



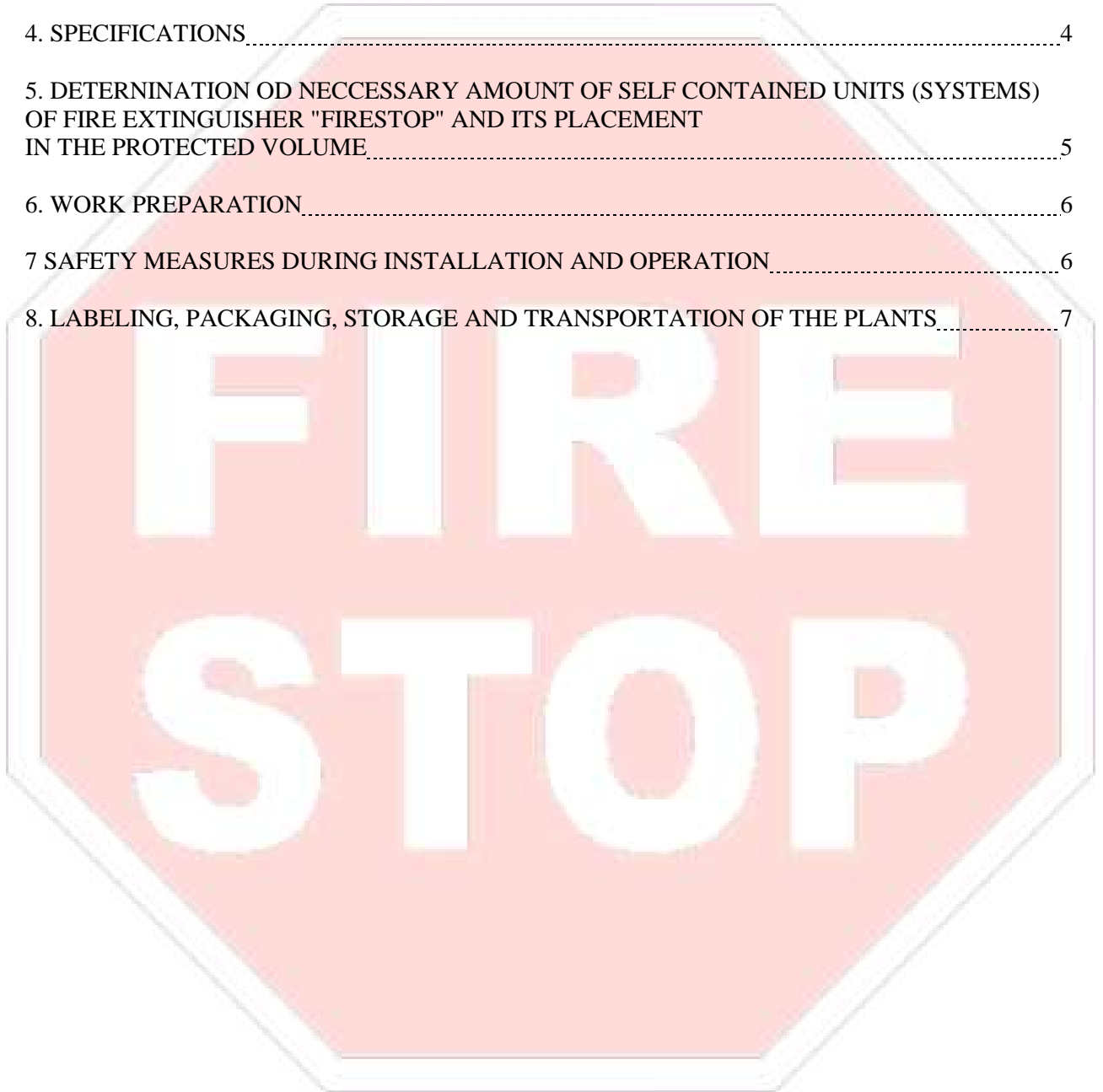
**Operation Manual**

**Self contained plant (system)  
of aerosol fire extinguisher "FIRESTOP"**

**Kyiv  
2015**

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## 1. PURPOSE

Self contained unit (system) aerosol fire extinguisher "FIRESTOP" (hereinafter "**Plant**") is the mean of intellectual total saturation and performs functions of detection and extinguishing fires regardless external power supply, control systems, is not connected with self contained unit installation and does not alert about fire to the personnel and is only for fires localization and extinguish of flammables and combustible liquids, solid combustible materials and electrical equipment, including energized, combustible gases and fats.

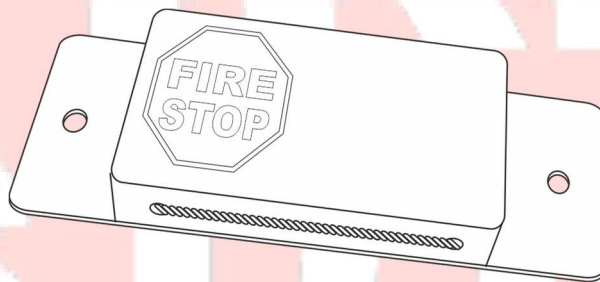
Plants used for fire protection of electrical and electronic equipment with voltage up to 35 kV, placed local volumes (cabinets, electrical cabinets, switchboard, distribution boards, bays, channels, compartments, servers, server rooms, etc.); equipment of vehicles (cars, railway locomotives and carriages, aircraft and marine vessels), located in local volumes (cabinets, motor and technical compartments, holds, containers, etc.); the contents of bank vaults, safes, cells.

When using plants, it should be guided by existing regulations, including ISO 4490: 2005 "Self contained plants of aerosol fire extinguisher."

Plants are not used for extinguishing alkali and alkaline earth metals, smoldering materials and substances burning without air access.

## 2. STRUCTURE

Installation consists of case, which is part of aerosol creation charge, and identification and launch node. The aerosol creation charge structure is separated from upper cover and base case with insulating material. At the top cover of the case you can see slits through which comes extinguishing aerosol.



**Fig. Self contained unit (system) aerosol fire extinguisher "FIRESTOP"**

## 3. OPERATION MODE

When a heat pulse on node startup occurs the aerosol creation ignition charges, which is formed during combustion extinguishing aerosol, consisting of finely-divided particles (potassium salts, which are powerful inhibitor), about 70% of all original composition and mass gas phase, coming into protection volume.

#### 4. SPECIFICATIONS

	<b>FIRESTOP 15</b>	<b>FIRESTOP 25</b>	<b>FIRESTOP 45</b>	<b>FIRESTOP 60</b>	<b>FIRESTOP 100</b>	<b>FIRESTOP 300</b>	<b>FIRESTOP 600</b>
<b>Maximum Volume, which is protected conditionally from airtight volume (<math>\square^* &lt; 0,001\text{m}^{-1}</math>), <math>\text{m}^3</math></b> $\square^*$ - ratio of total space of permanently opened slits to the volume of protected volume. $\text{m}^3/\text{l}$	0,015 15	0,025 25	0,045 45	0,06 60	0,1 100	0,3 300	0,6 600
<b>Weight of the equipped plant, kg,</b>	0,041 $\pm 0,001$	0,0412 $\pm 0,001$	0,042 $\pm 0,001$	0,043 $\pm 0,001$	0,045 $\pm 0,001$	0,054 $\pm 0,001$	0,068 $\pm 0,001$
<b>Weight of the aerosol creation charge, kg,</b>	0,001 $\pm 0,0005$	0,0012 $\pm 0,001$	0,002 $\pm 0,001$	0,003 $\pm 0,001$	0,005 $\pm 0,001$	0,013 $\pm 0,001$	0,027 $\pm 0,001$
<b>Fire extinguishing ability of the aerosol, <math>\text{kg}/\text{m}^3</math></b>	0,05	0,05	0,05	0,05	0,05	0,05	0,05
<b>Work time, s</b>	2 $\pm$ 1,0	2 $\pm$ 1,0	2 $\pm$ 1,0	2 $\pm$ 1,0	3 $\pm$ 1,0	4 $\pm$ 1,5	7 $\pm$ 1,5
<b>Dimensions, mm</b>							
length					90		
width					30		
height					18		

#### Operating conditions:

- operating temperature range, °C - 20 - 50 +
- comparative humidity at 25 °C, % 80

To start the plant, special thermo-chemical run nodes should be used.

The use of thermo-chemical run nodes, that triggered upon reaching in the volume, protected till temperature of 170-200 °C, allows each generator to operate fully autonomously or with several plants.

Structure gas phase:

Component	Concentration, $\text{mg}/\text{m}^3$	Volume part, %	Conc., $\text{mg}/\text{m}$ of
NH <sub>3</sub>	45	0,0070	0,272
NO <sub>2</sub>	28,3	0,0012	0,187
HCN	24,6	0,0022	0,163
CO	562	0,05	3,552
CH <sub>4</sub>	272	0,038	1,630

Mass storage of dispersion phase:

$2K_2CO_3 * 3N_2O$	-	54.7%
$NH_4HCO_3$	-	22,7%
$KHCO_3$	-	8.2%
$KNO_3$	-	8,9%
Other compounds	-	5,5%

Plant holds its integrity, capacity and prevents its work when falling from 1m height on the floor.

Inertia (response time) throughout the temperature range operation of the device - no more than 2 seconds.

Maximum temperature of the cover and base case of the device does not exceed 200 °C.

Potential possibility of trouble-free start-up at least 96 %.

Potential possibility of device failure is not more than 04 %.

### **5. DETERMINATION OF NECESSARY AMOUNT OF SELF CONTAINED UNITS (SYSTEMS) OF FIRE EXTINGUISHER "FIRESTOP" AND ITS PLACEMENT IN THE PROTECTED VOLUME**

5.1. Design and construction work on the Self contained units (systems) aerosol fire extinguishers should be carried out by specialized organizations with appropriate licenses for the right to carry out such works. Calculating of the units number, required to protect a given volume, is produced by the methods outlined in the existing regulations (ISO 4490: 2005 "Installation of self contained units of aerosol fire extinguisher" BC V.2.5-56-2014 "Fire protection systems").

5.2. Plants (systems) of aerosol extinguishing is recommended to set most likely in areas of combustion in volume, protected in such way, to ensure rapid and equal filling of total volume with extinguishing aerosol and to minimize aerosol removal through open lids (hatches, doors, ventilation systems, etc.). Hatches, doors, and other constructive openings should be closed and locked.

5.3. Placing plants in protected volume should be done with the following requirements:

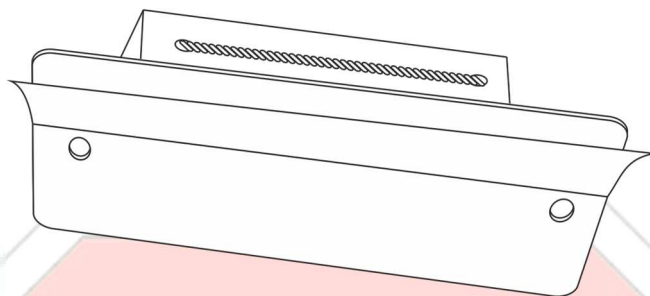
- distance from the surface and cover unit to the walls, partitions, equipment, wiring, etc. must be at least 100 mm;
- distance between both devices must be at least 20 mm;
- the installation of the device on flammable bases is prohibited;
- access shall be provided to the mounted device for servicing and routine maintenance.

5.4. When using multiple systems for the protection of one volume, simultaneous operation must be provided.

5.5. To reduce response time of the plant, equipped thermo-chemical launch node, it is recommended to equip the object, protected with thermo-sensible cord, paving its way that it to be put through the upper part of the protected volume and to the places most likely origin of fire, and connect power cord to thermo-chemical element run node.

## 6. WORK PREPARATION

6.1. The device is installed on protective constructions.



Device anchors are carried out through various types of metal products through two holes 2 mm in diameter or two-way tape. When anchors device are on tape, the surface of the installation product should be degreased, removed from the protective tape from the back side of device (see. Fig.) and firmly pressed to the surface. Installation of device on the tape should be held in heating room under normal climatic conditions, then the device should not change its temperature regime for at least 4 hours.

6.2. Thermo-sensible cord of run node should be kept and supported.

## 7 SAFETY MEASURES DURING INSTALLATION AND OPERATION

7.1. At operation with plants and run nodes you should remember, that they include flammable substances.

7.2. When the plants is acted, possible revile of extinguishing aerosol protected volume through various leaks out. Keep in mind that extinguishing spray contains no toxic compounds in quantities that are dangerous to humans, and aerosol particles irritate the mucous membranes, and its effect can be neutralized by means of respiratory protection, gauze or cloth bandages.

7.3. The temperature of aerosol stream at a distance of 60 mm - 200 °C and 20 mm - 400 °C, and cover and bottom of the device can heat up to 200 °C. The size of fire risk zone of the device is 0.06m.

7.4. False actions of the plant are excluded.

7.5. After plant aerosol extinguisher operation, fire products and spray sunken on the surfaces, located in the protected volume must be removed within 3 days since the absorption of moisture spray gives slightly alkaline reaction. Collecting is to be conducted with a vacuum cleaner, brush and conducting wet cleaning. Collecting is held with personal protection equipment (respirator and rubber gloves).

7.6. Plant, in standby mode, does not harmful impact on staff, passengers and environment.

7.7. Maintenance is intended to prevent the occurrence of faults in the plants, maintenance in constant readiness, which provides reliable operation in the event of fire.

7.13. Maintenance itself comprises the visual inspection of the plants presence in places of its construction, reliability mounting, integrity and security of attachment.

7.14 Units are not repaired and the detection of defects after operation are not to be replaced.

### IT IS PROHIBITED TO:

- use setup for manual fire extinguishing;
- perform welding or other firing works closer than 2m to the plant;
- use the plant with mechanical damage;
- dismantle the plant.

## 8. LABELING, PACKAGING, STORAGE AND TRANSPORTATION OF THE PLANTS

8.1. The plant case is labeled with printing technology and marks as follows:

- trademark, manufacturer name;
- symbol;
- icon denoting classes of fire extinguishing which can be used in this setting;
- month and year;
- protected volume.

The label shall be manufactured from a material resistant to possible adverse environmental factors.

The inscriptions printed on the label should be kept for the entire service period.

8.2. Each packed box with the plant and shipping container should be marked with label and manipulation signs made in typographic way, which include the following information:

- trademark and the name of the manufacturer;
- the name of the device;
- date of manufacture (month and last digits of the year made);
- serial number;

8.3. The data sheet includes serial numbers of aerosol creation charge, device, use case, date of manufacture, weight of charge and the maximum amount, which is designed this plant for.

8.4. Units are supplied from manufacturer packed in cardboard boxes. Plants are not applied to dangerous goods in accordance with ISO 4500-2:1 and do not require special labeling.

8.5. Settings in the factory package can be transported by all types of vehicles.

8.6. Storage is carried out in the factory package in closed space at + 5 - + 40 °C and with relative humidity of 80% with no attack.

8.7. Stacking in original packaging at each other is allowed, without limit in the number of height.

**The design of the plant can be amended with changes, not affecting its performance.**

Guaranteed shelf life - 18 months, including 12 months of storage in a warehouse.

Device operational lifetime - 5 years, including 1 year of storage at the moment.

After the end of operational term, questions concerning of its extension are decided by the manufacturer.

### **SUPPLY PACKAGE:**

Self contained system (plant) of aerosol fire extinguisher "FIRESTOP"

Operation Manual with data sheet

Packaging

Plant complies to TS 39299386-000:15.

Packing conducted according to the reference design requirements.