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THE PROBLEMS OF INNOVATIVE TECHNOLOGIES SAFETY '2013
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THE PROBLEMS OF INNOVATIVE TECHNOLOGIES SAFETY

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In this article we describe the use of language English

Annotation. The analysis of terms safety and security is held, the dialectics of properties of garments with bulking filler is given, the safety indices and characteristics of garments with bulking filler are analysed, the research norms and methods of environmental pollution caused by the given goods'group manufacturing are highlighted.

Key words: security, safety, garments with bulking filler.

Numerous studies witness, that the people's health depends on the absence of diseases and physical defects as well as it is determined by the three sets of factors - genetically inherited, socio-economic and ecological. The chemical substances intensive introduction into all branches of national economy allows to assume that the chemical factor is one of the leading factors for many key units of hygiene [1].

There is a need to differentiate between the two notions – security and safety.

Nowadays the goods safety theory and practice issues are given a significant consideration, which is justified by a great number of publications [2-3]. The authors consider the contradictions in a terminology base and assume that safety means the production characteristics rather than its state.

There are two notions in the Ukrainian language – security and safety. Security is a state, in which none or nothing is threatened by danger, but safety means the absence of danger [4].

The contemporary textile materials and fabrics in the context of the people's health safety have to be considered as a product of the chemical substances complex

negative effect. First of all, the textile fabrics are affected by the raw materials nature, the technological processes peculiarities of their manufacturing. In other words – the textile production natural characteristics. In particular: chemical characteristics (chemical danger), physical-mechanical properties (mechanical danger), electrical ones (electrical danger) etc.

The long-lasting accumulation of certain chemical substances in a person's body during the textile fabrics exploitation may lead to the person's and their descendants' genetic apparatus dysfunction, the central nervous system, kidneys and lungs affection as well as the other organs malfunction.

Nowadays heavy metals and pesticides rank the first ones in the world concerning the ecosystem pollution priority. The latter can be rather steady compounds and be preserved in the soil as well as in the natural raw materials (cotton, flax, wool) for long. Besides that, raw materials and final products made of the natural raw materials are processed with special substances, which protect them from the microorganisms', moths', rodents' destructive effect during storing and transportation.

The heavy metals, pesticides, chlorine, capacious organic compounds, dioxins etc. can get into natural fibers in the process of their growth by means of ground waters and air.

Heavy metals can affect negatively as they can pollute textile fabrics and clothes in the process of dyes application, technological processes peculiarities at the expense of the ecosystem pollution. At present the most wide-spread contaminants of ecosystem are bismuth, cadmium, cobalt, manganese, copper, zinc, nickel, tin, mercury, lead, antimony, chromium. Among them, lead, mercury and cadmium belong to the environmental global pollutants of the first grade of danger [5].

A crucial issue on the safety of dyes which are able to provoke negative biological effects during the process of textile fabrics and clothes use is still remained unsettled in the domestic hygienic research practice.

It is a well-known fact that the dyes which are allergens are used in the textile industry of Ukraine. In technological processes of raw materials processing and

fabric manufacturing the employing of finishing compositions, textile auxiliary substances (e.g. thermosets - phenol-aldehyde, melamine phenol-aldehyde etc.) is allowed, which leads to the rise in manufacture effectiveness and the appearance improvement. The compositions and substances mentioned above are not always removed completely from products and materials at different stages of technological process. Due to the atmospheric factors influence and mechanical loading the destruction by-products may be emitted into the under clothes space during the clothes exploitation, and the negative consequences may arise (skin irritation, allergenic etc.) due to the process of sweating [1].

Thus, textile materials and fabrics are the source of a possible negative effect of chemical substances which are different in their designation, grade of danger, biological effects. Taking into consideration the fact, that from their birth humans are in direct contact with textile materials and fabrics and their chemical contaminants possible migration affects the human body within the lifespan, it is obvious that at present the issue on safety is a crucial one for textile materials and fabrics.

Unfortunately, the products made of natural raw materials are still considered to be safe for human's health.

In Ukraine the issues on clothes and footwear hygiene are the ones which have no their "own" standards and regulations concerning their chemical substances migration. But only standards of chemical fibers enclosure in materials for children's clothes and footwear are valid in Ukraine. These standards are stated in San R&N № 42-125-4390-87 "Chemical fibers enclosure in materials for children's clothes and footwear in accordance with hygienic indices" [6].

Moreover, the garments with bulking filler form a separate group of fabrics. As the sleep occupies the main part of human life. But the healthy sleep requires that mattress, pillow and blanket have to be comfortable as well as they should have high mechanical, physical characteristics, safety standards etc.

The range of garments with bulking filler is formed in accordance with consumers' requirements depending on the age and target, natural and social conditions of use, individual preferences etc.

The goods quality is a critical issue at the current stage of market relations formation.

The goods quality control is widely used in commerce, design, industry and agriculture. Also it involves the whole “product life cycle”: the stage of technical task, development phases, sale and service, competitiveness’ assessment.

The industry produces fabrics for domestic purposes to sleep and rest: pillows, blankets, bedspreads, mattress covers, warmth keeping counterpanes and other items with bulking filler.

Nonwoven cloth, down or balls made of polyester fibers are used as a filler.

The utility of these goods is revealed through their consumer properties, that means those properties, that allow consumers to satisfy certain needs, requirements [7].

According to Fig.1, goods safety occupies a great place in satisfying consumers’ needs and requirements with textile articles.

It is known, that the natural raw stuff usage will significantly ensure the finished products harmlessness. In Ukraine the fabrics with bulking filler which is made of natural fibers (sheep's wool, hemp, cotton, flax) for domestic purposes to sleep and rest are in great demand. Special attention is paid to the Ukrainian traditional raw materials – flax and hemp.

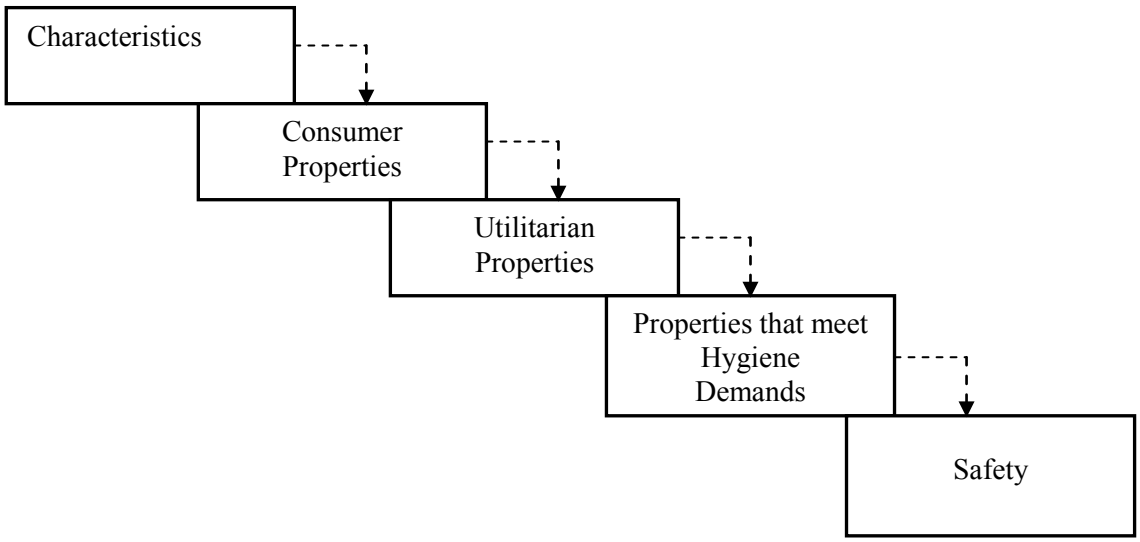

Fig. 1. The properties’ dialectics of fabrics with bulking filler

Bast fibers belong to the natural fibers of plant origin. Textile fabrics made of them and designed in the style “eco-natural” are very popular throughout the world due to their alternative appearance and their properties set. Such textile fabrics have higher medico-biological and protective characteristics. Due to this unique complex of bast fibers attributes as being hygienic, high strength, low electrical resistance, comfort, natural bactericidal action there is a constant growth in demand worldwide for textile bast fabrics for domestic purposes. Hemp cloths possess unique characteristics. In particular, hemp cloths are antistatic, hygienic, absorb up to 30 % of perspiration and 95 % of ultraviolet rays. They ensure comfortable temperature and humidity of the under clothes space and at the same time the perspiration elimination from body surface. Garments made of these cloths are recommended to wear for those people who tend to suffer from rheumatism, dermal allergy, spine diseases [8]. The separate subgroup of attributes that are complied with hygienic demands is presented by safety characteristics (fig. 2).

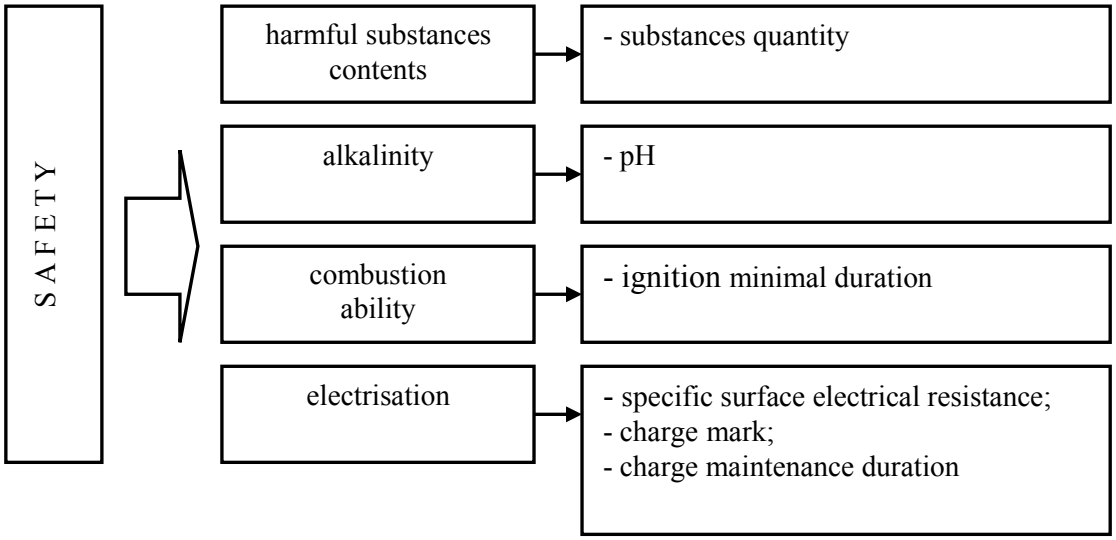

Fig. 2. Safety indices and characteristics of fabrics with bulking filler

The safety of fabrics with bulking filler depends on the purpose and human skin contact degree. Extremely important indicator is combustion ability (ignition), since both natural and synthetic raw materials are easily inflammable, but synthetic raw stuff give off hypertoxical substances.

To ensure consumers' requirements as to safety of garments with bulking filler a significant role is assigned to an electrization ability. Statistical electricity charges may appear on the garments in the manufacturing process as well as in their service period. Thus, electric field voltage can reach 5000V/sm on the lavsan and acrylic garments. Electrostatic charges accumulation, their size and certain polarity cause garments sticking to a human body, their sparkling, cracking, rapid contamination due to the dust attraction.

Accessible foreign sources analysis has shown that in the European countries clothes, textile and leather materials are estimated according to safety indices in compliance with norms regulated by Instructions and standards.

For this reason the International Association of Investigation and Trial in Textile Ecology is functioning in Europe ("Oeko-Tex-100"). This Association comprises 12 countries (Germany, Austria, Italy, Switzerland, France, Belgium, Great Britain, Spain, Scandinavian countries, Netherlands).

It deals with research as well as the development of scientifically grounded specifications to ensure the textile materials and their garments safety. Production which has been undergone a trial in specialized probationary laboratories and in the field of textile ecology ("Oeko-Tex-100") is obligatory labeled.

The basis of the European countries standards is the control of migrating chemical substances complex with skin irritation and allergenic effects and remote effects.

In accordance with the international standard "Oeko-Tex-100" textile goods must be subjected to the analysis in order to detect the organic substances concentration. This standard regulates the admissible level of harmful substances content in textile materials and garments depending on the category they belong:

1. Textile goods of children's range;
2. Textile goods that are in direct contact with a human body;
3. Textile goods that are not in contact with a skin;
4. Ornamental textile materials.

The first and second categories of criteria (A1 and A2) stated in the EU Instructions are called “ecological” ones. The category of criteria A1 refers to the article’s composition (e.g. alkali – for wool, chemical substances pesticides which are used to process natural fibers to store – for cotton and wool, antimony – for polyester fibers, zinc - for polyurethane fibers etc.).

The second category of criteria A2 involves processes and chemicals including dyes. And through all textile goods manufacturing phases it regulates the permission to employ definite substances as well as contents norms or harmful chemical substances migration, among them: oils, wax, size, softeners, detergents, heavy metals, free or partially hydrolyzed formaldehyde, chlorophenol, compound dyes which contain metals and azo dyes etc.

A positive measure is an elaboration of the state standard SSTU 4239-2003 “Textile and leather materials and wares for consumer service. Main hygienic demands”, which came into force on the 1 of October, 2004. This standard is conformed with standards of the “Oeko-Tex-100” system in the section concerning the hygienic demands. The textile production hygienic demands are differentiated depending on its designation and to what extent it contacts with a human skin.

The problem of environmental pollution occurred during manufacturing process of garments with bulking filler is a crucial one.

The maximum allowable content (MAC) of hazardous substances in working area air during products manufacturing must correspond to the demands of SSS 12.1.005 [9] and data given in the table.

Table 1

Hazardous chemical substances and methods of their monitoring

Chemical substance name	MAC, p.r.z.	Security level	Control methods
formaldehyde	0,5	2	«Methodical instructions on gasochromatological measurement of formaldehyde in working zone air» № 4595-88 from 30.03.88.

phenol	0,3	2	«Methodical instructions on gasochromatological measurement of tricresol concentration (mixture of o-,m-, p- cresols) and phenol in working zone air» №4590-88 from 30.03.88.
benzol	15/5	2	«Methodical instructions on gasochromatological measurement of benzol, toluol, o-, m-, n- xylols, cyclohexane, ethylacetate and butyl alcohol in working zone air» № 4168-86 from 06.11.86.
dust: cotton, wool	2,0	4	«Gravimetric measurement in working zone air and in dust ventilating plants systems» №1719-77 from 18.04.77.
lavsan dust	5.0	3	«Gravimetric measurement in working zone air and in dust ventilating plants systems» №1719-77 from 18.04.1977.

Thus, nowadays, when a society development is aimed to guarantee the health care and people's high level of life, it is assumed that textile goods safety, especially of those with bulking filler, depends on their designation and contact degree with people's skin. So, a risk-free production (or production with minimal level of risk) for people's health and safety, is a safe one.

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