

SECTION 8. FIRE AND CIVIL SAFETY

RESEARCH GROUP:

Bogatov Oleg 

PhD, Associate Professor, Associate Professor of the Department of Metrology and Life Safety
Kharkiv National Automobile and Highway University, Ukraine

Chernukha Anton 

PhD, Associate Professor of the Department of Fire and Rescue Training
National University of Civil Defence of Ukraine, Ukraine

Bezuglov Oleg 

PhD, Associate Professor, Associate Professor of the Department of Fire and Rescue Training
National University of Civil Defence of Ukraine, Ukraine

Chernukha Andrii 

Lecturer of The department of fire prevention in settlements
National University of Civil Defence of Ukraine, Ukraine

Bytsenko Daria

Applicants for higher education of Mechanical Engineering Faculty
Kharkiv National Automobile and Highway University, Ukraine

Zhuravlova Olga

Applicants for higher education of Faculty of operational and rescue forces
National University of Civil Defence of Ukraine, Ukraine

IMPROVEMENT OF THE BREATH TESTER IN THE "MASTER – FACIAL TESTER – EXTREME ENVIRONMENT" SYSTEM

Man, his life and health, honor and dignity, inviolability and security are recognized in Ukraine as the highest social value [1].

Man-made safety - a set of actions of authorities, business entities, managers (owners) and responsible persons of facilities aimed at preventing accidents, emergencies and emergencies of a man-made nature in hazardous facilities and hazardous areas.

Thus, providing the personnel of the facility with personal respiratory protection for routine or emergency work in a non-breathable environment [2], as well as providing special protective breathing apparatus operational and rescue service of civil defense in the event of an emergency - is integral. part of ensuring man-made safety.

Currently, there are a large number of testers to check respiratory protective equipment, but none of them measures the amount of toxic substances under the mask space, depending on the vacuum.

Therefore, the study of the system "master - tester with the front part - the extreme environment", the modernization of devices for personal respiratory protection and the study of the amount of toxic substances in the mask under space is an urgent task.

During the operation of the proposed device, the poisoned environment is modeled using a dome. Changing the concentration of a toxic substance in the environment. After starting the installation at start-up from the carbon dioxide cylinder, its concentration was 35%.

An important stage in the study of the effectiveness of protective breathing apparatus is the study of the obturation zone, namely the suction of toxic substances under the mask space. It is advisable to study the front parts of insulating devices of different types.

From the obtained dependences it can be concluded that the suction of the environment in the area under the mask is affected by the complexity of the structure and the area of obturation of the front parts. The most reliable was the mask without an intercom with a large area of obturation, and the most dangerous to use a panoramic mask.

The analysis of testers for checking breathing apparatus shows that all these devices check only the tightness of the devices, and the amount of suction of dangerous value does not check any of them, so their modernization will improve the system "master - tester with front - extreme environment".

After analyzing the ITM-laboratory, it was decided to use carbon dioxide as a dangerous gas, and to measure its concentration in the sub mask space carbon dioxide sensor MQ135.

The concentration of CO₂ in the mask space is constantly increasing, which indicates a leak in the obturation zone and exhalation valve of the front of the device, i.e. the proposed upgraded tester to check breathing apparatus gives a more accurate idea of the tightness of the device because the output parameter does not depend on the tightness of the device. which will improve the system "master - tester with the front part - extreme environment".

The dependence of the concentration of hazardous chemicals under the mask of space depending on the type of the front part and the vacuum time is obtained. For this dependence, the coefficients of the type of the front part of the device are derived. The dependence for obtaining the mass concentration of hazardous chemicals under the mask of space is derived, which provides the ability to predict and compare the result with the maximum allowable concentration, which will improve the system "master – tester with the front part – extreme environment".

References:

1. Strilets', V.M., Koval'ov, P.A., Borodych, P.Yu., Rosokha, S.V. (2014). Osnovy stvorenniya ta ekspluatatsiyi zasobiv indyvidual'noho zakhystu. Navchal'nyy posibnyk. Kharkiv, 325
2. Strilets', V.M., Borodych, P.Yu., Rosokha, S.V. (2019). Zakonomirnosti diyal'nosti ryatuval'nykiv pry provedenni avariyno-ryatuval'nykh robit na stantsiyakh metropolitenu. Monohr. KP «Mis'ka drukarnya», 112