



**PROCEEDINGS OF THE
I INTERNATIONAL SCIENTIFIC
AND THEORETICAL CONFERENCE**

SCIENTIFIC REVIEW OF
THE ACTUAL EVENTS,
ACHIEVEMENTS AND
PROBLEMS

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**Scientific review of the
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SECTION 9.

FIRE AND CIVIL SAFETY

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DISCUSSION OF RESULTS FROM APPLYING THE INSTALLATION WITH AN EXTENDED BARREL FOR EXTINGUISHING BY GEL-FORMING COMPOUNDS

As it is known, the basic mechanisms of combustion termination are: cooling the zone of combustion or of burning substances, dilution of substances involved in combustion, insulation of combustible substances from the combustion zone, inhibition of chemical reaction of oxidation. Gel-forming compositions in various degrees have all the mechanisms of combustion termination. Since water is the basis of such compositions, they have a high cooling action. Water vapor that is formed during GFC evaporation ensures a dilution effect. The layer of the xerogel formed after evaporation of water from the gel layer has the insulating effect. It is possible to introduce the inhibitors of burning to the gel-forming composition, which makes it possible to increase the fire-extinguishing effect of such compositions. Thus, the organization of extinguishing fires with the use of gel-forming compounds is considered a rather promising direction, especially in multi-storey buildings and buildings for different functional purposes [1].

Existing means of fire extinguishing by gel-forming compounds ensure extinguishing by finely dispersed jets from the distance that is dangerous for a fire-fighter or by compact and by flat-radial jets from the distance that is safe for a fire-fighter, however, with excessive consumption of GFC component [1]. Given the above, the use of the existing means is not safe and is not sufficiently effective.

The solution of these problems is ensured by the use of the installation of extinguishing by gel-forming composition with the extended barrel of the cranked type. Its design makes it possible to extinguish a fire by GFC from the distance of 3–5 m, which is safe for a fire-fighter. The fact that it is compact in the folded state and easy to deploy to operating position ensures convenience of transportation and operation efficiency.

One of the most important indicators of the effectiveness of gel-forming compositions is their indicator of fire-extinguishing capacity, however, during previously conducted studies, the influence of the diameter of droplets and the intensity of GFC dispersion was not considered. That is why to determine the optimal value of dispersion and intensity of GFC spraying, we conducted comparative trials of extinguishing simulated fires A1, which characterized the efficiency of fire suppression in different modes of operation. Based on the results of comparative tests, we obtained the rational values of the dimensions of drops of 1 mm and intensity of GFC spraying of 0.6 kg/s, which allowed extinguishing the simulated fire 1A with the consumption of gel-forming compositions of 2.5 kg. Thus, the application of the designed installation makes it possible to decrease the losses of gel-forming substances by 1.5 times in comparison with the existing means of extinguishing by GFC and by 3.5 times in comparison with extinguishing by water. The obtained results of the study give grounds to consider that conducting subsequent work in this direction is relevant.

The difficulty with reliability of the cranked design of the extended barrel can occur during its practical application. Indeed, during the experimental trials of the operating sample of the new extinguishing installation, it was found that to ensure the convenience of variation of the barrel extension in practice, it is advisable to make a 3- or 5-cranked barrel. It is also advisable not to use in mass production the structures from aluminum and polymeric materials that are deformed during the lengthy influence of high temperatures. These problems are not difficult to solve by applying modern refractory materials. In addition, the cranked way of the barrel extension can be replaced with the telescopic, which is more convenient.

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