**OPERATING MANUAL**

For the fire extinguishing aerosol generators

AGS-6/2

**CONTENTS**

1. INTENDED USE……………………………………………………………………………………………………………………3

2. DESIGN……….………………………………………………………………………………………………………………………3

3. OPERATING PRINCIPLE……………………………………………………………………………………………………….3

4. TECHNICAL DATA……………………………………………………………………………………………………………….4

5. DETERMINATION OF NECESSARY QUANTITY OF GENERATORS AGS-6/2 AND THEIR ALLOCATION IN THE PROTECTED VOLUMES……………………………….………………………………………….5

6. PRE-STARTING PROCEDURE………………………………………………………………………………………………..6

7. SAFETY MEASURES DURING INSTALLATION AND OPERATION OF THE GENERATORS….……..6

8. MARKING, PACKING, TRANSPORTATION AND STORAGE OF GENERATORS…………………….……7

9. PASSPORT……………………………………………………………………………………………………………………….…..8

1. **APPLICATION**

Generator of extinguishing aerosol AGS-6/2 (hereinafter – generator) is the mean of volume fire extinguishing is designed for localization and suppression of fires of solid combustible materials (wood, insulating materials, plastics etc.), inflammable liquids (petrol, oil refinery products, organic solvents, etc.), electrical insulating materials and electrical live equipment with voltage up to 40 kV.

Generators should be used in accordance with the valid norms SP 5.13130.2009 “Automatic fire alarm and fire extinguishing systems. Design norms and rules” and GOST Р 53284-2009 “Fire extinguishing aerosol generators. General technical requirements”.

Generators are not applied for extinguishing of alkaline metals, as well as for extinguishing of substances which are burning without air access.

1. **DESIGN**
2. 

Generator (see the drawing) consists of the body (1) inside which an aerosol forming compound (2) and the starter (3) are located. Aerosol forming compound is separated from the shell of the body by the heat insulating material (4). To reduce the temperature of aerosol flow the cooler (5) is used, which is located between the compound and the side surface of the body. There are nozzle holes (6) in the side surface of the body through which the aerosol comes out. The threaded sleeve for binding of the starter is located in the cover of generator. Generator is installed in the protected room with the special brackets (7), which are supplied with generator. Generator can be additionally completed with the tank (8) for accumulating of the condensed aerosol.

**Pic. Fire extinguishing aerosol generator AGS-6/2**

1- body, 2 – aerosol forming compound, 3 – starter, 4 – heat insulating material, 5 – cooler, 6 – nozzle holes, 7 – brackets, 8 – tank.

Generators AGS-6/2 can be activated with electrical, heat or combined starters. The starters can be inbuilt or can be supplied separately from the generator and installed during the assembly.

**3. OPERATING PRINCIPAL**

After the electric or heat impulse reaches the starter, the aerosol forming compound is ignited. Aerosol is produced in the process of burning of the solid aerosol forming compound which is located inside the generator shell. Aerosol flow penetrates through the cooler and enters the protected volume.

1. **TECHNICAL DATA**

Mass of equipped generator: 12.5 kg

Mass of aerosol forming compound: 3.5 +/- 0.1 kg

Aerosol extinguishing ability 0.065 kg/m3

Maximum volume of protected semi-hermetic room (δ < 0.001 m-1\*): 52m3

 *\*) δ – is ratio of the total area of the openings to the volume of protected room*

Operating period: 37 +/- 3.7 sec

The time lag (operating time) in the whole operating temperature range is 2 +/-0.5 sec

Dimensions (without brackets):

* Diameter 167 mm
* Height: 420 mm

Operating conditions:

* Temperature from – 50 °C to + 50 °C
* Relative humidity at 25 °C 80 %
* Mechanical effect 1 g in the frequency band up to 100 Hz

The use of thermochemical starters which activate when the temperature in the protected volume reaches 180 ⁰C, allows each generator to operate autonomously.

The use of electrical starters allows to use generators as part of automatic aerosol fire extinguishing systems.

Characteristics of electrical signal necessary for the start up of generator and for control of electric starting chain during operation of generator as part of aerosol fire extinguishing system:

**Electrical starter VEL, VELTH –combined, with thermochemical cord (is installed outside):**

* Minimum starting current – 0.4A
* Maximum starting current – 5A
* Type of current – direct (DC)
* Duration of impulse – not less than 0.5 sec
* Resistance of electrical initiator of the starter – 2.5 – 4.5 Om (without additional resisters)

**Electrical starter VRp-7,5, VRTHp-7,5 – combined, with thermochemical cord (is installed outside):**

* Minimum starting current – 1.5A
* Maximum starting current – 2A
* Type of current – direct (DC)
* Duration of impulse – not less than 3 sec
* Resistance of electrical initiator of the starter –7.5 – 8.0 Om (without additional resisters)

Maximum current of control of generator starting chain should not exceed:

* At constant control – 0.005 A
* At periodical control during no more than 2 minutes with breaks not less than 10 minutes – 0.05A.

The starter type should be chosen by the Buyer.

Heat quantity which is distinguished during generator operation: 10500 kJ

Generator keeps its integrity and efficiency and does not spontaneously start after the free fall from the height of 1 m on the concrete layer with the thickness not less than 100 mm or on the steel sheet with the thickness not less than 16 mm.

The time lag (operating time) in the whole operating temperature range is no more than 2 sec.

Electrical resistance between generator body and terminals for connecting of the starting chain at the normal climatic conditions should be not less than 1 MOm (according to GOST 15150-69).

Probability of trouble-free start-up is 0.98, at confidence interval 0,8, probability of generator failure is no more than 0.04, at confidence interval 0,8.

The value of ozone depleting potential of aerosol does not exceed 0.01.

Permissible voltage for electric installations is determined according to breakdown voltage rate in the environment «aerosol + air». (Annotational record notification of Federal State Institution Fire Safety Research Institute of Russian Federation Ministry of Civil Defense and Emergency Response) «Research of breakdown voltage rate determination in the environment «aerosol + air».

**5. DETERMINATION OF NECESSARY QUANTITY OF GENERATORS AGS-6/2 AND THEIR ALLOCATION IN THE PROTECTED VOLUMES**

* 1. The design and installation work on aerosol fire extinguishing systems should be fulfilled by the specialized organizations which have the license for such type of service.
	2. Calculation of generator quantity necessary for protection of the given room is made according to the methodology contained in the valid norms.
	3. Generators are recommended to be installed in such way to provide quick and even filling of the protected room with the aerosol and to minimize aerosol outflow through the openings (hatches, gates, ventilation etc.)
	4. Generators should be located evenly at the whole area of the room;
	5. The location of generator should be chosen that way to provide the most free spreading of the aerosol flow.

5.6 The distance from generator to the fence or wall should be not less than 500 mm.

5.7 The distance from generator to the equipment, material in stock, property, wiring, electrical appliances should be not less than 500 mm;

5.8 The distance between generators should be not less than 1.5 m;

5.9 Generators can not be installed on the burning basement;

5.10 If generator is installed vertically on the wall, it is necessary to protect the wall from the influence of aerosol flow high temperature with the heat insulating sheet. The width and height of this sheet should be 0.5 m bigger than the perimeter of generator.

5.11 There should be an access to installed generator for control and prevention works.

5.12 If several generators are used for protection of one space, their simultaneous activation should be provided.

**6. PRE-STARTING PROCEDURE**

* 1. Generator is anchored on the room walls or fences vertically with the starter upwards. It is necessary to anchor the brackets, install generator and to tighten nuts. The brackets can be anchored to the walls or the ceiling.

Generator can also be mounted horizontally, but this exclude the usage of the tank (8) which accumulates the liquid phase of aerosol.

* 1. After generator is mounted and the whole installation of the fire extinguishing system is finished, the starter is screwed into the threaded sleeve in the central opening of generator.
	2. During installation of thermochemical starter it is necessary to keep heat sensitive cord undamaged.

**7. SAFETY MEASURES DURING INSTALLATION AND OPERATION OF THE GENERATORS**

* 1. During work with generators and starters it should be considered that they contain the inflammable compositions
	2. During installation of electrical starters the endings of cables should be shorted. Their connection to the jack on injector should be done after commissioning of the whole automatic fire extinguishing system.
	3. Electrical equipment of premises in which generators with electrical starters are installed should conform to requirements of Rules of Electric systems operation.
	4. At the design of generator electrical starting chains there should be provided the measures which exclude the appearance of current pickup which can lead to the accidental start of generators.
	5. When fire starts and generators are activated, people located in the premises should leave it rapidly, close the doors and call fire brigade.
	6. In is not recommended to use generators in the premises which can not be abandoned before generators start their operation.
	7. If it is impossible to leave the room quickly, the respiratory should be protected from the impact of the aerosol particles with the fabric bandage or gauze and the premises should be immediately abandoned. Safe aerosol presence in the atmosphere is not more than 10 minutes.
	8. Technical service is aimed to prevent failing in the operation of generator, to maintain it at permanent readiness, providing it’s fail-free operation in case of fire.
	9. Technical service of generators includes visual inspection of generators presence in the installation sites, mounting security, entirety and mounting security of generator’s supply lines.
	10. Generators should not be repaired and if a fault is detected or after triggering should be replaced.

***IT IS FORBIDDEN:***

* ***To use generators for manual extinguishing of fire;***
* ***If welding or other works connected with open fire are executed, the generators located nearby or at a distance less than 3.0 m should be disconnected of trigger lines and removed or covered with fire protective material;***
* ***To use damaged generators;***
* ***Dismantle the generator.***

**8. MARKING, PACKING, STORAGE AND TRANSPORTATION OF GENERATORS AGS-3**

* 1. There are serial numbers of aerosol forming compound, generator, type and batch of starter, manufacturing date, mass of compound and maximum protected volume in the passport.
	2. Generators are supplied by the Manufacturer packed into the pasteboard boxes.
	3. According to GOST 19433 generators are not the hazardous cargo and should not be specially marked.
	4. Generators should be stored in the Manufacturer packing in the closed storage rooms under the temperature from +5°C to +40°C and relative humidity up to 80% without the presence of aggressive environment.
	5. Generators can be stored in a pile, but no higher than 5 stages one on another (according to the Manufacturer packing)

**JSC “NPG Granit-Salamandra”**

**Generator of extinguishing aerosol AGS-6/2**

**PASSPORT**

INFORMATION ON THE PRODUCT:

Generator AGS-6/2 batch No\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date of manufacturing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Aerosol forming compound batch No \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Starter type\_\_\_\_\_\_\_\_\_ batch\_\_\_\_\_\_\_

MAIN TECHNICAL CHARACTERISTICS:

Mass of aerosol forming compound 3.5 kg

Protected volume up to 52 m3

Warranty period – 18 months.

Operating period – 5 years.

Lifetime – 10 years

After expiration of the operating period the question of its prolongation can be solved by the Manufacturer.

After expiration of the lifetime period the question of its utilization can be solved by the Manufacturer.

COMPLETENESS OF THE PACKAGE:

Generator AGS-6/2

Operating Manual

Brackets 2 pcs

Nuts M8 4 pcs

Collars 8 4 pcs

Package

Generator is completed with the starter in accordance with the order.

Generator conforms to Technical Conditions 4854-062-54876390-2014

The packing conforms to the requirements of engineering documentation

Department of technical control

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