GROUP OF COMPANIES®
EPOTOS®

YAGEL®

Hydrogel fire extinguisher

Extinguishing Lithium-Ion Batteries

Extinguishing installations under voltage up to 1000 V

Class A fire extinguishing,
including ABS plastic, rubber, coal, as well as spills of flammable and combustible liquids on the surface

High thermal insulation properties
(reduction of heat flow by 16 times)

Ecologically safe fire extinguishing composition

Operating temperature conditions from -40 to +50°C

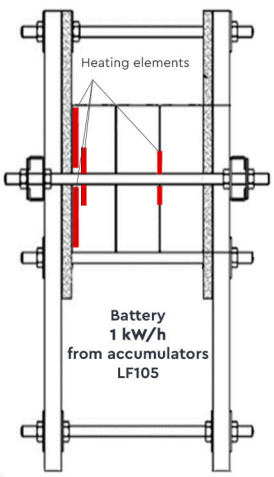
Watch demonstration tests of "Yagel"

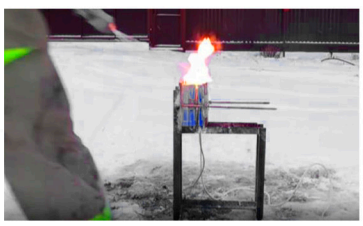
RESEARCH OF FIRE EXTINGUISHING CAPABILITY OF HYDROGEL IN EXTINGUISHING LITHIUM-ION BATTERIES

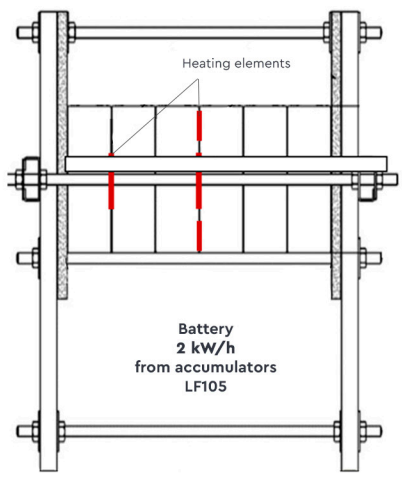
Characteristics of lithium-ion battery (cell)

Parameter	Meaning
Type and description	$LiFePO_4$ (LFP) Lithium-ion battery with aluminum shell (LF105)
Voltage	3,2 V
Resistance	≤ 0,5 Ohm
Capacity	105 Ач / 336 WHr
Permissible charging cur.	52,5 A/0,5 C
Dimensions	200 x 130 x 67 mm

Fire extinguisher tests on batteries of 3, 6 cells





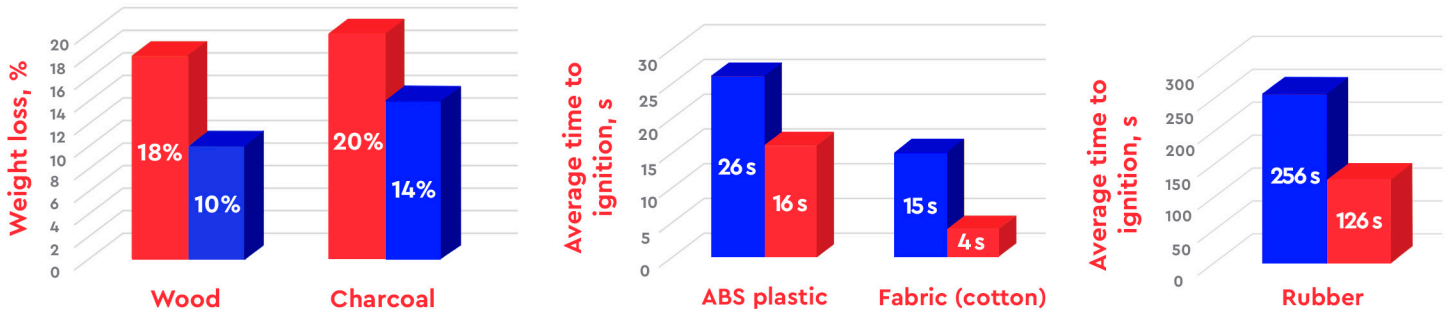


Results of research on determining the fire extinguishing ability of hydrogel when extinguishing lithium-ion batteries

Experiment No.	Designation of non-standard fire source (number of batteries)	Extinguishing time, sec	Hydrogel mass, kg	Hydrogel consumption for extinguishing, kg/s	Note
Extinguishing a battery with a total capacity of 1 kW h using hydrogel					
1-A.2/ extinguishing 3 LF105	1 kWh lithium-ion battery from 3 LF105 without damaging the separator	8	2,2	0,275	Burning 1-ro LF105
2-A.2/ extinguishing 3 LF105	Lithium-ion battery 1 kWh of 3 LF105 with separator damage	6	1,35	0,225	Simultaneous burning 3-x LF105
Extinguishing a battery with a total capacity of 2 kW h using hydrogel					
1-A.2/ extinguishing 6 LF105	Lithium-ion battery 2 kWh from 6 LF105 without damage to separator	9	2,3	0,255	Burning 1-ro LF105
2-A.2/ extinguishing 6 LF105	Lithium-ion battery 2 kWh of 6 LF105 with separator damage	15	4,3	0,225	Simultaneous burning 2-x LF105

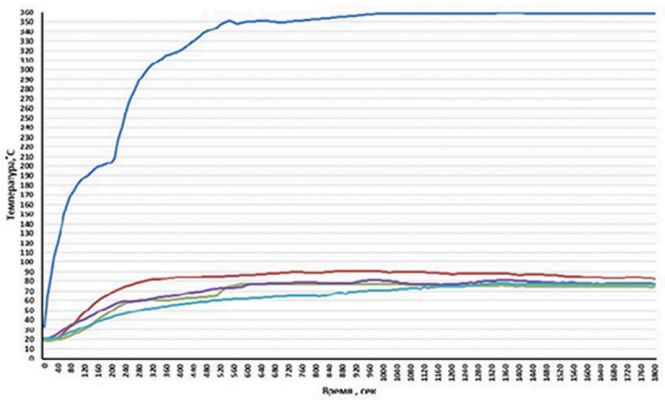
The proposed fire extinguisher allows solving the problem of extinguishing stationary energy storage systems (lithium-ion batteries) with an order of magnitude lower consumption of gel compared to traditional water, and taking into account the service life of the fire extinguisher of 10 years, significantly lower operating costs will be required in total.

RESEARCH ON THE EFFECTS OF GEL ON VARIOUS SOLID COMBUSTIBLE MATERIALS



where, - materials not treated with gel; - treated with gel

Results of studies of temperature changes in steel samples



The gel has good adhesion to various surfaces and forms a stable coating on them, allowing to reduce the heating rate 10–16 times.

THE PRINCIPLE OF ACTION OF THE GEL

Low-temperature gel-forming fire extinguishing composition (NGOS) consists of two liquid components, which, when mixed, form a pseudo-plastic fire extinguishing agent (gel), capable of remaining even on a vertical surface. Each of the NGOS components can be used at temperatures down to -40 °C, so one of its areas of application can be automatic fire extinguishing systems for vehicles with traction lithium-ion batteries, including those operating in low-temperature conditions, as well as manual and mobile fire extinguishers.

Hydrogel applied to the protected surface prevents its ignition. The solid layer formed after water evaporates from the gel is stable on the protected surface for up to 6 months under atmospheric precipitation. The gel is removed from the surface mechanically using a scraper or water under pressure.

APPLICATION AREAS

protection of maintenance and storage areas for lithium-ion batteries

extinguishing fires in lithium-ion battery energy storage systems

protection of commercial, industrial and warehouse facilities

extinguishing fires in wheeled and rail transport, special and quarry equipment

protection of objects in the Arctic and Antarctic regions at temperatures of -50°C

protection of forest and landscape objects

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Подробнее о ГК «ЭПОТОС»