

11. NOTICE OF ACCEPTANCE

This notice certifies that the generators have left "Fire extinguishing means" Ltd. in full working order.

The "Tor" generators covered by this notice are listed below:

- Goods were inspected and packed on:
- Inspector's stamp and signature



Condensed aerosol generator with circular discharge



«TOR-160»
«TOR-1000»
«TOR-1400»
«TOR-2800»
«TOR-3500»

USER MANUAL

1. DESIGNATION

1.1. Condensed aerosol fire extinguishing generators "Tor-160" (-1000, -1400, -2800 and -3500) with circular discharge (hereinafter referred to as "generator") have been designed for extinguishing of the following classes of fires in conditionally enclosed volumes:

Class A2 fire - fires involving solid combustible materials;

Class B fire - fires involving volatile flammable and combustible liquids;

C — gases ignition

and fires involving electrical equipment under voltage up to 140 kV.

1.2. The generator has been designed for us within the air ambient temperature range from -50°C to $+95^{\circ}\text{C}$ (it is permitted to rise repeatedly the ambient temperature up to $+125^{\circ}\text{C}$ for the duration of not more than 8 hours).

1.3. The generator has been intended for extinguishing fires predominantly in engine compartment and other spaces in various transport vehicles such as river and sea vessels, railway locomotives, transformer plants and etc

1.4. The generator contains no ozone depleting chemicals.

1.5. The generators can be produced in two basic versions: for use in fixed fire suppression systems and for operative firefighting.

the open surfaces following the generator's discharge can be removed by vacuuming, brushing off, washing off or wet cleaning. Personal protection equipment such respirator or gauze bandage should be during cleaning. In case of eyes contact, rinse your eyes with plenty of water.

8.5. The following is not allowed:

- placing generators near heating devices (in the zone with the temperature higher than 50°C);
- connecting generators to a power source prior to their installation;
- carrying any work near the generator placed in a standby mode;
- carrying any hot work such as welding, smocking and using open flame within the distance of 25 meters from the generator.

9. STORAGE AND TRANSPORTATION

9.1. The generators should always be stored and transported in original packing. This will provide protection from mechanical damage, direct sunlight, moisture and aggressive environments.

9.2. The generators are not under pressure. They can be transported by any transport at any distance in accordance with general existing rules of cargo transportation.

10. WARRANTY

10.1. The manufacturer guarantees the compliance to the Technical Specifications provided the conditions of transportation, storage and operation are strictly complied to by users.

10.2. The specified service life of generators is 10 years with the storage time being not more than 8 years.

10.3. Warranty period is 2 years from date of purchase of the generator.

height between the floor of the room and first level of generators should be in the range of 1 m to 2.5 m.

5.5. Minimum thermal clearances from the generator's discharge nozzles shall be observed. The area of 0.15 m around the discharge nozzles is considered a fire hazard – no flammable substances shall be present in the area. The area of 1m around the generator's discharge nozzles should be clear of any structural elements (floor, ceiling, column, etc) or equipment that can impede a free aerosol flow.

6. GETTING STARTED

6.1. Prior to installation remove from the packing and inspect for damages on the body and on the electric ignition device.

6.2. Install the generator in a selected mounting location within the protected area in accordance with recommendations of Section 5.

6.3. Remove the handling cap and screw the electric ignition device into the sleeve (the torque should be 8 -10 Nm).

6.4. Check the integrity of the electric circuit of the ignition device by a tester (**safe test current should not exceed 0.17A**).

7. MAINTENANCE

7.1 No special maintenance of generator is required.

7.2 Once a month a generator shall be placed in a standby mode and subjected to a visual inspection to check for any visible external failures, mechanical damage, reliability of fastening and integrity of the ignition device's electrical circuit.

Attention! The test current while checking the integrity of electrical circuit should be less than 0.17 A.

7.3. Generators with faults that cannot be easily rectified should be rejected and returned to the manufacturer.

8. HEALTH AND SAFETY REQUIREMENTS

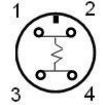
8.1. The personnel involved in installation and service of the generators shall read this manual and follow its requirements.

8.2. Upon actuation of the generator no people should be present in a zone of aerosol flow with the temperature higher than 75 °C. People must leave the room and return only after the room has been ventilated. If presence of personnel is necessary during the ventilation, the respiratory protective mask should be worn.

8.3. Fire extinguishing aerosol presents only a low toxicity hazard when used at fire extinguishing concentration under normal conditions. In case of contact with eyes it may cause irritation and swelling of the mucous. In this case, rinse immediately with plenty of water. The aerosol is not classified as dangerous for the environment.

8.4. Particulate matter of fire extinguishing aerosol that has accumulated on

2. SPECIFICATION

Designation	Tor-160	Tor-1000	Tor-1400	Tor-2800	Tor-3500
1. Mass of assembled generator, kg without electrical igniter, kg Mass of a standard electrical igniter - 0.057 kg	0.72 ±0,05	2,9 ±0,2	3.44 ±0,2	5,3 ±0,2	6,8 ±0,4
2. Mass of aerosol forming compound (AFC), kg	0.16 ±0.025	1.0 ±0.1	1.4 ±0.1	2.8 ±0.15	3.5 ±0.2
3. Extinguishing application density, g/m ³ Class A2 (according to GOST R 53284) Class B (according to GOST R 53284)	22 28	22 28	22 28	22 28	22 28
4. Maximum protected volume, m ³	7.27	45.45	63.63	127	159
5. Activation time, s, not more than	3	3	3	3	3
6. Discharge time, s, not more than	5	5	8	16	18
7. Ambient temperature operation range, °C	- 50 + 95 C				
7. Dimensions, mm, not more than • height (dimension A, Fig. 1) • diameter	36 130	57 240	69 240	110 240	126 240
8. Min clearance, m, from the generator discharge outlet to the point where the aerosol temperatures are not more than: • 400 °C • 200 °C • 75 °C	0.14 0.28 0.75	0.14 0.28 0.75	0.14 0.28 0.75	0.14 0.28 0.75	0.14 0.28 0.75
9. Electrical ignition device parameters: • activation current, A, not less than • electrical resistance, Ohm • safe test current, A, not more than • starting voltage, V • pulse duration, ms, not more than	0.7 2.0÷4.0 0.17 5÷30 5	0.7 2.0÷4.0 0.17 5÷30 5	0.7 2.0÷4.0 0.17 5÷30 5	0.7 2.0÷4.0 0.17 5÷30 5	0.7 2.0÷4.0 0.17 5÷30 5
10. Connections in ExStream electrical connector					

NOTE: There is no zone depletion potential during the operation of the generator.

3. SUPPLY

The Generator supply (fig.1) includes:

- Generator – 1 pc,
- Electric ignition device – 1 pc,
- Bracket – 1 pc,
- Hardware for fixation of the bracket – 1 set,
- User manual,
- Packing.

4. DESIGN AND OPERATION

4.1. The generator construction and design principles are showed in Fig.1.

4.1.1. The body of the generator consists of two cylindrical steel cases (1) with discharge nozzles. A block of aerosol-forming compound is positioned inside the each case and fixed with a protective adhesive layer. The electric ignition device (2) should be unscrewed during storage and transportation with a sleeve being closed with a handling cap (3).

4.2. Principle of operation.

4.2.1. The generator activates upon application of an appropriate electrical signal to the generator's electric ignition device.

4.2.2. Upon generator's activation the aerosol-forming compound combusts producing gas-like combustion products, aerosol, which propels itself through the discharge nozzles into the protected volume.

4.2.3. The discharged aerosol is the actual extinguishing medium.

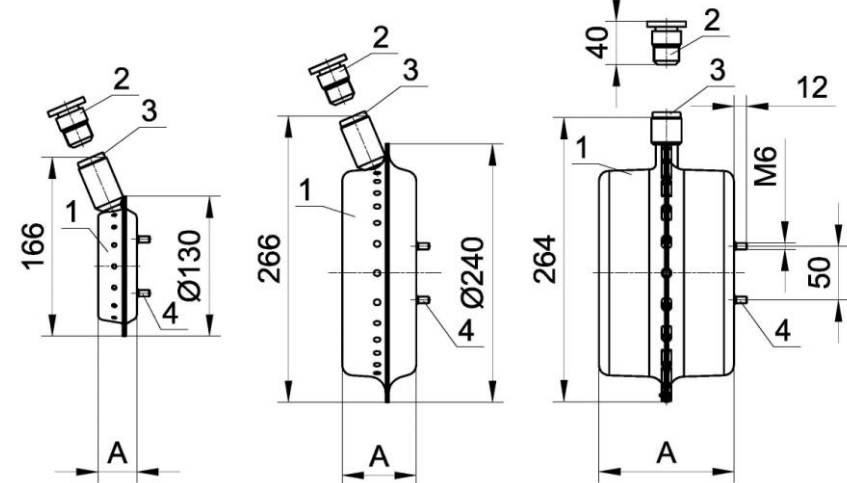
4.2.4. Special composition of the aerosol-forming compound ensures high extinguishing efficiency.

4.2.5 Circular discharge outlets provide such added advantages as fast cooling of the discharged aerosol and rapid distribution throughout the protected volume.

TOR-160

TOR-1000/1400

TOR-2800/3500



- 1 – Case
- 2 – Electric ignition device
- 3 – Handling cap
- 4 – Hardware

Fig. 1 Condensed aerosol generator with circular discharge

5. INSTALLATION

5.1. The generators can be mounted on the walls, floors or ceilings of the protected enclosure. A mounting structure for the generator should withstand a static load of not less than 40 kg in vertical direction. There are two options for installing the generator – vertical and horizontal.

5.1.1. Installation in vertical position is performed on a wall or other vertical structure. In this case the sleeve of electric ignition device should be facing up. The fire extinguishing aerosol will discharge from the nozzles with the initial vertical spread.

5.1.2. The generator may also be mounted on the floor, ceiling or any other construction so as to provide a horizontal spread.

5.2. The generator should be fixed to the mounting structure with the bracket using the supplied hardware.

5.3 After the generator is mounted, the handling cap must be removed and replaced with electric ignition device.

5.3. The generators are installed in the protected area as evenly as possible. Recommended distance between adjacent generators should be not less than 2 m. Installation height from the floor should be in the range of 1 m to 2.5 m.

5.4. It is possible to install the generators at several levels in rooms with total height over 5 m. The distance between the levels should be not more than 5 m, and the