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CONDUCTING RESEARCH ON THE DRYING OF FIRE HOSES IN A MOBILE DRYING DEVICE

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Abstract:
This article presents studies conducted on fire hose drying equipment for rubber-coated, latex-coated, and double-coated hoses with diameters of 51, 66, and 77 at drying temperatures of 40, 50, and 60 °C.

Keywords: Mobile drying chamber, coolant, fire hoses, fire.

For the purpose of conducting research, two "Mobile Drying Chamber" experimental devices were developed, and studies were carried out using both experimental devices. Experimental research was conducted to determine the thermophysical parameters of the process of removing moisture from fire hoses of different types and diameters operating under pressure. The studies were carried out with three types of hoses with diameters of 51, 66, and 77 mm, namely, hoses with rubber hydro-insulation coating, latex-coated hoses, and hoses with double-sided hydro-insulation coating, at drying temperatures of 40, 50, and 60 °C.

Figure 1
The experimental device "Mobile Drying Chamber" developed for drying fire hoses.

Figure 2
The internal view of the experimental device "Mobile Drying Chamber" developed for drying fire hoses

Experimental studies were conducted in several stages.

Stage 1:

The purpose of this stage was to conduct experimental studies to determine the feasibility of drying fire hoses within one hour using the hose drying device.

Testing methodology:

Preparing the fire hose drying device (Mobile Drying Chamber) for operation.Weighing the fire hoses in their dry state and recording the obtained data in the research table.

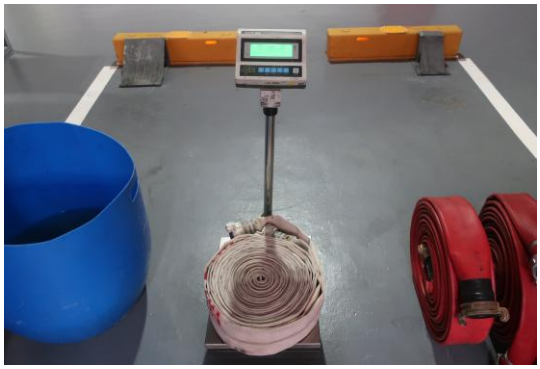

Figure 3
Weighing the fire hoses in their dry state.

Figure 4
Submerging the hoses in a water container.

Fire hoses were submerged in the water container for 40 minutes.

Afterward, the hoses were removed from the water, and residual water was drained from the internal cavity of the hoses.

The fire hoses in their wet state were weighed, and the data were recorded in the research table.

The moisture in the hoses was further removed using a squeezing device, and the hoses were weighed again, with the data recorded in the research table.

The hoses were placed into the mobile drying chamber.

The "Start" button was pressed to activate the device.

The drying process was carried out as follows:

The experimental device was heated for 20 minutes until the temperature (T) reached 50°C.

The fire hoses were dried inside the device using hot air for one hour.

After 30 minutes, the temperature inside the device and the progress of the process were monitored.After one hour of drying, the experimental drying device was forcibly stopped. The dried fire hoses were removed from the device, weighed, and the obtained data were recorded in the research table.

Stage 2:

The purpose of this stage was to conduct experimental studies to determine the feasibility of drying fire hoses in the drying device (Mobile Drying Chamber) for 1 hour and 30 minutes. Experimental studies were carried out on two hoses with diameters of 51, 66, and 77 mm, each 20 meters long, using the experimental device.

Testing process:

After weighing the fire hoses as a control measure during the first stage, they were placed in the special slots designed for hanging the hoses inside the experimental device, and the device was closed.

The "Start" button was pressed.

Drying was carried out using the following method:

Drying was continued for an additional 30 minutes.

After completing the drying process, the drying operation was forcibly stopped. The fire hoses were removed from the device, and the data were recorded in the research table.

The hoses were weighed as a control measure, and the data were entered into the research table.

Stage 3:

The purpose of this stage was to conduct experimental studies to determine the feasibility of drying fire hoses in the drying device within two hours. Experimental studies were carried out on hoses with diameters of 51, 66, and 77 mm, each 20 meters long, using the device.

Experimental research methodology:

After weighing the fire hoses as a control measure during the second stage, they were placed in the special slots designed for hanging the hoses inside the experimental device, and the device was closed.

The "Start" button was pressed.
Drying was carried out using the following method:
Drying was continued for an additional 30 minutes.
After completing the drying process, the drying operation was forcibly stopped.
The fire hoses were removed from the device, and the data were recorded in the research table.
The hoses were weighed as a control measure, and the data were entered into the research table.
Stage 4:
The purpose of this stage was to conduct experimental studies to determine the feasibility of drying fire hoses in the drying device within 2 hours and 30 minutes. Experimental studies were carried out on hoses with diameters of 51, 66, and 77 mm, each 20 meters long, using the device.
Experimental research methodology:
After weighing the fire hoses as a control measure during the second stage, they were placed in the special slots designed for hanging the hoses inside the experimental device, and the device was closed.
The "Start" button was pressed.
Drying was carried out using the following method:
Drying was continued for an additional 30 minutes.
After completing the drying process, the operation was forcibly stopped.
The fire hoses were removed from the device, and the data were recorded in the research table.

Table 1 Data from studies conducted with double-sided hydro-insulation coated hoses operating under pressure with a diameter of 51 mm.

Drying time, hours	Weight of **51** mm diameter fire hoses, kg.		
	At 40°C with T const	At 50°C with T const	At 60°C with T const
Weight of the fire hose in a dry state: 5.190 ± 0.015 kg			
Weight of the fire hose in a wet state: 6.319 ± 0.015 kg			
0	6,319 ± 0,015	6,319 ± 0,015	6,319 ± 0,015
0,5	6, 131 ± 0,015	6,029 ± 0,015	5,939 ± 0,015
1,0	5, 943 ± 0,015	5,739 ± 0,015	5,559 ± 0,015
1,5	5,755 ± 0,015	5,449 ±0,015	5,179 ± 0,015
2,0	5,567 ± 0,015	5,175 ± 0,015	4,799 ± 0,015
2,5	5,379 ± 0,015	4,869 ± 0,015	4,711 ± 0,015

Table 2 Data from studies conducted with double-sided hydro-insulation coated hoses operating under pressure with a diameter of **66** mm.

Drying time, hours	Weight of **66** mm diameter fire hoses, kg.		
	At 40°C with T const	At 50°C with T const	At 60°C with T const
Weight of the fire hose in a dry state: 6.560 ± 0.015 kg			
Weight of the fire hose in a wet state: 7.699 ± 0.015 kg			
0	7,699 ± 0,015	7,699 ± 0,015	7,699 ± 0,015
0,5	7,519 ± 0,015	7,409 ± 0,015	7,319 ± 0,015
1,0	7,339 ± 0,015	7,119 ± 0,015	6,939 ± 0,015
1,5	7,159 ± 0,015	6,829 ±0,015	6,559 ± 0,015
2,0	6,979 ± 0,015	6,549 ± 0,015	6,179 ± 0,015
2,5	6,799 ± 0,015	6,249 ± 0,015	6,110 ± 0,015

Table 3 Data from studies conducted with double-sided hydro-insulation coated hoses operating under pressure with a diameter of **77** mm.

Drying time, hours	The weight of fire hoses with a diameter of **77** mm, kg.		
	At 40°C with T const	At 50°C with T const	At 60°C with T const
The weight of the fire hose in a dry state, kg: 10.820 ± 0.015			
The weight of the fire hose in a wet state, kg: 11.949 ± 0.015			
0	11,949± 0,015	11,949 ± 0,015	11,949 ± 0,015
0,5	11,769 ± 0,015	11,659 ± 0,015	11,569 ± 0,015
1,0	11,589 ± 0,015	11,369 ± 0,015	11,189 ± 0,015
1,5	11,409 ± 0,015	11,079 ±0,015	10,809 ± 0,015
2,0	11,229 ± 0,015	10,819 ± 0,015	10,429 ± 0,015
2,5	11,049 ± 0,015	10,499 ± 0,015	10,049 ± 0,015

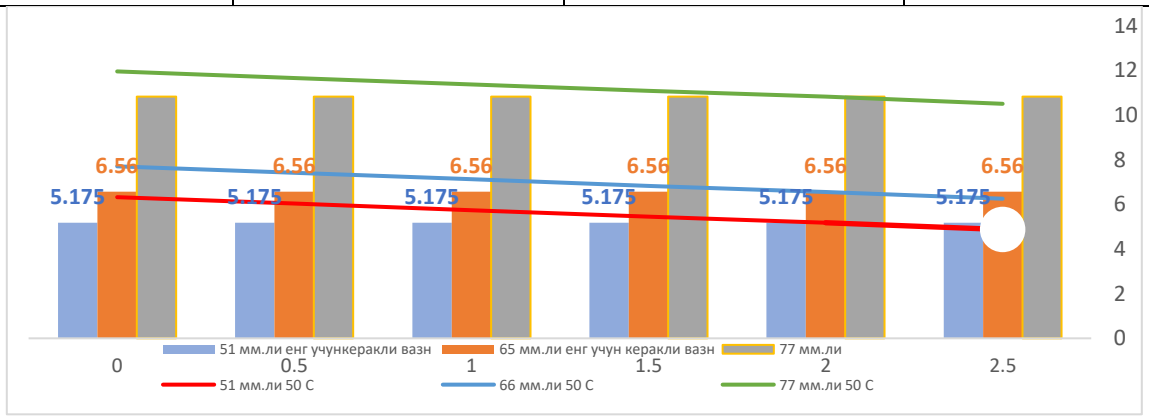

Figure 3.6

Research demonstrating the drying process of double-sided hydro-insulation coated fire hoses with diameters of 51, 66, and 77 mm at a temperature of 50°C. The studies were conducted using two experimental devices. Based on the experiments, it was confirmed that drying fire hoses in the "Mobile Drying Chamber" is effective. The results of experimental studies with fire hoses established the optimal technological parameters for the drying process of fire hoses of various types and diameters.

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