LECTURE 10 FIRE SAFETY

Lecture contains the next partitions: 1) the reasons of occurrence of fire; 2) general requirements for fire prevention and protection; 3) assessment of fire danger of industrial production; 4)evacuation of humans at fire danger.

Characteristics of species of impulses

- The spark it is a point source of ignition. They can formed at friction, collision (stroke) or can be caused by electrical discharge. On practise often arise a electrical sparks with temperature up to 10000 ^{0}C.
- Chemical impulse arises due to interaction of some chemical substances with oxygen, water and other substances which are capable to allocate some quantity of temperature, which are causing ignition of the combustible materials.

Basic notion of burning

Uncontrollable burning out of the special center, causing a material damage is called as a fire. The fire are causing next reasons:

- combustion of energized electric devices.
- To burning are refers the speed of flowing the chemical transformation of substances with release of large quantity of the temerature. The burning represents by themselves a process of oxidation of various materials.
- Reason of explosion or fire can be presence of the burning dusts or fibers and other reasons. For example in industrial enterprises when are carried out the crushing and grinding of raw materials is released a lot of dusts . Some of settled dusts can ignite spontaneously.

Reasons of fire dangerous

- More over by the reasons of fire can be:
- Violation of rules of handling with the devices and equipment;
- Presense in premise of production of the combus - tible dusts and fibers;
- The fire is occuring against of opened surface of electrolysis bathes;
- Gas leakage due to loose connections;
- Using in the fire-dangerous environment of electric devices with possibility of accumulation of static charges and their use without adaptations of extinguishing a spark.;
- Lightning

On combustiblities all substances are subdivided on non combustible, difficult-combustible and combustible.

Incombustible substances not combusted upto 900 ^{0}C

Difficult combustible substances may ignite under an influence of source of ignition, but they are not able to independently burn.

Combustible substances able to burn against source of ignition and can continue to burn independently.

To the notion of highly flammable above all are referred the flammable

Liquid combustibles	Temperature of spark in closed cricible	Temperature of spark in open cricible
Highly dangerous	$t \leq 18$	$t \leq 13$
Constant dangerous	$23 \geq t \geq 18$	$27 \geq t \geq 13$
Dongerous at higher temperature	$23 \geq t \geq 61$	$27 \geq t \geq 66$

- *Combustion is carried out in result of oxidation of combustible materials.*
- In conformity with GOST 27331-87, fires are classified as follows:
- A – combustion of solid substances;
- B – combustion of liquid substances;
- C – combustion of gaseous substances;
- D – combustion of metals and their alloys;
- E – combustion of energized electric devices.

Uncontrollable burning out of the special center, causing a material damage is called as a fire.

Sources of ignition are open flame, overheated and heated surfaces, sparks, damaged electric equipment and networks, the sources of static and the atmospheric electricity, and any other sources whose energy is sufficient for reaction of combustion.

A special case of fire occurrence is self-ignition of substances. The causes of self-ignition can be:

Thermal oxidation; Chemical oxidation; Microbiological oxidation.

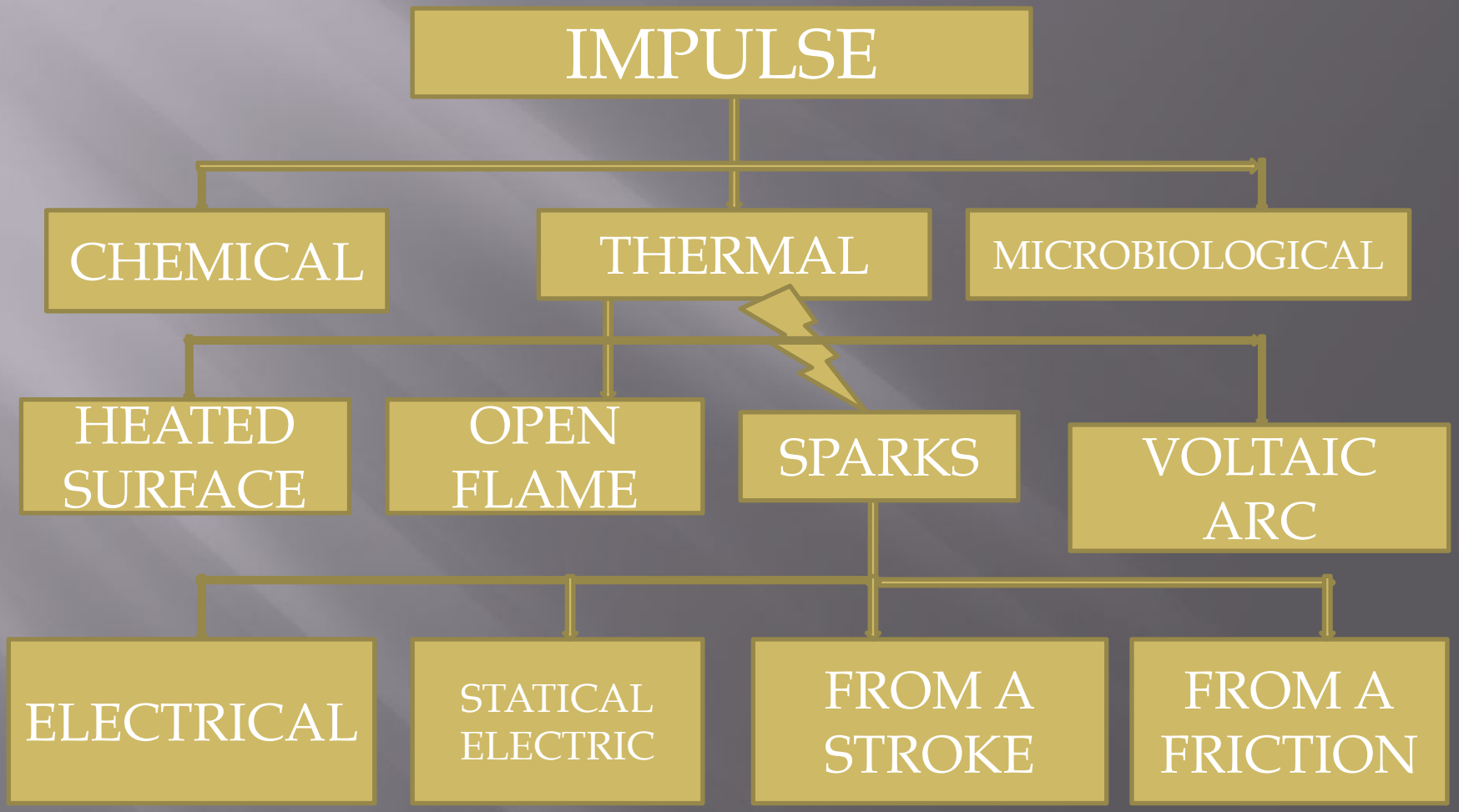
The spark it is a point source of ignition. They can formed at friction, collision (stroke) or can be caused by electrical discharge. On practise often arise a electrical sparks with temperature up to 10000 ^{0}C.

The thermal oxidation occurs in result of appearance of impulse for burning, for example the burning match or electrical spark.

The chemical oxidation occurs in case of interaction kind of materials with air, water, or one substances with another.

The microbiological oxidation can be explain by next: when are accumulating in form of their agglomeration, in those layer are appearing the microorganisms. Life activity of microorganisms is accompanied with allocating of temperature.

IGNITION SOURCE



assessment of fire danger of industrial production

According to “Construction Norms and Regulations 11-90-81” industrial buildings on explosion and fire hazardous are subdivided into six categories: “А”, “Б ", “В”, “Г", "Д", “Е”.

Category “А” (explosive and fire hazardous enterprises) included the burning gaseous substances with concentration of ignition less than 10% and temperature of ignite till 28 ^{0}C;

Category “Б " (explosive and fire hazardous enterprises) gaseous sources of ignition more than 10%, ^{0}t ignite till 60 ^{0}C;

Category “В” (fire hazardous enterprises) the enterprises having liquid with ^{0}t ignition higher than 61 ^{0}C;

Category “Г“- they are enterprises having a incombustible materials, but they are releasing the sparks;

Category "Д“ refers to not the fire hazardous enterprises;

Category “Е”(explosive danger enterprises) where is has the burning gases and dusts without liquid phases.

Providing savety of humans at avacuation

- For safety of people from fire danger, it is necessary to provide him quickly to leave a building, and it is necessary to think of it still at building design. Time from beginning of fire up to the emergence of a situation, dangerous to the person is called critical duration of a fire. The necessary time for evacuation from damgerous premises in dependence of category of fire dangerous amd of volume of premises precented in table 1.

Category of fire dangerous	Necessary time of evacuation , min, at volume of premise, $m^3 \times 10^3$				
	Up to 15	30	40	50	60 and more
А, Б, Е	0.50	0.75	1.00	1.50	1.75
В	1.25	2.00	2.00	2.50	3.00
Г, Д	does not limited				

Lightning prevention

- The atmosferic charge can be reason of explosions, fires and defeat of humans. According to statistics about 7% of fires happens for a reasons of lightning.
- Exsists a three category of safety agains of lightning (1, 2, 3) To 1 category of lightning protection refers the industrial buildings with explosives materials.
- To the second category of lightning protection refers the industrial buildings and communications with average thunderstorm activities. According the third category of lightning protection should be protected all kind of objects of industrial enterprises.
- For protection of buildings against direct stroke of lightning are using lightning arresters. For this purpose often use metal cores and cables.

The Fire prevention system must to be elaborated for each concrete object.
To place primary firefighting means, non-mechanized instruments, and firefighting inventory in production and warehouse premises that are not equipped with internal firefighting water pipeline and automated firefighting devices, as well as in the territory of enterprises, organizations that do not have any external firefighting water pipeline, or in case if the distance of buildings, constructions, external process installations of such enterprises is more than 100 m from external firefighting water sources, *boards* are provided *with fire prevention means*.