



UDC 687.12

SPECIAL CLOTHING FOR WORKERS OF REFRIGERATING SECTIONS

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Abstract. With a view to develop special clothing, the program of requirements for special clothing, based on research of the production conditions of workers of refrigerating sections, harmful factors affecting in the work process and consumer preferences has been developed.

Keywords: agricultural cluster, workers of refrigerating sections, targeted design, special clothing, impact of external factors, wear of clothing, production factors, topographical map, consumer preferences, clothing comfort, functionality, reliability, appearance.

At present, there are no specially designed clothing for workers of refrigerating sections working in the agricultural cluster, because this field is new for the national economy of Uzbekistan, and the workers are using ordinary daily clothing. In order to study the state of wear of existing working clothing of workers of refrigerating sections under the influence of external factors, research was carried out in cold storages of “Buxoro gosht-sut savdo” JSC of the Food Reserve Association of the Republic of Uzbekistan, as well as several cold storages located in a number of districts (Kagan, Bukhara, Romitan) of the Bukhara region, as a result, a topographical map of the influence of production factors on the working clothing of workers in this field has been developed.

During the research, 30 existing sets of working clothing were studied. The topography of wear was studied by observing activities of the workers during the working day, directly inspecting working clothing and surveying workers. The main type of clothing of workers of refrigerating sections is a jacket and pants, gloves on hands, boots or high-heeled shoes on feet, and a hat on the head. As the object of research, working clothing worn by workers during the work process for 6 months have been accepted.

During operation, it has been established that the working clothing is exposed to complex effects that cause the clothing to lose its shape and wear out. These are contamination from blood residues in meat and dust from vegetables, mechanical effects, and the effect of chemical reagents, because of which work clothing are damaged, soiled, worn, and quickly torn [1].

Analysis of the impact of hazardous and harmful production factors on special clothing allow creating a topography of its damage areas and a scheme of the wear topography of current work clothing. Table 1 shows the topographic zones of exposure to external factors for each occupation of workers of refrigerating sections.

Table 1

Topographical zones of impact of external factors on existing working clothing of workers of refrigerating sections [2]

No	Workers	Impact factors	Topographical zones
1	Workers working in meat and dairy storage refrigerating sections	Low air temperature and high humidity, contamination from blood residues in meat, mechanical effects	The middle part of the front piece of the clothing, the lower parts of the sleeves, the front part of the pants
2	Workers working in vegetable storage refrigerating sections	Low air temperature and high humidity, pollution, mechanical effects	The middle part of the front piece of the clothing, the lower parts of the sleeves, the front part of the pants
3	Workers working in fruit storage refrigerating sections	Low air temperature and high humidity, pollution, mechanical effects	The middle and side parts of the front piece of the clothing, the lower part of the sleeves, the front part of the pants

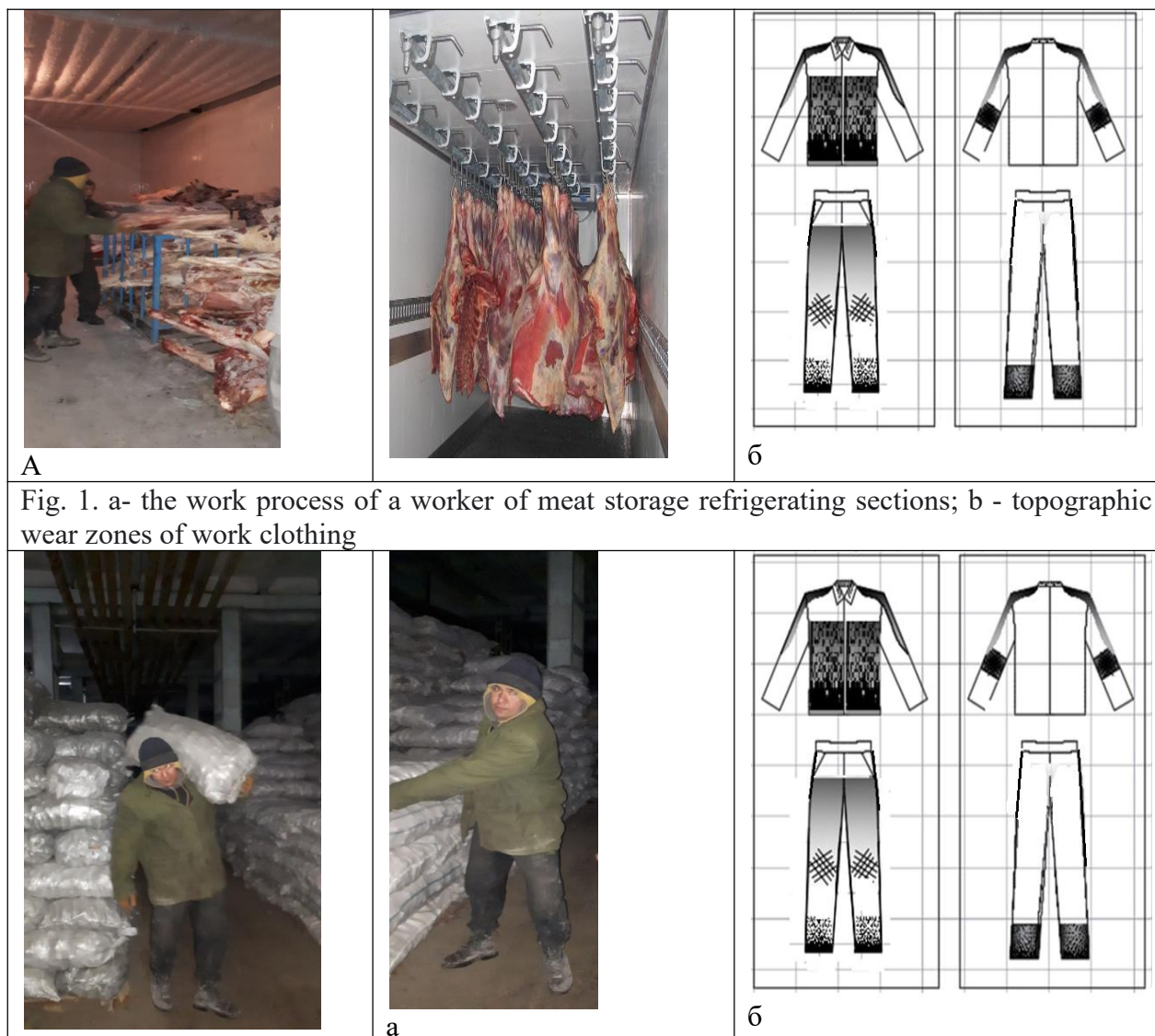


Fig. 1. a- the work process of a worker of meat storage refrigerating sections; b - topographic wear zones of work clothing

Fig. 2. a- the work process of a worker of vegetable storage refrigerating sections; b - topographic wear zones of working clothing



Fig. 3. a- the work process of a worker of fruit storage refrigerating sections; b - topographic wear zones of work clothing

At the next stage of research, the levels of impact of harmful factors affecting special clothing have been studied. The analysis showed that the factors influencing the working clothing of different professions in cold storage and the topographic areas of their impact are different, therefore, in the process of studying the levels of harmful factors affecting the special clothing of these professions, they were studied in groups.

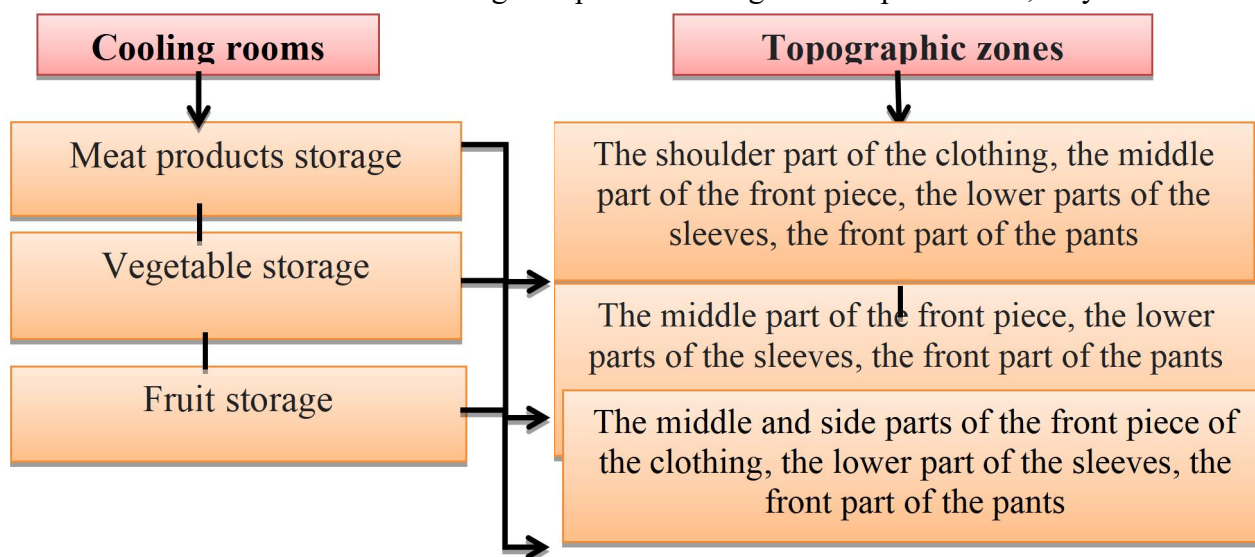


Fig. 4. Damage to working clothing of workers of refrigerating sections due to exposure to hazardous and harmful production factors

Visual assessment of the condition of the working clothing used by the workers of refrigerating sections today, based on [3] has been carried out. The results of the analysis of levels of harmful factors affecting special clothing are presented in Table 2.

Table 2

Levels of exposure to harmful factors affecting working clothing of workers of refrigerating sections, %

No	Impact factors	Type of refrigerating section		
		Meat products	Dairy products	Fruits and vegetables
1.	Mechanical effects	40	30	40
2.	Pollution	40	30	40
3.	Moisture	20	40	20
	Total	100	100	100

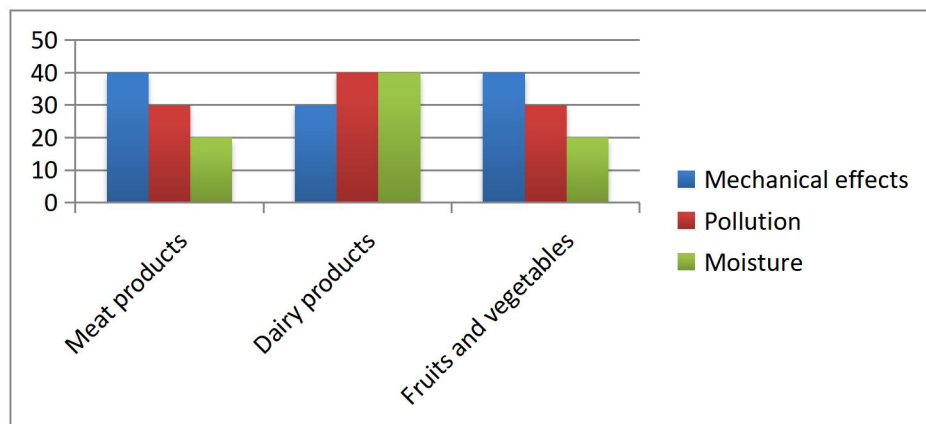


Fig. 5. Harmful factors affecting working clothing of workers of refrigerating sections

As can be seen from the histogram, the cold storage sections of meat products and fruits and vegetables has mechanical effects in the first place, pollution in the next place, and humidity in the last place. Pollution and moisture are the first places in the level of impact on the clothing of workers in cold storage of dairy products, followed by mechanical effects.

In the process of inspecting the existing working clothing of workers of refrigerating sections, the middle part of their front details, the elbow and lower parts of the sleeves, the upper and knee parts of the pants are quickly worn due to friction, mechanical effects, pollution and moisture [4].

In addition, due to physical work and dynamic stress, the following areas of clothing were damaged: the shoulder, elbow and knee parts, and the step seam.

Thereby, after examining the existing working clothing of workers of refrigerating sections, it was found that their most damaged areas are:

because of pollution, on the front side – chest and abdomen, bottom, knee and upper parts of pants;

because of mechanical effects – the middle and side parts of the front piece, the elbow and lower parts of the sleeves, the front upper part of the pants;

because of the influence of moisture – the middle part of the front piece, the end of sleeves, the front upper part of the pants.

In conclusion, it can be said that the existing working clothing of workers are not designed for this type of production (they consist of randomly selected types of products). The cold air temperature and high moisture in the cold storage rooms cause occupational diseases such as back, leg and arm pain. During work, it was found that the chest, abdomen, arms and legs of the worker are the most affected areas of the body. During work, special clothing should provide comfort for workers' movement, provide warmth and be durable.

At the next stage, taking into account the preferences of consumers, research, selection and substantiation of the main properties of special clothing for workers of refrigerating sections has been carried out.

In order to develop special clothing for employees of agricultural clusters in Uzbekistan, a questionnaire survey was conducted to determine the opinions of consumers, as well as to study the current state of the work clothing consumer market.

It is known that statistical data are characterized by a variety of interrelated factors affecting them in

different directions, which causes certain difficulties in their statistical processing. In some cases, there is a lack of preliminary data due to the inability to use one or another characteristic in quantitative form. The solution to this question can be done by applying a questionnaire and using the experience and knowledge of experts in the field. Based on extensive research by leading industry experts, sufficient information can be determined using various methods of questionnaire organization. Such an approach allows reducing the amount of experimental work, to accept or reject some initial hypotheses and to determine the influence of various factors on optimization parameters.

In order to determine the functional requirements and to reveal the characteristics of special clothing, a questionnaire survey was conducted among the workers of the cold store in the agro-industrial complex of Romitan, Bukhara and Kagan districts of Bukhara region and the workers of “Buxoro gosht-sut zahira” JSC [5]. The age of respondents ranged from 19 to 46 years old. Questionnaires are known to be a reliable tool in sociological research.

The survey of experts was conducted using a questionnaire and a personal interview. Questionnaire questions reflect the following factors that influence special clothing and are taken into account in its development: color, silhouette and type of special clothing, selected materials, hygienic properties, and the influence of industrial and climatic factors, artistic and constructive solutions depending on wear factors.

The APRIOR ranking method was used to process the results of the questionnaire survey [6]. The contribution and necessity of each factor is evaluated by the value of the position assigned to this factor by the respondents, taking into account their expected impact in the ranking of all factors. The survey results are shown in Figure 6.

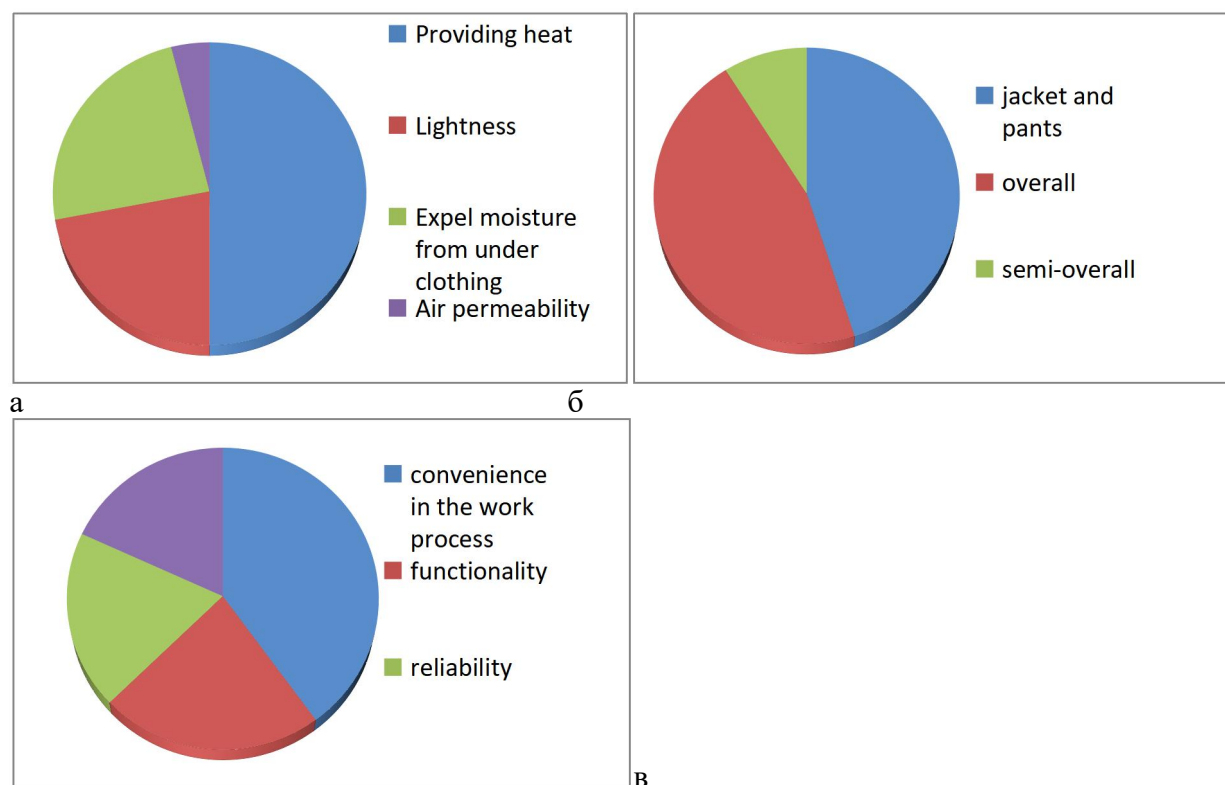


Fig. 6. Distribution of opinions of respondents about special clothing a) importance of features; b) type of preference set; c) important aspects

The analysis of the results of the questionnaire survey of employees showed that the most important indicators of special clothing for workers working in refrigerating sections are the heat supply and moisture permeability of the material package (Fig. 6, a).

Regarding the set of special clothing, workers working in fruit and vegetable cold storage preferred jackets and trousers, and overalls preferred by workers working in cold storage for meat products (Fig. 6b).

Because of research, it was found that the most important aspects of special clothing are its comfort, functionality, reliability and appearance (Fig. 6, c).

As can be seen from the histograms (Fig. 6-7), the majority of respondents chose jackets and pants as

the most preferred type of special clothing (73%), and the main characteristics of special clothing are convenience in the work process (44%), and functionality in the second place (21%). in third place is reliability (21%) and in last place is appearance (20%). Because of the conducted research, the requirements for special clothing were formed, taking into account the suggestions of consumers.

Thereby, the design of special clothing is a multifunctional task, and the requirements for it can be formulated as follows:

- 1) special clothing must reliably protect the human body from cold, pollution and mechanical effects during work;
- 2) special clothing construction and materials should release the moisture (sweat) generated during the period of increased physical activity of a person to the outside environment through the clothing package, for this the clothing package should be composed of natural materials;
- 3) special clothing must not lose its operational properties, aesthetic appearance, protective and hygienic functions during the period of operation;
- 4) special clothing should be in the form of overalls for meat cold storage workers, and a jacket and pants set for fruit and vegetable cold storage workers;
- 5) the design of the special clothing should provide comfort for work activities, and at the same time, it should be compact, light and attractive.

Mentioned requirements have been taken as a basis for the selection and construction of a fabric pack for special clothing at the next stages of research.

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