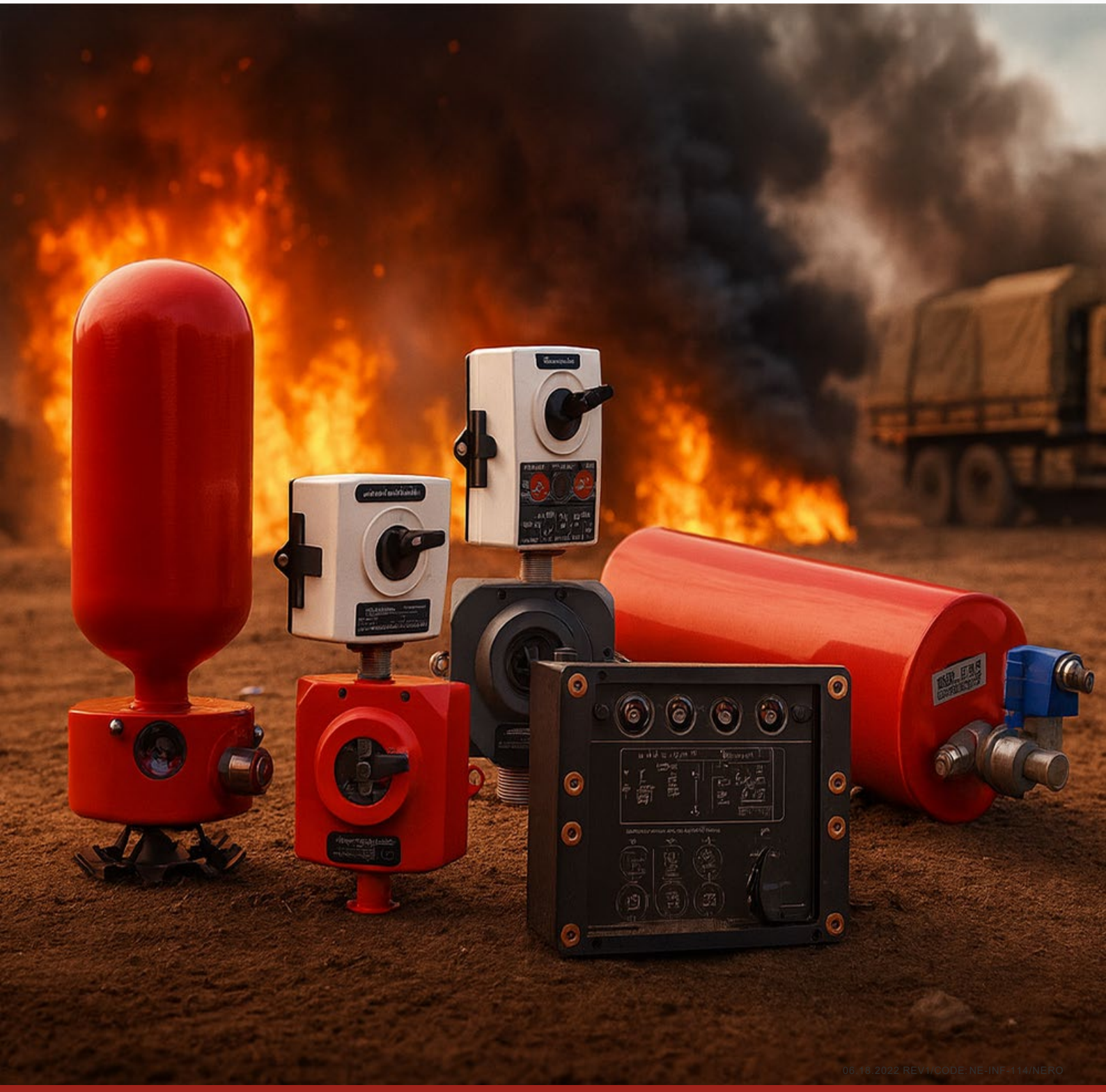
NERO INDUSTRIES
Advanced Reliability

Automatic Fire Suppression System
Technical Datasheet – Revision 03 / March 2025



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FIRE SUPPRESSION SYSTEMS

VIP personnel are especially targeted during operations; it enables making necessary preparations for taking urgent protective precautions or activation of protection systems. The most dangerous threats during operations are remote attacks. The weapons used for remote attacks could even destroy a heavily armed vehicle within seconds. These product groups developed by NERO INDUSTRY could suppress the explosion caused by unguided attacks, mine explosions, flammable and explosive hazardous materials, liquid fuel fires, and weapons used for remote attacks.

NERO INDUSTRY manufactures fire suppression systems for commercial use as well as defense platforms. The company aims to ensure the safety of people traveling by bus, working in agricultural areas, construction zones, etc.

Fire suppression systems are mounted on vehicles as shown below

EFFECTIVENESS AND STANDARDS

Fire Suppression Systems integrated into the platform showed a 95% decrease in blast problems. When integrated into vehicles, the aim is to prevent vehicle losses; however, the primary goal is the protection of human life.

The fire suppression system's UV-IR optical sensors have the capability of detection in less than 3 milliseconds, control units have the feature of activation within 6 milliseconds after detection, and extinguishing cylinders become active in less than 7 milliseconds. The fire is completely suppressed in less than 250 milliseconds.

This system comprises all the conditions described in NATO STANAG 4317, and all qualification tests are performed at NATO Level 4 standard together with the customer.

FIRE HAZARD RATING SPECIFIED IN NATO STANAG 4317 FOR ARMORED GROUND VEHICLES

Level of Threat	Protection Requirement	Application Vehicles
Level 0	No protection required	Automotive vehicles
Level 1	Fairly slow fire	Bank transit vehicle
Level 2	Slow growing fire	Armored SUV
Level 3	Fast growing fire	Armored logistic vehicle
Level 4	Explosion	Armored personnel carriers, radar systems, sophisticated weapon systems

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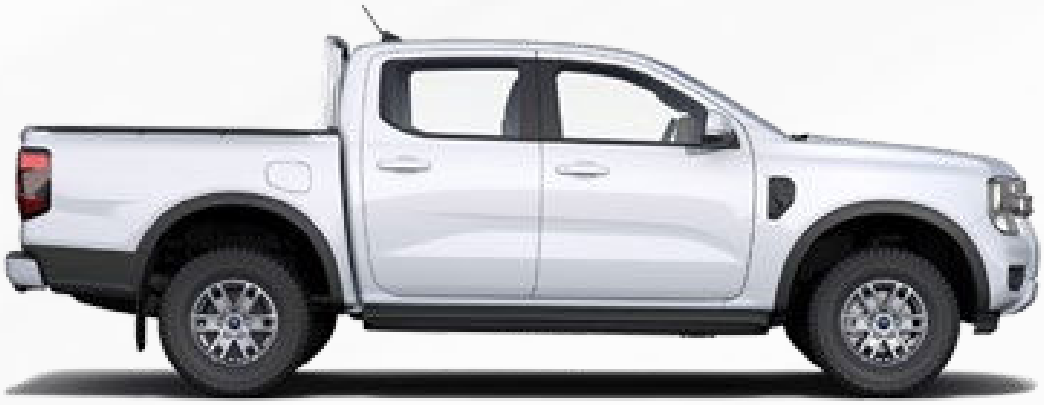
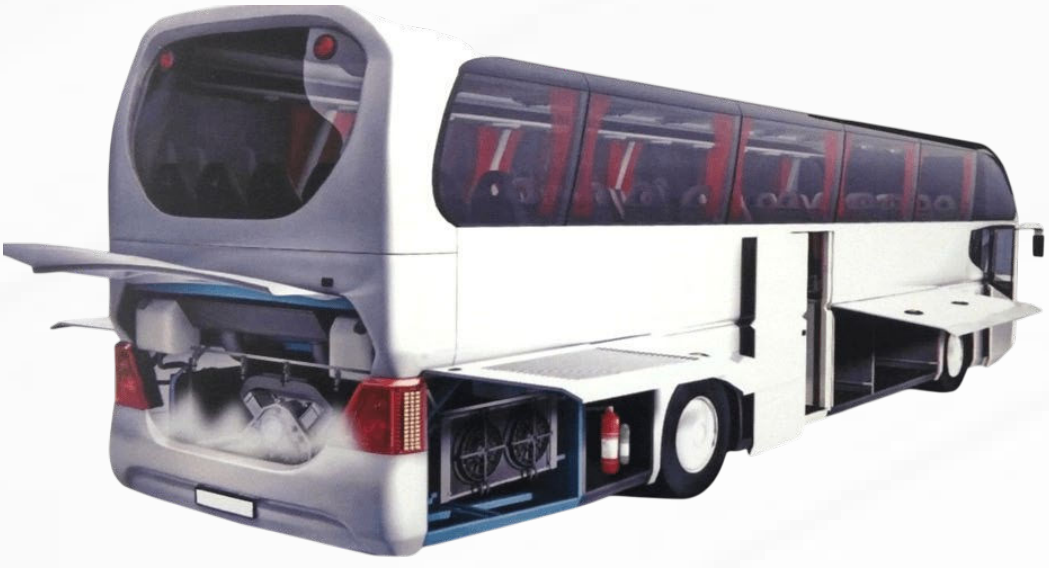
Vehicle Zone	Recommended Protection Level
Personnel Compartment	Level 4
Engine Compartment	Level 3
Auxiliary Power Unit Compartment	Level 4
Vehicle Body	Level 2
Tires	Level 2

CRITICAL TIMING AND HUMAN SAFETY

In Level 4 fires, the system must detect within 3 milliseconds and extinguish a fire or explosion within 250 milliseconds.250 milliseconds is the maximum time human skin can withstand explosion burning; when this time is exceeded, third-degree skin damage occurs.





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SYSTEM UNITS

NAME OF THE UNITS	DESCRIPTION
 **AUXILIARY POWER UNIT**	The auxiliary power unit supplies the automatic fire suppression and extinguishing system in a controlled manner from the battery or the auxiliary power supply. **Weight:** 2700 ± 20 g **Width × Height × Depth:** 179 × 167 × 82 mm
 **ARES III CONTROL UNIT**	It is an automatic fire suppression and extinguishing system control unit that supports 4 zones. UV-IR optical detector, pyrotechnic tube, and solenoid valve tube can be controlled. Besides these, sensors such as 3IR optical detector, linear heat detector, thermocouple, and NTC can also be used with the ARES III control unit. **Weight:** 1860 ± 100 g **Width × Height × Depth:** 180 × 155 × 67 mm
 **ARES III+ CONTROL UNIT**	It is an automatic fire suppression and extinguishing system control unit that supports 4 zones. UV-IR optical detector, pyrotechnic tube, and solenoid valve tube can be controlled. Besides these, sensors such as 3IR optical detector, linear heat detector, thermocouple, and NTC can also be used with the ARES III+ control unit. **Weight:** 2080 ± 100 g **Width × Height × Depth:** 180 × 150 × 70 mm
 **UV-IR OPTICAL DETECTOR**	It performs simultaneous radiation detection in the UV/IR ranges of the electromagnetic spectrum and produces an alarm output signal. It distinguishes signals from all other sources of radiation that are not identified as fires and does not treat them as alarms. These radiation sources and detector immunity distances are described in detail in the technical specifications section. **Weight:** 480 ± 20 g **Width × Height × Depth:** 87 × 86 × 50 mm

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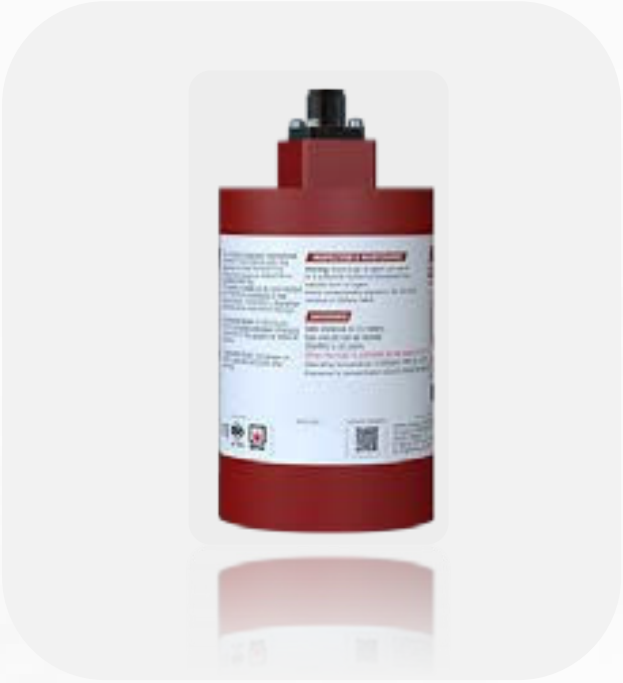
AEROSOL FIRE EXTINGUISHER

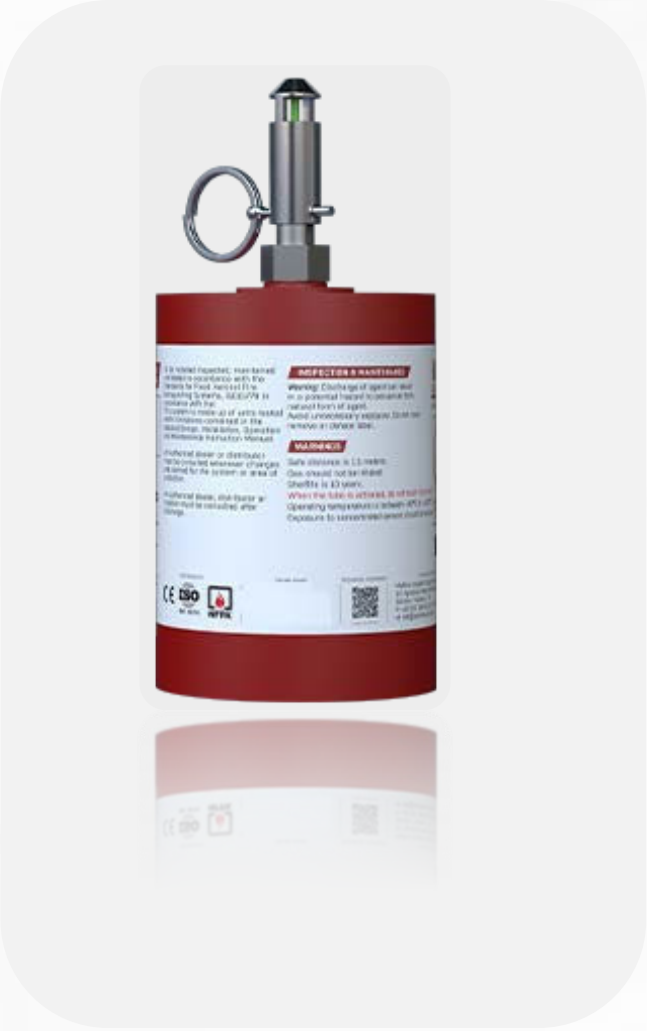


The Aerosol Fire Extinguisher family is designed to extinguish and neutralize type A (solid fuel), B (liquid fuel), C (gas fuel) fires and type E (electric) fires in enclosed spaces.

After calculating the required extinguishing agent concentration for each type of fire and the volume to be protected, and determining the appropriate extinguisher for that volume, the solid NRECM agent in the cylinder and the total number of cylinders in the area to be protected are defined.

Aerosol Extinguishers offer solutions for every need with electrical, mechanical, or combined electrical and mechanical activation options.

Weight: 1.8 kg Height: 132 mm Diameter: 89 mm



AEROSOL FIRE EXTINGUISHER WITH MECHANICAL ACTIVATION

NERO INDUSTRY provides an All-In-One independent system solution in which fire detection and extinguishing are united.

Although it can be controlled by the control unit, it can also be activated mechanically without being connected to any electrical power supply. Thanks to the thermal sensor/activator on it, it can detect fire and get activated automatically at various temperatures (e.g. 57°C, 68°C, 79°C, 93°C, 141°C, 180°C) according to different operational requirements.

After the fire is detected by the thermal sensor/activator, the fire is suppressed effectively by the aerosol extinguisher.

It provides high flexibility and integrability for active fire protection in different applications with its easy installation, rapid replacement feature, low weight, and compact dimensions.

Diameter: 89 mm
Height: 172 mm
Weight: 1.8 kg

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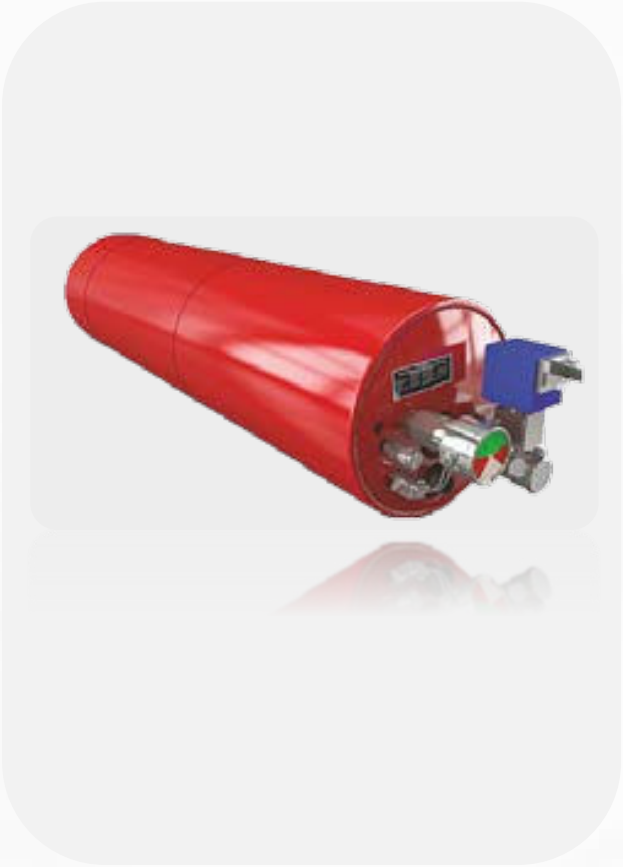
HORIZONTAL AFFF LIQUID FIRE EXTINGUISHER



It is specifically designed for fire suppression systems in armored vehicles. It is used to extinguish fires on and around vehicle tires.

The extinguishing agent contains AFFF, an environmentally friendly fire extinguishing compound.

The special design of the tube valve allows the valve to open quickly, ensuring rapid agent release during fire events.

The active extinguishing substance is distributed through pipes and nozzles across the designated protection zone.

Weight: 24–30 kg
Height: 132 mm

PYROTECHNIC EXTINGUISHER TUBE

Pyrotechnic tubes are used as extinguishers in both personnel and engine compartments.

The fire extinguisher tube contains the environmentally friendly HFC-227ea agent and performs fire suppression in less than 250 milliseconds.

Thanks to the special valve design developed by NERO INDUSTRY, the pyrotechnic tubes ensure rapid valve opening.

The extinguishing agent is distributed in the engine compartments through pipes, hoses, and nozzles for maximum reach and effectiveness.

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SYSTEM INTEGRATION & ZONE ARCHITECTURE

Fire suppression and extinguishing systems in armored ground vehicles are integrated into five distinct zones:

Vehicle Zone	Integrated Components	Recommended Level
Personnel Compartment	UV-IR Optical Detector, Pyrotechnic Extinguisher Tube, Control Unit	Level 4
Engine Compartment	3IR Detector, Pyrotechnic Tube, AFFF or Aerosol Extinguisher	Level 3
Auxiliary Power Unit (APU) Compartment	UV-IR Detector, Aerosol Extinguisher, Control Link	Level 4
Vehicle Body	Aerosol or Liquid Extinguishing System	Level 2
Tires	AFFF Extinguisher	Level 2

Each zone is controlled by the Control Unit (ARES III or ARES III+), which processes signals from detectors and activates extinguishing cylinders accordingly.

The integration allows automatic, mechanical, or manual operation modes, depending on mission requirements and power configuration.

LEVEL 4 PERFORMANCE REQUIREMENTS

For Level 4 conditions (explosion or high-intensity fire scenarios), the system must comply with the following operational timings:

Event	Maximum Time Allowed
Detection (UV-IR Optical Sensor)	3 milliseconds
Control Unit Activation	6 milliseconds
Cylinder Activation	7 milliseconds
Full Fire Suppression	250 milliseconds

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ENVIRONMENTAL AND OPERATIONAL SPECIFICATIONS

NERO INDUSTRY's fire suppression and extinguishing systems are designed and tested to meet the strictest environmental and operational standards defined under NATO STANAG 4317 – Level 4 requirements.

All materials used in extinguishing units are environmentally friendly, halon-free, and non-corrosive.

The systems are engineered to withstand extreme military conditions including shock, vibration, temperature, and electromagnetic interference.

The systems operate with full efficiency in the following environmental conditions:

Parameter	Specification
Operating Temperature	-40°C to +80°C
Storage Temperature	-50°C to +90°C
Humidity Resistance	Up to 98% relative humidity
Vibration Resistance	MIL-STD-810 compliant
EMC/EMI Shielding	NATO and MIL standards certified
Corrosion Resistance	All metallic parts are anodized or treated against corrosion
Shock Resistance	Tested under explosive and ballistic impacts
Environmental Agent	AFFF, HFC-227ea, or NRECM solid aerosol agent

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Parameter	Specification
Operating Temperature	-40°C to +80°C
Storage Temperature	-50°C to +90°C
Humidity Resistance	Up to 98% relative humidity
Vibration Resistance	MIL-STD-810 compliant
EMC/EMI Shielding	NATO and MIL standards certified
Corrosion Resistance	All metallic parts are anodized or treated against corrosion
Shock Resistance	Tested under explosive and ballistic impacts
Environmental Agent	AFFF, HFC-227ea, or NRECM solid aerosol agent

All components including control units, detectors, and extinguishers are modular and can be easily replaced or upgraded without system recalibration.

QUALIFICATION AND TESTING

All NERO INDUSTRY fire suppression systems are qualified and validated according to NATO STANAG 4317 standards, specifically for Level 4 explosion and fast fire response conditions.

Testing procedures include the following validation steps:

Test Type	Objective	Result Criteria
Detection Test	Verify detection within 3 milliseconds	Pass if < 3 ms
Activation Test	Verify control signal initiation within 6 milliseconds	Pass if < 6 ms
Cylinder Firing Test	Confirm extinguishing cylinder activation within 7 milliseconds	Pass if < 7 ms
Suppression Test	Confirm total fire extinguishing under 250 milliseconds	Pass if < 250 ms
Environmental Test	Confirm reliability under temperature, humidity, and vibration	Pass under MIL-STD-810
Shock & Blast Test	Verify operation under simulated explosion conditions	No failure or misfire
EMC/EMI Test	Confirm no electromagnetic interference with vehicle systems	Pass all NATO criteria

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MAINTENANCE AND SERVICE

Component	Maintenance Schedule / Action
Aerosol Extinguisher	Replace after discharge or every 5 years (whichever comes first).
Pyrotechnic Tube	Replace after activation or during system overhaul inspection.
AFFF Liquid Extinguisher	Check for pressure loss and refill or replace if below specification.
UV-IR and 3IR Detectors	Clean optical lenses monthly or after each mission. Verify with diagnostic self-test.
Control Units (ARES III / III+)	Run diagnostic test every 6 months. Verify LED status and sensor integrity.
Wiring and Power Units	Inspect connections every 12 months or after vehicle maintenance.

All NERO INDUSTRY systems feature self-diagnostic functionality through the control units to detect wiring faults, disconnected sensors, or extinguishing cylinder failures.

RELIABILITY AND LIFETIME

System Element	Operational Lifetime
Control Units	10 years minimum
Optical Detectors	8 years minimum
Aerosol / AFFF Extinguishers	5 years minimum (subject to environment)
Pyrotechnic Tubes	5 years minimum
Cables and Connectors	10 years minimum
System Certification	NATO STANAG 4317 Level 4

All system components are designed for rapid replacement without requiring calibration after reinstallation.

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