



PERSONAL PROTECTIVE EQUIPMENT AND THEIR TYPES

Ibragimov Rustam Abdulhamidovich

*Lecturer, Department of Surgical Diseases and Life Safety
Andijan State Medical Institute, Andijan, Republic of Uzbekistan*

Annotation

this article provides information on personal protection and how to use them. The article provides images and tables.

Keywords

insulation, glasses, thermal, helmet, spectrum, welding.

General view of personal protection:

The entire topic of personal protection should be considered in the context of control methods for the prevention of industrial injuries and occupational diseases. This article provides a detailed technical discussion of the existing types of personal protection, the risks that may be indicated in their use and the criteria for choosing the appropriate protective equipment. Where they can be applied, existing approvals, certificates and standards for protective equipment and equipment are summarized. When using this information, it should always be borne in mind that personal protection should be considered as a last resort in reducing workplace risks. In a hierarchy of methods that can be used to control workplace hazards, personal protection is not the first choice method. In fact, it should be used when there is possible engineering control (such as insulation, protection, ventilation, replacement or other process modification) and administrative control (such as reducing working hours at risk of exposure) that reduces the risk.) were implemented at a possible level. However, there are situations where personal protection as a short-term or long-term control is necessary to reduce the risk of occupational disease and injury. When such use is necessary, personal protective equipment and tools should be used as part of a comprehensive program that includes a complete assessment of risks, the correct selection and installation of equipment, training and training of people who use equipment, maintenance and repair.

Elements of the personal protection program:

The apparent simplicity of some personal protective equipment can lead to a gross neglect of the effort and costs required for the effective use of this equipment. While some devices, such as gloves and protective shoes, are relatively simple, other equipment such as a respirator can actually be quite complex. Factors that make it difficult to achieve effective personal protection are inherent in any method based on changing human behavior to reduce risk, rather than the protection included in the process at the source of risk. Regardless of a specific type of protection, there is a set of elements that must be included in the personal protection program.

Training protective equipment

Any protective device must be properly installed if it is to ensure the level of protection developed. In addition to the operation of the protective device, proper installation is also an important factor in adopting

the equipment and encouraging people to use it. It is unlikely to use protection that is incorrect or inconvenient for its intended purpose. In the worst case, improperly equipped equipment such as clothing and gloves can actually pose a risk when working around the machine. Manufacturers of protective equipment and tools offer different sizes and designs of these products, and workers must be provided with the right protection to achieve their goal.

When protecting respiratory organs, specific requirements for installation are included in standards such as the United States Department of labor protection and health's respiratory protection standards. The principles of ensuring the correct installation are used in the full range of protective equipment and tools, regardless of whether a certain standard is required.

Eye and face protection

Eye and face protection includes safety goggles, goggles, face shields, and the like, which are used to protect against flying particles and foreign bodies, corrosive chemicals, smoke, lasers, and radiation. Often, it may be necessary to protect the entire face from radiation or mechanical, thermal or chemical hazards. Sometimes a face shield can also be enough to protect the eyes, but often a separate eye protection is necessary, either separately or as a complement to protect the face.

A wide range of professions requires eye and face protection: risks include volatile particles, smoke or corrosive solids, liquids or vapors in grinding, grinding, cutting, blasting, grinding, galvanizing, or various chemical operations; against intense light as in laser operations; and ultraviolet or infrared radiation in welding or furnace operations. Of the many types of eye and face protection, there is the right type for each risk. For some serious risks, it is preferable to protect the entire face. When necessary, hood or helmet-type face guards and face shields are used. Glasses or goggles can be used to specifically protect the eyes.



Figure 1 common types of glasses for eye protection with side screens or without protection.

Protection against special risks

Thermal radiation. Face shields or eye protectors from infrared radiation are mainly used in furnace work and other hot work related to exposure to high temperature radiation sources. Protection is usually necessary against sparks or flying hot objects at the same time. Helmet-type face guards and face shield are mainly used. A wide variety of materials are used, including metal wire mesh, perforated aluminum plates or similar metal plates, aluminized plastic shields, or plastic shields with a gold layer coating. A face shield made of wire mesh can reduce thermal radiation by 30 to 50%. Aluminum-plated plastic shields provide good protection against bright heat. Some examples of face shields against thermal radiation are shown in .

Broad spectrum ranges. Welding and cutting processes or ovens emit radiation in the ultraviolet, visible and infrared lines of the spectrum, all of which can have a detrimental effect on the eyes. Eyeglass type or eyeglass-type protectors, similar to those shown in Figure 1 and Figure 2, can be used, as well as welder protectors, such as those shown in Figure 4. In welding work, helmet-type protection and hand shield-type protectors are usually used, sometimes in combination with glasses or goggles. It should be noted that

protection is also necessary for the welder's assistant.

Table 1. Conductivity requirements (ISO 4850-1979)

Scale number	Maximum conductivity in the ultraviolet spectrum, $t(\lambda)$, %		Light transmittance (T), %		Maximum average permeability in the infrared spectrum, %	
	313 nm	365 nm	maximum	minimum	Near IR 1,300 to 780 nm.	Middle IR 2,000 to 1,300 nm.
1.2	0,0003	50	100	74,4	37	37
1.4	0,0003	35	74,4	58,1	33	33
1.7	0,0003	22	58,1	43,2	26	26
2.0	0,0003	14	43,2	29,1	21	13
2.5	0,0003	6,4	29,1	17,8	15	9,6
3	0,0003	2,8	17,8	8,5	12	8,5
4	0,0003	0,95	8,5	3,2	6,4	5,4
5	0,0003	0,30	3,2	1,2	3,2	3,2
6	0,0003	0,10	1,2	0,44	1,7	1,9
7	0,0003	0,037	0,44	0,16	0,81	1,2
8	0,0003	0,013	0,16	0,061	0,43	0,68
9	0,0003	0,0045	0,061	0,023	0,20	0,39
10	0,0003	0,0016	0,023	0,0085	0,10	0,25
11	For 365 nm	0,00060	0,0085	0,0032	0,050	0,15
12	allowed	0,00020	0,0032	0,0012	0,027	0,096
13	from permeability	0,000076	0,0012	0,00044	0,014	0,060
14	less or equal to	0,000027	0,00044	0,00016	0,007	0,04
15	price	0,0000094	0,00016	0,000061	0,003	0,02
16		0,0000034	0,000061	0,000029	0,003	0,02

The main purpose of the safety helmet is to protect the user's head from dangers, mechanical shocks. It can additionally protect against other objects such as mechanical, thermal and electrical.

A safe helmet must meet the following requirements to reduce the harmful effects of blows on the head:

1. It should spread the load on the largest possible surface and limit the pressure applied to the skull. This is achieved by providing a sufficiently large harness that closely matches the different shapes of the skull and a hard shell strong enough to prevent the head from coming into direct contact with accidentally fallen objects and providing protection if the user's head touches a hard surface (Figure 1). Therefore, the Shell must withstand deformation and punctures.

2. With a corresponding smooth and rounded shape, it is necessary to twist the fallen objects. A helmet with protruding ridges tends to hold falling objects rather than twist them and thus store a little more kinetic energy than perfectly smooth helmets.

3. It must distribute and distribute the energy that can be transmitted to itself in such a way that the energy does not completely pass to the head and neck. This is achieved with the help of harnesses, which must be firmly fixed on a solid shell, so that it absorbs shock without separating it from the shell. The harness must also be flexible enough to deform under impact without touching the inner surface of the shell. This deformation, which absorbs most of the impact energy, is limited by the minimum amount of space between

the hard shell and the skull and the maximum stretching of the harness before it breaks. Thus, the stiffness or stiffness of the harness must be the result of a compromise between the maximum amount of energy it is designed to absorb and the progressive speed that allows the shock to be transmitted to the head.

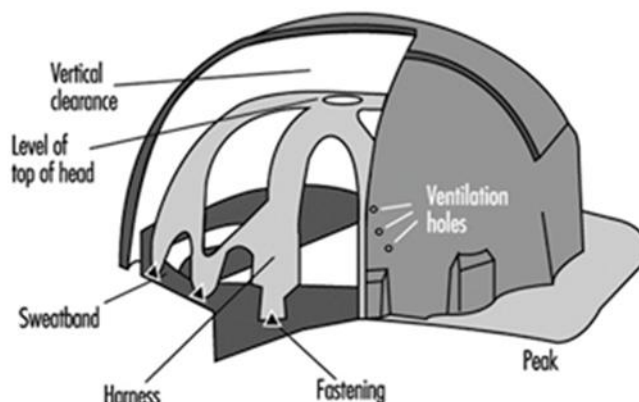


Figure 2. An example of important elements of safe helmet construction

Other requirements may apply to helmets used for specific tasks. These include protection against splashes of molten metal in the iron and steel industry and protection against electric shock by direct contact of helmets used by electrotechnicians.

The materials used in the manufacture of helmets and harnesses must maintain their protective properties for a long time and in all predictable climates, including the sun, rain, heat, cold temperatures, etc. Helmets should also have good fire resistance and should not be damaged if they fall on a hard surface from a height of several meters.

Conclusion: Protective equipment and devices are an important part of the risk control strategy. In the management hierarchy, they can be used effectively if their respective role is recognized. The use of protective equipment and tools should be provided with a personal protective program, which ensures that protection is really carried out in accordance with the terms of Use and that people who need to wear it use it effectively in their labor activities.

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