Norms of Pattern Making Using Sample Measurements Table In The Readymade Garments Industry

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Abstract:
The engineering basics of the apparel design have been presented by the design department which is consisting of apparel and pattern designer, so the process of Pattern making one of the most accurate functions that the apparel industry depend on, where success of the design and full production depend on .The research aim has been to Identify sample measurements and placements required for the industrial Pattern. Making and Measuring its efficiency according to the sample measurements table and Establish Norms for the preparation of Men's underwear Pattern(sleeveless vest, Briefs) using the sample measurements table.
Through the study process and field visits to number factories have been norms for the Men's underwear pattern making.

- Pattern lines simulation of the anatomical shape of the human body(Arm hole – neck line - shoulder slope) and (Front rise, Back rise, Upper thigh diameter)
- Handling accurately with the fabric properties and estimate ratios that are adding or deleting to achieve the fitting.
- Measurement of the full diameters not semi diameters.

Keywords :
Pattern making – Sample- Readymade Garments–Industry.

Introduction:

Men's clothing was first mass produced, ready-to-wear garments, starting in the early 1800's (Ahren's, 2000). This industry was established long before the women's apparel industry began.

Satisfactory fit of underwear is important to the male consumer. Whether the consumer is an athlete or a professional who is seated all day, designing intimate apparel that will provide comfort makes a difference. Based on past research, Ahrens's (2000) found that the perception of fit could also occur when garment dimensions are changed at other areas of the body. This is an important finding in relationship to designing more satisfactory fitted underwear for men.

Men traditionally wear the same type of underwear their fathers wore and maintain wearing the same type throughout their entire lives. Comfort and satisfaction of fit in men's underwear has always been key to this sector of the industry. This is one of the reasons that brand loyalty has always been high(Taihesia,2005-42) .

There are three basic types of underwear men can choose from, there are four silhouettes and for bottoms there are six. Some manufacturers have created other versions of these silhouettes to provide competitive differences in the market, however, the basic silhouette, minus trend or trim differences, remains the same. As shown in Figure 1, tops consist of a short-sleeve crew neck shirt (round-neck), a v-neck (v construction at front), a muscle shirt (crew construction without sleeves) or an ashirt, more commonly know as a tank (containing wide shoulder straps and a low rounded neckline).

Figure 2 depicts silhouettes for the bottoms. Typical silhouettes consist of either an underwear brief (coverage from the lower midsection stopping at the upper part of the thighs), a boxer brief (similar to the brief but with legs that reach mid-thigh), a trunk (similar to a boxer brief with shorter legs, covered to top of thigh at leg), a traditional boxer, which usually comes in a woven fabric (like dress shirts) and are essentially like loose shorts, the knit boxer, similar to traditional boxer but in a jersey fabrication (like T shirts) and finally a bikini or low-rise style of underwear (coverage from lower hips to upper thigh, cut very narrow on sides of hips), similar to a women's bikini bottom.

Figure 1 – Top Silhouettes

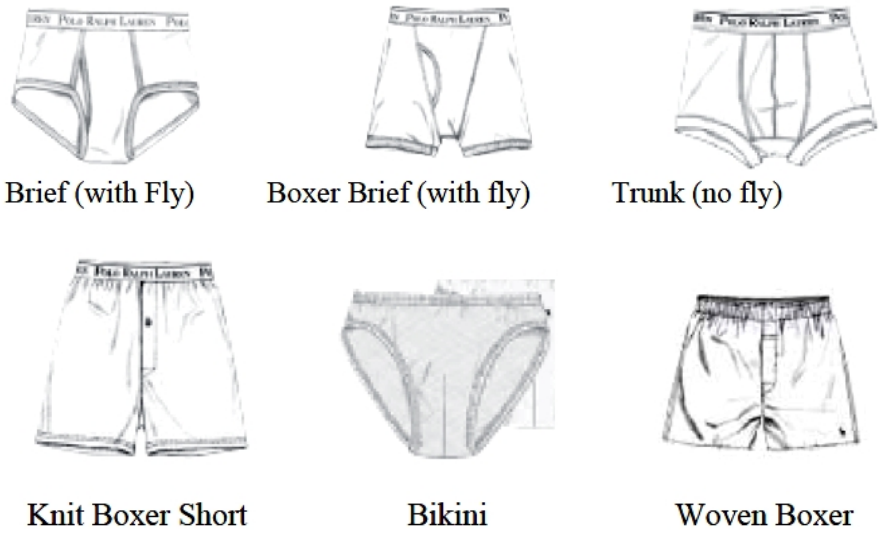

Figure 2 - Bottom Silhouettes

In addition, **Ahrens** found that casual shorts provide an excellent test garment for fit preference and self-measurement reliability and validity. The relationship between crotch length and waist measurements can be measured in relative isolation from other body dimensions.

Hatem Refai studied the history of men's underwear, and identified different types of men's underwear and raw materials used in the industry and ways to take care of it, as well as identify the method of preparation of the basic pattern of the Sleeveless vest, briefs ,she ars and machinery used in the production line.

The study concluded that the men's underwear need a special method in dealing during pattern prepare and cutting and sewing in line with the nature of the material used.

Maille's study followed the aim is to study flat pattern in order to test the suitability of men's underwear measurements that was taken from previous studies on the size of the human body, The study also mentioned the dimensional stability of knitted fabrics. The research mentioned 26stylesfor men's body's types and provided appropriate standards for the length and width. Results also proved a better dimensional stability of knitted fabrics when stitches are smaller.

Roqaia Lotfy's study also emphasized that the garments industry starts by Basic Pattern and end with Pattern design chosen. So having a good Pattern means that you have reached the half of the production process, and then while performing the cutting and operating process accurately, we get a high quality

product. (RoqaiaLotfy -2001-30).

Noha Magdy's study dealt with SPEC method and this method relies on taking the sample measurements and then recorded in specific tables in specification sheet with a flat drawing of the sample shown measurements places and Pattern prepared according to the dimensions of which have been recorded. (NohaMagdy-2011-15)

Garments can be copied by one of three methods-measuring, tracing, or rub-off. Measuring and tracing are the easiest. The rub-off methods is the most time consuming.(Claire B.Shaeffer:1997-180)

Knock-off is a fashion industry word for copying ready-made garments. This is a common practice and generally happens when hot items hit the retail market. Other manufacturers want a piece of the action before the season ends or before sales cool down. Such items must be produced quickly. This is accomplished by applying a variety of short-cut methods to the patternmaking process.

Knock – Off Methods :

- The garment is laid over paper and traced by pencil, pen, or a tracing wheel Paper or muslin is placed over the garment and the design is rubbed off with tailor's chalk.
- Transparent plastic (dry cleaner's plastic bag cut apart or a firmer bag purchased from a hardware store) is placed over the garment and the design is copied with a marking pen.
- The garment is placed on the form and draped with muslin to its exact shape and design.
- Garments can be generated through measurements and following the grain lines of the design.
- The garment is taken apart and pressed, and the fabric patterns are traced.
- A computer can be used to copy designs. (Armstrong.H.J:2006-553)

The above-mentioned: review of the related studies, the method of preparation of the basic pattern of the Sleeveless vest, Briefs, Maille research mentioned 26 models for men's bodies types and provided appropriate standards for the length and width ,This method relies on taking the sample measurements Knock – Off Methods Measuring –Tracing -Rub-Off. In the light of what revealed from the above-mentioned studies and researches, the study of the appearance of the stitching joints and results of exposing them to the repeated domestic artificial washing processes Norms of pattern Making Using Sample Measurements Table.

The research problem can be cocluded in the following questions:

- Identify the sample measurements and placements required for the industrial pattern making can be reached?
- What is the industrial Pattern efficiency according to the sample measurements table?
- What are the criteria for the preparation of Men's underwear Pattern(sleeveless vest, Briefs) using the sample measurements table?

Research Objective:

- Identify sample measurements and placements required for the industrial Pattern Making
- Measuring the industrial Pattern efficiency according to the sample measurements table
- Establish Norms for the preparation of Men's underwear Pattern(sleeveless vest, Briefs) using the sample measurements table.

Research Significance:

The study results benefit in Contributes to add new methods of Pattern making for the students of Apparel department in specialized colleges in order to reach the link between academic education and industry requirements. Contribute to the improving performance quality of products and increas ing the competitiveness of men's underwear products.

Methodology:

Study tracking the experimental method.

Study Tools

1. Field Trip
2. Interview Form
3. Men's underwear Sample (Sleeveless vest – Briefs)

4. Single Jersey fabrics
5. Evaluation form

Field Work

Field Trip and Interview

The researcher visited five of the Men's underwear factories to held personal interview withthe managers of both patterns and sample departments to check the technical files Which contains the technical specifications of the men's wear including the measurements tables, so according to the personal meeting that were held with Pattern makers and samples implementation.aim to collect(gathering)information, data and specialists Reviews to answerer search questions .**Annex (1)Interview Form**

Data analysis:

The researcher Revised and analyzed the technical files and these samples and identified the basic measurements were necessary to prepare the Pattern corresponding samples are carried out and then the researcher applied the Pattern drawing steps using the proposed measurements table, which was prepared.

Sample preparation:

Experimental sample was prepared according to the following steps :

1. Obtainment the standard Sample from (El Nasr Clothes & Textiles (Kabo)) sizes "L" .
2. Select required measurements and use the measuring tape Measure with the garment smoothed flat on a table and recording measurements in the prepared table for both (Sleeveless vest – Briefs).
3. Use the recorded measurements in the pattern making for both (Sleeveless vest – Briefs) according to technical methods and using Help tools. **Annex (3)steps of men's(Sleeveless vest – Briefs)Pattern**
   After the researcher finished the pattern prepared (Sleeveless vest Briefs)
4. cut the Sample use the Single Jersey fabrics and sewing tools to complete the sample To compare between the two samples (standard and experimental sample),
5. The researcher shown them to Thirty academics professors and specialists from the industry to evaluate it and give their academic and professional opinions. **Annex (4)Evaluation form**

Surveying the satisfaction of the sampling

The measurement will be a tripartite balance estimation (accurate - semi accurate - not accurate) .To measure the validity and reliability of the evaluation form , the researcher Displayed it to Thirty academics professors and specialists from the industry who recognized the validity of the application. **Annex (5)The names of the Reviewer**

The statistical analysis was used to calculate was percentage and means.

Establish Norms

through Search Procedures carried out by a researcher " personal interviews and then selected required measurements and experimental sample Pattern making and the preparation of the sample and compared the samples and conducting statistical analysis

the researcher has been reached to a set of standards for the Pattern making of the men's underwear using the measurements of the sample table.

Results

As was mentioned before in the experimental work that the researcher did some field visits to several Men's underwear factories and by checking the files in the existing technical and according to personal interviews that were held with Pattern makers and implementation of the samples and by revising these samples and the tables which has

been designed and developed by the researcher which contains a basic group sizes required to prepare Pattern both sleeveless vest, Briefs and The following table 1&2 and Figure 3&4 shows us that the required sizes and by that the researcher achieved the first objective **"Identify sample measurements and placements required for the industrial Pattern Making"** and answered the first question**"Can Identify the sample measurements and placements required for the industrial pattern making can be reached?**

Table 1: sleeveless vest measurement

Measurement
AChest
BBottom Hemming
CFront neck depth
D Back neck depth
ENeck opening edge to edge
FShoulder
G Armhole
H Full length from HPS.
Width of armhole tape

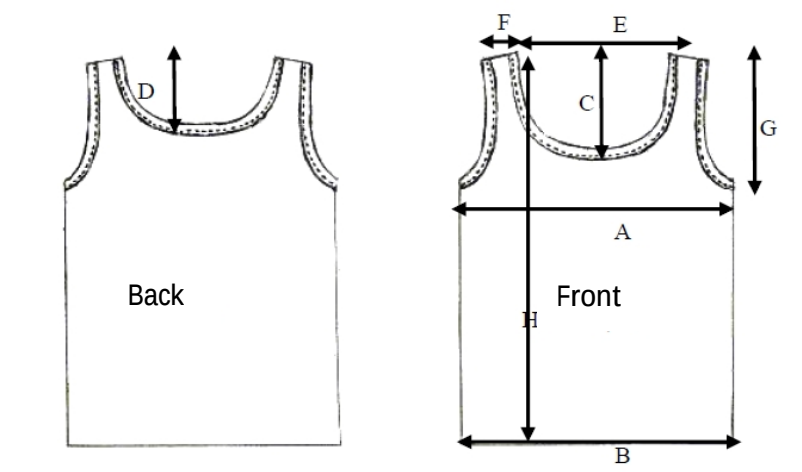

Figure 3: Sleeveless vest measurement

Table 2 : Briefs **measurement**

Measurement
A Waistband
B Waistband, stretched
C Hip
D Front & back rise
E Side length
F Crotch width
G Leg opening width
H Leg depth
I Fly Opening
K Overlap inside fly (from fly binding)
L Fly Width at band
Waistband width
Tape for cut width
Tape for leg width

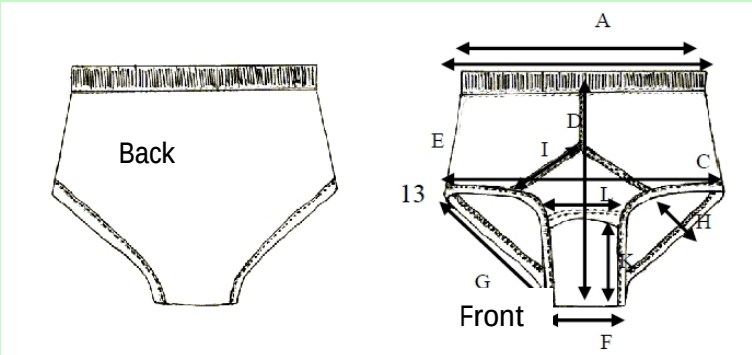

Figure 4 Briefs measurement

To achieve the Second objective ***"Measuring the industrial Pattern efficiency according to the sample measurements table"*** the researcher did the statistical analysis was used to calculate was percentage and means. the fowling table show that.

Table (3) the correlation coefficient between the correctors

Correctors	**Sleeveless vest**				**Briefs**		
	Front	Back	Side	**Total**	Front	Back	**Total**
x , y	**0.891**	**0.734**	**0.801**	**0.826**	**0.914**	**0.887**	**0.761**
x, z	**0.777**	**0.812**	**0.849**	**0.759**	**0.702**	**0.792**	**0.851**
y, z	**0.925**	**0.875**	**0.901**	**0.866**	**0.839**	**0.941**	**0.718**

table (3) show that the correlation coefficient between the correctors,All values Significant differences at α=0.01Per approached from 1.0, which shows the stability of the evaluation form

To investigate the efficiency of the Pattern prepared for the **Sleeveless vest** was applied "T" test and the following tables show that:

Table (4) significant differences between the standard Sample and Experimental sample " Sleeveless vest front"

Total	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	11.518	0.728	15	14	0.986	0.341 Non-Significant
Experimental sample	11.285	0.760				

table (4) show that (T) test = 0.986 for the " Sleeveless vest front" which is statically non-significant, where mean of the standard Sample score was 11.518, While the mean of the experimental sample score was 11.285 , Which refers to that no differences between standard Sample and Experimental sample.

Table (5) significant differences between the standard Sample and Experimental sample " Sleeveless vest back"

Total "Knowledge - Skill"	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	11.152	0.798	15	14	0.325	0.750 Non-Significant
Experimental sample	11.052	0.706				

table (5) show that (T) test = 0.325 for the " Sleeveless vest back" which is statically non-significant, where mean of the standard Sample score was 11.152, While the mean of the experimental sample score was 11.052 , Which refers to that no differences between standard Sample and Experimental sample.

Table (6) significant differences between the standard Sample and Experimental sample "Sleeveless vest Side"

Total	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	7.582	0.245	15	14	0.643	0.531 Non-Significant
Experimental sample	7.492	0.342				

table (6) show that (T) test = 0.643 for the " Sleeveless vest said" which is statically non-significant, where mean of the standard Sample score was 7.582, While the mean of the experimental sample score was 7.492 , Which refers to that no differences between standard Sample and Experimental sample.

Table (7) significant differences between the standard Sample and Experimental sample "Sleeveless vest Overall"

Total	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	30.252	1.321	15	14	0.774	0.452 Non-Significant
Experimental sample	29.829	1.105				

table (7) show that (T) test = 0.774 for the " Sleeveless vest overall " which is statically non-significant, where mean of the standard Sample score was 30.252, While the mean of the experimental sample score was 29.829 , Which refers to that no differences between standard Sample and Experimental sample.

To investigate the efficiency of the Pattern prepared for the Briefs was applied "T" test and the following tables show that:

Table (8) significant differences between the standard Sample and Experimental sample " Briefs front"

Total	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	7.533	0.342	15	14	0.584	0.568 Non-Significant
Experimental sample	7.425	0.467				

table (8) show that (T) test = 0.584 for the " **Briefs front** " which is statically non-significant, where mean of the standard Sample score was 7.533, While the mean of the experimental sample score was 7.425 , Which refers to that no differences between standard Sample and Experimental sample.

Table (9) significant differences between the standard Sample and Experimental sample " Briefs back"

Total	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	7.628	0.397	15	14	0.221	0.828 Non-Significant
Experimental sample	7.598	0.382				

table (9) show that (T) test = 0.221 for the " **Briefs back** " which is statically non-significant, where mean of the standard Sample score was 7.628, While the mean of the experimental sample score was 7.598 , Which refers to that no differences between standard Sample and Experimental sample.

Table (10) significant differences between the standard Sample and Experimental sample " Briefs Overall"

Total	Mean "m"	Standard Deviation "sd"	Number of Sample "n"	Degree of freedom "df"	T Test	Significance level and direction
standard Sample	15.161	0.523	15	14	0.307	0.763 Non-Significant
Experimental sample	15.023	0.672				

table (10) show that (T) test = 0.307 for the " **Briefs Overall**" which is statically non-significant, where mean of the standard Sample score was 15.161, While the mean of the experimental sample score was 15.023 , Which refers to that no differences between standard Sample and Experimental sample ,And based on the steps which has been mentioned before the researcher answered the second question "Measuring the industrial Pattern efficiency according to the sample measurements table" .

Through the previous display and the data of the statistical analysis for the arbitrators opinions have been confirmed of the efficiency of the pattern which prepared for both upper and lower part where the mean scores of the arbitrators were close and not statistically significant where refers to that no differences between the standard sample and the experimental sample for both upper and lower part. And This does not mean that there is no differences between samples but those differences are small and in acceptable tolerances which reflect that difference between the allowable minimum and maximum on a process or finished measurement, and this tolerance has been accepted in the professional zone where each company develops its own standards for tolerances for each type of product it produces and uses them when spelling out the written specifications for each new style.

In general, torso girth measurements can vary +/– (plus or minus) 1/4 inch to +/– 1/2inch, depending on the size and style of product

which will also affect the amount of tolerance permitted before the overall structure of the garment is impaired.

The third objective **was "Establish Norms for the preparation of Men's underwear Pattern(sleeveless vest, Briefs) using the sample measurements table "**and to achieve that , so according to the study process and field visits to a number of Men's underwear factories, it have shown that the instructions of the Pattern making are important since the product could be rejected if any technical defect is found in the Pattern. However, the design a correct Pattern reflects the middle of the production process and by completing the cutting and operating process we will reach a final production a high quality.

Standards have been developed for the Men's underwear pattern making using the measurements of the sample table.

1- The accuracy of measurements taking for the sample and recorded it.
2- Measure with the garment smoothed flat on a table.
3- Do not allow any portion of the garment to drape over the edge of the surface.
4- Use a flexible vinyl or soft tape measure (not metal).
5- Putting the juxtaposition marks in their place accurately.
6- Pattern Pencil lines are neat and crisp
7- Pattern Neatly cut
8- All pattern pieces must be accurately trued
9- All pattern pieces must be properly labeled with the following:
   -Identification name of pattern piece
   -CF= Center Front
   -CB= Center Back
   -Grain line
10- Pattern lines simulation of the anatomical shape of the human body(Arm hole – neck line - shoulder slope) (Front rise, Back rise, - Upper thigh diameter)
11- Handling accurately with the fabric properties and estimate ratios that are adding or deleting to achieve the matching
12- Measurement of the full diameters not semi diameters.

By the previous result the researcher answered the third question ***"which stipulates what* are the criteria for the Men's underwear (Sleeveless vest, Briefs) pattern making using the measurements of the sample table?"**

Conclusion

Based on the above-mentioned results, the research questions were answered and its objectives were realized and according to the research results,

With reference to the comparison, it was apparent that the

Achieve the main objective of the research which match the experimental sample and stander sample which confirms the effectiveness of the Pattern method used for research taking into consideration the application of standards for the underwear Pattern making using the sample measurements table so as to obtain the Pattern good technically, this is half of the production process and if the cutting and operating process was strictly reach a final product on a high degree of quality.

And the possibility to take advantage of global brand products by taking measurements and registration and drawing Pattern matching by using the sample measurements table, which have a good impact in improving the products quality in small factories

It should be noted that further studies to be carried out, to help improving the pattern fitting.

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Annex (1) Interview Form

The researcher held personal interview aim to collect information, data and specialists Reviews to answer research questions.

1. What are the sources of technical data and product specifications?
2. What are the Various forms of technical files and different types of measurements tables?
3. What kind of standard tables used in drawing Pattern?
4. What are the measurements which used to drew the top(upper) part of the Pattern?
5. What are the measurements which used to drew the bottom (lower) part of the Pattern?
6. explain the engineering basics to draw the pattern?
7. What are the tools needed to drew the pattern?
8. What's the time it takes to draw the top(upper) part of the Pattern?
9. What 's the time it takes to drew the bottom (lower) part of the Pattern?
10. What is the Pattern making controls to meet the technical requirements?

Annex (2) sleeveless vest measurement

Measurement \ Size	S	M	L	XL	XXL
A Chest	70	78	86	94	102
B(Bottom Hemming	70	78	86	94	102
C Front neck depth	9.5	10	10.5	11	11.5
D Back neck depth	2	2	2.5	3	3
E Neck opening edge to edge	19.5	20	20.5	21	21.5
F Shoulder	4.5	4.5	4.5	4.5	4.5
G Armhole	48	50	52	54	56
H Full length from HPS.	70	72	74	76	78
Width of armhole tape	1	1	1	1	1

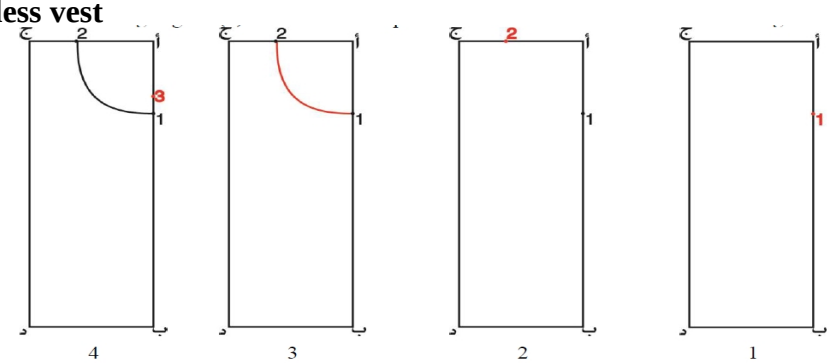
Briefs measurement

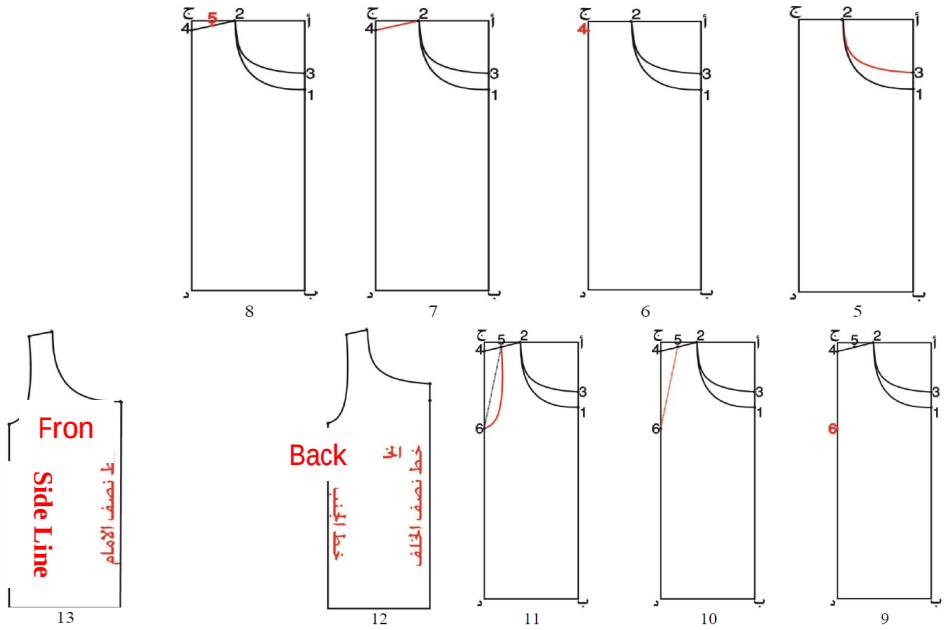
Measurement \ Size	S	M	L	XL	XXL
A Waistband	68	74	80	86	92
B Waistband, stretched	100	110	120	130	140
C Hip	80	88	96	104	112
D Front & back rise	31	31.5	32	32.5	33
E Side length	14	14.5	15	15.5	16
F Crotch width	13	13	13	13	13
G Leg opening width	25.5	27	28.5	30	31.5
H Leg depth	6.5	6.5	6.5	7	7
I Fly Opening	11.5	12	12.5	13	13.5
K Overlap inside fly from fly binding	8.5	8.5	9	9	9.5
L Fly Width at band	16	17	18	19	20
Waistband width	2.5	2.5	2.5	2.5	2.5
Tape for cut width	1.3	1.3	1.3	1.3	1.3
Tape for leg width	1.3	1.3	1.3	1.3	1.3

Annex (3)

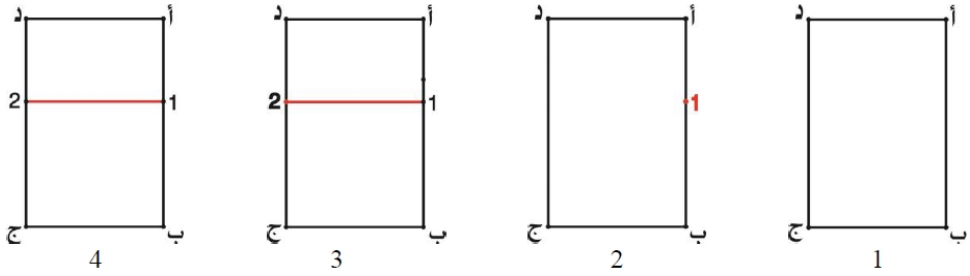
steps of men's sleeveless vest& Briefs Pattern

A- sleeveless vest

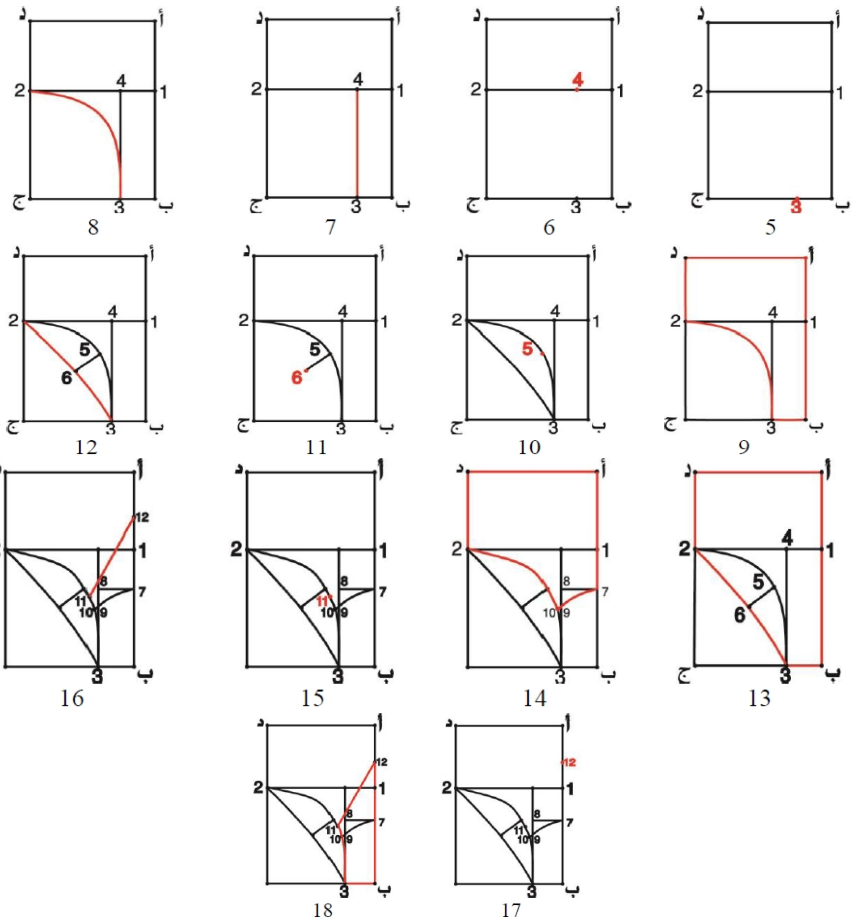




B- Briefs



C-



Annex (5)
The names of the Assessors

	Name	Title
1	Dr. Ahmed Hosni	Professor -Faculty of applied arts - Helwan University
2	Dr. Mohamed Elbadry	Professor -Faculty of applied arts - Helwan University
3	Dr.NermeenAbdelrahman	Professor -Faculty of home economics Helwan University
4	Dr.HatemRifai	Professor -Faculty of home economics Helwan University
5	Dr.YasserEid	Professor -Faculty of applied arts - Helwan University
6	Dr. Ihab Abu Mousa	Professor -Faculty of home economics Monfaya University
7	Dr. EmanAbdElsalam	Professor -Faculty of home economics Helwan University
8	Dr. WalidShaban	Assoc. Prof. Faculty of home economics - Helwan University
9	Dr. HossamHikal	Assoc. Prof. Faculty of applied arts - Domyat University
10	Dr. Osama Hussein	Assoc. Prof. Faculty of home economics - Helwan University
11	Dr. Hazem Abdel Monaem	Assoc. Prof. Faculty of home economics - Helwan University
12	Dr.Rania Mostafa	Assoc. Prof. Faculty of home economics - Helwan University
13	Dr. AberAbrahem	Assoc. Prof. Faculty of home economics - Helwan University
14	Dr. Omaima Ahmed	Assist.Prof. Faculty of home economics - King Abdulaziz University
15	Dr. SherifAbid	Academic director , lecturer of fashion design-Raffles Millennium International Ahmedabad
16	Dr. KaramaThabet	lecturer -Faculty of home economics - Helwan University
17	Dr. Ahmed Pebars	lecturer -Faculty of home economics - Helwan University
18	Dr. AmrAbass	patterns and sample departments director - Cairo
19	Dr. Khaled Abed	lecturer -Faculty of home economics - Helwan University
20	Dr. OlfatKordi	Lecturer- Faculty of applied arts - Helwan University
21	Dr. HeshamAseem	lecturer -Faculty of home economics - Helwan University
22	Dr. AhmadElsheikh	Lecturer- Faculty of applied arts - Helwan University
23	Dr. ShadiaSalim	lecturer -Faculty of home economics - Masora University
24	Dr. WedianMadian	Lecturer- Faculty of applied arts - Helwan University
25	Dr.KhalidElsheikh	Lecturer- Faculty of applied arts - Helwan University
26	Dr. Rasha Wagdi	Lecturer- Faculty of applied arts - Helwan University
27	Dr.ShaimaaEraqi	Lecturer- DAH College– K.S.A
28	Eng. EssamElshoura	Production Manager - Za'farani group - Cairo
29	Eng. Farag Ahmed	patterns and sample departments director - Cairo
30	Eng. Rasha Ali Yossef	Instructor - Fashion & Design Center -FDC