BASICS FOR ENSURING THE SAFETY OF THERMAL SHOP WORKERS

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Annotation

This article theoretically analyzes the basics of ensuring the safety of workers working in the technological process in thermal shops. When working in thermal shops, it is necessary to follow a number of safety rules.

The main points that should be paid attention to when working with electric furnaces, gas and fuel furnaces, bath furnaces in thermal shops are analyzed. in addition, the necessary proposals have been made, which should be paid attention to when working with flammable and explosive products.

Key words: *Thermal shop, furnaces, annealing, hardening, nitriding, carburizing, chimneys, nozzles.*

The thermal shop is a room equipped with automatic and semi-automatic lines and furnaces of chamber and shaft type, where all types of heat treatment of carbon and alloy steel blanks and parts weighing up to 150 kg and up to 1200 mm long are performed.

Modern mechanical engineering cannot be imagined without heat treatment operations such as annealing, hardening; chemical-thermal (nitriding, carburization, etc.); deformation-thermal (high-temperature rolling). However, the workshop in which heat treatment operations are performed is a high-risk area.

When working in thermal shops, a number of safety rules must be observed. Practice shows that accidents at work are the result of inept and careless work and the consequence of the fact that measures were not taken in a timely manner to prevent danger [1,2,3].

Because the heat treatment shop uses high voltage energy, flammable and explosive gas, fuel oil, oil, as well as life-threatening materials (kerosene, oil, molten salts, lye, poisonous salt, acid, etc.). Therefore, to work with such products, employees require high attentiveness and diligence.

The thermist should only perform the work (Figure-1) that is assigned by the administration, and provided that it is done in a safe way. In doubtful cases, upon receipt of a new (unfamiliar) work, it is necessary to require a safety briefing from the master.

Fig-1. Thermist's workplaces

Proper organization of the workplace is essential for ensuring work safety. So, for example, when using broken forceps or tongs, the product can easily slip out and cause a bruise or burn.

It is especially important to observe a number of basic rules when operating furnaces and baths. Before kindling an oil stove, you need to open the chimney damper and check if the nozzle is “flowing”. If the nozzle is in order, then you should open the valve to supply air, and then let the fuel oil in and light it with a torch.

When igniting a hot stove, first you need to bring a burning torch to the nozzle hole, then let the air in and after that - fuel oil.

When igniting the fuel, the worker must be away from the inspection hole in the furnace door and from the nozzle. Failure to do so may result in burns to the face and hands. It must be borne in mind that in a warm furnace, fuel oil turns into gas and, when ignited, gives a strong explosion, while the flame is knocked out of the nozzle hole. When stopping the furnace, first you need to stop the supply of fuel oil, and then air. This is necessary so that unsprayed fuel oil does not accumulate in the furnace, which can suddenly ignite. Trays with sand should be placed under the nozzle to soak up spilled fuel oil.

Before lighting gas thermal oven, it is recommended to open the gas thermal oven doors and the air supply cock. This is necessary in order to remove the gas accumulated there from the furnace (Fig-2). When igniting gas stoves, the same rules must be observed as for oil stoves, i.e., first you need to give air, and then gas. When using electric furnaces, it is necessary to observe the basic rule - when loading and unloading the furnace, as well as during its repair and inspection, the current must first be turned off. There should be a rubber mat near electric ovens. It is not recommended to touch the frame of the electric furnace during operation, as it may be energized. When servicing electric ovens, protect your eyes from ultraviolet rays. When using salt baths, the following basic rules should be observed [4].

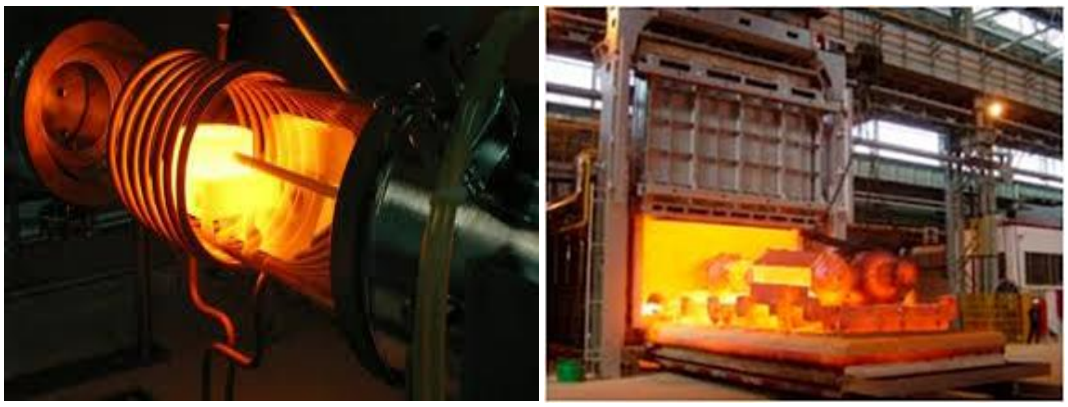

Fig. 2. Furnaces for heat treatment of metals

Thermal treatment of products in salt, nitrate furnaces is associated with increased danger, therefore, special care, caution and knowledge of safe working methods are required from the thermist worker. If safety rules are not observed, accidents associated with burns to the body, face, eyes and poisoning are possible (Fig. 3).

Fig. 3. Bath ovens

As a result of the study and analysis of the above, it was determined that the basis of labor safety in the thermal shop depends on several factors. These factors include:

1. Before starting work, you should carefully inspect the workplace and put it in order .;

2. Check the serviceability of the grounding of transformers, baths.

3. Check the serviceability of the starting devices of the thermal equipment, the suction devices of the ventilation system, the presence and serviceability of the fences.

4. Prepare the tool, fixtures for work and make sure that they are in good condition.

5. Do not touch the inductor or workpiece during power on and heating.

6. It is necessary to monitor the readings of the instruments and the presence of cooling water in the inductor, high-frequency transformer and capacitor bank.

7. Changing the inductor should be done with the voltage removed.

8. Do not open guards that protect against accidental contact with live parts.

9. During the heat treatment of products, it is necessary to comply with the established technological regime in accordance with the technological process map.

10. It is forbidden to work on induction electrothermal installations with faulty electrical equipment, apparatus, instruments, interlocks installed on the doors through which access to buses and live parts under voltage is possible, as well as if there is a malfunction of the protective covers or damage to the mechanical part of the installation.

11.At the end of the work, the thermist must tidy up his workplace and inform the foreman and shift worker about equipment malfunctions that he noticed during work.

In addition, when carrying out the processes of thermal and chemical-thermal treatment, measures should be taken to protect workers from the possible action of hazardous and harmful production factors [6-8]. The concentrations of substances with harmful properties and the levels of physical hazardous and harmful production factors should not exceed the values established by sanitary standards.

Due to the fact that during the period of operation of industrial enterprises there are several types of hazardous areas and risks, security is theoretically divided into several methods. These methods are the following:

Method-A) to solve this, the division of the homosphere and nososphere in space and time, remote control, automation, robotics tools are used;

Method -B) normalization of the noxosphere by eliminating risks. This method includes the use of personal and joint protective equipment that protects

workers from noise, gas and dust damage;

Method -V) this method includes the use of various means and methods aimed at adapting workers to the appropriate environment and increasing their level of protection: professional selection, psychological impact and means of (individual) protection. In practice, the above methods are used together.

Based on the above, we have come to the following conclusions. To implement this theory, it is necessary and mandatory to carry out the necessary work in thermal shops:

- In order to control the processes of preparing products for heat treatment, to control and regulate the parameters of heat treatment of metals (temperature, pressure in the working space of the furnace, the content of components in a gaseous environment, etc.), it is necessary to use blocking, as well as means of light and sound signaling of violations technological process that could lead to an emergency.

- When preparing products and parts for heat treatment (applying protective pastes, etching, degreasing, etc.) and during heat treatment using substances with toxic, flammable and explosive properties (kerosene, oils, molten salts and metals, liquid media), the possibility of exposure of workers to these substances should be excluded.

- Places of possible release of substances, toxic, explosive substances and dust into the air of industrial premises must be equipped with mechanical exhaust ventilation in an explosion-proof design.

- Before filling with combustible gases and mixtures, the gas pipeline system must be purged with non-combustible or inert gases at elevated pressure.

- Premises and air ducts must be cleaned of dust so that the amount of airborne and settled dust cannot form an explosive dust-air mixture in a volume of more than 1% of the volume of the premises.

- Poisonous heat treatment salts must be used in granular form.

- Delivery to the workshop of heat treatment products, as well as oils, acids, alkalis and other chemical materials used in preparing products for heat treatment and in heat treatment processes, should be carried out in ways that exclude the risk of injury, physical overstrain, the possibility of intoxication, contamination of the body and clothes of workers, as well as pollution of the premises and air in them.

- All workers, employees and engineering and technical workers of thermal workshops and sections are instructed in labor safety and fire safety;

introductory - when applying for a job;

primary - at the workplace;

repeated - at least once every three months;

unscheduled - in case of violation of labor safety requirements; accident, etc.

- Workers in thermal shops must use personal protective equipment.

By applying these conclusions and suggestions in the thermal shop, accidents in the shop can be prevented and the safety of workers can be ensured.

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