

Modifying of air-mechanical foams using organosilicone compounds

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Theory basis

- **Fast-hardening foam (FHF)** can be made by modifying of air-mechanical foams using organosilicone compounds (in our case – tethaethylsilicate, TES).
- There are three main stages of making FHF:
- 1) Making the aqueous solution of foaming agent
- 2) Mixing that solution with the organic compound

The first two studies are accompanied with the complex physico-chemical reactions, which can be described as follows:



- $\text{Si}(\text{OH})_4 + \text{Si}(\text{OH})_4 \longrightarrow \dots\text{Si-O-Si}\dots + \text{H}_2\text{O}$
- $\text{Si}(\text{OH})_4 + \text{Si}(\text{OC}_2\text{H}_5)_4 \longrightarrow \dots\text{Si-O-Si}\dots + \text{C}_2\text{H}_5\text{OH}$

- 3) Experimental probation of the test samples

Experimental part:

Table 1. Ratio of components to obtain

The experiment included the following steps:

- 1) Preparation of solutions of two types:
 - foaming agent and water
 - foaming agent, water and TPP
- 2) Manual foaming of the obtained solutions (foaming time in all tests -20 seconds) in a laboratory pulverizer.
- 3) Supply of solution to the ignited surface of diesel fuel; recording of extinguishing parameters.

The starting ratios of the foam components are shown in Table 1:

Test No.	Initial component volumes, ml		
	Foaming agent (PO-6UM)	Water (distyl.)	THERMAL POWER PLANT
1	30	470	-
2	30	470	30
3	60	440	-
4	60	440	30
5	60	440	60

The results

Test No.	Extinguishing parameters			
	Extinguishing time, s	Hardcoat formation time, s	Sample volume consumed for extinguishing, ml	Coating appearance
1	21,5	-	259	The foam layer collapsed, leaving no hard coating
2	10,6	About 5 minutes	194	A small layer of white color, heterogeneous in appearance.
3	18,5	-	244	The foam layer collapsed, leaving no hard coating
4	10,4	About 5 minutes	192	Non-uniform white layer
5	9,8	About 4 minutes	176	Non-uniform white layer

The results

It can be seen that all tests of compositions with TES show the formation of a hardening coating that completely isolates the burning surface



Thank you for your
attention!