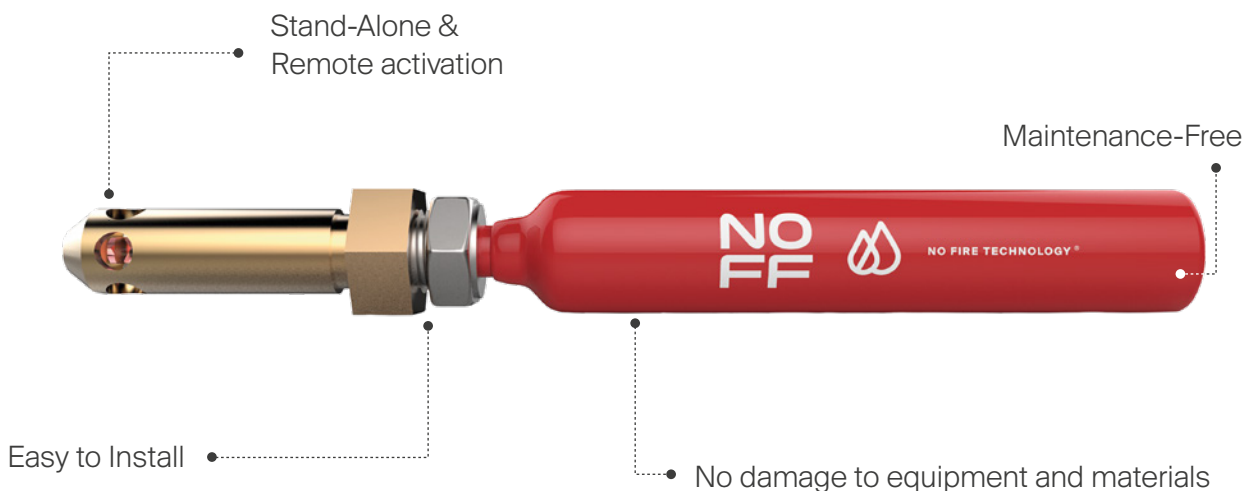




Automatic Miniature Fire Extinguisher (AMFE)

R-AMFE Model

TECHNICAL DATASHEET



We protect what matters the most

OVERVIEW

R-AMFE is an innovative device designed to protect specific assets compared to conventional fire protection systems that protect entire rooms, which brings low-cost and easy-to-configure installations in the field. R-AMFE detects and extinguishes fires inside devices and equipment in industry, preventing the spread of fire.

R-AMFE is an analog intelligent fire suppression device capable of connecting to any conventional fire alarm and detection system. It is equipped with sensor connections allowing it not only to monitor the release of the clean extinguishing agent, but also can be externally and remote triggered by an electric activation signal using smoke detectors manual pull stations, or very early warning aspirating smoke detectors; the main purpose is to initiate the extinguishing process in an incipient stage of fire even before significant enough heat buildup.

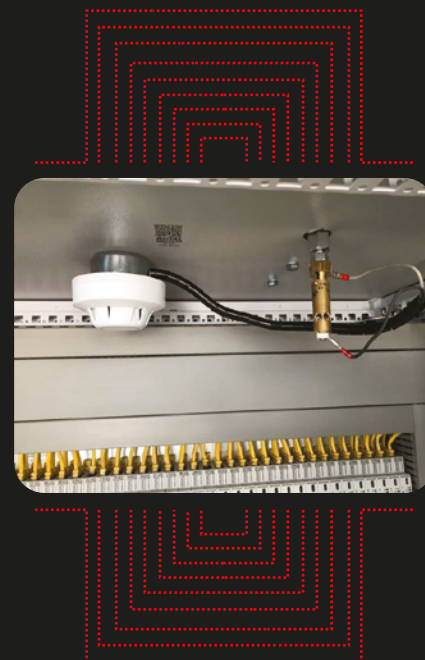
R-AMFE version can work in larger enclosed spaces (cabinets) than S-AMFE, because if several R-AMFE devices are needed to protect the same enclosed space, all of them can be triggered at the same time using a current signal from a smoke detection system. Therefore, R-AMFE can work much faster than S-AMFE if is linked to a fire alarm and detection system.

R-AMFE has also the versatility that when the thermo bulb burst, it can be used to monitor the activation and execute some other strobes, as well as to turn off air conditioning systems and even cut off electrical power.

The R-AMFE makes it possible to fire-protect a full range of electrical equipment, important machinery, and high-valued apparatus with only little effort.

R-AMFE extinguishes ABC-type fires, although it focuses mainly on class C fires. Depending on the place where it will be installed, R-AMFE is available in three different standard temperatures.

R-AMFE use NOVEC 1230 as extinguishing agent, which is exclusively intended for the use in enclosed rooms. It is a highly efficient extinguishing agent that is electrically non-conductive and leaves no residue to clean up. This makes ideal for use in special hazard areas where maintaining continuous operation of high-value equipment is critical both during and after the outbreak and suppression of a fire. It takes approximately just 10 seconds to reach the required concentration level of extinguishing agent. At this point the full extinguishing effect is already achieved.



STANDARD FEATURES

- Rapid extinguishing.
- Capable of integrating with any Fire Alarm Control Panel.
- Easy to Install.
- Stand-alone activation.
- NOVEC 1230 as clean extinguishing agent.
- Variety of activation temperatures available.
- Robust & Shock tolerant.
- Reliable integrated heat sensitive glass bulb.
- Maintenance-free.
- Minimal Space requirements.
- No hazard to human health.
- Electrically non-conductive.
- No corrosive effects.
- No damage to equipment and materials.
- Reduce business interruption.
- High-safety for people.
- Remote activation.
- Protection of enclosed spaces larger than 1.6m³.
- 10 years Lifetime.

APPLICATIONS

Fire suppression today is an important part of a growing number of life safety installations and a mean not only to protect investments, high-tech machinery, and important equipment but also minimize business interruption saving million of dollars in down-time and loss of production. Nowadays, building owners are looking to fire suppression as a means of protecting their property and assets. Below, you will find a list of application examples for the AMFE product line:

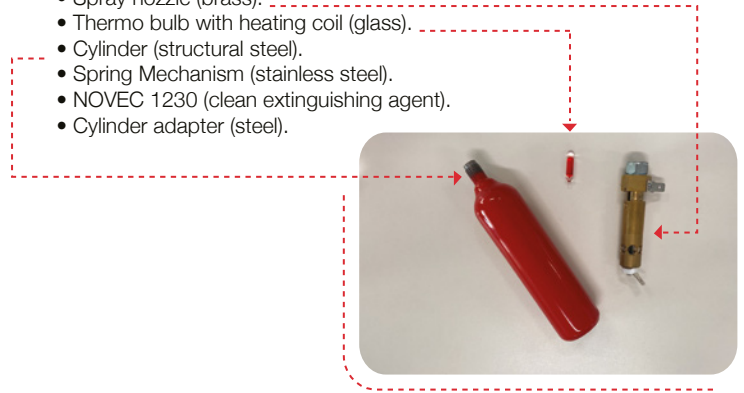
- Low, medium, and high-voltage circuit breakers.
- Switchboard, switchgear and panelboards.
- Industrial and production control panels.
- Machinery control panels.
- Motor central centers.
- Fuse boxes.
- Enclosed switches or electrical cabinets.
- Pump or motor controller's cabinets.
- Electrical Distribution Switchboards.
- IT racks & IDM Racks.
- PLC cabinets
- CCM
- Uninterruptible power supply (UPS)
- ATM
- High-cost & Critical Medical apparatus and equipment.
- High-valued equipment.
- State of the art sound systems.

TECHNICAL DATASHEET

AMFE™

PARTS OF THE R-AMFE

- Standard connectors (6.3 mm Blade terminals)
- Spray nozzle (brass).
- Thermo bulb with heating coil (glass).
- Cylinder (structural steel).
- Spring Mechanism (stainless steel).
- NOVEC 1230 (clean extinguishing agent).
- Cylinder adapter (steel).



OPERATION

R-AMFE (short for Automatic Miniature Fire Extinguisher) is an independent, thermally initiating, stand-alone fire extinguishing device.

The integrated certified and listed sprinkler bulb bursts when a defined operating temperature is exceeded (similar to the way automatic sprinklers systems works), thus activating a spring mechanism which opens the attached cylinder containing a clean extinguishing agent. In a matter of seconds, the enclosed space is flooded with the clean extinguishing agent, suppressing the fire when it is still at an incipient stage. R-AMFE can also be activated by smoke detectors, manual pull stations, very early warning aspirating smoke detectors, etc. when they are integrated into a system. If these devices got activated, a low-power signal current will be sent through the thermo bulb that features a heating coil, the bulb will overheat intentionally when electric current is applied resulting in a burst of the thermo bulb and release of the clean extinguishing agent.

The bulb burst is used to monitor the activation and for other several applications, in example: to interrupt the power supply, display an alarm in the fire alarm control panel, disable the HVAC system, etc.

When discharged, NOVEC 1230 rapidly vaporizes from a liquid to a gas. It also poses no hazard to the human health.

STANDARD ACTIVATION

R-AMFE activates automatically by heat because it is equipped with a listed thermo-bulb that has a very high reliability to activate at an established standard temperature. In this option, the R-AMFE discharge nozzle is not connected with any device, so when activated it will extinguish the fire, but it will not trigger an alarm signal to a control panel or other device.

SUPERVISED & RELAY MODE

R-AMFE can be remotely and externally triggered by a smoke detector, manual pull station, or very early warning smoke detectors, manual switch, etc. This means that R-AMFE activates in incipient and smoldering stage of the fire development providing a very early alarm. When an incipient fire (smoke particles) is detected by initiation devices, an electric current intentionally will be released and overheat the thermo bulb that features a heating coil; therefore, the bulb will burst, and the electric current will stop flowing through the R-AMFE discharge nozzle. The loss of current (interruption) in the nozzle can be used to monitor the activation by displaying an alarm signal in the fire alarm control panel, disconnect the electrical power, sound a strobe, horn, turned off the HVAC, etc. It is desirable that a relay module should be utilized when R-AMFE is going to be connected to a listed fire alarm control panel. The relay module should be connected in the signaling line circuit (SLC) loop following the relay manufacturer's instruction.

Using a relay, several R-AMFE can even be triggered at the same time in case it is required to protect enclosed spaces (cabinets) greater than 1.6m³.

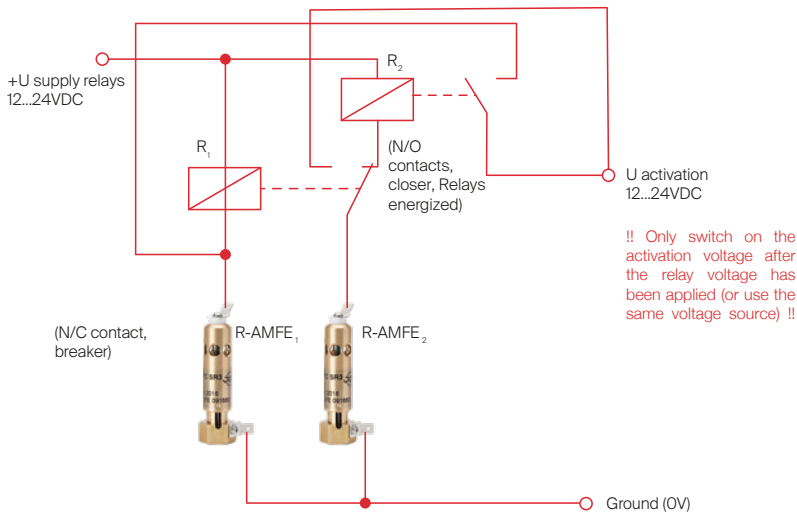
DESIGN

For design purposes, we recommend you contact the NOFF technical staff so that they can assist you in the best way. NOFF technical staff will provide you with the necessary official training seminars and tools so that you can propose solutions using R-AMFE following world-wide recognized fire protection standards such as **NFPA 2001, Standard On Clean Agent Fire Extinguishing Systems.**



WIRING

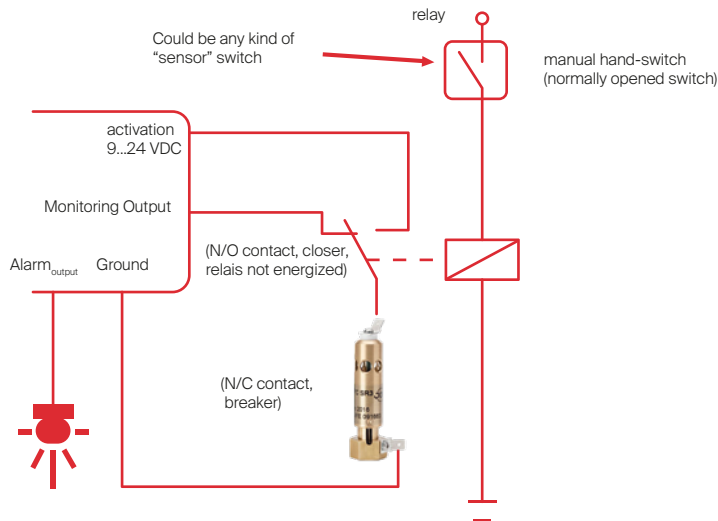
1. Example of a common connections:



EXAMPLE R-AMFE Activation

- Larger protected volume, needs two AMFE
- 2 x R-AMFE have to be used to activate second R- AMFE if first R-AMFE is activated by fire (& vice versa).
 - R-AMFE ₁ is activated by fire, disables relay R₁, and activation current goes into R-AMFE ₂ → both R-AMFE are activated nearly simultaneously.
 - If R-AMFE ₂ is activated by heat, relay R₂ is deactivated, switching back to providing activation current for R-AMFE ₁ → both R-AMFE activate nearly simultaneously.

2.

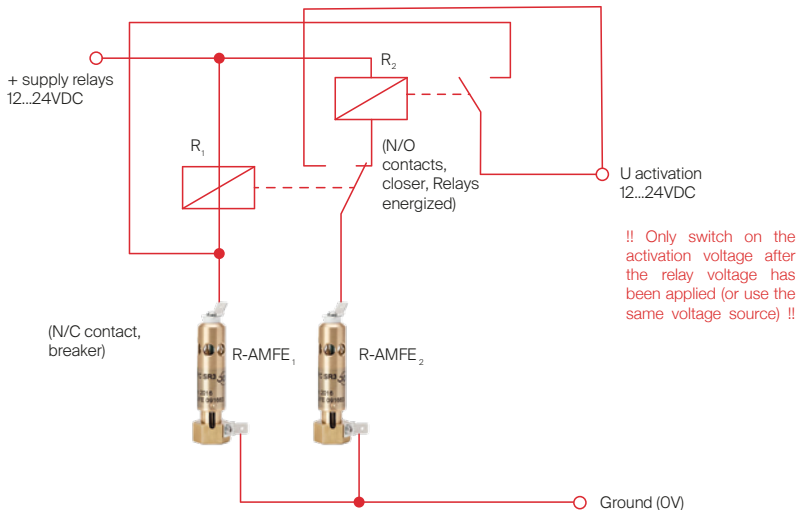


EXAMPLE R-AMFE Activation

- If the manual switch is activated (closer), the relay is closing and the activation current circuit is closed.
- The R- AMFE activates from the activation current.
- At the same time, the monitoring circuit is interrupted which can generate an alarm.

Or: R-AMFE detects temperature and activates automatically in case of fire

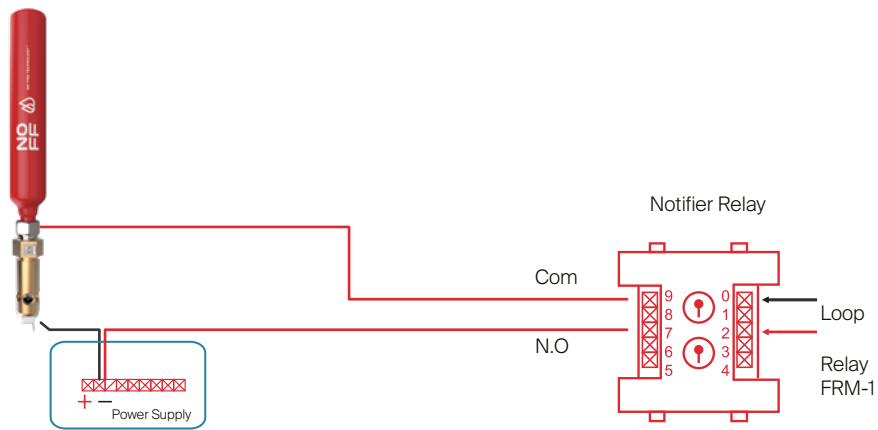
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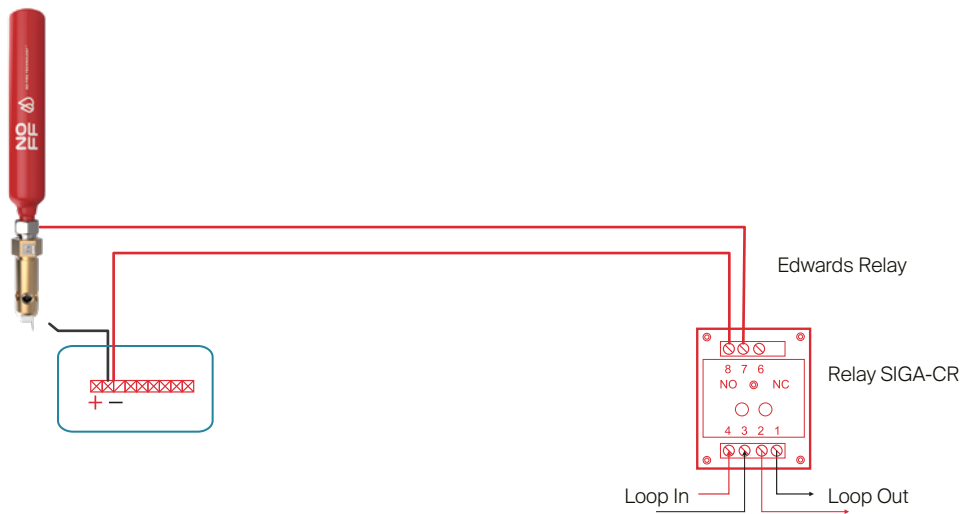
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b) Example connection with a Notifier fire alarm and detection system:



c) Example connection with an Edwards fire alarm and detection system:



INSTALLATION

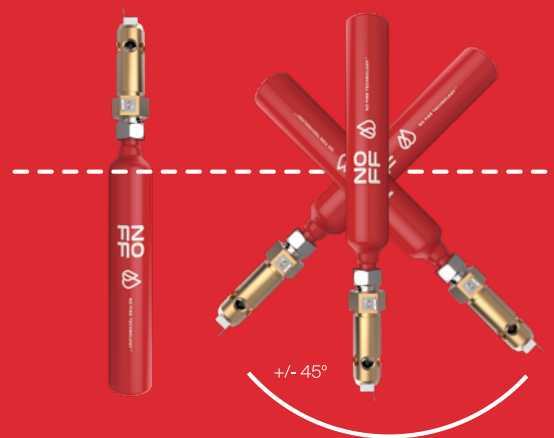
R-AMFE is very easy to install, thanks to its size it adapts to any enclosed space, device, machinery, or apparatus. Before proceeding with the installation of R-AMFE make sure you have your personal protective equipment (PPE) and follow the safety procedure or guidelines published in the facility. Prior any installation please check that the device, machinery, or equipment is turned off. For the installation we recommend following the next steps:

1. Verify that the place for the installation (device/machinery/apparatus/cabinet, etc.) is mostly an enclosed space.
2. R-AMFE must be installed in the highest possible location inside the enclosed space.
3. If there is lack of space inside the enclosed space, R-AMFE can be installed outside on the top of the cabinet / panel, etc.
4. R-AMFE must be installed in a vertical position (at an angle of 90 °) or at a maximum of 45 ° C with respect to the vertical.
5. The R-AMFE spray nozzle must be installed to face downwards.
6. The tools required to install the cylinder with the bracket are an electric drill, open-jaw wrenches of 19mm and 15mm, and drill bits.

For more information regarding assembly and installation, we strongly recommend you request the AMFE's manual to the NOFF technical staff.

NOT OK!

OK!



ACCESSORIES

BRACKET

The bracket is made of steel with EPDM rubber cushion and comes with bolt 3/16"x1/2", nut and washer.

MOUNTING

Placing the R-AMFE outside and on the top of the cabinet offers the advantage of minimizing the space consumption within the cabinet. This is especially interesting when there is limited space available within the electrical cabinet. The Mounting Holder comes in two sizes covering all available cylinder sizes from 0 to 5. The product comes as a complete set with bolt, nut, and washer. Easy to mount and ready for installation.



Specifications

ELECTRICAL:

Contact Type	Normally Closed
Maximum Current	10 mA
Activation Current	1 mA
Operating Voltage DC	9 – 24 Volts
Transition Resistance (Rt)	10 Ohms

PHYSICAL DIMENSIONS SPRAY NOZZLE:

Diameter x Length (cm)	Diameter x Length (in)
1.6 x 6.4	0.63 x 2.52

PRESSURE:

Operating pressure (22°C)	870 psi (60 bar)
Pressure test	3,626 psi (250 bar)

ACTIVATION TEMPERATURES:

Celsius	Fahrenheit	Bulb Color
68°	155°	Red
79°	175°	Yellow
93°	200°	Green

PHYSICAL DIMENSIONS CYLINDER:

Cylinder Size	Diameter x Length (cm)	Diameter x Length (in)	Volume (ml / Fl.oz)	Number of brackets recommended
#0	2.2 x 13.3	0.87 x 5.24	26 / 0.88	1
#1	3.5 x 14.9	1.37 x 5.86	80 / 2.70	1
#2	4.0 x 17.9	1.57 x 7.05	133 / 4.50	1
#3	5.1 x 22.6	2 x 8.89	267 / 9.00	2
#4	5.1 x 31.1	2 x 12.24	400 / 13.50	2
#5	6.0 x 35.7	2.36 x 14.05	670 / 22.60	2




NOVEC 1230 DESIGN CONCENTRATIONS PER CYLINDER ACCORDING NFPA 2001

Cylinder Size	NOVEC content per Cylinder size (ml)	Protected Volume (m³) for Class A Fires (4.2%)	Protected Volume (m³) for Class B Fires (5.9%)	Protected Volume (m³) for Class C Fires (4.7%)
#0	24	0.06	0.04	0.05
#1	72	0.19	0.14	0.17
#2	120	0.32	0.23	0.28
#3	241	0.64	0.46	0.57
#4	360	0.96	0.69	0.85
#5	603	1.61	1.15	1.43



CERTIFICATIONS

a) Product Certifications:

	Organization	Bureau Veritas, DEKRA
	Organization Type	Certification Organization
	Country	International
	Component /Reference	Declaration of conformity 2011/65/EU; 2010/35/EU; 2008/68/EG
	Product	S-AMFE, R-AMFE
	Organization	TUV NORD Systems
	Organization Type	Certification Organization
	Country	Internacional
	Component /Reference	DIN EN 46646-2, 2020; ARGUE Guideline Part 1; ARGUE Guideline Part 2
	Product	S-AMFE, R-AMFE
	Organization	SGS
	Organization Type	Certification Organization
	Country	Internacional
	Component /Reference	European Directive 2002/95/EC; 2011/65/EU
	Product	S-AMFE, R-AMFE

b) Components Certifications:

	Organization Type	Certification Organization
	Country	International
	Component /Reference	Termo-Bulbo / UL-199 Automatic Sprinklers
	Component /Reference	3M NOVEC 1230 / Clean Agent Extinguishing System Unit
	Organization	Factory Mutual
	Organization Type	Certification Organization
	Country	Internacional
	Component /Reference	3M NOVEC 1230 / Fixed Extinguishing Systems, Clean Extinguishing Agents
	Organization	Loss Prevention Certification Board
	Organization Type	Certification Organization
	Country	Internacional
	Component /Reference	Termo-Bulbo / LPS 1039: Requirements and Testing methods for Automatic Sprinklers.
	Organization	VdS
	Organization Type	Certification Organization
	Country	International
	Component /Reference	Termo-Bulbo / VdS 2344:2014-07; VdS 2160:2000-05

c) Regulatory:

	Organization	Environmental Protection Agency
	Organization Type	United States Government
	Country	USA
	Component /Reference	3M NOVEC 1230 / Listed for total flooding use in normally occupied & unoccupied areas.

d) Ordering Information:

Cylinder Size	Description	Ship Weight lb (kg)
120022	Nozzle R-AMFE SR3 68°C	0.017 (0.080)
120023	Nozzle R-AMFE SR3 79°C	0.017 (0.080)
120024	Nozzle R-AMFE SR3 93°C	0.017 (0.080)
120010	Cylinder with NOVEC size #0	0.368 (0.167)
120011	Cylinder with NOVEC size #1	0.921 (0.418)
120013	Cylinder with NOVEC size #2	1.183 (0.537)
120014	Cylinder with NOVEC size #3	2.586 (1.173)
120015	Cylinder with NOVEC size #4	3.492 (1.584)
120016	Cylinder with NOVEC size #5	5.29 (2.4)
120001	Bracket size #0	0.048 (0.022)
120002	Bracket size #1	0.094 (0.427)
120003	Bracket size #2	0.105 (0.0478)
120004	Bracket size #3 & #4	0.204 (0.0927)
120005	Bracket size #5	0.209 (0.0959)
120025	Mounting Holder sizes #0 - #2	0.661 (0.300)
120026	Mounting Holder sizes #3 - #5	0.881 (0.400)
120006	AMFE Demo Sales Kit	2.535 (1.15)

NOVEC™ is not a dangerous good. Compressed N2 in the cylinders is classified as a "dangerous good in limited quantities" group II as per UN 2037 2.2.