 cm
Waist circumference	74 cm
Hip circumference	100 cm

**Fig.4.a.**



Applied main measurements:

Body height	<b>176</b> cm
Bust circumference	96 cm
Waist circumference	74 cm
Hip circumference	100 cm

**Fig.4.b.**

. Comparison of Decimal and Müller-type pattern design methods in the case of women's body constitution deviated from the medium constitution

Comparing both methods it can be concluded that given the Decimal pattern design method, in the Müller-type pattern design method:

- the distance between the 7<sup>th</sup> cervical vertebra and the hipline is bigger;
- the distance between the bustline and the waistline is bigger;
- the armhole depth is smaller and is not dependent on the body height;
- the armhole width is bigger;
- the front armhole width is smaller;
- the back armhole width is bigger;
- the shoulder shaping depth is bigger;
- the bust depth is bigger and is not dependent on the body height;
- the front neck width is smaller;
- the front height to waistline is bigger and is not dependent on the bust circumference;

- the back length is not dependent on the bust circumference;
- the bust shaping depth is smaller;
- the shoulder width is bigger;
- the central back-line is more deviated from the back vertical axis on the waistline level;
- the bust shaping is closer to the central fore-line;
- the distance between the waistline and the hipline does not depend on the body height, its value being equal with the armhole depth;
- once with the growth of the body height, the distance between the bustline and the hipline is modified only by the growth of the distance between the bustline and the waistline. However, in the Decimal pattern design method, the growth of the distance between the bustline and the hipline represents the growth of both partial distances obtained by dividing it with the waistline.

## 2 CONCLUSIONS

The purpose of this analysis was to determine through the comparison of Decimal and Müller-type pattern design methods in what way these two methods are suitable for made-to-measure garment design (custom tailoring).

The Müller-type pattern design method makes it possible to determine some pattern measures by individual body measuring. The Decimal pattern design method takes more into consideration the body height, but most of the partial measures of the base patterns are calculated using the decimal proportions derived from the general divisioning of the human body. The Müller-type pattern design method takes less into consideration the effect of body height, but in certain parts of the design it makes it possible to use individual body measurements as specific measures of the base pattern.

Both of these two methods firstly refer to the demands of mass production in the apparel industry. Based on the advantages mentioned above, the Müller-type pattern design method looks as a better starting point for the custom tailoring process. If in the construction of this method we manage to build in some further individual body measurements, then we will most likely attain an even more adequate made-to-measure pattern design method, with which garments will be custom-made to an individual's style and fit.

### *Acknowledgement*

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