Automatic Fire Detection & Suppression

GE Energy 1.6 MW Wind Turbine

JERICHO WIND ENERGY CENTRE

Fire Suppression by: Stat-X

Distribution by: CONTROL FIRE SYSTEMS.COM
Overview:

Stat-X highly advanced fire suppression technology offers the lightest and most compact fire extinguishing solution available. A Stat-X unit consists of an extremely rugged, hermetically sealed stainless steel canister containing a stable, solid compound. The canister is compact, durable and non-pressurized and is capable of withstanding harsh, corrosive environments, including the severe marine setting of an off-shore wind turbine. In the event of a fire, Stat-X units automatically release ultra-fine particles and propellant inert gasses which effectively extinguish fires using less mass of agent than any other conventional extinguishing system.

Stat-X generators are automatic thermally-activated units, requiring no external power source. Discharge of the extinguishing agent causes no damaging or harmful by-products, so in the event of a fire downtime is kept to a minimum.

All electrical cabinets where a potential fire could occur will be equipped with a thermal activation Stat-X fire suppression generator. The protected electrical cabinets are as listed.

Electrical cabinets down tower

- Converter Filter Cabinet
- Power Distribution Cabinets
- Main Control Cabinet

Electrical Cabinets Nacelle

- High Voltage Stator Cabinet
- Small Junction
- Rotor Cable Box
- Auxiliary Transformer Cabinet
- Top Box

For optional turbine shutdown upon Stat-X release can be achieved by installing a thermal switch. These are then connected to the main converter cabinet WEMA card and top box WETB card.
## Manual/Thermal Activation Stat-X®
### Fire Suppression Generators

<table>
<thead>
<tr>
<th>Model</th>
<th>Part No.</th>
<th>Aerosol Mass</th>
<th>Shipping Weight</th>
<th>Length</th>
<th>Diameter</th>
<th>Discharge Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30T</td>
<td>15300</td>
<td>.03 kg. / .07 lb.</td>
<td>.26 kg. / .60 lb.</td>
<td>109 mm/ 4.30 inches</td>
<td>51 mm/ 2.00 inches</td>
<td>8 seconds</td>
</tr>
<tr>
<td>60T</td>
<td>15310</td>
<td>.06 kg. / .14 lb.</td>
<td>.35 kg. / .80 lb.</td>
<td>142 mm/ 5.60 inches</td>
<td>51 mm/ 2.00 inches</td>
<td>8.5 Seconds</td>
</tr>
<tr>
<td>100T</td>
<td>15410</td>
<td>.10 kg. / .22 lb.</td>
<td>1.44 kg. / 3.20 lbs.</td>
<td>152 mm/ 6.00 inches</td>
<td>76 mm/ 3.00 inches</td>
<td>11.5 seconds</td>
</tr>
<tr>
<td>250T</td>
<td>15510</td>
<td>.25 kg. / .55 lb.</td>
<td>2.72 kgs. / 6.00 lbs.</td>
<td>168 mm/ 6.60 inches</td>
<td>127 mm/ 5.00 inches</td>
<td>12 Seconds</td>
</tr>
</tbody>
</table>

Please note that the length dimensions and weights that are listed above for the Stat-X generators are based on the length of the generators with the thermal/manual heads installed on the generators. For additional information on use of Stat-X systems, please contact your local distributor or Fireaway Inc.

### Transportation Classification:
- Classification Code: 4.1
- UN Identification #: UN 3178
- Packaging Group: PGIII
- Shipping Limitations:
  - Ground: None
  - Max. weight per unit packaging - Cargo Air 100 kgs (220 lbs)
  - Max. weight per unit packaging - Passenger Air 25 kgs (55 lbs)
Manual/Thermal Actuation Heads

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Temperature</th>
<th>Manual Pull Style</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>20116</td>
<td>M/T Head</td>
<td>254°F / 123°C</td>
<td>Horizontal Pull</td>
<td>Brass</td>
</tr>
</tbody>
</table>

*All manual/thermal actuation heads are 1.41” (36.068 mm) long and weigh .077 lbs. (.035 kg.) In addition, the brass heads are made out of C48500 naval brass.*
**PRODUCT SPECIFICATION SHEET**

**Part Number 14670**

**Stat-X** Thermal Switch 125°C/257°F

**DESCRIPTION**

*Stat-X* Thermal Switch 125°C/257°F (P/N 14670) is a conductive bimetallic construction quick-break/quick-make normally open switch.

Case is heat resistant PBT plastic.

Preset calibration temperature is 125°C +/- 5°. Reset temperature is 70% of response temperature.

Standard thermal switch is equipped with two 100mm wires stripped 9.5mm #20awg. UL 3266 White XLPE irradiated 300V 125°C.

Contact ratings (applicable for 6,000 cycles):

- 12 AMPS/24 VDC
- 12 AMPS/125 VAC
- 8 AMPS/250 VAC
Stat-X Thermal Switch 125°C/257°F (P/N 14680) is a conductive bimetallic construction quick-break/quick-make normally closed switch.

Case is heat resistant PBT plastic.

Preset calibration temperature is 125°C +/- 5°. Reset temperature is 70% of response temperature.

Standard thermal switch is equipped with two 100mm wires stripped 9.5mm #20awg. UL 3266 White XLPE irradiated 300V 125°C.

Contact ratings (applicable for 6,000 cycles):

- 12 AMPS/24 VDC
- 12 AMPS/125 VAC
- 8 AMPS/250 VAC
Suggested Circuit for Thermal Function Sensor

Note that the selection of wiring/relay & etc. will determine how many Thermal Function Sensors may be installed. All Thermal Function Sensors are to be installed in series as shown. Recommended Maximum Contact rating for sensors: 24V DC / 125V AC = 9A, 250V AC = 6A

When power is turned on, the Red indicator lights. When circuit is armed by briefly closing the momentary switch, which causes the relay to close, and if all components are satisfactory, the Green indicator lights.

Upon function of any such wired Stat-X unit the Thermal Sensor opens, which opens the relay, causing the Green Light to turn off, and the Red Light to turn On. This may also indicate a connection wiring failure.
Environmentally Friendly Aerosol Fire Suppression

Stat-X highly-advanced fire suppression technology offers the lightest, most compact and economical fire extinguishing solution available. A Stat-X unit consists of an extremely rugged, hermetically sealed, stainless steel canister containing a stable, solid compound. The canister is compact, durable and non-pressurized, and is capable of withstanding harsh, corrosive environments. In the event of a fire, Stat-X units automatically release ultra-fine particles and propellant inert gasses which effectively extinguish fires using less mass of agent than any other conventional extinguishing system.

The Stat-X application technology requires no pressure vessels, manifolds, nozzles or pipe work, factors which result in significant installation and maintenance savings to our customers.

What is a Stat-X aerosol generator?

An aerosol generator is a self-contained extinguishing unit that contains an aerosol forming compound which, during a controlled combustion process within the generator, produces an ultra-fine aerosol extinguishing agent that is significantly more effective than currently available alternatives. The units are constructed of stainless steel components, are listed for both area and volumetric coverage, and require no piping, nozzles, or other distribution equipment. In effect, the generator acts as its own storage, production and delivery device.

How does it work?

A highly stable solid charge of the aerosol forming composition is contained within the sealed generator. Upon activation of the initiator, the charge begins a controlled burn producing an ultra-fine aerosol, which is ten times as effective as any agent currently on the market. The effective aerosol passes through a series of oxidation and cooling filters, where the temperature of the aerosol is rapidly reduced before it escapes through the discharge ports of the generator at low pressure. Generator placement within the hazard area provides proper flow and distribution of the highly effective aerosol within the protected volume.

Does it reduce the oxygen level?

No, oxygen levels are not affected.
How does it extinguish fires?

Unlike other agents that work by reducing oxygen levels or by cooling, the aerosol extinguishes by chemical interaction with the free radicals that fuel the growth of the fire — in the same manner as halon did. The aerosol stream contains ultra-fine (1-2 micron) particles of potassium compounds that provide a large surface area interaction with the fire. In the fire zone the free potassium radicals bind with the free radicals of the fire (O, OH, H) to rapidly slow and extinguish the fire.

Is it safe for the environment?

Yes. Stat-X has no global warming potential and no ozone depletion potential.

Is it safe for personnel?

The aerosol, itself, consists of solid and gas combustion products. The solid phase is composed of highly dispersed particles that present insignificant health hazards for humans at normal design concentrations. The gas phase is primarily Nitrogen gas which is inert and acts as propellant to disperse the ultra-fine particulate throughout the protected space.

While the components of the aerosol are not considered toxic at normal concentration levels, ingestion of the ultra-fine particulate may cause short-term discomfort and unnecessary exposure should be avoided. Exposure to the aerosol is generally of less concern than is exposure to the decomposition products of a fire. Accidental exposures under ten minutes are normally considered safe. There is a high obscuration factor with the aerosol and a 30 second time delay and system lock out switch should be used whenever personnel may be present in the protected space.

How is a system designed?

Stat-X are designed by trained, certified, and authorized distributors using a computer aided design program that uses data on dimensions, areas of leakage and location of un-closable openings, fire class, and other factors to arrive at a system tailored to the clients specific requirements. The design methods of calculation are part of our listing.

What is the service life?

The service life of Stat-X generators is 10 years. Once the Stat-X generators pass the service life date they are required to be replaced.
Specifications for Stat-X Generators

Agent Container- The generator housing shall be constructed of exterior and interior stainless steel shells separated by an insulating material. Top and bottom of housing shall be stainless steel. Housing shall be sealed with a non-permeable membrane and shall incorporate a mechanical means to insure rupture of the membrane upon activation. Housing shall be non-pressurized prior to system activation.

Finish- Brushed Stainless Steel. Units shall have passed salt spray corrosion testing per UL Standard 2775 as part of their listing.

Aerosol Agent- Aerosol generated shall be potassium based and shall have no ozone depletion potential and no global warming potential. Agent shall be approved for commercial sale by the US EPA.

System- Extinguishing system shall be accomplished by means of distributed generating devices to insure distribution of extinguishing aerosol throughout the protected volume. Devices shall be capable of being supervised.

Mounting- Generator devices shall be mounted by means of stainless steel bracketing that allows for directional adjustment through both vertical and horizontal plane.

Operation- Temperature -40° C to +54° C

Thermal Units

Stat-X Fixed System Thermal Units are standalone units incorporating their own patented detection mechanism, eliminating the need for separate detection and releasing controls. Suitable for a broad range of applications in smaller enclosures, they are available in sizes ranging from 30 grams (covering up to 0.5 m3) up to 500 grams (covering up to 8 m3).

Note: Thermal units are not UL listed, however with the exception of the initiator assembly, they are of the same construction as the electric units. The thermal actuator has been tested by UL and complies with UL 33.
Is there an NFPA standard for aerosol extinguishing systems?


Are Stat-X Fire Suppression Systems in compliance with NFPA 850, Chapter 10?

Yes, Stat-X Fire Suppression Systems are in compliance with NFPA 850, Chapter 10 for Wind Turbine Generating Facilities.

Does Stat-X have any listing or approvals?

Stat-X is Listed/Approved by the following authorities: Underwriter’s Laboratories (UL), Underwriter’s Laboratories Canada (ULC) Underwriter’s Laboratories Denmark CSIRO/ActivFire (Australia) ECB (Europe) American Bureau of Shipping (ABS) RINA (Italy) Bureau Veritas (France) MCA Marine and Coastguard Agency (UK) Germanischer Lloyd (Germany) Norwegian Maritime Directorate, Swedish Maritime Directorate Icelandic Maritime Directorate Finnish Maritime Directorate Chilean Maritime Directorate Australian Maritime Authority Swedish Fire Protection Association (SBF 128) Taiwan Fire Authority Japanese Authority (METI) Malaysian Fire Authority (BOMBA) United States Environmental Protection Agency Dubai Civil Defence Abu Dhabi Civil Defence Oman Civil Defence SSI Israel, and TUV

Complies with NFPA 2010, CEN TR 15726, ISO 15779, and has been successfully tested to strenuous US military standards including IL-STD-810G
ENVIRONMENTAL AND HEALTH ISSUES FOR Stat-X AEROSOL GENERATORS

ENVIRONMENTAL ISSUES

There are no environmental issues associated with the use of Stat-X aerosol generators. Both the Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) are zero.

TOXICITY AND HEALTH ISSUES

Aerosol generators do not present a health hazard in their benign state - as the constituent chemicals are pressed into a solid form that is extremely stable - even at elevated operating temperatures. There are no environmental or health hazards from the chemical in storage.

Unlike gaseous agents, the aerosol does not decompose in the presence of fire nor does it extinguish by oxygen deprivation. Stat-X suppresses fire (primarily) by chemical interference with the “Fire Propagation” radicals (OH, H, and O) that are essential elements in the expansion of the fire. Stat-X interacts rapidly with these free radicals within the fire zone – thus interrupting the on-going fire reaction.

The aerosol, itself, consists of solid and gas combustion products. The solid phase is composed of highly dispersed particles of salts and oxides of alkaline metals that present insignificant health hazards for humans at normal design concentrations. The gas phase may contain small amounts of carbon monoxide CO, carbon dioxide CO$_2$, nitrogen oxides NO$_x$, and ammonia NH$_3$. Production of these gases is minimal in the case of Stat-X due to its patented construction, chemical formulation, and its manufacture in the United States using only technical and reagent grade chemicals. In tests conducted by a certified, accredited testing facility in the United States, Stat-X generators were shown to produce gas levels several orders of magnitude less than the standard allowed for automobile airbag systems for passenger vehicles (See Figure 1).

Tests have shown no long-term negative effects from exposure to the aerosol. While the components of the aerosol are not considered toxic at normal concentration levels, ingestion of the ultra-fine particulate may cause short-term discomfort and unnecessary exposure should be avoided. Studies conducted to date, indicate that any potential toxicological issues with the aerosols in general are related to possible elevated levels of potentially harmful products that may be produced in the gas phase – such as, CO, NO$_x$, etc. - and not due to the influence of the solid particulate.\textsuperscript{1,2} In the case of

\textsuperscript{1} E.A. Smith, E.C. Kimmel , et al, “Toxological Evaluation of Exposure to Two Formulations of a Pyrotechnically-Generated Aerosol: Range Finding and Multiple Dose”, HOTWC.96

Stat-X, in particular, The effect is negligible due to the extremely low level of gas production (See Figure 1).

In tests conducted by VNIIP (Russian State Fire Protection Institute), the aerosol was considered to have the same acute toxicity as Halon 1301\textsuperscript{3}. The Toxicology Institute of the Public Health and Medical Department of the Russian Federation and tests conducted by the Institute of Biophysics (Department of Public Health and Medicine Russian Federation), as well as others, have shown that the aerosol does not present a health hazard due to limited accidental exposure at normal design concentrations. Exposure to the aerosol is generally of less concern than is exposure to the decomposition products of a fire. Accidental exposures under five minutes are normally considered safe. Certain safety restrictions, however, should always be observed. Exposure to the aerosol should be avoided as ingestion of the ultra-fine particulate may cause short-term discomfort. The discharge of the aerosol also has a relatively high obscuration factor. As a result, the following system installation requirements must be observed.

**SYSTEM INSTALLATION REQUIREMENTS**

Stat-X total flood systems shall only be applied in occupied areas in conjunction with a 30 second time delay and system isolate switch to insure egress of personnel prior to system discharge and manual only activation whenever personnel may be present in the protected volume.

Stat-X Aerosol Physical Properties
Average Values @ 100 gram/m³ Concentration

<table>
<thead>
<tr>
<th>Gas Products: (ppm)</th>
<th>Stat-X 15 minute TWA*</th>
<th>Automobile-Airbag Emission Standard 20 minute TWA*</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂</td>
<td>1.08</td>
<td>9.90</td>
<td>20.00</td>
</tr>
<tr>
<td>NO</td>
<td>0.97</td>
<td>50.10</td>
<td>100.00</td>
</tr>
<tr>
<td>NOₓ = NO + NO₂</td>
<td>2.05</td>
<td>60.00</td>
<td>120.00</td>
</tr>
<tr>
<td>CO</td>
<td>84.20</td>
<td>445.00</td>
<td>1,200.00</td>
</tr>
<tr>
<td>CO₂</td>
<td>756.00</td>
<td>40,000.00</td>
<td>40,000.00</td>
</tr>
<tr>
<td>NH₃</td>
<td>58.30</td>
<td>151.50</td>
<td>300.00</td>
</tr>
</tbody>
</table>

**Solid Particulate:**

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>K₂CO₃</td>
<td>55.2%</td>
</tr>
<tr>
<td>KHCO₃</td>
<td>8.2%</td>
</tr>
<tr>
<td>KNO₂</td>
<td>7.9%</td>
</tr>
<tr>
<td>Other Potassium Compounds</td>
<td>5.5%</td>
</tr>
<tr>
<td>NH₄HCO₃</td>
<td>23.2%</td>
</tr>
<tr>
<td>pH in solution</td>
<td>= 8.6</td>
</tr>
</tbody>
</table>

**Particle Size Distribution:**

<table>
<thead>
<tr>
<th>Size (µm)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1µm</td>
<td>3%</td>
</tr>
<tr>
<td>&lt; 2µm</td>
<td>76%</td>
</tr>
<tr>
<td>&lt; 5µm</td>
<td>97%</td>
</tr>
<tr>
<td>&gt; 5µm</td>
<td>3%</td>
</tr>
</tbody>
</table>

**Operating and Storage Conditions:**

- **Humidity**: Up to 98% @ +35°C
- **Temperature**: -54°C to +54°C
- **Shelf Life**: 10 years +

* TWA = Time Weighted Average

Figure 1.0
The Stat-X thermal/manual operated family of automatic extinguishing units (referred to as aerosol generators) include the following models: 30T, 60T, 100T, 250T, 500T and 1000MT. These units are shipped from the factory without the actuators installed. The actuators are mechanical devices that are ordered separately and shipped loose in their individual cardboard box.

During installation at site, the actuator is screwed hand tight into the top of extinguishing unit body. The mounting bracket is available in two models (fixed or pivoting type) and is mounted on the wall surface or ceiling.

The interchangeable actuators are available in naval brass or aluminum material. The cotter pin is used for manual release purposes. The actuators are ordered in 3 possible factory fixed temperature settings:
- 158 °F/70 °C (blue label)
- 203 °F/95 °C (green label)
- 254 °F/123 °C (red label)

Color coded labels are factory installed on each actuator to enable quick identification that the correct actuator is selected for installation.

Aerosol generators should normally be mounted near ceiling height and angled to discharge down (under floor expected) toward the floor at an angle to insure three-dimensional distribution of aerosol. Normal orientation from vertical is 15° - 30°.

Aerosol generators must never be positioned to discharge directly at each other! Aerosol generators must be mounted in such a way as to have an unobstructed discharge path and must not discharge at close range onto walls, ceiling, or equipment. Always check for obstructions in the path of the aerosol discharge stream. Generators must be installed such that they cannot cause personnel injury upon activation.

<table>
<thead>
<tr>
<th>Model</th>
<th>P/N</th>
<th>Diameter</th>
<th>Length</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30T</td>
<td>15300</td>
<td>2“</td>
<td>3”</td>
<td>0.6 lbs</td>
</tr>
<tr>
<td>60T</td>
<td>15311</td>
<td>2“</td>
<td>5 1/4”</td>
<td>1.3 lbs</td>
</tr>
<tr>
<td>100T</td>
<td>15410</td>
<td>3”</td>
<td>6”</td>
<td>2.0 lbs</td>
</tr>
<tr>
<td>250T</td>
<td>15510</td>
<td>5”</td>
<td>7 7/8”</td>
<td>4.9 lbs</td>
</tr>
<tr>
<td>250MT</td>
<td>15511</td>
<td>3”</td>
<td>7 1/4”</td>
<td>3.0 lbs</td>
</tr>
<tr>
<td>500T</td>
<td>15610</td>
<td>5”</td>
<td>7 1/8”</td>
<td>6.4 lbs</td>
</tr>
<tr>
<td>1000MT</td>
<td>15711</td>
<td>5”</td>
<td>11 7/8”</td>
<td>12.4 lbs</td>
</tr>
</tbody>
</table>

Sizes and weights of the various thermal/manual actuated generators are listed in the table. These do not include the brackets and actuators.
# Standard Stat-X® Generator Mounting Brackets

<table>
<thead>
<tr>
<th>Part #</th>
<th>Mounting Bracket SS</th>
<th>Fits</th>
</tr>
</thead>
<tbody>
<tr>
<td>#18001</td>
<td>Mounting Bracket SS</td>
<td>30 &amp; 60 generators</td>
</tr>
<tr>
<td>#18005</td>
<td>Mounting Bracket SS</td>
<td>100T/100E/250 MT/250ME generators</td>
</tr>
<tr>
<td>#18010</td>
<td>Mounting Bracket SS</td>
<td>250T/250E/500T/500E/1000MT/1000ME generators</td>
</tr>
<tr>
<td>#18015</td>
<td>Mounting Bracket SS</td>
<td>1000/1500/2500 generators</td>
</tr>
</tbody>
</table>
Material: 304 SS, 12 gauge
DIMENSIONS IN INCHES.
ALL DIMENSIONS IN INCHES.
INTRODUCTION

Thank you for your purchase of a *Stat-X* aerosol fire suppression system. This manual designed to provide you with a general understanding of the product, as well as, general information on installation, operational, and maintenance parameters. It is not a detailed design, installation, operation, and maintenance manual. A detailed manual may be obtained by contacting the manufacturer:

*Fireaway LLC*
11503 K-Tel Drive
Minnetonka, MN 55343
U.S.A.

*Stat-X* systems are to be installed and periodically inspected by trained personnel. No modifications are to be made to the installed system without consulting a qualified system designer. The system is made up of units tested within limitations contained in the detailed design, installation, operation, and maintenance manual. The system designer must be consulted whenever changes are planned for the system or the protected area. An authorized installer or system designer must be consulted after the system has discharged.

SYSTEM DESCRIPTION

**General**

*Stat-X* automatic units combine an environmentally safe fire suppression agent, specially developed components, and a highly effective thermal detection device to provide rapid agent application. The resulting timely suppression of fire reduces property damage and products of combustion to the lowest possible levels. These units are extremely compact, and totally eliminate the expensive pressure vessels, nozzles, and distribution piping associated with other fire suppression systems. The thermally activated generator is strategically placed within the protected enclosure offering significant space savings over conventional systems. *Stat-X* thermal units are designed for total flooding applications in accordance with established design criteria. All installations must meet the requirements of the local authority having jurisdiction.

*Stat-X* automatic units are used to suppress fires in enclosures where an electrically non-conductive agent is required and where low weight/space to extinguishing capacity is a factor. The fire-extinguishing agent is an ultra-fine aerosol, which hangs in suspension for extended periods of time (up to one hour) providing excellent protection against re-flash, as well as, minimizing clean up.

*Stat-X* systems are not suitable for the following hazards; or, where the following materials may be present:

- Materials, which burn with deep-seated characteristics (wood, fiber, cotton, etc.)
- Electrical equipment operating at over 40,000 V
- Metal Hydrides, Pyrophoric substances, and Chemical substances that smolder and burn without air
- Metal powders (magnesium, titanium, etc.)
- Environments rated Hazardous (explosive atmospheres).

**Extinguishing Agent**

The aerosol produced upon activation of the Fireaway LLC *Stat-X* system suppresses fire by a combination of chemical and physical mechanisms similar to the Halons without any negative effect on the environment. Because of the aerosol’s ultra-fine particle size (≤ 2 micron) there is a dramatic increase in the surface area interaction between the agent and the fire.

Unlike gaseous agents the aerosol does not decompose in the presence of fire nor does it extinguish by oxygen deprivation. The aerosol is considered non-toxic to humans when applied in normal design concentrations necessary to extinguish most fires; however, certain safety restrictions should be observed when applying and handling the generators. Exposure to the aerosol should be limited and unnecessary exposure to the particulate should be avoided. Exposure to the aerosol is generally of less concern than is exposure to the decomposition products of a fire.

**Toxicity:** Tests conducted by the Institute of Biophysics (Department of Public Health and Medicine Russian Federation) as well as others have shown that the aerosol does not present a health hazard due to limited accidental exposure at normal design concentrations. Exposures under five minutes are normally considered safe. Gas by-products are several times less than that allowable for automobile airbag systems.

While the components of the aerosol are not considered toxic at normal concentration levels, ingestion of the ultra-fine particulate may cause short-term discomfort and unnecessary exposure should be avoided. Tests have shown no long-term negative effects from exposure to the aerosol. In addition the aerosol has a high obscuration factor. *Stat-X* is approved by the US EPA for use in unoccupied and normally unoccupied areas.

**Corrosivity:** Extensive tests have shown that the aerosol is non-corrosive and non-harmful to a wide variety of materials including structural metals, plastics, electrical components, sophisticated materials used in aviation, film, and magnetic tape. In all cases it has been shown that *Stat-X* has no deleterious effect on the operating capability of equipment. Aerosol may cause minor surface discoloration of some metal alloys if not cleaned promptly - but this is a non-progressive event with no effect on functionality.

**Cleanliness:** The ultra-fine aerosol discharge remains in suspension for an extended period of time and can be easily vented by a fan or air handling system. Minor amounts of aerosol, which may have settled on the floor or other horizontal surfaces, can be easily vacuumed or wiped clean with a water alcohol solution. Settled particulate is minor and is much less than the particulate produced by the decomposition products of the fire.

**Other Safety Considerations:** The aerosol discharged into the hazard area upon activation of the generator is relatively "cool". However, the aerosol stream as it leaves the generator may be above 100°C for a very short distance from the outlet of the generator (dependent on size). Maximum temperatures are realized only in the last seconds of discharge. Temperatures 0.5 meter (18 in.) from the discharge ports will reach a momentary (< 2 sec.) maximum in the range of 20°C - 75°C at the end of discharge (depending on model). Each model has a required installation clearance distance specified as its “C-Zone”. Steps must be taken to insure generator placement so that it complies with this
installation requirement. The generator housing is approximately 90°C immediately after discharge and care should be taken if handling the post-discharge generator prior to its cooling to ambient temperature. Generators must never be installed to discharge directly on walls or equipment being protected, as this will cause agglomeration of the aerosol.

Operating/Temperature Range: Fireaway LLC Stat-X automatic units are listed to operate within a temperature range of 0 °C to +54 °C. The generators are sealed with a non-permeable membrane and are unaffected by fluctuations in humidity and temperature. Accelerated aging tests have shown the generator’s charge maintains its viability for more than 10 years under conditions ranging from -54°C to +54°C and cycled relative humidity levels up to 98%.

EQUIPMENT INSTALLATION

General. All Fireaway LLC Stat-X equipment must be installed to facilitate proper operation, inspection, testing, and any other maintenance as may be necessary. Equipment must not be subject to mechanical, chemical, or other damage, which could render the equipment inoperative. Equipment must be installed in accordance with all applicable standards and the contents of this section of the manual.

WARNING

AEROSOL GENERATORS CONTAIN A PYROTECHNIC ELEMENT AND MUST ONLY BE HANDLED, INSTALLED, AND SERVICED BY A TRAINED TECHNICIAN USING THE INSTRUCTIONS CONTAINED IN THIS SECTION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE A PREMATURE DISCHARGE AND POTENTIAL INJURY.

Mounting: Stat-X thermal aerosol generators must be mounted so that the unit is securely fixed to the support structure and is mounted in a position where its “C-zone” (required clearance zone) will not impact on personnel, equipment, and combustible materials located within the protected enclosure.

Aerosol Stream Characteristics.

<table>
<thead>
<tr>
<th>Model</th>
<th>C - Zone</th>
<th>Max. Height</th>
<th>Max. Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 T</td>
<td>0.1 m</td>
<td>1.1 m</td>
<td>0.50 m²</td>
</tr>
<tr>
<td>60 T</td>
<td>0.2 m</td>
<td>1.8 m</td>
<td>0.60 m²</td>
</tr>
<tr>
<td>100 T</td>
<td>0.2 m</td>
<td>2.0 m</td>
<td>0.93 m²</td>
</tr>
<tr>
<td>250 T</td>
<td>0.3 m</td>
<td>2.0 m</td>
<td>2.15 m²</td>
</tr>
<tr>
<td>500 T</td>
<td>0.5 m</td>
<td>2.5 m</td>
<td>3.72 m²</td>
</tr>
</tbody>
</table>

Mounting Height: In general, the aerosol generators should be mounted at or near ceiling height and directed toward the floor with an unobstructed discharge path. In order to insure maximum distribution of aerosol throughout the hazard area, the maximum height of generator placement must be limited as indicated above.

Flow: Placement of the aerosol generator to insure proper aerosol flow and distribution is extremely important. The aerosol generator must be positioned to insure that the aerosol stream does not impinge directly on walls or the sides of equipment being protected.

Aerosol Generator Installation. Stat-X automatic aerosol generators must be located within the protected enclosure. The following installation instructions must be followed in the exact sequence outlined below to prevent accidental discharge, bodily injury, or property damage.

NOTE:

All thermally activated models are to be installed as a single unit system only.

1. Position mounting bracket and securely fasten in a location and manner to allow for an unimpeded discharge upon activation and which insures the generator will not be subjected to accidental discharge or movement. Care must be taken so that the generator does not directly discharge at close range at the wall, ceiling, or vertical surfaces of the equipment within the hazard area.

2. The unit should be mounted as close as possible to ceiling height in an area that will be exposed to turbulent airflow in the event of a fire and angled to discharge down toward the floor at an angle to insure three-dimensional distribution of aerosol. Potential “dead air” locations should be avoided. In un-vented enclosures avoid mounting in a corner as this may become an area of dead air flow.

3. Remove generator from shipping container and inspect integrity of the non-permeable membrane and generator. Do not install if the membrane is ruptured in any way or if the housing has been damaged in shipment.

4. Securely attach generator to the mounting bracket, taking care to insure that there is adequate room for the detector mechanism and that all bolts are securely tightened in place.

5. Remove shipping caps from both the generator and the thermal detector (supplied separately).

6. Install the thermal detector into the bushing on the top of the generator taking care not to damage the threads. The detector will “bottom” into the bushing when properly installed.

Post Installation Checkout: After the Stat-X generators have been installed perform the following inspection and tests.

1. Verify that generator is the correct size and installed per the installation drawings.

2. Verify that generator mounting bracket is properly installed and that all fittings are tight.

3. Verify that the generator is positioned properly. Check for obstructions in the path of the aerosol discharge stream. Generators must be installed such that they cannot cause personnel injury upon activation. The aerosol discharge stream must not impinge at close range on walls, ceiling, or vertical surfaces of equipment.

4. All acceptance testing shall be in accordance with this manual, any applicable standards, and the authority having jurisdiction.

OPERATION

Aerosol Generator. A solid charge of the aerosol composition is contained within the sealed generator. Upon activation of the initiator, the charge begins a controlled burn producing an ultra-fine aerosol, which is ten times as effective as any agent currently on the market. The aerosol passes through a cooling bed where the temperature of the
Post Fire Operation: After discharge of a Stat-X fire suppression system, qualified fire suppression system maintenance personnel must perform post fire maintenance and system installation procedures outlined in this manual.

WARNING

ENSURE FIRE IS COMPLETELY EXTINGUISHED BEFORE VENTILATING AREA, BEFORE PERFORMING POST FIRE MAINTENANCE PROCEDURES REFER TO THE MATERIAL SAFETY DATA SHEET.

Post Fire Maintenance: The following procedures must be followed in the exact sequence to maintain and re-commission a Stat-X suppression system:

1. After discharge, allow a minimum holding time of ten (10) minutes
2. Always be sure to have backup portable extinguishers at hand for use in the unlikely event of re-ignition.
3. Vent the area thoroughly by operating the ventilation system, by fan extraction, or by opening doors and windows. To avoid unwanted inhalation of fire by-products and aerosol, a protective breathing apparatus or mask should be worn if it is necessary to enter prior to complete ventilation of the hazard volume.
4. Inspect the area to insure the fire is completely extinguished and that there are no localized hot spots or other sources of re-ignition present.
5. Remove spent generators, being sure to wear gloves or other hand protection. The generators will remain quite warm to the touch for a time after actuation.
6. Dispose of spent generators according to applicable federal, state, and local regulations.
7. Contact your authorized Stat-X distributor immediately for replacement generators. Replacement and commissioning should only be undertaken by trained personnel.

Post Fire Maintenance

RECYCLING OF AEROSOL GENERATORS AFTER DISCHARGE:

In most cases the discharged generator can be disposed of in any landfill that handles industrial waste. However, local regulations must be researched and observed. Each discharged aerosol generator will contain the following material:

1. Stainless steel outer shell – all
2. Mild steel cross members/spacers - all
3. Stainless steel inner shell – 100, 250, 500
4. Mild steel inner shell – 30, 60
5. Stainless steel top and bottom plates, screens – all
6. Activated Alumina: CAS 1333-84-2 (Aluminum Oxide non-fibrous)
7. Fiberglass rope (ø1cm x 50cm) – 250, 500.
8. Ceramic Paper < 15g – 30, 60, 100

Contact Fireaway LLC if there are any questions relative to the above.

MAINTENANCE

General: While Fireaway LLC Stat-X suppression systems require significantly less maintenance than other fire suppression systems; a regular program of systematic maintenance must be established to insure continuous, proper operation of any fire suppression system. A periodic maintenance schedule must be followed and an inspection log maintained for ready reference. At a minimum, the log must record: (1) inspection interval, (2) inspection procedure performed, (3) maintenance performed, if any, as a result of inspection, and (4) the name of the responsible person performing the operation.

Preventive Maintenance. Perform preventive maintenance per the following schedule at a minimum:

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 10 years</td>
<td>Replace per date code on label.</td>
</tr>
<tr>
<td>Six Month</td>
<td>Visual inspection of Components</td>
</tr>
<tr>
<td></td>
<td>Inspect bracketing &amp; position of generator.</td>
</tr>
</tbody>
</table>

Inspection Procedures

Every Six Months

1. Make a general visual inspection of all aerosol generators for damaged or missing parts.
2. Ensure there are no obstacles inhibiting the proper operation of the aerosol generators or distribution of the aerosol in the event of a fire.

Replacement from Service. The aerosol generators have an installed service life of 10+ years. They are to be replaced 10 years from the date code in the lower right corner of the product label.
Note: (There is a grace period of 1 year as the generators have been certified for a period longer than 10 years to insure a full 10 years in actual service).

The Date Code appears as follows, where the alphabetic character represents the year and the numeric the month of shipment from the factory:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
</table>
A = 2001, B = 2002, C = 2003, etc. A unit marked A 12, for example, would have shipped in December of 2001

**LIMITED WARRANTY STATEMENT**

Fireaway LLC represents that this product is free from defects in material and workmanship, and it will repair or replace any product or part thereof which proves to be defective in workmanship or material for a period of eighteen (18) months from the date of first shipment from our factory. Defective units should be returned shipment prepaid to the factory:

Fireaway LLC
11503 K-Tel Drive
Minnetonka, MN USA 55343

Fireaway LLC will repair or replace and return shipping prepaid. Return or repair shall be the purchaser’s sole remedy for defect.

**Limitations of Liability**

This warranty does not cover equipment damaged during shipment or by misuse, accident, or negligence, or which has been repaired or altered by others. Fireaway LLC shall not under any circumstances be liable for special or consequential damages such as, but not limited to, damage or loss of property or equipment, loss of profits or revenue, cost of capital, cost of purchased or replacement goods, or claims by customers of the original purchaser. Remedies set forth herein to the original purchaser and all others shall not exceed the price of the equipment supplied.

This warranty is exclusively and expressly in lieu of all other warranties, whether expressed or implied, including warranty of merchantability or fitness.

**A DETAILED MANUAL MAY BE OBTAINED BY CONTACTING THE MANUFACTURER:**

Fireaway LLC
11503 K-Tel Drive
Minnetonka, MN 55343

Questions concerning the information presented in this manual may be addressed to your authorized distributor or:

Fireaway LLC
11503 K-Tel Drive
Minnetonka, MN 55343
U.S.A.
Tel: 952-935-9745
Fax: 952-935-9757
www.statx.com

Stat-X® products are manufactured in the USA, and sold worldwide (excluding the Federation of Russian States) exclusively by Fireaway LLC under license from R-Amtech, International.
1. PRODUCT

*Stat-X* Condensed Aerosol Generators - Models 30 thru 2500.

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components – Chemical (Hazardous Components ≥ 1%)</th>
<th>CAS#</th>
<th>COMMENTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium Nitrate</td>
<td>7757-79-1</td>
<td>Components are blended and pressed into a highly stable, molded form. Molded composition is contained within a sealed double-walled stainless steel housing – no environmental exposure.</td>
</tr>
<tr>
<td>DCDA</td>
<td>461-58-5</td>
<td></td>
</tr>
<tr>
<td>Organic Resin</td>
<td>9003-35-4</td>
<td></td>
</tr>
</tbody>
</table>

Appearance & Odor: Beige to white in color. No odor.

Auto-Ignition Temperature: 300°C

Solubility in Water: Slightly Soluble

3. HAZARD IDENTIFICATION

Possible exposure to aerosol suppression agent if generator is activated. May cause temporary, mild irritation of mucous membrane if inhaled.

4. FIRST AID MEASURES

<table>
<thead>
<tr>
<th>Contact Method:</th>
<th>Procedure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Remove to fresh air</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>Flush with water</td>
</tr>
<tr>
<td>Skin Contact</td>
<td>Wash with soap and water.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Not a likely route of exposure.</td>
</tr>
</tbody>
</table>

Seek medical attention for further treatment, observation, and support if necessary.

5. FIRE FIGHTING MEASURES

In the event of a fire, evacuate the area and inform emergency services. Ignition of *Stat-X* produces a fire-suppression aerosol. Water may be used as an additional suppression agent.

6. ACCIDENTAL RELEASE MEASURES

If these devices are spilled they can be safely recovered by hand and should be inspected for damage prior to repacking. Suspect or damaged articles should be labeled and consigned for correct destruction.

7. HANDLING AND STORAGE

Store in temperate conditions. Avoid shock, electric currents, static discharge, excessive heat and extended periods of storage at temperatures greater than 65°C.
8. EXPOSURE CONTROL/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Respiratory Protection</th>
<th>Ventilate area completely after discharge. Do not enter area prior to complete venting of enclosure. Use filter mask as necessary during clean-up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Protection</td>
<td>Wear gloves if handling generators prior to cooling.</td>
</tr>
<tr>
<td>Eye Protection</td>
<td>Safety glasses are advisable.</td>
</tr>
<tr>
<td>Skin Protection</td>
<td>N/A</td>
</tr>
</tbody>
</table>

9. PHYSICAL AND CHEMICAL PROPERTIES

| Appearance:           | Stainless Steel Cylinder up to 270 mm in length |

10. STABILITY AND REACTIVITY

These devices are extremely stable below 125°C. They should be protected from fire, sources of electrical power, shock, and high temperatures.

11. TOXICOLOGICAL INFORMATION

Toxic by-products of combustion are extremely low. Main by-products are listed below with 15-minute TWA values for a maximum 100g/m³ concentration in a hermetically sealed volume.

<table>
<thead>
<tr>
<th>Gas</th>
<th>15 minute Time Weighted Average in parts per million</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂</td>
<td>1.08</td>
</tr>
<tr>
<td>NO</td>
<td>0.97</td>
</tr>
<tr>
<td>CO</td>
<td>84.20</td>
</tr>
</tbody>
</table>

12. ECOLOGICAL INFORMATION

These devices are sealed and present no ecological hazards. The aerosol produced upon ignition has no global warming potential and an ozone depletion potential = 0.

13. DISPOSAL CONSIDERATIONS

Comply with all local, state, and federal/international regulations.

14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>UN Number: 3178</th>
<th>Shipping Limitations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Classification: 4.1 Flammable solid, inorganic, n.o.s. (fire suppressant containing potassium nitrate)</td>
<td>Cargo Air</td>
</tr>
</tbody>
</table>

Division 4.1 articles present no significant hazard as packaged for transport.

15. REGULATORY INFORMATION

<table>
<thead>
<tr>
<th>S15</th>
<th>Keep away from heat</th>
</tr>
</thead>
<tbody>
<tr>
<td>S33</td>
<td>Take precautionary measures against risk of static discharge</td>
</tr>
<tr>
<td>S35</td>
<td>This material and its container must be disposed of in a safe way</td>
</tr>
<tr>
<td>S38</td>
<td>In case of insufficient ventilation wear suitable respiratory equipment</td>
</tr>
<tr>
<td>S39</td>
<td>Wear eye/face protection</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Comply with manufacturer’s installation and maintenance procedures.

Disclaimer:

The information contained herein is accurate to the best knowledge and belief of Fireaway LLC, and is intended to describe the product for health, safety, and environmental requirements only. It is not intended and should not be construed as a warranty. Consult Fireaway LLC for further information.