

**BAVARIA**<sup>®</sup>  
Fire Fighting Solutions



**BAVARIA**  
SYSTEMS  
FIRE FIGHTING

# A GLANCE ON BAVARIA HOLDING



## The Company

The roots of BAVARIA go back to 1923, when BAVARIA Feuerlöscher-Apparatebau was first established in Falkenstein, Germany. The objective of the company was to manufacture quality firefighting equipment and supply safety at a time of great need. BAVARIA with its old heritage is the second oldest fire extinguisher manufacturer in Germany.

Many years later, with a vision of globalization that was ahead of its time, BAVARIA Egypt stock company was established in 1971 as an Egyptian German joint venture. BAVARIA Egypt's main objective has always been to provide innovative, reliable and sustainable high quality fire fighting products to meet the current and future market demands, providing safety to individuals and the society at large.

In 1999, both companies merged together under one holding company; BAVARIA Holding and thus expanding turf on both the national and international levels. Features of the benefits reaped are quite numerous including the integration of their market strategies, product packages, the combination of the production facilities in Germany and Egypt as well as the endorsed experiences, research and development activities.

BAVARIA HOLDING has other subsidiaries like Optima logistics Free-Zone that is specialized in logistics and free zone operations, BAVARIA Alarm, a turnkey provider for automated alarm and fixed fire fighting installations & systems.

Today, on the international level, BAVARIA HOLDING extends its market endeavors to many countries. BAVARIA is directly present through its own subsidiaries in Lebanon, and Sudan as well as being active in the European Union as well as in several other countries. Under the umbrella of its six companies BAVARIA secures the supply of its wide range of products through 26 owned branches in 5 countries. This allows hands on reliable consultations, prompt supply, technical support, and after sale services.

Thanks to its well-developed fleet of customer service vehicles that deliver high quality services on site to 55,000 contracted service customers and is committed to fulfilling their requests within 72-hours. BAVARIA is perhaps the largest producer in Africa, the Middle East, and Europe for cars' fire extinguishers with a capacity of up to several million fire extinguishers per annum.



# QUALITY THAT SPEAKS EVERY LANGUAGE



European Standards DIN/EN3, since 1996



European Standards Din/EN1866, since 1999



The Extinguishing Media (dry chemical powder) is Certified According to The European Norm EN615



UL Listed



FM Approved



CE Mark - Certification for European Quality measures, Since 2001



TÜV approval pressure vessels, since 1995



Compliance Mark for Marine use regulation SOLAS 74/88



Egyptian Standards ES 734, ES 1494, ES 1871 and ES 5680, Since 1978



ISO 9001 Certification awarded by DNV England Quality Management System, since 1994



ISO 14001 Certification awarded by DNV England Environmental Management System, since 1997



ISO 45001 Certificaton awarded by DNV Safety System, since 2025



BAVARIA Laboratory Accredited According to the ISO/IEC 17025 by EJAC, since 2004

# BAVARIA SYSTEMS FIRE FIGHTING



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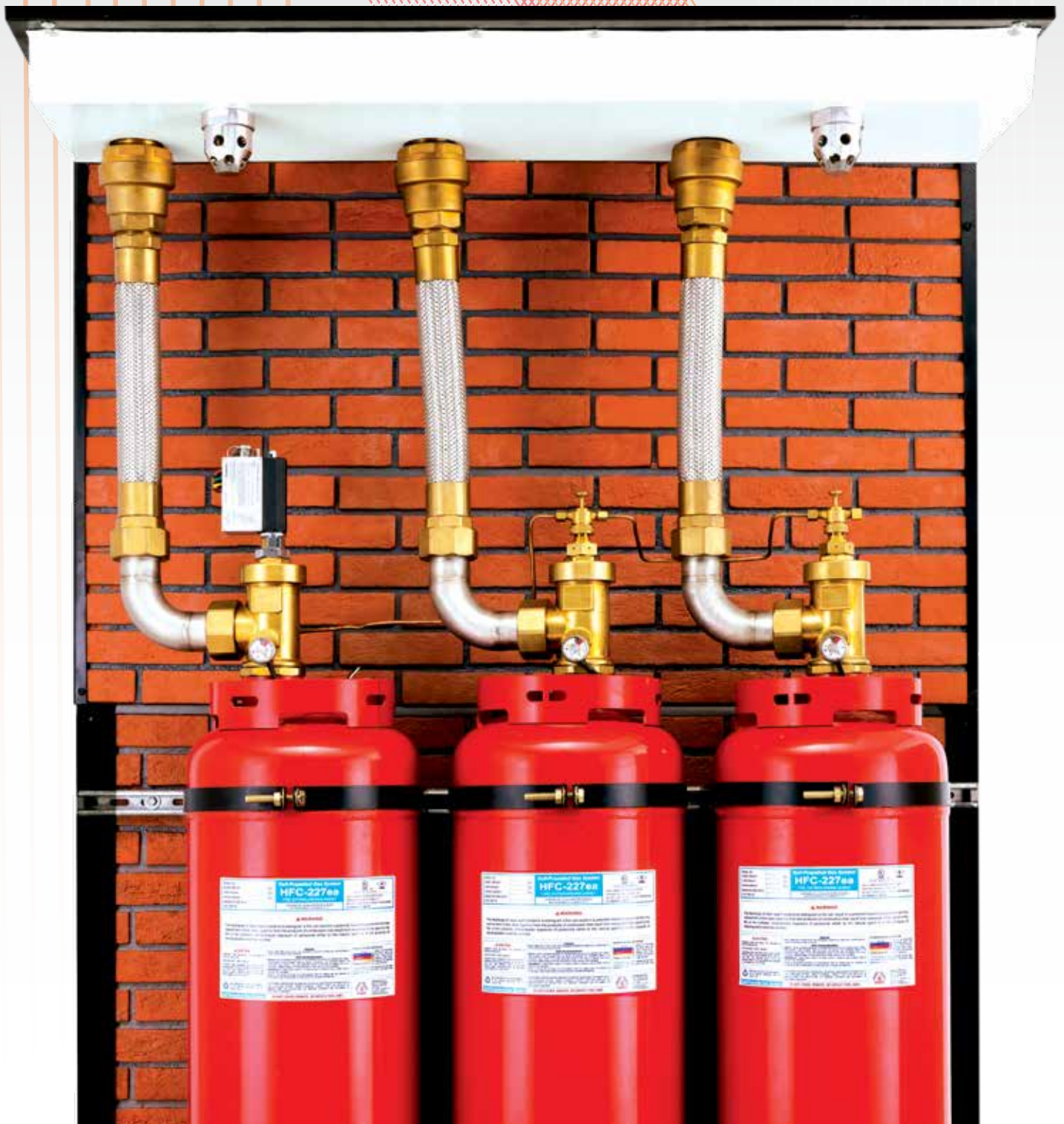
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**BAVARIA®**

GAS SUPPRESSION SYSTEMS  
**BAVARIA HFC-227ea**  
UL LISTED & FM APPROVED



## ▣ APPLICATIONS:

- ▣ Vaults and High-Security Enclosures
- ▣ Battery Backup Rooms
- ▣ Clean Manufacturing Facilities
- ▣ Data Processing Centers
- ▣ Document and Archive Storage Areas
- ▣ Simulators and Training Facilities
- ▣ Offshore Platforms
- ▣ Tape and Digital Media Storage Areas
- ▣ All normally occupied or unoccupied electronic areas containing highly sensitive equipment
- ▣ Telecommunications facilities, including cellular sites and switching centers
- ▣ Recreational facilities and other high-value installations requiring reliable clean agent fire protection.



## ▣ EXTINGUISHING AGENT

- ▣ BAVARIA HFC-227ea® Agent (1,1,1,2,3,3,3-heptafluoropropane) is an advanced clean fire suppression compound composed of carbon, fluorine, and hydrogen (CF<sub>3</sub>CHFCF<sub>3</sub>). The agent is colorless, odorless, and electrically non-conductive, making it ideally suited for the protection of mission-critical environments and sensitive electronic assets.
- ▣ BAVARIA HFC-227ea® Agent extinguishes fire through a highly effective combination of physical and chemical suppression mechanisms without significantly reducing the available oxygen concentration within the protected enclosure. This enables occupants to maintain visibility and breathable conditions during discharge, supporting safe evacuation from the hazard area.
- ▣ Recognized for its suitability in occupied spaces, BAVARIA HFC-227ea® Agent offers acceptable toxicity characteristics when applied in accordance with the requirements of the United States Environmental Protection Agency (EPA) Significant New Alternatives Policy (SNAP) Program.
- ▣ While BAVARIA HFC-227ea® Agent is considered safe for use at concentrations required to extinguish most fire scenarios, all applicable safety precautions for handling and system discharge must be observed. During fire exposure, the agent can produce decomposition by-products when subjected to flames or high-temperature surfaces. As with all clean agent systems, unnecessary exposure to either the agent itself or its thermal decomposition products should be avoided.

## ▣ BAVARIA HFC-227EA ENGINEERED SYSTEM FEATURES

- ▣ Combines the proven advantages of clean agent technology with advanced active fire protection, while delivering people-safe and environmentally responsible performance.
- ▣ Provides colorless, odorless, and non-contaminating gaseous fire protection for clean and efficient fire suppression.
- ▣ Specifically engineered to safeguard critical assets and sensitive processes without causing damage or operational disruption.
- ▣ Delivering a complete fire protection solution designed, manufactured, installed, and serviced by a single company for maximum reliability and seamless system performance.
- ▣ Engineered to fully discharge the clean fire suppression agent into the protected area within 10 seconds, enabling rapid and effective fire extinguishment.
- ▣ Backed by Bavaria exceptional quality practices and comprehensive technical and service support.
- ▣ Available in both Self-Propelled Gas (SPG) and External Propellant Gas (EPG) configurations, providing maximum flexibility for optimized system design.
- ▣ Comprehensive range of cylinder capacities available from 26.8 L up to 175 L to accommodate diverse application requirements.
- ▣ The External Propellant Gas (EPG) System offers enhanced design versatility, enabling greater freedom in pipeline routing, agent cylinder storage room arrangement, and protected area layout configuration.
- ▣ Engineered for reliable performance across a wide operating temperature range from 0°C (32°F) to 55°C (130°F).



## GAS SUPPRESSION SYSTEMS

**BAVARIA<sup>®</sup>** HFC227ea UL LISTED & FM APPROVED

**Advanced Fire Protection. Safe for People. Reliable for What Matters Most.**



TIME OF THE ESSENCE ?

### BAVARIA HFC-227ea Agent Features:

1. Environmentally Responsible Protection – Engineered with zero ozone depletion potential for sustainable fire suppression performance.
2. Safe for Occupied Environments – Designed and approved for total flooding applications in normally occupied spaces.
3. True Clean Agent Performance – Leaves no residue after discharge, eliminating costly cleanup and minimizing downtime.
4. Asset-Safe Suppression – Non-conductive and non-corrosive formulation protects valuable equipment and sensitive contents without damage.
5. Ultra-Fast Fire Response – Delivers rapid detection-to-suppression action to quickly control developing fire events.
6. Proven Active Fire Suppression – Provides highly effective extinguishing performance against applicable fire hazards.
7. Certified Quality Assurance – Components recognized to stringent UL Solutions requirements.
8. Globally Trusted Approval – Fully approved by FM Approvals for dependable fire protection system performance.
9. Suitable for use in Class A, Class B and Class C fires



PROTECTING YOUR ENVIRONMENT ?

### Table No.1, BAVARIA HFC-277ea Extinguishing Agent Physical Properties

Molecular mass	170
Boiling point at 1013 bar	°16.4C
Freezing point	°127-C
Critical temperature	°101.7C
Critical pressure	29.3 bar (abs)
Critical volume	1.61 cm <sup>3</sup> /mol
Critical density	594 kg/m <sup>3</sup>
Vapor pressure at °20C	3.90 bar (abs)
Liquid density at °20C	1410 kg/m <sup>3</sup>
Saturated vapor density at °20C	31.035 kg/m <sup>3</sup>
Specific volume of superheated vapor at 1013 bar and °20C	0.1374 m <sup>3</sup> /kg
Ozone Depletion Potential (CFC11-)	0
Atmospheric lifetime	34.2 years
4hr, rat) properties) LC50	>800,000 ppm



GAMBLING YOUR INVESTMENT ?



SPACE AT THE PREMIUM?



## Toxicity

In independent testing, BAVARIA HFC227-ea® Agent demonstrated acute toxicity characteristics comparable to those of Halon 1301, confirming its suitability for use in modern clean agent fire protection applications.

BAVARIA HFC227-ea® Agent has also undergone comprehensive cardiac sensitization evaluation in accordance with test protocols approved by the United States Environmental Protection Agency (EPA). Under the EPA Significant New Alternatives Policy (SNAP) Program, BAVARIA HFC227-ea® Agent is classified as an acceptable total flooding fire suppression agent for use in normally occupied spaces. For complete application requirements and limitations, reference should be made to the applicable SNAP Program rules.

## CLEANLINESS

BAVARIA HFC227-ea® Agent delivers true clean agent performance by leaving no residue after discharge, eliminating costly post-fire cleanup procedures and significantly reducing operational downtime. This enables faster recovery of protected facilities and helps maintain business continuity following a fire event.

BAVARIA HFC227-ea® Agent is also fully compatible with a wide range of materials commonly found in critical environments. Metals including steel, stainless steel, aluminum, brass, and similar alloys, as well as plastics, rubber materials, and sensitive electronic components, are not adversely affected by exposure to the agent when applied under normal operating conditions.

## Suppression Technology

Unlike water, which suppresses fire through cooling, or CO<sub>2</sub>, which extinguishes flames by reducing oxygen levels, HFC-227ea operates primarily through rapid heat absorption. At the molecular level, the agent quickly removes thermal energy from the combustion process, interrupting the fire's ability to sustain itself. In addition, HFC-227ea provides a secondary extinguishing effect by chemically inhibiting the free radicals that propagate the flame.

## Use and Limitation

HFC-227ea is specifically engineered for Total Flooding Systems, delivering rapid fire suppression by discharging the agent throughout an enclosed protected space within seconds. To ensure maximum extinguishing performance, the enclosure must maintain a high level of integrity. Openings such as door gaps, unsealed cable penetrations, or other leakage paths can allow the agent to escape before complete fire suppression is achieved. For this reason, an annual Door Fan Test is typically conducted to verify that the enclosure can retain the agent concentration for a minimum of 10 minutes, commonly referred to as the required "soak time."

HFC-227ea systems are typically UL Listed and FM Approved for storage and operation within an ambient temperature range of 0°C to 55°C. When temperatures fall below freezing, the internal cylinder pressure decreases. Because HFC-227ea is super-pressurized with Nitrogen at 25 bars, low temperatures can significantly reduce the nitrogen pressure, potentially limiting the driving force required to propel the liquid agent through the piping network and achieve proper nozzle atomization within the required 10 second discharge period. For installations in unheated environments, cylinder heaters or thermostatically controlled thermal blankets are recommended to maintain the agent at its optimal operational readiness temperature.

Conversely, elevated ambient temperatures cause the liquid agent to expand and substantially increase the nitrogen pressure within the cylinder. If storage temperatures exceed 55°C, the system may become susceptible to an unintended "nuisance discharge." To safeguard the cylinder from over-pressurization, the valve assembly is equipped with a safety burst disc designed to rupture before the cylinder integrity is compromised. Activation of this safety device due to excessive ambient heat results in the complete loss of the agent charge; an expensive consequence that simultaneously leaves the protected facility without fire suppression coverage. For this reason, cylinders should not be located in boiler rooms, high-heat mechanical areas, or adjacent to un-insulated roof structures. Where elevated temperatures cannot be avoided, the storage area should be designed with appropriate ventilation, high-temperature pressure relief considerations, or dedicated HVAC environmental control.

## GAS SUPPRESSION SYSTEMS

**BAVARIA<sup>®</sup>** HFC227ea UL LISTED & FM APPROVED

### External Propellant Gas (EPG) Technology

External Propelled Gas (EPG) technology was engineered to overcome one of the key hydraulic limitations associated with conventional HFC-227ea Self-Propelled Gas (SPG) systems: the progressive loss of cylinder pressure during discharge. In conventional systems, both the extinguishing agent and the super-pressurizing nitrogen are stored within the same cylinder. As the agent is released, the internal pressure gradually decreases, reducing the available driving force required to transport the agent efficiently through long or complex piping networks.

The EPG concept introduced a far more advanced discharge methodology. Rather than relying exclusively on the cylinder's initial pressure, the system utilizes a separate high-pressure nitrogen source to continuously propel the HFC-227ea agent throughout the discharge sequence. This creates a highly efficient "power flow" effect, maintaining an almost constant discharge pressure from start to finish. The result is enhanced hydraulic performance, improved agent delivery efficiency, and reliable protection across extended piping configurations.

### System Components:

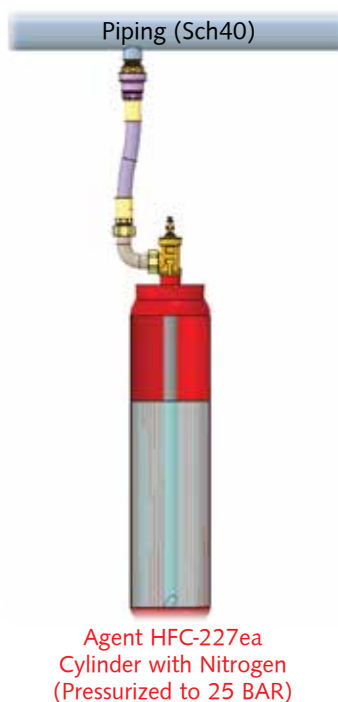
#### Agent Storage Containers

BAVARIA HFC-227ea welded storage containers SPG system have the following capacities: 26.8, 40.2, 63, 68, 89, 115.4 and 175 liters.

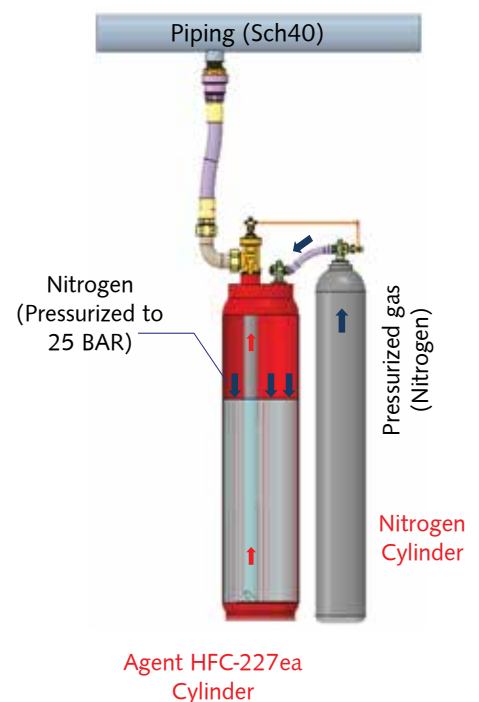
BAVARIA HFC-227ea welded storage containers for EPG system with a driver seamless cylinder containing Nitrogen gas compressed up to 80 bar, EPG system have the following capacities: 63, 68, 89, 115.4 and 175 liters.

For more information on BAVARIA HFC-227ea storage containers. When the required quantity of BAVARIA HFC-227ea has been determined, the size of the container should be selected from the available range of containers considering their maximum and minimum filling weights

Self-Propelled Gas System **SPG**



External Propelled Gas System **EPG**





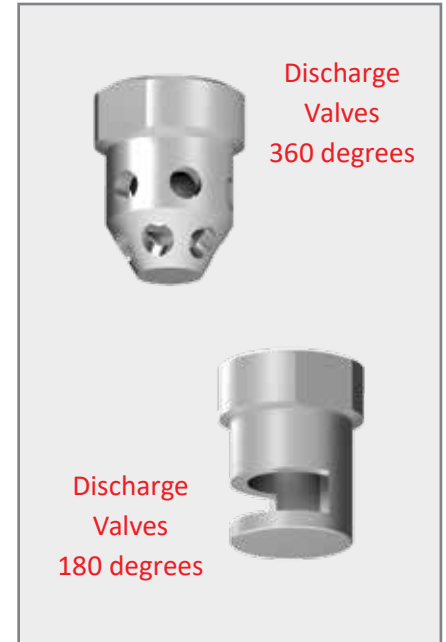
### Discharge Valves

All valve models have a similar operation, accessories, release system and characteristics. The only difference is their dimensions and flow-rates.



### Pneumatic Actuation Valve

Body material	Brass
Min. Actuation Pressure	6 bar
Safety Clip	St.Steel 304
Copper Tube Port	Ø6.3 mm tybe
Valve Actuation Port	M38 x 1.5
Overall Size (mm)	94( L) x 85 (W)
Weight	0.5 kg
Thread connection	M38x1 .5



Discharge Valves  
360 degrees

Discharge Valves  
180 degrees

### Discharge Nozzles

The discharge nozzles, manufactured from Brass Nickel Chrome plating, are devices through which the agent is discharged and distributed within the protected enclosure. They come in different sizes and each size is available with either 360 degrees or 180 degrees dispersal patterns.



Check Valve



Union Elbow



Flixable Hose

## GAS SUPPRESSION SYSTEMS

**BAVARIA<sup>®</sup>** HFC227ea UL LISTED & FM APPROVED

### Key Engineering Advantages:

#### Extended Pipe Run Capability

One of the most significant advantages of EPG technology is its ability to protect hazards located at considerable distances from the cylinder bank. While conventional FM-200 systems can encounter hydraulic limitations across long piping networks, EPG systems are engineered to support substantially greater horizontal and vertical pipe runs with enhanced hydraulic efficiency. Advanced piston-flow technology also enables effective protection for high-rise applications and remote hazards where conventional systems may be restricted.

#### Optimized Pipe Sizing

By maintaining higher and more consistent discharge energy throughout the release sequence, EPG systems can often utilize smaller pipe diameters while still fully complying with NFPA 2001 discharge requirements. This engineering advantage can significantly reduce installation costs, minimize structural loading, decrease ceiling space congestion, and simplify retrofit integration within existing facilities.

#### High-Speed, Efficient Agent Delivery

The external nitrogen propulsion system enhances liquid agent transport efficiency and maintains optimal nozzle atomization during discharge. As a result, the system is capable of discharging more than 95% of the extinguishing agent within the required 10-second discharge period, even in complex or extended piping configurations, ensuring rapid and reliable fire suppression performance.

## Commercial Value of the EPG Concept

- From both engineering and commercial perspectives, EPG technology established a benchmark in advanced clean agent fire suppression, positioning the system as a high-performance engineered solution for demanding applications. The EPG approach enhanced the value of HFC-227ea systems by delivering superior long-distance agent transport capability, reliable protection for large and complex hazards, and premium hydraulic performance across extended piping networks.
- This innovative concept proved especially beneficial in projects where installation flexibility and infrastructure optimization were critical, including applications with limited storage space and facilities where cylinder banks could not be located adjacent to the protected hazard.



**Table No.2, System design limitation summary,**

System limits	SPG	EPG
Minimum design concentration, Class A (Class C):	6.78% (7.63%)	6.7% (7.23%)
Minimum design concentration, Class B:	9.46%	8.97%
Maximum design concentration for occupied enclosure:	10.5%	
Extinguishing agent discharge time:	6 - 10 seconds (FM Approved discharge time for SPG is 9 sec.)	
Filling range of extinguishing agent cylinder:	495 kg/m <sup>3</sup> -955 kg/m <sup>3</sup> (63 L, 89 L, 115.4 L, 175 L)	
Agent flow rate in pipe and manifold:	Depending on pipe size. Refer to Table 3	
Minimum pressure at discharge nozzle:	360° type : 9.17 bar / 180° type : 8.34 bar	
Maximum nozzle discharge radius, 360° nozzle:	8.9 m	
Maximum nozzle discharge radius, 180° nozzle:	14.1 m	
Nozzle installation height:	0.3 m - 4.5 m	
Maximum pressure deviation between discharge nozzles:	6.0 bar	4.5 bar
Deviation of maximum arrival time of extinguishing agent to discharge nozzle:	1.0 second	0.9 second
Deviation of maximum ending time of extinguishing agent discharge between discharge nozzles:	2.0 seconds	1.5 second
Discharge nozzle orifice area:	25% - 70% (Ratio of nozzle orifice area to pipe area)	
Maximum percent agent in pipe (volume ratio of extinguishing agent vs pipe volume):	106%	326%
Percent of agent volume in pipe to first tee:	Minimum 5.9%	62% lower than total percent agent in pipe
Length of pipe before and after tee split:	Minimum of 10D (D is the outside diameter of pipe)	
Tee flow split, Bull head tee:	50% : 50% - 25% : 75%	
Tee flow split, Side tee:	35% : 65% - 10% : 90%	
Tee split in the selection valve outlet:	Horizontal tee split	
Maximum pipe size of manifold:	150A	
Operating temperature:	0°C - 55°C	

**Table No.3, Agent flow ranges**

Pipe Nominal Size	Flow Rate (kg/s) Min. - Max.	Flow Rate at Manifold(kg/s) Min. - Max.
15A	0.32 - 1.36	-
20A	0.91 - 2.50	-
25A	1.54 - 3.86	0.92 - 3.86
32A	2.63 - 5.67	1.58 - 5.67
40A	3.81 - 9.07	2.29 - 9.07
50A	5.90 -13.61	3.59 -13.61
65A	8.85 -24.95	5.31 -24.95
80A	14.97 -40.82	8.98 -40.82
100A	26.31 -56.70	15.79 -56.70
125A	43.09 -90.72	25.85 -90.72
150A	57.61 - 136.1	34.57 - 136.1

**BAVARIA<sup>®</sup>**

**GAS SUPPRESSION SYSTEMS**

**BAVARIA UL LISTED**

**CO<sub>2</sub> EXTINGUISHING SYSTEMS**



## ▣ APPLICATIONS:

The system is particularly suited for industrial and mission-critical applications where water-based suppression may damage equipment or prove ineffective. Typical applications include:

- ▣ Transformer and substation rooms,
- ▣ Turbine enclosures,
- ▣ Paint booths and powder coating lines,
- ▣ Flammable liquid storage areas,
- ▣ Engine test cells,
- ▣ Cable tunnels and false floors,
- ▣ Printing machinery,
- ▣ Marine engine rooms,
- ▣ Oil & gas facilities,
- ▣ Chemical processing plants,
- ▣ Electrical switchgear rooms,
- ▣ Industrial machinery spaces,
- ▣ Warehouses and manufacturing plants.



### Suppression Technology

The system is engineered around two proven fire suppression methodologies—

**Total Flooding and Local Application**—allowing the solution to be tailored to the specific hazard and operational environment.

**Total Flooding Systems** are designed for enclosed protected spaces, where Carbon Dioxide rapidly suppresses fire by reducing the oxygen concentration throughout the entire hazard volume to a level that will not sustain combustion.

**Local Application Systems** deliver the extinguishing agent directly onto the identified hazard area, providing targeted fire suppression without the requirement for a fully sealed enclosure.

## ▣ FEATURES

The Bavaria Carbon Dioxide® Extinguishing System is engineered as a robust industrial fire suppression platform designed to deliver high-performance protection for demanding applications. The system combines rapid extinguishing capability with proven reliability, making it an ideal solution for critical industrial hazards. Key technical advantages include:

- ▣ Fast and effective fire knockdown for Class B flammable liquid and energized electrical hazards,
- ▣ Clean gaseous suppression agent that leaves no residue and eliminates post-discharge cleanup concerns,
- ▣ Electrically non-conductive extinguishing medium suitable for sensitive electrical equipment protection,
- ▣ Reliable operation in high-temperature, rugged, and harsh industrial environments,
- ▣ Precision-engineered nozzle technology for controlled and efficient agent distribution,
- ▣ Fully integrated automatic and manual actuation capabilities for enhanced operational flexibility,
- ▣ Modular and scalable cylinder bank configurations to protect both small and large-volume hazards,
- ▣ Seamless compatibility with cross-zoned fire detection and alarm systems,
- ▣ Economical fire protection solution for large industrial enclosures and process areas,
- ▣ Proven dependable performance for unmanned facilities and mission-critical industrial operations.



## GAS SUPPRESSION SYSTEMS

### BAVARIA® CARBON DIOXIDE UL LISTED SYSTEMS

#### Use and Limitations

While Carbon Dioxide systems provide highly effective fire suppression performance, several important operational considerations must be addressed during the system design phase to ensure safe and compliant operation.

- Carbon dioxide reaches extinguishing concentrations that can present a hazard to personnel,
- Occupied spaces require stringent safety measures, controlled evacuation procedures, and restricted access protocols,
- Pre-discharge warning alarms and programmable time delays are mandatory to allow personnel evacuation prior to agent release,
- Enclosure integrity is essential for total flooding applications to maintain the required extinguishing concentration,
- The system is generally not intended for deep-seated Class A combustible hazards without specialized engineering considerations,
- Pressure venting and relief provisions may be necessary during discharge to manage enclosure overpressure,
- All installations must be designed and executed in accordance with NFPA 12 and applicable local regulatory requirements.

For these reasons, Carbon Dioxide fire suppression systems are most commonly specified for normally unoccupied, restricted access, or industrial process hazards where rapid, residue-free fire protection is required.

#### Advantages

From both commercial and engineering perspectives, Bavaria Carbon Dioxide® Extinguishing System platform delivers a range of competitive advantages that make it a highly effective solution for industrial fire protection applications.

- **High Suppression Efficiency** Carbon dioxide delivers exceptionally rapid flame knockdown performance, particularly in flammable liquid and energized electrical fire scenarios, enabling fast and reliable fire control for critical hazards.
- **Residue-Free Protection** Unlike powder or water-based suppression systems, Carbon dioxide leaves no residue after discharge, helping to minimize equipment contamination, reduce operational downtime, and eliminate costly post-fire cleanup procedures.
- **Economical Protection for Large Hazards** For large industrial enclosures and process areas, Carbon dioxide systems can provide a highly cost-effective alternative to clean agent systems that require significantly larger agent quantities and storage capacities.
- **Long-Term Agent Stability** As a naturally occurring gas, carbon dioxide offers outstanding long-term storage stability with no concerns related to chemical degradation during extended cylinder storage periods.
- **Engineered for Harsh Industrial Environments** The system is ideally suited for demanding industrial applications exposed to heat, vibration, dust, and severe operating conditions, ensuring dependable long-term performance in rugged environments.
- **Flexible and Scalable System Design** The modular cylinder bank configuration allows efficient protection of both single and multiple hazards through centralized storage arrangements, providing greater system flexibility and optimized installation efficiency.

#### Design Features:

1. UL listed and designed according to NFPA12, Standard on Carbon Dioxide Extinguishing Systems
2. Wide selection of cylinder sizes of different nominal charging capacities ranging from 2.0 – 100 Kg (4.4 – 220 lbs)
3. High pressure systems {Operating pressure: 58 bar (850 psi) @ 21°C (70°F)} easily accommodate remote cylinder installation, freeing up valuable space inside the protected enclosure
4. Wide operating temperature range -18°C to 54.4°C (0°F to 130°F)
5. Piping network sized using a hydraulic calculations computer software resulting in reliable results.



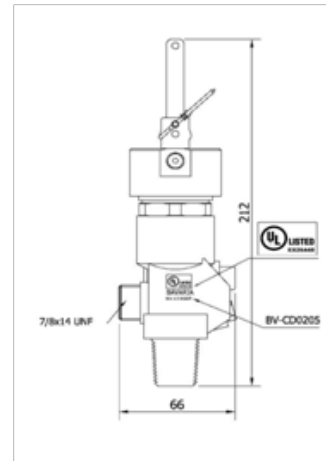
## System Components

### Cylinders

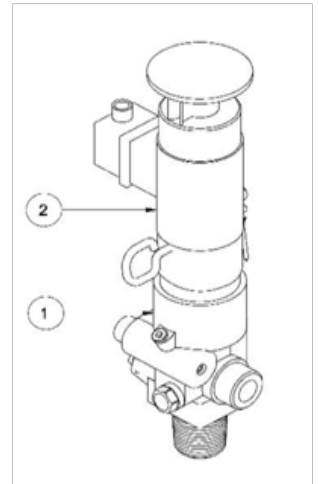
A basic cylinder assembly consists of a pressure vessel, a valve and siphon tube assembly, and a charge of carbon dioxide. A variety of cylinder sizes are available. They are all designed to hold pressurized carbon dioxide in liquid form at atmospheric temperatures, corresponding to a normal pressure of 58 bar (850 psi) @ 21°C (70°F).

### Discharge Valves

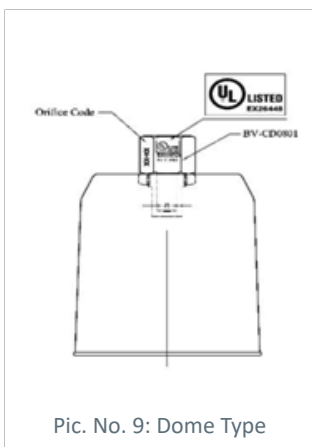
Two types of valves are available for either electric actuation or pneumatic actuation. The electric actuator valve assembly is used for electric actuation using a solenoid valve kit. The solenoid valve is normally closed device, closed when de-energized and open when energized. The solenoid should be connected to a control panel that is powered through a separately fused circuit, and that also incorporates battery backup power. The pneumatic valve assembly is used for pneumatic actuation by supplying a pressure greater than 5 kg/cm<sup>2</sup> to the pneumatic port of the valve. On pressuring the pneumatic port, the piston of the pneumatic actuator releases out in turn mechanically operates the manual lever there by the main valve piston lifts up and the gas is released from the discharge port.



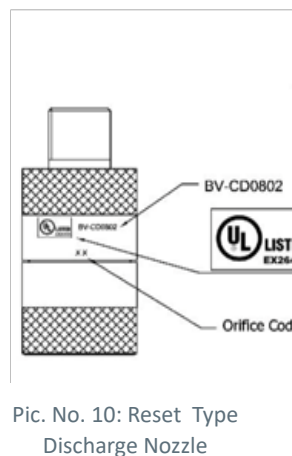
Pic. No. 7: Pneumatic Valve (Slave Valve)



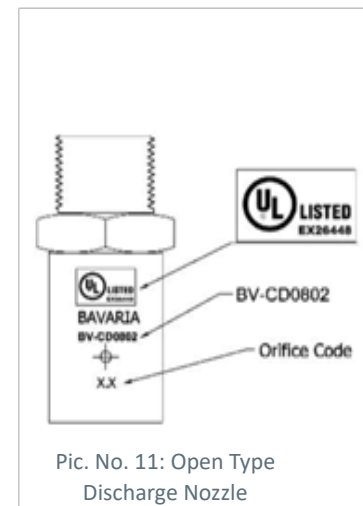
Pic. No. 8: Electric Actuator (Master Valve)



Pic. No. 9: Dome Type Discharge Nozzle



Pic. No. 10: Reset Type Discharge Nozzle



Pic. No. 11: Open Type Discharge Nozzle

### Discharge Nozzles

Three types of discharge nozzles are available: dome, open and reset. All nozzles have a drilled orifice. The nozzle orifice size will vary depending on the flow and the location of the nozzle in the system. It is important that nozzles are installed exactly as specified on the project drawings, otherwise system performance will be jeopardized.

### Piping Network

This network is sized using hydraulic calculations computer software and designed in accordance with NFPA 12, Standard on Carbon Dioxide Extinguishing Systems and engineering, installation and operation manual.



**BAVARIA<sup>®</sup>**

**GAS SUPPRESSION SYSTEMS**

**ISO / VDS / EN COMPLIANT**

**CO2 EXTINGUISHING SYSTEMS**



## ▣ APPLICATIONS:

The Total Flooding Carbon Dioxide System is a proven fire protection solution trusted in mission-critical facilities and demanding industrial environments where rapid fire suppression and asset protection are vital to operational continuity. Engineered for high-performance applications, the system safeguards sensitive equipment, minimizes downtime, and delivers reliable protection across a wide range of hazards, including:

- ▣ Electrical switch rooms and power substations
- ▣ Data centers and mission-critical server rooms
- ▣ Transformer, generator, and turbine enclosures
- ▣ Industrial machinery and process equipment areas
- ▣ Flammable liquid storage and handling facilities
- ▣ Printing, coating, and production operations
- ▣ Dust collection, filtration, and manufacturing plants



## Engineered for Superior Protection. Built to Keep Your Operations Running.

Bavaria Total Flooding Carbon Dioxide System provides fast-acting, dependable, and high-performance fire suppression for mission-critical facilities. Engineered in compliance with globally recognized ISO 6183 and VdS standards, the system delivers efficient total flooding protection for electrical installations, industrial applications, and other high-value assets. Its clean-agent performance leaves no residue, eliminates post-discharge cleanup concerns, and minimizes operational downtime—making it the preferred solution for environments where continuous business operation is vital..

## ▣ WHAT MAKES BAVARIA TOTAL FLOODING CARBON DIOXIDE SYSTEMS THE SMART CHOICE FOR FIRE PROTECTION?

- ▣ Rapid and highly effective suppression of Class A, B, and C fire hazards
- ▣ Clean-agent performance with no residue, no post-fire cleanup, and no harm to sensitive equipment
- ▣ Electrically non-conductive extinguishing agent ideal for energized and critical electrical environments
- ▣ Space-efficient cylinder storage design for optimized facility utilization
- ▣ Dependable automatic, pneumatic, and manual actuation configurations for enhanced operational flexibility
- ▣ Flexible and scalable system architecture for both single-zone and multi-zone protection applications
- ▣ Engineered to perform reliably in demanding industrial and commercial environments
- ▣ Designed and manufactured in compliance with internationally recognized ISO 6183 and VdS standards



## GAS SUPPRESSION SYSTEMS

**BAVARIA<sup>®</sup>** CARBON DIOXIDE ISO / VDS / EN COMPLIANT

### FAST & EFFECTIVE SUPPRESSION



Rapid and effective suppression of Class A, B, and C fires.

### CLEAN AGENT PERFORMANCE



No residue, no cleanup, and no damage to sensitive equipment.

### ELECTRICALLY NON-CONDUCTIVE



Electrically non-conductive agent ideal for energized and critical electrical environments.

### COMPACT STORAGE FOOTPRINT



Space-efficient cylinder storage design for optimized facility utilization.

### FLEXIBLE ACTUATION OPTIONS



Reliable automatic, pneumatic, and manual actuation configurations.

### SCALABLE SYSTEM ARCHITECTURE



Flexible and scalable system architecture for both single-zone and multi-zone protection.

### BUILT FOR DEMANDING ENVIRONMENTS



Engineered to perform reliably in demanding industrial and commercial environments.

### COMPLIANT BY DESIGN



Designed and manufactured in compliance with internationally recognized ISO 6193 and VdS standards.

## Advanced Features & Engineered Performance Excellence

The BAVARIA CO<sub>2</sub> platform combines premium-grade components with advanced engineering to deliver exceptional durability, operational reliability, and long-term fire protection performance. Designed for demanding industrial and commercial environments, the system integrates high-pressure storage technology, precision discharge devices, intelligent actuation controls, and advanced flow management components to ensure fast, consistent, and efficient extinguishing performance when it matters most.

- High-pressure seamless cylinders charged to 58.6 bar for dependable agent storage
- 24VDC solenoid actuators with supervised circuitry for enhanced system reliability
- Precision-engineered 180° and 360° discharge nozzle configurations for optimized agent distribution
- Advanced selector valves enabling efficient multi-zone protection
- Integrated pressure monitoring and discharge indication devices for real-time system status awareness



## Technical Specifications at a Glance

Parameter	Specification
Agent Type	Carbon Dioxide (CO <sub>2</sub> )
Operating Pressure	58.6 bar @ 21°C
Operating Temperature	-20°C to +50°C
Cylinder Capacities	67.5L
Actuation Methods	Electrical, Pneumatic, Manual
Standards	ISO 6183, VdS
Protection Types	Total Flooding

## Protecting Your Critical Assets with Confidence

From mission-critical electrical infrastructure to demanding industrial operations, the Bavaria Total Flooding Carbon Dioxide System delivers reliable fire protection when response time is critical. Combining rapid discharge capability, clean-agent suppression performance, and a flexible system architecture, it has become a trusted solution for consultants, contractors, and facility owners across the globe.

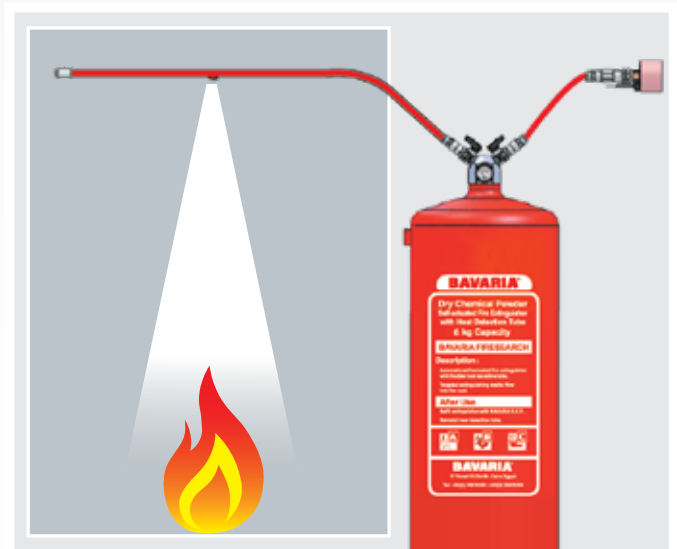
Select a fire protection solution engineered to enhance safety, support operational continuity, and deliver lasting confidence in your fire protection strategy



**Extinguish Fires Where They Started IN SECONDS**



**Indirect Pressure Operated System**



**Direct Pressure Operated System**

## ▣ APPLICATIONS:

The BAVARIA FIRESEARCH is the new innovation technology designed with automatic tube sensor, it can work with dry chemical powder or Carbon Dioxide, specifically for protecting inaccessible areas or enclosures which are difficult to access, such as control panels, power panels computer, servers room, main machinery rooms, generators. And is also suitable for protecting cars, buses, boats, ships and fits for use within commercial buildings, industrial plants, residential and fuel station and others.



## ▣ FEATURES

- ▣ Ideal for any application where a potential fire risk is present within an enclosed or confined space by extinguishing fire at its very incipient stage with minimal damage.
- ▣ Firesearch automatic fire extinguishing system do not need any external source of energy or electric supply.
- ▣ Cost effective as no electrical installation or wiring is required
- ▣ Can be interfaced with an alarm device or system via pressure switch
- ▣ Extinguish Fires Where They Started .... IN 15 SECONDS
- ▣ Detection tube considers all points of an infinite number of sensors and nozzles
- ▣ Available in two systems: Direct Pressure Firesearch and Indirect Pressure Firesearch Systems, with dry chemical powder or Carbon Dioxide



## PRE-ENGINEERED LOCAL APPLICATION AUTOMATIC SUPPRESSION SYSTEMS:

**BAVARIA®** FIRESEARCH ILP DRY CHEMICAL POWDER/ DHP CO2/ DLP FK-5-1-12 (HFC227ea)



### Theory:

- Specially designed for protecting inaccessible areas or enclosures such as: vehicles, control panels, storage racks and machinery rooms.
- Firesearch sensor tube made of flexible engineering polymer material, considers all points of an infinite number of sensors and nozzles.
- Automatically actuated upon bursting of the tube at any point along its length due to temperature rise upto 100°C
- Equipped with a special pressure regulator valve innovative to work automatically when the pressure leak from the tube through any hole.
- Available in two systems: Direct Pressure Firesearch and Indirect Pressure Firesearch Systems.

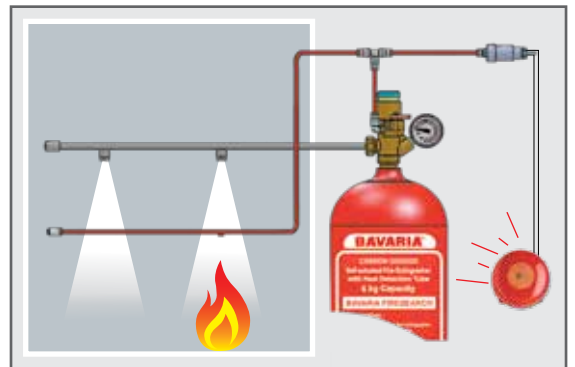
### 1. Direct Pressure Operated System

BAVARIA FIRESEARCH direct pressure operated system uses the firesearch tube as both "Detection Device" a sensor to detect the fire start, and "Extinguishing Agent Delivery System", firesearch tube considers all its points of an infinite number of sensors and nozzles. As the fire starts, the firesearch tube is detected ruptures, forming as an effective nozzle. The pressure will drop releases the cylinder Carbon Dioxide through the effective nozzle to effectively suppress the fire, which allows the fastest extinguishing time and minimum spread of the fire. As an Option the Firesearch system can linked with a siren alarm operated with battery.



### 2. Indirect Pressure Operated System

BAVARIA FIRESEARCH indirect pressure operated system uses the firesearch tube as a "Detection Device" a sensor to detect the fire start only, not as the discharge tube, and "System Activation Device". As the fire starts the firesearch tube ruptures making drop of pressure, effect to active the indirect valve, then causing the Carbon Dioxide is discharged from the cylinder through the diffuser nozzles, which allows the fastest extinguishing time and minimum spread of the fire. As an Option the Firesearch system can linked with a siren alarm operated battery.



## Discontinue Fires Where They Started . . . . . IN SECONDS



**5 SECONDS**  
small fire begins



**10 SECONDS**  
tubing ruptures, releasing gas,  
extinguishing fire



**15 SECONDS**  
the fire is out



## Designed for protecting ....



Engine



Escalators



Server Rooms



Control Panels



Boats and ships



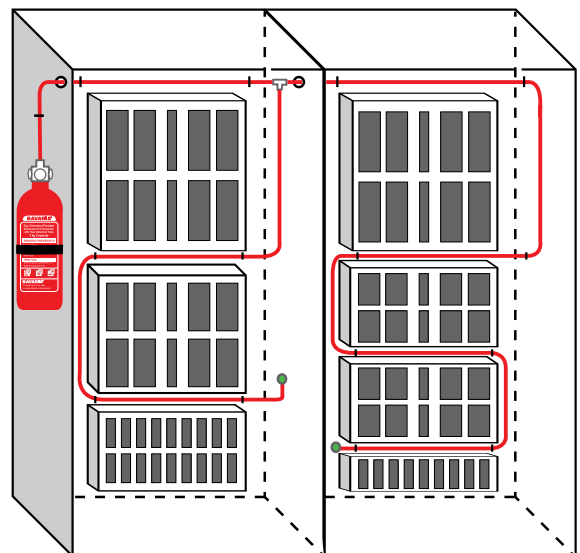
Buses



Flammable liquids

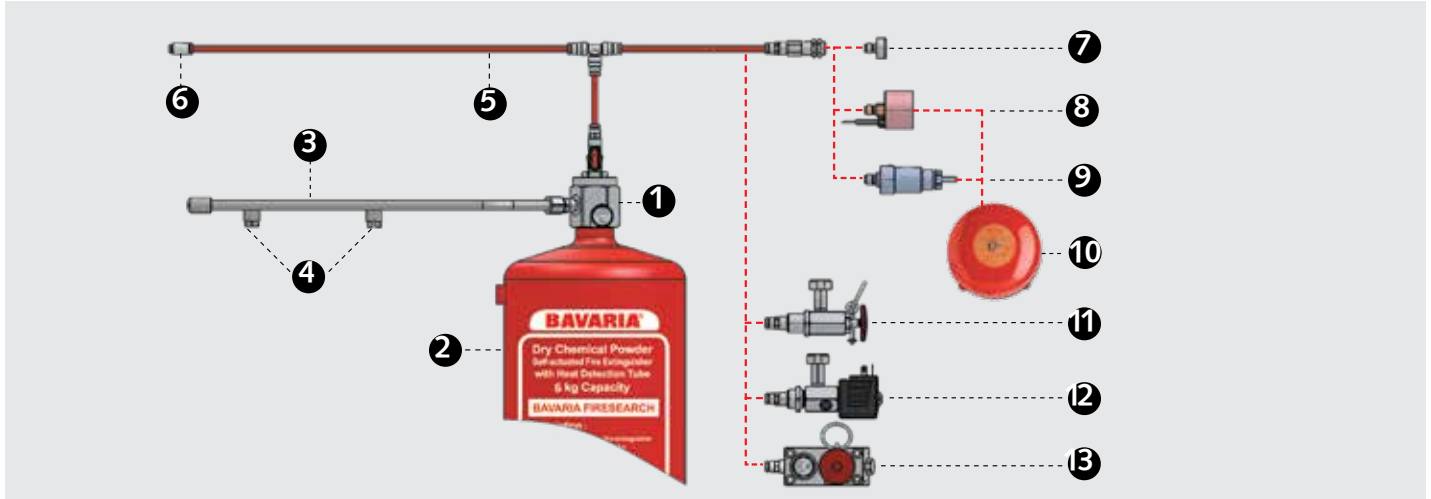


Gasoline Station



## PRE-ENGINEERED LOCAL APPLICATION AUTOMATIC SUPPRESSION SYSTEMS: BAVARIA® FIRESEARCH ILP DRY CHEMICAL POWDER

### Indirect Operated Low Pressure System Dry Chemical Powder (Fig 1)



#### System's Components:

- |                             |  |                                   |
|-----------------------------|--|-----------------------------------|
| 1. Head valve               | 5. Flexible detection tube               | 9. Pressure switch                |
| 2. Extinguishing vessel     | 6. Flexible detection tube               | 10. Alarm siren                   |
| 3. Steel piping network     | 7. End of line with manometer            | 11. Manual release with manometer |
| 4. Special diffuser nozzles | 8. Pressure gauge with electrical switch | 12. Solenoid release              |
|                             |  | 13. Manual release                |

#### Head Valve Features:

- European Standard EN ISO 10297:2006 Certified
- Chrome-plated brass valve and internal parts for longer serviceability, available in two head-outlets or one outlet to the flexible sensor tube.

#### Extinguishing Cylinder Features:

- Full chrome-plated brass valve and internal parts for longer serviceability, with two firesearch tubes outlets.
- Equipped with a pressure gauge for instant pressure indication
- Electricity and corrosion-proof protective base
- High quality surface treatment and red polyester coating
- Supplied with a special hanging wall bracket
- Affords highest extinguishing efficiency due to its special multipurpose BAVARIA dry chemical powder



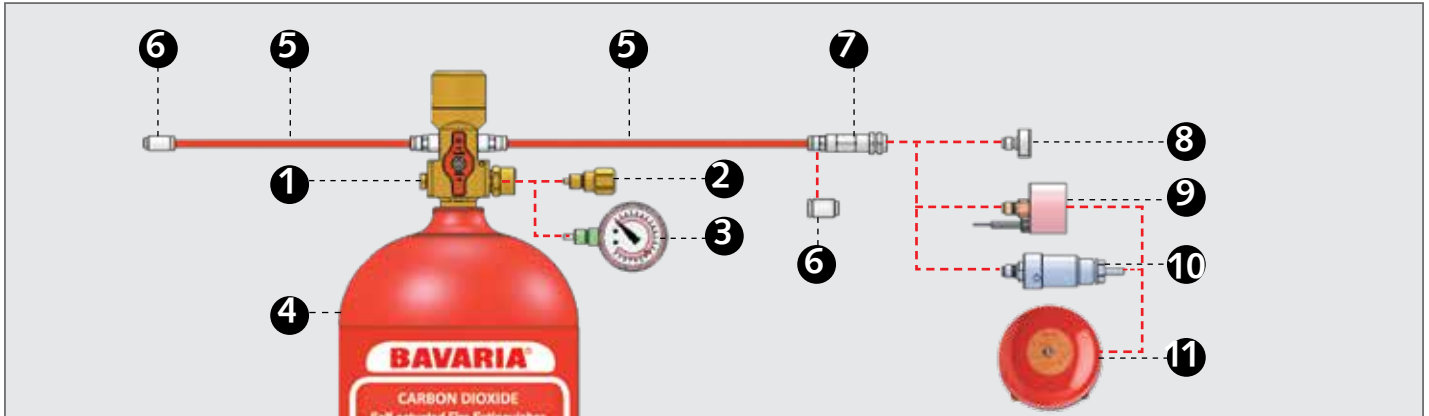
#### Data Specifications: BAVARIA FIRESEARCH ILP (Indirect low Pressure)

System Type	BAVARIA FIRESEARCH (Indirect low Pressure System)	
Capacity	6 kg	12 kg
Test Pressure	35 bar	
Cylinder Bursting Pressure	Over 70 bar	
Operating Head	Chrome-plated brass valve	
Discharge Fittings	Piping net which ends with special nozzle	
Shell Material	Steel according to DIN EN 10130 and ES 1110	
Tube Bursting Temp. at 8 bar	100 °C (± 5 °C)	
Extinguishing Agent	MAP-based	
Paint Finish	Surface treatment and 100% polyester coating	
Option at Extra Cost	Items 8, 9, 10, 11, 12 and 13 (See Fig 1)	



PRE-ENGINEERED LOCAL APPLICATION AUTOMATIC SUPPRESSION SYSTEMS:  
**BAVARIA®** FIRESEARCH DHP CO2

**Direct Operated High Pressure System Carbon Dioxide (Fig 2)**



**System's Components:**

- |  |  |  |
|--|--|--|
| 1. Head valve (valve with pressure controller for low pressure detection tube) | 6. End of line   | 10. Pressure switch (to link with siren alarm) |
| 2. Filling gas enclosure   | 7. End of line (to add options)                          | 11. Alarm siren                                |
| 3. Pressure gauge  | 8. Manometer   |  |
| 4. CO2 Cylinder  | 9. Pressure gauge with switch (to link with siren alarm) |  |
| 5. Firesearch flexible detection tube (low                                     |  |  |

**Head Valve Features:**

- European Standard EN ISO 10297:2006 Certified
- VdS Recognition Listing – German Insurance Union
- Brass valve and internal parts for longer serviceability

**CO2 Cylinder Features:**

- TÜV Approved Pressure Vessel
- Awarded the European ( CE ) mark
- Carbon dioxide is a clean agent that leaves no traces, thus ideal for fighting fires involving electronic, hi-tech equipment and flammable liquids.
- Available in various capacities (2, 6 and 10) kg to cover all applications and purposes.
- High quality surface treatment with red polyester coating



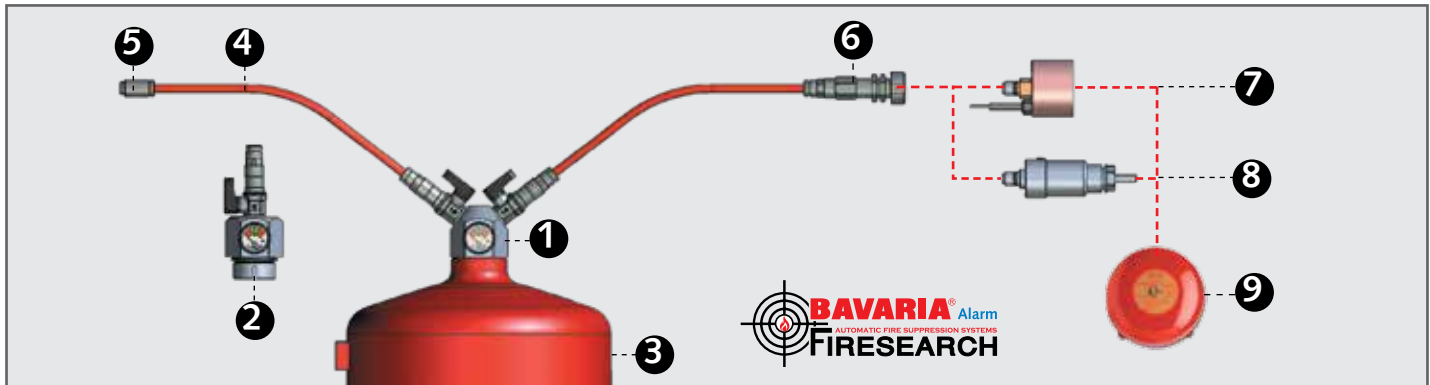
**Data Specifications: BAVARIA Alarm FIRESEARCH Carbon Dioxide**

System	DHP (Direct High Pressure system)		
Capacity	2 kg	6 kg	10 kg
Fire Classes	BE		
Cylinder Test Pressure	250 bar		
Cylinder Bursting Pressure	Over 450 bar		
Operating Head	Brass valve with overpressure safety valve		
Discharge Fittings	Firesearch polymer flexible tube with several lengths		
Tube Bursting Temp. at 8 bar	100 °C (± 5 °C)		
Extinguishing Agent	CO <sub>2</sub> gas		
Shell Material	Seamless steel cylinder		
Paint Finish	Surface treatment and 100% polyester coating		
Option at Extra Cost	Items 3, 9, 10 and 11 (See Fig 2)		

## PRE-ENGINEERED LOCAL APPLICATION AUTOMATIC SUPPRESSION SYSTEMS:

### BAVARIA® FIRESEARCH DLP FK-5-1-12 (HFC227ea)

#### Direct Operated Low Pressure System Fk-5-1-12 (Fig 3)



#### System's Components:

1. Head valve with two lines
2. Head valve with one line
3. Extinguishing vessel
4. Flexible Firesearch detection tube
5. End of line
6. End of line with manometer
7. Pressure gauge with electrical switch
8. Pressure switch
9. Alarm siren

#### Head Valve Features:

- European Standard EN ISO 10297:2006 Certified
- Chrome-plated brass valve and internal parts for longer serviceability, available in two head-outlets or one outlet to the flexible sensor tube.

#### Extinguishing Cylinder Features:

- Full chrome-plated brass valve and internal parts for longer serviceability, with two firesearch tubes outlets.
- Equipped with a pressure gauge for instant pressure indication
- Electricity and corrosion-proof protective base
- High quality surface treatment and red polyester coating
- Supplied with a special hanging wall bracket



#### Data Specifications: BAVARIA FIRESEARCH DLP (Direct low Pressure)

System Type	BAVARIA FIRESEARCH DLP ( Direct low Pressure )		
Capacity	2 kg	4 kg	6 kg
Test Pressure	35 bar		
Cylinder Bursting Pressure	Over 70 bar		
Operating Head	Chrome-plated brass valve		
Discharge Tube	Firesearch polymer flexible tube with several lengths		
Shell Material	Steel according to DIN EN 10130 and ES 1110		
Tube Bursting Temp. at 8 bar	100 °C (± 5 °C)		
Extinguishing Agent	Fk-5-1-12		
Paint Finish	Surface treatment and 100% polyester coating		
Option at Extra Cost	Items 7,8 and 9 (See Fig 3)		



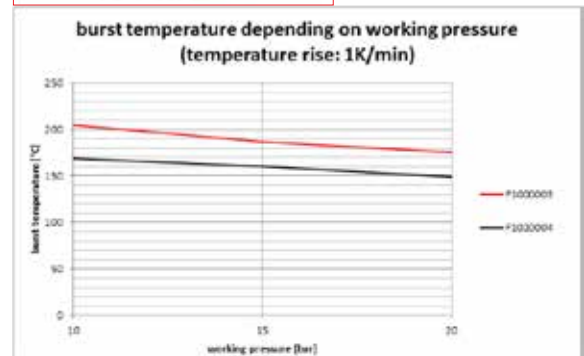
## AUTOMATIC FIRE SUPPRESSION SYSTEM

**BAVARIA**® FIRESEARCH CARBON DIOXIDE / DRY CHEMICAL POWDER

### Heat Detection Tubing Automatic Fire Suppression System

#### Features:

- enables linear Monitoring and Detection
- flexible Installation in the Hazard Area
- suitable for all BAVARIA - Plug-In-Connectors - Quick and Easy Installation
- low Susceptibility / high Reliability
- meets the Requirements of ISO16750-3:2007 for Road Vehicles in conjunction with the BAVARIA Plug-In Connectors
- Approval: UL-recognized



#### Data Specifications: Heat Detection Tubing

System	BAVARIA Hollow-point	BAVARIA Black mamba
Cylinder Test Pressure	red (RAL3000)	Multi-Layer Tube Black
Cylinder Bursting Pressure	Optimal temperature for long-term use is -40°C to +80°C (higher Temperatures can lead to a Reduction in Service Life) / Steady Load to max. +80°C has been tested. The lowest Operating. Temperature is stipulated at minus 40°C.	
Life Time	Best of our Knowledge and Experience we can contemplate that the Life Time of minimum 8 years can be expected considering Normal Environmental Conditions without any harsh Influences and without contact of aggressive Media	
UV	/	UV-stabilized
Dimensions	outer Ø6mm	outer Ø6mm
Tube Length	100m (per roll)	
Material	modified Polyamide (PA)	
Melting Point	approx. +220 degrees Celsius when heating up with 10 K/minute	
Operating Pressure	recommended between 11bar and 23bar within the whole Temperature Range. optimal Filling Pressure: 18bar, depending on Existing Safety Devices	
Burst Pressure	approx. 120 bar @ 20°C (without Flame Impingement)	
Bursting Temperature	Depending on System Pressure and Temperature Rise in K/min	
Product approval	UL-approved	UL-approved and tested for long-term use

# BAVARIA®

SELF CONTAINED AUTOMATIC  
EXTINGUISHER UNITS  
CELLGUARD FK-12-1-5



## ▣ APPLICATIONS:

Automatic Fire suppression for Electrical panels is vital due to the high risk of potential fire. Not only it is critical function of the electrical cabinet compromised in a fire scenario which could spread to surrounding equipment causing devastating fire.

If the Electrical room is already equipped with fire suppression system, our BCG can reduce replacement cost of suppression system when fire occurs. If the room is not equipped with fire suppression system, BCG is the best solution to protect your valuable assets.

Environmental test chambers are systems that allow users to manipulate the environmental conditions of an enclosed space to run controlled tests on a subject. Researchers, engineers, scientists, and manufacturers utilize these conditions to push innovation and ensure whatever products they produce are safe for use. The most common concern involved during the environmental testing is the release of flammable gases causing a fire. In case this situation occurs, BCG can help suppress the fire almost immediately and stop the spread



## ▪ EXTINGUISHING AGENT

- Surfaces a fire in ordinary combustible material, such as the surface of the wood, cloth, paper, rubber and many plastics.
- A fire in flammable liquids, combustible liquids, petroleum greases, tars, oils oil-based paints, solvents, lacquers, alcohols and flammable gases.
- A fire that involves energized electrical equipment (When used for the Class C purpose, additional fire detection and signaling system is required) UL Listed Heat Detection wire is recommended.

## ▪ FEATURES

- BAVARIA CellGuard is a 5 layered device that provides
- strong gas barrier properties and optimal activation temperature.
- The tube uses PE-type resin for detecting fire promptly and releasing extinguishing agent smoothly.
- The tube detects fire before temperatures rise to 120 due to abnormal heat generation of Electrical equipment including wires and batteries and releases extinguishing agent quickly.



## SELF CONTAINED AUTOMATIC EXTINGUISHER UNITS

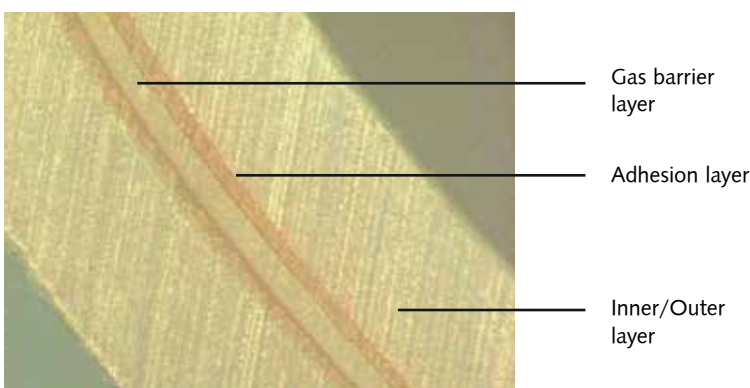
### BAVARIA® CELLGUARD FK-12-1-5

#### PRODUCT OVERVIEW

1. It is a pre-engineered total flooding extinguisher unit designed to protect enclosures less than 1m<sup>3</sup>. When the temperature in the protected enclosure rises to the critical threshold the polymeric tube discharges the fire fighting agent into the enclosure through a ruptured nozzle hole and suppress the fire automatically.
2. BAVARIA CellGuard Tube Device is a stand alone device, flexible and easy to install even in a difficult place to access.
3. No cylinder and power source required to activate the device. It is reliable even in case of a power outage.
4. It is specially suitable for the electrical panel fire that first responder cannot access quickly.
5. The tube detects fire before temperature rises to 120°C.
6. The tube activates at 107°C to 115°C at ambient temperature.
7. It uses a PE-type resin for detecting fire and releasing fire extinguishing agent quickly. A resin layer specializing in barrier.
8. properties is provided to block the permeation and reduction in weight of fire extinguishing agent.
9. The device uses a FK-5-1-12 - Its human and eco friendly fire extinguishing agent and it also does not influence equipment due to its superior electrical insulation properties.



#### BAVARIA CellGuard TUBE COMPONENTS AND FEATURES



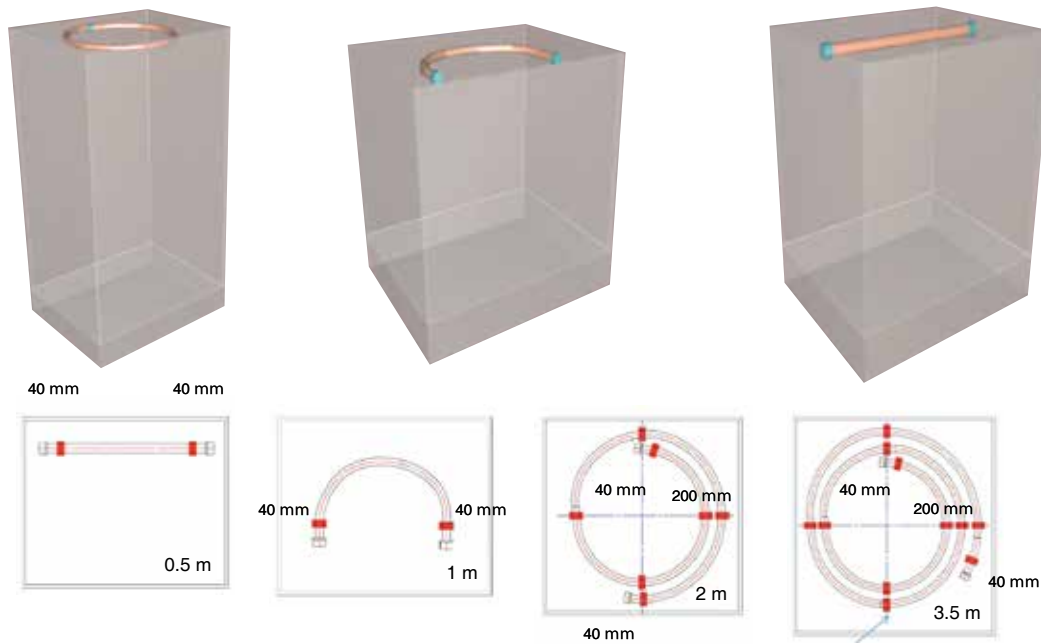
BAVARIA CellGuard FK-12-1-5 is a 5 layered device that provides strong gas barrier properties and optimal activation temperature.

The tube uses PE-type resin for detecting fire promptly and releasing extinguishing agent smoothly.

The tube detects fire before temperatures rise to 120 due to abnormal heat generation of Electrical equipment including wires and batteries and releases extinguishing agent quickly.



## TYPICAL INSTALLATION LAYOUT OF BAVARIA CELLGUARD



Note: Every section of BCG tubing must maintain a min. 50 mm distance from each wall of the enclosure. The distance between coils is 40 mm.

## PROTECTED VOLUME TABLE

	0.5 m	1 m	2 m	3.5 m
Length	0.5 m	1 m	2 m	3.5 m
Part number	BCG-05UL		BCG-20U L	BCG-35UL
Weight	Approx. 0.42 kg	Approx. 0.55 kg	Approx. 0.84 kg	Approx. 0.74 kg
FK-5-1-12	0.11 kg	0.21 kg	0.42 kg	0.74 kg
Protected volume/ Height	0.12 m <sup>3</sup> 0.5 m (Max. H.) 0.3 m (Min. H.)	0.23 m <sup>3</sup> 1.0 m (Max. H.) 0.5 m (Min. H.)	0.45 m <sup>3</sup> 1.5 m (Max. H.) 0.6 m (Min. H.)	0.8 m <sup>3</sup> 2.3 m (Max. H.) 0.8 m (Min. H.)
Mounting clip				
Magnetic mounting clip (Option)				

Note:

□ CELLGUARD designed as independent operating unit.

It is not possible to install multiple units into one enclosure unless each unit has enough agent quantity to extinguish the enclosure alone.

□ This automatic extinguisher unit has been tested and all limitations have been pre-established based on UL 2166P.

If the specified limitations are not followed, the unit might not supply the required quantity of the extinguishing agent which might result in a fire not being extinguished.

## SELF CONTAINED AUTOMATIC EXTINGUISHER UNITS

### BAVARIA® CELLGUARD FK-12-1-5

#### COMPARISON OF GAS PERMEABILITY

	Nitrogen	Oxygen	Carbon dioxide	Helium
	25°C	25°C	25°C	25°C
ERASE TUBE (Polythylene)	0.017	0.27	0.081	160
Polyamide 6 (Stretched)	12	38	205	2000

#### CHEMICAL RESISTANCE

##### □ Gas resistance

Ammonia	Applicable
Carbon dioxide gas	Applicable
Chlorine (Dry)	Partially applicable
Chlorine (Wet)	Partially applicable
Hydrogen	Applicable
Natural gas	Applicable
Nitrogen	Applicable
Oxygen	Applicable
Ozone	Partially applicable
Water vapor (L) at <150°C	Partially applicable
Water vapor (L) at <150°C or higher	Not applicable
Sulfurous acid gas	Applicable

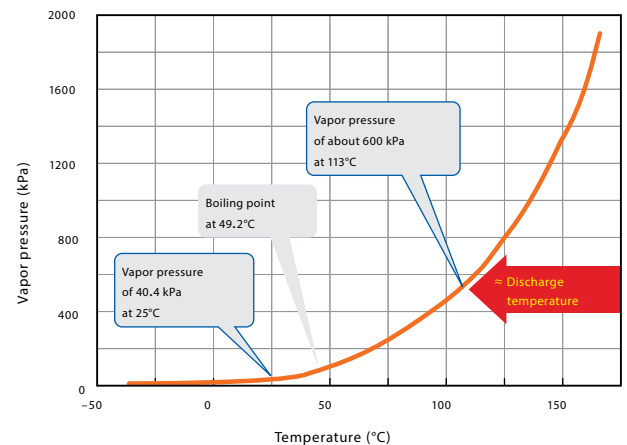
##### □ Oil resistance

Liquefied petroleum gas	Applicable
Benzine	Partially applicable
Gasoline	Applicable
Kerosene	Not applicable
Petroleum	Partially applicable
Lubricant	Partially applicable
Grease	Partially applicable
Animal oil	Applicable

#### FK-5-1-12

The extinguishing agent increased with the vapor pressure in case of abnormal heat generation and released by utilizing the pressure of its own without requiring power source.

FK-5-1-12 fluid is low in acute toxicity and is a highly efficient clean agent extinguishant, so that it puts out fire long before the agent reached concentrations that could harm humans. In fact, because its design concentration is much lower than it's No Observable Adverse Effects Level (NOAEL). FK-5-1-12 fluid offers the largest margin of safety amongst all other chemical clean agents, CO2 and inert gas mixtures.





## Electrical insulation properties

A cellphone and a circuit board are submerged into a tank of clean agent. It clearly shows that the Electrical insulation properties of the clean agent has a superior properties, thereby giving no influence to the electronic equipments. Its withstand voltage of 2.3 comparing to 1.0 of N<sub>2</sub> at 1 atm.





**BAVARIA<sup>®</sup>**

**ADVANCED WATER-BASED  
FIRE PROTECTION TECHNOLOGIES**



▣ COMPLETE FIRE PROTECTION  
SOLUTIONS FOR COMMERCIAL,  
INDUSTRIAL, AND HIGH-RISK  
APPLICATIONS

Modern facilities demand fire protection systems that combine rapid response, operational reliability, and engineered performance. As a trusted supplier and contractor of world-class firefighting products, Bavaria provide advanced water-based fire protection technologies designed to protect people, property, and critical operations across a wide range of applications.

From commercial buildings and logistics warehouses to power infrastructure and mission-critical facilities, our engineered solutions deliver dependable protection tailored to every hazard.

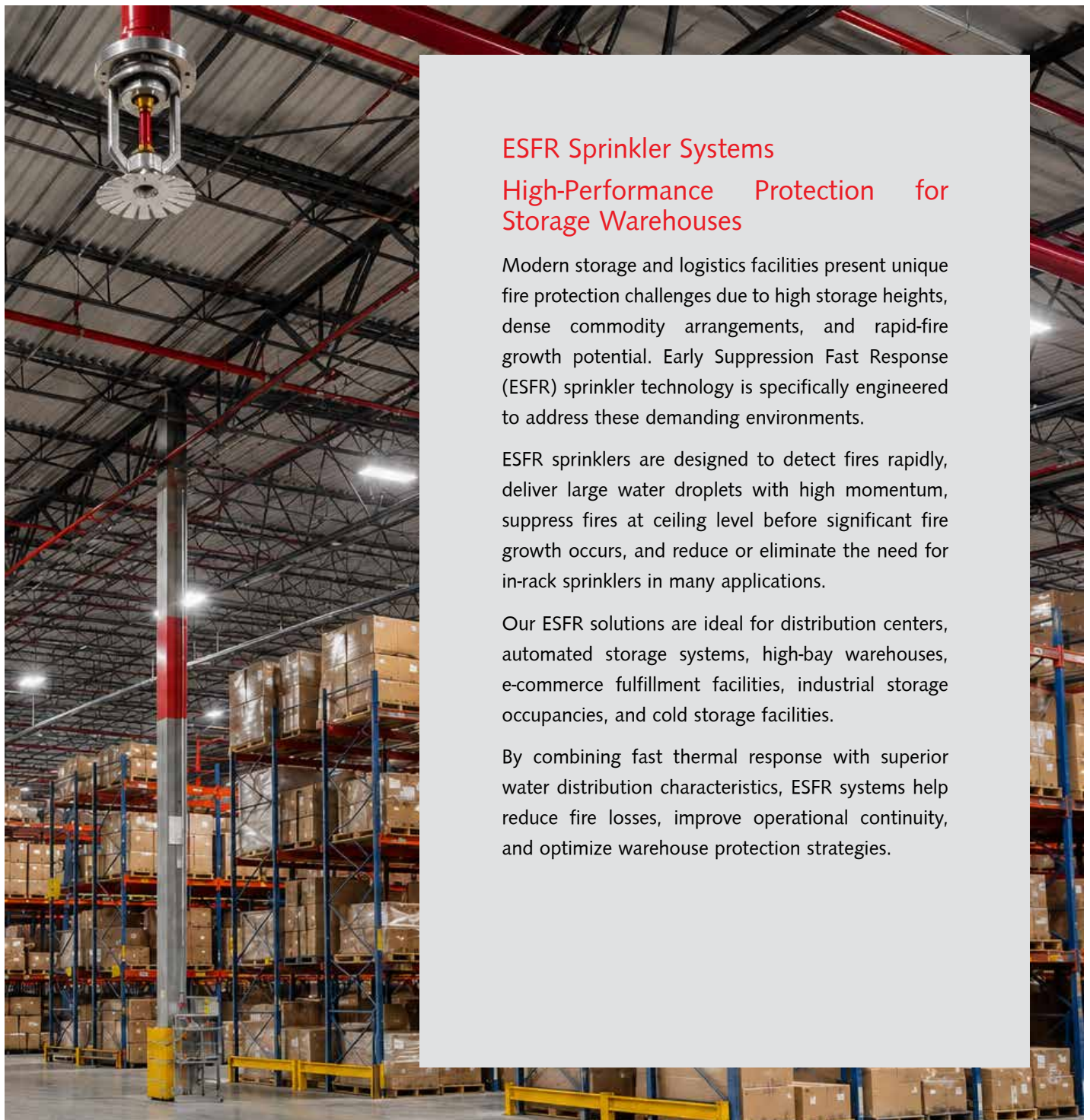


## Commercial Sprinkler Systems Reliable Protection for Everyday Occupancies

Automatic sprinkler systems remain the cornerstone of modern fire protection in commercial buildings. Designed to detect and suppress fires at their earliest stages, sprinkler systems provide fast, efficient, and automatic response that minimizes property damage and enhances occupant safety.

Our commercial sprinkler solutions are suitable for office buildings, shopping malls, hotels and hospitality facilities, educational institutions, healthcare facilities, residential towers, and mixed-use developments. We supply and install a complete range of standard spray sprinklers, quick response sprinklers, concealed sprinklers, sidewall sprinklers, corrosion-resistant sprinklers, and specialty application sprinklers.

Engineered in accordance with international standards, our systems deliver reliable hydraulic performance, flexible installation options, and long-term operational dependability.



### ESFR Sprinkler Systems

#### High-Performance Protection for Storage Warehouses

Modern storage and logistics facilities present unique fire protection challenges due to high storage heights, dense commodity arrangements, and rapid-fire growth potential. Early Suppression Fast Response (ESFR) sprinkler technology is specifically engineered to address these demanding environments.

ESFR sprinklers are designed to detect fires rapidly, deliver large water droplets with high momentum, suppress fires at ceiling level before significant fire growth occurs, and reduce or eliminate the need for in-rack sprinklers in many applications.

Our ESFR solutions are ideal for distribution centers, automated storage systems, high-bay warehouses, e-commerce fulfillment facilities, industrial storage occupancies, and cold storage facilities.

By combining fast thermal response with superior water distribution characteristics, ESFR systems help reduce fire losses, improve operational continuity, and optimize warehouse protection strategies.



## Water Spray Systems Specialized Protection for Transformers & Tunnels Applications

Certain hazards require directional water application capable of controlling heat exposure, cooling equipment surfaces, and preventing fire escalation. Water spray systems are specifically engineered for these critical applications.

### Transformer Protection

Power transformers contain significant quantities of flammable insulating oil, creating substantial fire risk in utility and industrial installations. Our water spray systems provide rapid cooling and fire control designed to limit fire spread, cool exposed surfaces, reduce radiant heat exposure, protect adjacent equipment, and support operational continuity.

These systems are widely used in electrical substations, power generation facilities, industrial utility areas, and renewable energy



### Tunnel Fire Protection

Tunnel environments demand highly reliable fire protection systems capable of operating under severe conditions. Water spray technologies help mitigate tunnel fire incidents by controlling fire growth, reducing heat release rates, improving evacuation conditions, limiting structural damage, and enhancing firefighter intervention.

Our tunnel protection solutions are engineered for road tunnels, rail tunnels, service tunnels, and critical infrastructure projects.

## Pre-Action Fire Protection Systems Intelligent Protection for Valuable Assets

Pre-action systems provide advanced fire protection where accidental water discharge must be avoided while maintaining rapid fire response capability. These systems combine detection technology with sprinkler protection to deliver enhanced security for sensitive environments.

Pre-action systems are widely used to protect data centers, server rooms, telecommunication facilities, museums and archives, libraries, control rooms, clean rooms, and critical electrical installations.

Key advantages include reduced risk of accidental discharge, enhanced protection against false activation, integrated fire detection and suppression, fast response to confirmed fire events, and protection of high-value and mission-critical assets.

Our engineered pre-action solutions combine intelligent control systems, reliable detection technologies, and high-performance valves to ensure maximum operational confidence.





## Deluge Systems Maximum Fire Protection for High-Challenge Hazards

Deluge systems are designed for environments where rapid fire development requires immediate large-scale water application. Unlike conventional sprinkler systems, deluge systems discharge water simultaneously through all open nozzles upon system activation, providing aggressive fire control and exposure protection.

These systems are ideal for petrochemical facilities, aircraft hangars, loading racks, power generation plants, fuel storage areas, chemical processing facilities, industrial hazards, and offshore and energy applications.

Deluge technology provides rapid area-wide water application, exposure cooling, fire containment, equipment protection, and enhanced hazard control.

Our solutions include advanced deluge valves, releasing panels, detection systems, foam integration options, and specialized water discharge devices designed for the most demanding fire protection challenges.

### BAVARIA Your Trusted Fire Protection Partner

We represent leading international manufacturers of firefighting equipment such as Tyco and Weflo, delivering fully integrated solutions backed by technical expertise, engineering support, and industry experience.

Our services include system design and engineering, product supply, installation and commissioning, testing and maintenance.

With a commitment to quality, reliability, and innovation, we help protect commercial, industrial, and critical infrastructure projects with proven fire protection technologies designed for performance when it matters most.



# Protecting Lives - Securing Assets - Ensuring Continuity





## **BAVARIA® EGYPT S.A.E**

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