**TECHNICAL SPECIFICATION DOCUMENT FOR AUTOMATIC FIRE EXTINGUISHING SYSTEM FOR FIRE PROTECTION OF COMMERCIAL COOKING EQUIPMENT**

 **(Automatic Kitchen Hood Fire Extinguishing System)**

1. **SUBJECT**

This technical document addresses the technical specifications, inspection methods, and other related aspects of the "Wet Chemical Fire Extinguishing Systems for Protection of Commercial Cooking Equipment" with class F wet chemical, against grease and fat fires occur in the kitchen hoods.

1. **REQUESTS and FEATURES**
	1. **Definitions and Abbreviations**

2.1.1 The "Wet Chemical Fire Extinguishing System" defined in this technical specification will hereinafter be referred to as the "Fire Extinguishing system."

2.1.2 Class F Fire**:** Fires caused by grease and fat (liquid or solid) in any type of frying or cooking appliance.

2.1.3 Wet chemical extinguishing agent: A low pH valued (pH value 80 – 90) wet fire extinguishing agent, potassium salt-based, effective against Class F fire occured by grease and fat (liquid and solid).

2.1.4 UL 300 Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment NFPA 17A Standard for Wet Chemical Extinguishing Systems NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations EN 17446 Fire Extinguishing Systems in Commercial Kitchens – System design, documentation and test requirements

2.1.5 Notified body: Private or public organizations appointed under the framework of the Law No. 4703 on the Preparation and Implementation of Technical Legislation Relating to Products and the Regulation on Notified Bodies and Conformity Assessment Bodies.

2.1.6 Commercial cooking appliance**:** All types of fryers, grills, stoves, vertical cookers, electric – lava stone – synthetic coal – natural wood or natural coal – gas grills, flat grills, chain (conveyor) cookers, pans, boilers, heaters, ovens, and similar commercial cooking equipment, along with hoods with filters and ventilation units equipped with grease collectors.

* 1. **Regulations, Standards, and Compliance Evaluations**

2.2.1 The fire extinguishing system will comply with the requirements of below standarts.

2.2.2 The fire extinguishing system;

* UL 300 Standard for Fire Testing of Fire Extinguishing System for Protection of Commercial Cooking Equipment
* NFPA 17A Standard for Wet Chemical Extinguishing Systems
* NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
* EN 17446 Fire extinguishing systems in commercial kitchens - System design,

documentation, and test requirements

 2.2.3 The fire suppression system's compliance with the standards specified in clause will be certified by a notified body. The certificate of compliance will be submitted to the administration/tender comittee/ purchasing department along with the quotations/ offers.

 2.2.4 The cylinders used in the fire extinguishing system;

 2.2.4.1 Cylinders with a water volume of up to 13 liters will comply with the EN 3 standard and the requirements of the 97/23/EC Pressure Equipment Directive, and will be marked with the “CE” symbol by cold stamping. Declarations of conformity and copies of certificates for the cylinders will be submitted to the administration/tender comittee/ purchasing department before purchasing

2.2.4.2 Cylinders with a water volume from 13 liters to 275 liters will comply with the EN 1866 standard and the requirements of the 97/23/EC Pressure Equipment Directive and will be marked with the “CE” symbol by cold stamping. Declarations of conformity and copies of certificates for the cylinders will be submitted to the administration/tender comittee/ purchasing department before purchasing.

 2.2.5 The system valves used in the fire suppression system will comply with the EN ISO 10297 standard and the requirements of the Pressure Equipment Directive and will be certified by a notified body. Declarations of conformity and copies of certificates for the system valves will be submitted to the administration/tender comittee/ purchasing department before purchasing.

2.2.6 The Material Safety Data Sheet (MSDS) for the low pH valued (pH value 8,0 – 9,0) potassium salt-based fire extinguishing agent, effective against Class F Fires caused by grease and fat( liquid and solid), will be submitted to the administration/tender comittee/ purchasing department along with the quotations/ offers.. The MSDS will indicate the suitability of the extinguishing agent for Class F fires and confirm that it does not have harmful environmental effects.

2.2.7 The capacities of pre-engineered fire suppression systems will be pre-determined based on engineering calculations. The fire suppression system suitable for the type, quantity, and characteristics of the commercial cooking appliance to be protected will be selected and quoted/offered by the manufacturer or the system provider, serving on behalf of the manufacturer. The capacity of the quoted/ offered fire extinguishing system will be indicated on the certificate of conformity issued by the notified body.

* 1. **Usage Conditions**

The fire suppression system will be installed on the kitchen hood subject to this procurement. It will ensure the fire protection of the hood, the ducts connected to the hood, the filters, the grease trap, and the commercial cooking appliances located under the hood. An individual fire extinguishing system will be selected and installed for each hood system. The fire suppression system or systems protecting the commercial cooking appliances, hood, duct, and chimney sections exposed to fire hazards at the same time will be designed and installed to discharge simultaneously.

**2.4 Technical Specifications of the Fire Suppression System**

2.4.1 The fire extinguishing agent will be the wet chemical agents specified in the NFPA 17A standard. The wet chemical agent to be used will be potassium salt-based, with a low pH value, and will be used for class F extinguishing fires caused by grease and fat. Upon contact with the fire surface, the extinguishing agent will react with hot or burning liquid and solid cooking oils, quickly extinguishing the flames. It will not cause the oils to splatter or spread. The extinguishing agent will form a layer on the fire surface, preventing re-ignition.

The fire suppression system will not use water-based chemicals, foam concentrates mixed with water, dry chemical fire suppression powder, carbon dioxide gas, halocarbon chemical gases, or aerosol-based chemicals.

 Physical Properties of Class F Wet Chemical Fire Extinguishing Agent:

pH value : 8,0 – 9,0

Density : 1.28 ± 0.02 kg./lt.

Freezing point :< -25°C

Residue content: : < 0.1%

Viscosity : 5± 0.5 mm²/sec at +20°C; 29± 3.0 mm²/sec at -15°C.

 2.4.2 The cylinders used in the fire suppression system will be made of stainless steel (CrNi 304 grade) to resist the corrosive effects of the potassium salt-based extinguishing agent. A siphon, connected via a threaded connection to the system valve, will be inside the cylinder. After the extinguishing agent is filled, the system cylinders will be pressurized with dry nitrogen, which does not react with the extinguishing agent (continuously pressurized). The system’s operating pressure will ensure that the extinguishing agent is discharged from the nozzles at the required level. The test pressure for the system cylinders will be at least 27 bar. External cartridges (propellant cylinders) or those installed inside the cylinder will not be used for pressurization. No carbon steel materials will be used inside or attached to the cylinder. All materials used on the cylinder will be chrome-nickel or nickel-plated. Each system cylinder will have a label displaying identification details, including the system manufacturer and provider’s contact information. The label will also include maintenance and inspection instructions, warnings, and notices.

2.4.3 The system cylinder will be mounted on the wall or hood using mounting brackets. These brackets will be chrome-nickel or galvanized; painted materials will not be accepted.

2.4.4 The system valve will be brass material and nickel-plated. The valve, mounted on the cylinder, will operate automatically using a counter-pressure principle (activation through pressure differences in the valve mechanism). When the system pressure inside the cylinder pushes the valve mechanism, the counter-pressure from the detection and activation line connected to the valve will keep it in a ready to discharge, closed position. Once this pressure inside the fire detection is relieved, the system valve will automatically activate due to the internal cylinder pressure. When the pressure on the valve is released, the system valve will automatically activate due to the internal pressure of the cylinder. The system valve will have an outlet connection for discharging the extinguishing agent, a connection for refilling and repressurizing, and a pressure gauge to monitor the pressure inside the system cylinder. Additionally, a manual on/off valve will be installed on the system valve to turn it off when required or during maintenance. The production date, manufacturer, working pressure, and part number of the valve will be marked on the system valve by cold stamping.

 2.4.5 In order to activate the system cylinder to discharge, the use of outside cartridge and/ or weighting device mechanisms, that requires to be changed and/ or refilled after use, are prohibited.

2.4.6 A manual activation unit (with electric control switch) will be used to manually activate the fire extinguishing system when necessary. The manual activation unit (with electric control switch) will be enclosed in a chrome-nickel or galvanized casing. The casing will feature a red-painted aluminum button, with a diameter of at least 40 mm, to trigger manual activation. After pulling the safety pin connected to the button, the system can be manually activated by pressing the button. The manual activation unit will have operating instructions on it. It will be installed at a height of 130-150 cm above the ground, in an easily accessible location during the fire. The pressure switch and electrical connections inside the manual activation unit (with electric control switch) will allow a contact signal to be sent to shut off the gas and electrical supply of the kitchen's cooking appliances. This signal will shut off the gas and electricity when the system is activated, cutting off any fuel sources for the fire.

2.4.7 The discharge nozzles will provide coverage area of the wet chemical agent according to the size and technical specifications of the commercial cooking appliance being protected, releasing the appropriate quantity of extinguishing agent to extinguish any fires that occur. The types of nozzles to be used, their discharge capacities, and which nozzle type will be used for which commercial cooking appliance, along with the total discharge capacity and quantity, will be submitted with the design and quatation/offer documents. The capacity of the fire extinguishing system and the extinguishing agent will be equal to or greater than the total discharge capacity of the nozzles. This will be confirmed through engineering calculations documented and certified by a notified body. The nozzles will be made of brass and nickel-plated. Each nozzle will be marked with its type or code by cold stamping. Protection caps will be installed on the nozzle drill holes to prevent the nozzle holes from being clogged by grease and vapors from cooking appliance. The protection caps will be made of brass and nickel-plated, resistant to heat and flames. These caps will be connected to the nozzles by steel wire at the connection nipples. When the system is activated, the pressure of discharged extinguishing agent will cause the protection caps to open and remain suspended.

2.4.8 The system’s distribution (discharge) pipes will be installed according to the design specifications outlined in the installation manual provided by the manufacturer. The pipes used in the distribution system will be stainless steel (chrome-nickel). Carbon steel (black) pipes and galvanized pipes are not allowed to be used in the system. All conjunction connections, such as T-joints, elbows, and nipples used in the distribution piping, will be out of chrome-nickel or chrome-nickel plated materials. The stainless steel pipes and their connectiors on the distribution pipes system will be tightened using hydraulic connection. Threaded connections will not be allowed .The distribution piping will be hanged to pipe hangers mounted at intervals of no more than 1,5 meters from the hood ceiling. After the distribution piping is installed, but before the nozzles are mounted, the piping network will be cleaned with 10 bar dry nitrogen. All holes made on the hood surface will be insulated and sealed with heat-resistant material

 2.4.9 All materials and equipment used on the fire suppression system and the distribution piping will be stainless steel (chrome-nickel) or chrome-nickel plated. No carbon steel, galvanized, or painted materials will be used on the system or the distribution piping.

2.4.10 The fire detection and activation line will supply the fire suppression system to automatically activate, independent of human intervention. The fire detection and activation line will be made of polyamide-based material, sensitive to heat and flames. The system will be triggered, and the fire suppression system will automatically activate when flames come into contact with the line or the temperature reaches 80°C-100°C.

The internal diameter of the fire detection and activation line will be 4 ± 0.1 mm, and the external diameter will be 6 ± 0.05 mm. The operating pressure at 20°C will be a maximum of 20 bar, and the burst pressure at 20°C will be a maximum of 100 bar. The fire detection and activation line will be red (RAL 3000), with the commercial brand and production date marked on it. The shelf life of the line will be 5 years, provided it is stored under normal conditions.

The fire detection and activation line will be flexible, starting from the connection of the system valve and mounted through the inside of the hood, passing over the cooking appliances (inside the filters and chimneys) and extending to the end of the hood. It will act as a multi-sensor along its entire length.

After the fire detection and activation line is mounted, leakage test will be performed under 17 bar pressure at least 30 minutes. The fire detection and activation line will be cleaned with cleaning materials that are at most with 10 ph value.

The technical information document prepared by the manufacturer regarding the fire deteetion and activation line will be submitted to the adminstration/tender committee/ purchasing department along with the quotations/ offers.

 In order to activate the fire detection and fire extinguishing system, fusible mechanisms and digital heat sensors with detecetion ability at a single point connected to pneumatic hoses, tension mechanisms and steel wire are not be used on the fire extinguishing system.

2.4.11 End of line filling adaptor will be assembled at the front side of the hood and at a visible spot by the end of the fire detection line. Over the end of filling line adapter there will be a pressure gauge to monitor the pressure inside the fire detection and activation line and operation of the system. During the installation and/ or maintenance through the end of line filling adaptor, there is a check valve to pressurise the fire detection and activation line to re-commission the system after re-filling.

2.4.12 The fire extinguishing system, in accordance with the regulations of international standards, shall have a mechanism, upon activation, cuts off and deactivates the electricity, natural gas or LPG used as fuel according to the characteristics of the commercial cooking appliances, while also providing an audible warning.

2.4.13 Along with the fire extinguishing system, a gas detection detector, which will detect gas leaks and provide a warning for natural gas or LPG used in commercial cooking equipment, might be alternatively proposed. Upon detecting a gas leak, the flow of natural gas or LPG will be cut off.

2.4.14 All components and parts used in the fire extinguishing system will be brand new. The fire extinguishing system will be free of manufacturing and material defects, such as breakage, cracks, corrosion, or deformations.

1. **WORKING PRINCIBLE OF FIRE EXTINGUISHING SYSTEM:**

The heat and flames generated by a fire in commercial cooking equipment will come into contact with the fire detection and activation line, causing the pressurized fire detection and activation line to burst. As the pressure inside the fire detection and activation line drops, the system valve on the cylinder will be triggered, activating the fire extinguishing system. Once the system is activated, the extinguishing agent will begin to discharge simultaneously over the hood, filter, and cooking appliances through the distribution piping and nozzles

1. **INSTALLATION, COMMISSIONING, TRAINING and DOCUMENTATION:**

The fire extinguishing system will be installed by the manufacturer or an authorized dealer or service provider designated by the manufacturer, in accordance with the manufacturer’s design and installation requirements. After the installation is completed, technical documentation, which clearly shows the features of the fire extinguishing system, the layout of the protected commercial cooking equipment, the system’s distribution piping, and the nozzles placed according to the type and characteristics of the cooking equipment, will be submitted to the authorities.

Upon completion of the installation, users will be provided with training on the operating principles of the fire extinguishing system and its regular maintenance. Additionally, a user manual containing information on operation, usage, and regular maintenance of the system will be delivered to them.

1. **PACKAGING**

The fire extinguishing system and system equipments will be packed avaliable for road,air and sea transport and will not be affected by weather conditions.

1. **EXAMINATION**

Every purchasing fire extinguishing system, will be examined according the below physical inspections.

* 1. Visual inspection: The fire extinguishing system and system equipments/ documents will be eye controlled and marked with physical control label.
	2. Measurement inspection: A measurement inspection will be carried out on whether the fire extinguishing system meets the requests and specifications specified in Article 2.2 and Article 2.4 of this technical specification.
1. **WARRANTY TERMS:**

The fire extinguishing system and its components will be covered by a 24-month warranty against material, manufacturing, and installation defects, starting from the completion of installation and delivery. In the event of any issues within the warranty period, necessary interventions will be made to the system within 72 hours of receiving written notification.

In case of system discharge or the need for spare parts, refilling, reactivation, and supply of spare parts will be provided within 72 hours of receiving written notification, subject to payment.