# FIRE SUPPRESSION SYSTEM WITH IFLOW TECHNOLOGY

## Features

- Environmentally Friendly Agent
- Safe for People
- Fail-Safe Pressure Regulating Valve
- Proprietary Matrix System
- Multiple Hazard Protection
- Remote Container Storage Location

## Application

The iFLOW system is particularly suited for suppressing fires in hazards where an electrically non-conductive medium is essential or desirable; where clean-up of other agents presents a problem; or where the hazard is normally occupied and requires a non-toxic agent.

When properly designed, the system will suppress surface burning fires in Class A, B, and C hazards by lowering the oxygen content below the level that supports combustion.

The following are typical hazards protected by iFLOW systems:

- Computer rooms
- Subfloors
- Data Centres
- Telecommunications
- Museums
- Libraries
- Archives
- Machinery Spaces
- Switchgear
- Normally occupied or unoccupied electronic areas where equipment is either very sensitive or irreplaceable

## Description

The iFLOW Fire Suppression System, is an engineered clean-agent system utilizing a fixed nozzle agent distribution network. The system may be designed in accordance with the National Fire Protection Association (NFPA) Standard 2001, International Standard ISO14520 or European Standard EN15004.

The system can be actuated by detection and control equipment for automatic system operation in addition to local and remote manual operation as needed. Accessories are used to provide alarms, ventilation control, door closures, or other auxiliary shutdown or functions.

A system installation and maintenance manual is available containing information on system components and procedures concerning design, operation, inspection, maintenance, and recharge.

The system is installed and serviced by authorized distributors that are trained by the manufacturer.

**Composition and Materials** – The basic system consists of extinguishing agent stored in high-strength alloy steel containers. Various types of actuators, either manual or automatic, are available for release of the agent into the hazard area. The agent is distributed and discharged into the hazard area through a network of piping and nozzles. Each nozzle is drilled with a fixed orifice designed to deliver a uniform discharge to the protected area. In the proprietary matrix system the container(s) are connected to the distribution piping or the manifold by means of a flexible discharge hose and horizontal check valve assembly. Use of a manifold may be omitted on certain systems depending on the number of containers.

**Additional Equipment** – All or some of the following equipment is required when designing a total system: control panels, releasing devices, remote manual pull stations, corner pulleys, door closures, pressure trips, bells, alarms, and pressure switches.

**Inert agent** – Inert agents extinguish fire by lowering the oxygen content below the level that supports combustion. This is around 15% for most ordinary combustibles.

**Containers** – The containers are constructed, tested, and marked in accordance with applicable transportation specifications.

**Container/Valve Assembly** – The container is of steel construction. Two sizes are available depending on system design requirements (80 L and 140 L). Each container is equipped with a pressure regulating valve equipped with a gauge. The valve is constructed of forged brass and is capable of regulating the nominal discharge pressure at 60 bar in 300 bar systems and 40 bar in 200 bar systems while allowing for 95% of the design concentration to be discharged within 60 or 120 seconds (140 L container 120 seconds only). The valve is designed to close if pipeline pressures exceeds the nominal discharge pressure and also includes a safety pressure relief device which provides relief at 400-430 bar in the 300 bar system or 276-309 bar in the 200 bar system per CGA test method. The containers are provided with a shipping cap. The cap is attached to the threaded collar or affixed to a flange on the neck of each container to protect the valve whilst in transit. The container serial number and date of manufacture are stamped near the neck of each container.

**Electric Actuator** – Electric actuation of a pilot actuation container is accomplished by an electric actuator interfaced through an approved/ listed control system.

**Manual or Pneumatic Actuation Container** – Manual actuation is accomplished by pulling the hand lever on the pilot actuation container.

**Selector Valve** – Selector valves are used to direct the flow of agent into a single hazard of a multiple hazard system.

**Detection System** – A control system is used where an automatic electronic control system is required to actuate the iFLOW system. This control system is used to control a single fixed fire suppression or alarm system based on inputs received from fire detection devices.

**Nozzles** – Nozzles are designed to direct the discharge of agent and are available in either 360° or 180° discharge patterns. The system design specifies the nozzle and orifice size to be used for the proper flow rate and distribution. The nozzle selection depends on the geometry of the hazard to be protected.

**Pipe and Fittings** – Distribution piping downstream from the agent container pressure regulating valve must be constructed to withstand the maximum downstream pressure as determined by the flow calculation program.

**Flow Calculation Program** – The system design is confirmed using an approved flow calculation program, which is used to size pipework and determine nozzle orifice areas.

**Limitations** – The iFLOW system must be designed and installed within the guidelines of the manufacturer's design, installation, operation, inspection, recharge, and maintenance manual. The ambient temperature limitations are -20 °C to 55 °C (-4 °F to 130 °F)

## Technical Data

**Applicable Standards** – The system complies with NFPA Standard 2001, ISO14520 or EN15004.

## Installations

All system components and accessories must be installed by personnel trained by the manufacturer. All installations must be performed according to the guidelines stated in the manufacturer's design, installation, operation, inspection, recharge, and maintenance manual.

## Availability and Cost

**Availability –** iFLOW systems are supplied and serviced through a network of independent distributors located in many countries. \

**Cost –** Cost varies with type of system specified, size, and design.

## Maintenance

Maintenance is a vital step in the performance of a fire suppression system. As such, it must be performed by an authorized distributor in accordance with the manufacturer's design, installation, recharge, and maintenance manual. When replacing components in the system, use only Tyco approved parts.

## Inert gases used with iFLOW technology

The iFLOW technology is used with the four inert gases contained in NFPA 2001, ISO 14520 and EN 15004.

All the inert gases extinguish flre by displacing air from the protected enclosures, which reduces the oxygen to below the level at which combustion is sustained.

The available options are:

- **INERGEN**, comprised of a blend of 52% Nitrogen, 40% Argon and 8% CO2
- **IG-55**, comprised of 50% Nitrogen and 50% Argon
- **IG-100**, 100% Nitrogen
- **IG-01**, 100% Argon

# SAPPHIRE® PLUS TOTAL FLOOD FIRE SUPPRESSION SYSTEM

## Features and Benefits

- UL/ULC Listed, FM Approved and LPCB Redbook Listed
- Fully meets EN 12094
- Designs according to EN 15004, ISO 14520 and NFPA 2001
- UL and FM verified software
- Selector valve systems
- Available with standard pressure gauge or contacted pressure gauge for pressure monitoring
- Electric, pneumatic or manual operation
- Operating range of –20 °C to 50 °C (UL, FM and CE) or 0 °C to 65 °C (UL and FM)
- Manufactured in the EU
- Centralized storage locations
- Reduced pipe diameters for traditional systems

## Applications

Conventional SAPPHIRE® systems use a storage pressure of 25 bar or 42 bar, which is suitable for many applications. The SAPPHIRE PLUS system uses a storage pressure of 70 bar to provide the designer with more flexibility when planning the layout of the system. The higher pressure means the containers can be placed further from the hazard area (if required), the use of smaller pipe diameters, and the use of selector valves to protect multiple areas using one bank of containers.

## Description

The storage pressure of the SAPPHIRE PLUS system is determined by the quantity of nitrogen added to the container during the filling process to reach a state of super pressurization. The greater the quantity of nitrogen added to the container results in a higher storage pressure capable of driving the agent further, leading to greater flexibility during the planning and layout of the system.

## Approvals and Listings

- UL Listed
- FM Approved
- LPCB Redbook Listed
- CE Marked

E000608

## Specifications

| Environmental Data | |
|---|---|
| Ozone Depletion Potential (ODP): | 0 |
| Global Warming Potential (GWP): | 1 |
| Atmospheric Lifetime (ALT): | 3 to 5 days |
| Operating and storage temperature: | –20 °C to 50 °C (UL, FM and CE)<br>0 °C to 65 °C (UL and FM) |

| Physical Properties of 3M™ Novec™ 1230 Fluid | | |
|---|---|---|
| **Properties** | **Unit** | **Value** |
| Molecular mass: | – | 316.04 |
| Boiling point at 1013 bar (absolute): | °C | 49.2 |
| Freezing point: | °C | –108.0 |
| Vapor pressure 20 °C: | bar abs* | 0.3260 |
| Liquid density 20 °C: | g/ml | 1.616 |
| Saturated vapor density 20 °C: | $kg/m^3$ | 4.3305 |
| Heat of vaporization at boiling point: | kJ/kg | 88.0 |
| Chemical formula: | $CF_3CF_2C(O)CF(CF_3)_2$ | |
| Chemical name: | Dodecafluoro-2-methylpentan-3-one | |

* 1 bar = 0.1 MPa = 100,000 Pa; 1 MPa = 1 $N/mm^2$

## Ordering Information

| SAPPHIRE PLUS container assembly – TPED (70 bar) complete with Standard Pressure Gauge | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Part number | Description | Height to Outlet (mm) | Diameter (mm) | Nominal Tare Weight (kg) | Min. Agent Weight (kg) | Max. Agent Weight (kg) | Nominal Gross Weight (excluding $N^2$) (kg) | Manifold bracket height without AHA (mm) | Manifold bracket height with AHA (mm) |
| 303700001 | 15 L (TPED) 50 °C PG | 694 | 204 | 29.3 | 4.5 | 21 | 50.3 | 1151 | 1308 |
| 303700002 | 30 L (TPED) 50 °C PG | 972 | 229 | 38.8 | 9 | 42 | 80.8 | 1428 | 1585 |
| 303700003 | 45 L (TPED) 50 °C PG | 1071 | 267 | 60.4 | 14 | 63 | 123.4 | 1528 | 1685 |
| 303700004 | 60 L (TPED) 50 °C PG | 1425 | 267 | 80.1 | 18 | 84 | 164.1 | 2005 | 2177 |
| 303700005 | 120 L (TPED) 50 °C PG | 1546 | 360 | 140.6 | 36 | 168 | 308.6 | 2126 | 2298 |
| 303700006 | 180 L (TPED) 50 °C PG | 1783 | 406 | 214.8 | 54 | 252 | 466.8 | 2468 | 2640 |
| 303700013 | 15 L (TPED) 65 °C PG | 694 | 204 | 29.3 | 4.5 | 20.3 | 49.6 | 1151 | 1308 |
| 303700014 | 30 L (TPED) 65 °C PG | 972 | 229 | 38.8 | 9 | 41 | 79.3 | 1428 | 1585 |
| 303700015 | 45 L (TPED) 65 °C PG | 1071 | 267 | 60.4 | 14 | 60.8 | 121.2 | 1528 | 1685 |
| 303700016 | 60 L (TPED) 65 °C PG | 1425 | 267 | 80.1 | 18 | 81 | 161.1 | 2005 | 2177 |
| 303700017 | 120 L (TPED) 65 °C PG | 1546 | 360 | 140.6 | 36 | 162 | 302.6 | 2126 | 2298 |
| 303700018 | 180 L (TPED) 65 °C PG | 1783 | 406 | 214.8 | 54 | 243 | 457.8 | 2468 | 2640 |

| SAPPHIRE PLUS container assembly – TPED (70 bar) complete with Contacted Pressure Gauge | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Part number | Description | Height to Outlet (mm) | Diameter (mm) | Nominal Tare Weight (kg) | Min. Agent Weight (kg) | Max. Agent Weight (kg) | Nominal Gross Weight (excluding $N^2$) (kg) | Manifold bracket height without AHA (mm) | Manifold bracket height with AHA (mm) |
| 303700007 | 15 L (TPED) 50 °C CPG | 694 | 204 | 29.3 | 4.5 | 21 | 50.3 | 1151 | 1308 |
| 303700008 | 30 L (TPED) 50 °C CPG | 972 | 229 | 38.8 | 9 | 42 | 80.8 | 1428 | 1585 |
| 303700009 | 45 L (TPED) 50 °C CPG | 1071 | 267 | 60.4 | 14 | 63 | 123.4 | 1528 | 1685 |
| 303700010 | 60 L (TPED) 50 °C CPG | 1425 | 267 | 80.1 | 18 | 84 | 164.1 | 2005 | 2177 |
| 303700011 | 120 L (TPED) 50 °C CPG | 1546 | 360 | 140.6 | 36 | 168 | 308.6 | 2126 | 2298 |
| 303700012 | 180 L (TPED) 50 °C CPG | 1783 | 406 | 214.8 | 54 | 252 | 466.8 | 2468 | 2640 |
| 303700019 | 15 L (TPED) 65 °C CPG | 694 | 204 | 29.3 | 4.5 | 20.3 | 49.6 | 1151 | 1308 |
| 303700020 | 30 L (TPED) 65 °C CPG | 972 | 229 | 38.8 | 9 | 41 | 79.3 | 1428 | 1585 |
| 303700021 | 45 L (TPED) 65 °C CPG | 1071 | 267 | 60.4 | 14 | 60.8 | 121.2 | 1528 | 1685 |
| 303700022 | 60 L (TPED) 65 °C CPG | 1425 | 267 | 80.1 | 18 | 81 | 161.1 | 2005 | 2177 |
| 303700023 | 120 L (TPED) 65 °C CPG | 1546 | 360 | 140.6 | 36 | 162 | 302.6 | 2126 | 2298 |
| 303700024 | 180 L (TPED) 65 °C CPG | 1783 | 406 | 214.8 | 54 | 243 | 457.8 | 2468 | 2640 |

**Note:** AHA (Adjustable height adaptor)

- SAPPHIRE PLUS systems are configured around six TPED seamless container valve assemblies.
- Each container assembly consists of a container complete with transport cap, valve assembly with either a standard or contacted pressure gauge, and a container label (ordered separately).
- Each container assembly is pressurized with dry nitrogen to 70 bar (+2 bar, –0 bar) at 20 °C.
- Containers must not be stored in direct sunlight, in adverse weather conditions, and must not be positioned where water can accumulate around the base.
- Containers are manufactured in accordance with ISO 9809-1 and ISO 9809-2, as applicable, and are stamped TPED with a working pressure of 120 bar and a hydraulic test pressure of 200 bar.

LPG, SAPPHIRE, and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.

3M and Novec are trademarks of 3M Company.