

Safety of the technological process in the production and storage of explosives and ammunition

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Abstract: The report examines the main dangers that arise in the production and storage of explosives and ammunition. A classification of places where an explosive atmosphere may occur has been made. The obligations of the employer arising from the risks posed by the production of ammunition and pyrotechnic articles are described.

Keywords: SAFETY CONDITIONS, EXPLOSIVES, AMMUNITION, PRODUCTION

1. Introduction

Every strong economy relies on the manufacturing industry and it is of the biggest importance that companies provide safe working conditions for their workers. Ensuring the safety of employees leads to greater efficiency and improved product quality. In the production process there are a large number of risks and dangers for both workers and production. This report presents five main safety risks that are known in the technological process in the production of explosives and ammunition.

2. Main safety hazards in the explosives and ammunition manufacturing industry

2.1. Uncontrolled combustion

Combustion and welding equipment are examples of controlled fire that may be present in a production environment. These are critical points in many production processes. The reason for a large percentage of accidents in the production and storage of explosives and ammunition is the occurrence of uncontrolled combustion, shown in fig.1.

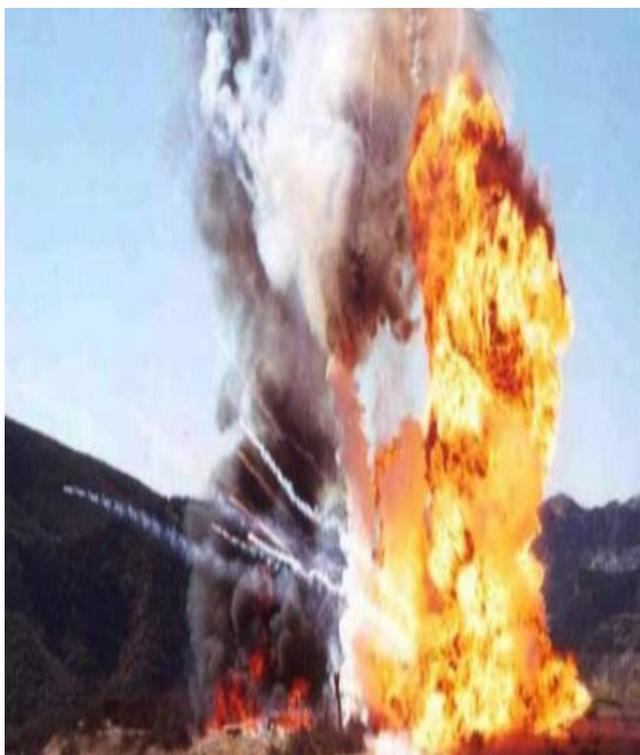


Fig.1

Production environments must be equipped with smoke detection and fire extinguishing devices in order to localize the occurrence of uncontrolled flames. Workers must be provided with and trained to use fire extinguishers, as well as be familiar with

evacuation plans. The required evacuation exits must be provided in each production or storage facility. It is necessary for the evacuation exits to be well marked, as well as for regular fire drills to be carried out in order to ensure the safety of the workers and residents of the building.

In order to ensure the necessary level of safety in addition to the provision of proper technological equipment used for the production and storage of explosives and ammunition, it is also necessary to ensure the necessary degree of protection of lighting and electrical systems.

2.2. Hazardous materials

Many industries require workers to manage and handle hazardous chemicals on a daily basis - fig. 2. These are often key elements in the production process. It is essential for the health and life of workers that they be trained to use them correctly and safely. Examples of hazardous chemicals include corrosive cleaning solutions, battery acid and flammable substances such as ethanol. First of all, workers using these chemicals need to know how to transport and load them and how to safely manage the processes using these chemicals. This will ensure safety in normal and predictable uses.



Fig.2

Incidents with hazardous substances and chemicals occur largely in unforeseen circumstances. For this reason, employees need to be trained to treat damage from hazardous chemicals. It is also vital that evacuation procedures are put in place to ensure that the relevant emergency response specialists have access. Keeping basic safety instructions nearby is a great way to help workers make decisions when exposed to a hazardous chemical. All hazardous chemicals must be clearly and visibly labeled so that in the event of a spill, workers and rescue teams can identify the hazard.

2.3. Protection of machines

Proper protection of the machines is essential to ensure the safety of the workers who work with them on a daily basis.

Improperly installed machine fuses pose a danger to employees, which can lead to life-threatening accidents. The machines intended for work in rooms in which there is a danger of explosion need to be in explosion-proof design - fig.3.



Fig.3

2.4. Movement of machines in the premises

Forklifts (Fig. 4) are a key risk factor, and accidents related to them are one of the most common in the manufacturing industry. These include risk to human life, likelihood of injury to workers and damage to goods and materials.



Fig.4

2.5. Slipping and falling in the workplace

Falls are a constant danger in the manufacturing industry. Working on high platforms, ladders or other raised areas poses a personal risk, not only is there a possibility of serious injury to workers, but there is also a risk to their lives. Although the use of safety equipment and helmets is mandatory in manufacturing plants, falling from a great height is the main cause of injuries and deaths among workers.

It is crucial that workers are periodically instructed and trained to understand the signals given to them from the ground, and use the necessary protective equipment and protective clothing.

3. Ensuring the safety and health of workers in the production of explosives and ammunition

Ordinance № 11 of 27 December 2004 on the minimum requirements for ensuring the safety and health of workers in the event of a potential risk of explosive atmosphere lays down the minimum requirements for ensuring the safety and health of workers exposed to the potential risk of an explosive atmosphere.

The employer is responsible and must take all necessary measures to ensure the safety and health of workers. It is the

obligation of the employer to provide the necessary conditions for prevention and protection against explosions, as well as to take technical and/or organizational measures, consistent with the nature of the work and in accordance with the following priorities and basic principles:

- prevention of the formation of an explosive atmosphere;
- preventing the ignition of explosive atmospheres and reducing the dangerous effects of explosions so as to ensure the safety and health of workers.

The employer is obliged to take the necessary measures in all places where an explosive atmosphere could occur to an extent that would endanger the safety and health of workers or other persons in order to ensure:

1. Work environment in which the work is performed safely;
2. Appropriate control of the working environment at work, which is in accordance with the risk assessment and is carried out using appropriate technical means. [1]

Site managers are required to provide:

1. The organization of the production process in accordance with the requirements for safety and fire protection;
2. Training of workers with explosives on occupational safety when working with these materials;
3. The development of instructions on occupational safety when working with explosives;
4. Those working with explosives with special work clothes suitable for their working conditions, the necessary personal protective equipment and auxiliary devices;
5. Monthly inspection of the procedure for storage, acceptance and reporting of explosives;
6. Order and security during unloading and transportation of explosives to warehouses and workplaces;
7. Timely investigation of accidents and incidents when working with explosives and development of measures to prevent them;
8. Fulfillment of the prescriptions of the control bodies on labor safety when working with explosive materials. [1-6]

4. Classification of places where an explosive atmosphere may occur

4.1. Places where an explosive atmosphere may occur are classified into two groups:

- (a) hazardous places;
- b) non-hazardous places.

4.1.1. The classification of areas where an explosive atmosphere may occur shall take into account the presence of flammable and / or combustible substances.

4.1.2. Layers, accumulations and amounts of flammable dust are reported as any other source that can form an explosive atmosphere.

4.2. Classification of hazardous places.

4.2.1. Hazardous areas are classified into zones on the basis of the frequency and duration of explosive atmospheres. The scope of the measures to be taken is determined by this classification - Fig. 5 and Fig. 6.

ZONES		
mixture with air of flammable substances in the form of gases, vapors and aerosols	mixture with air of flammable substances in the form of in the form of combustible powders	Zone definition
1 0	2 20	3 an explosive atmosphere exists permanently, continuously or occurs frequently
1	21	an explosive atmosphere can sometimes occur during normal operation
2	22	an explosive atmosphere is formed during normal operation or is formed in a short time

Fig. 5

4.2.1.1. Zone 0

A place where an explosive atmosphere consisting of a mixture of flammable substances in the form of gases, vapors or aerosols and air exists permanently or for a long time or occurs frequently.

4.2.1.2. Zone 1

A place where an explosive atmosphere consisting of a mixture of flammable substances in the form of gases, vapors or aerosols and air is likely to occur occasionally under normal operating conditions.

4.2.1.3. Zone 2

A place where an explosive atmosphere consisting of a mixture of flammable substances in the form of gases, vapors or aerosols and air is unlikely to occur under normal operating conditions, and if it does occur, it will only be for a short time.

4.2.1.4. Zone 20

A place where an explosive atmosphere, in the form of a mixture of dispersed flammable dust and air, exists permanently or for a long time or occurs frequently.

Classification of the areas

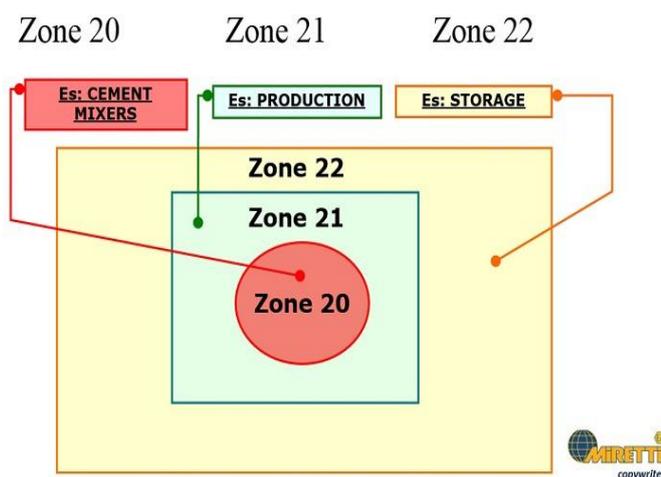


Fig. 6

4.2.1.5. Zone 21

A place where an explosive atmosphere, in the form of a mixture of dispersed flammable dust and air, is likely to occur occasionally under normal operating conditions.

4.2.1.6. Zone 22

A place where an explosive atmosphere, in the form of a mixture of dispersed flammable dust and air, is unlikely to occur

under normal operating conditions, and if it does, it will only be for a short time.

3. Conclusions

In conclusion, each workplace has its dangers, but the production of explosives and ammunition poses a higher risk of injury and loss of life than many other modern work environments.

A safe production process can be ensured by training personnel to work with hazardous materials, risk assessment, conducting the necessary briefings and strict adherence to work and production discipline.

Compliance with regulatory requirements and safety regulations regulated by laws and regulations leads to improving the quality of work performed and minimizing the risk of accidents in the production and storage of explosives and ammunition.

The results are aimed at the implementation of Work Package 2 "Intelligent Security Systems" of project BG05M2OP001-1.002-0006 "Construction and development of a Center of Competence" Quantum Communication, Intelligent Security Systems and Risk Management (Quasar) ", which received funding from the European Regional Development Fund through the Operational Program "Science and Education for Smart Growth" 2014-2020.

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