

Inert Gas Fire Extinguishing Systems





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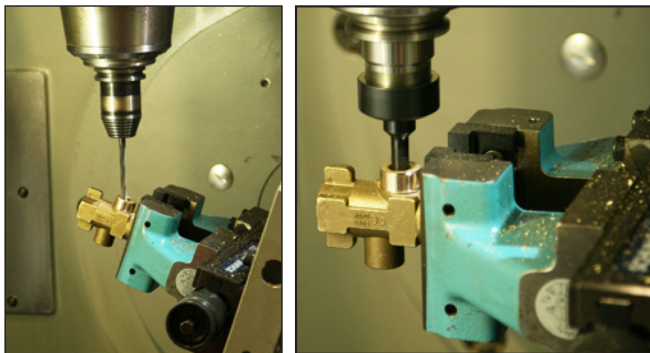
FOREWORD

Inert Gases are widely used in the fire industry as extinguishing agents for total flooding fire suppression systems within normally occupied areas. These gases are very effective and suppress fires by oxygen depletion, thus creating a surrounding atmosphere where combustion processes cannot be sustained.

Physically inert gases are electrically non conductive, non toxic and environmentally friendly making them a perfect choice for the fire protection of normally occupied areas and highly valuable equipment.

Inert Gases are stored in high pressure containers connected to a piping distribution network that runs from the cylinder bank to the protected area. Upon system activation, the agent is released from the container and travels in the pipe-work till it reaches the discharge nozzles. When discharged, the gas fills the area creating a low-in-oxygen atmosphere that causes a rapid fire extinguishment.

SA is a manufacturer of Hardware & Systems approved to EN 12094 for inert gases such as IG-01, IG-100, IG-55 and IG 541.



OVERVIEW

SA Inert Gas fire extinguishing systems provide protection of a variety of fire risks. Every system is manufactured according to client specifications and may assume various configurations depending on the features that are selected. Standard systems are made up of cylinder assemblies, valves, actuators, a manifold and discharge nozzles. For each system, one or more cylinders are configured as pilot cylinders and therefore they are equipped with an actuator that provides local and remote valve opening. The rest of the cylinders are configured as slave cylinders, hence they receive a pneumatic command from the

pilots to open their own valve. All cylinders are secured to a cylinder rack that may be a wall type, self standing open type, or a self standing closed cabinet. The latter may include also complementary systems and controls such as lights, heaters and HVAC. Each cylinder bank, independently from its configuration, may be provided with components suitable for hazardous areas and/or with SIL 2 actuators.

CONTAINER ASSEMBLY

The cylinders used for SA Inert Gas fire extinguishing systems are T-PED compliant and available in two different capacities (80 & 140 litres).

Standard cylinder assembly is equipped with a cylinder and a valve, available in two configurations: pilot and slave. The pilot configuration comes with a solenoid valve and is used to initiate a system discharge; while the slave cylinder is actuated pneumatically upon activation of the pilot cylinder. Every cylinder is provided with a metallic protection cap that provides physical protection during handling.

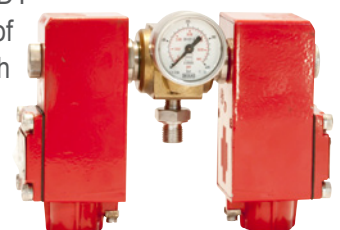
VALVE

The container valve consists of a forged brass or stainless steel body held in a normally closed position. The valve is pressure operated and includes also a manual lever for emergency actuation. The valve is designed for multiple threaded connections which accommodate the actuator and the cylinder connection. The valve is also equipped with provision for a safety disc holder and a double port connection to host single or redundant actuators.



ACTUATORS

Single and redundant actuators are used to activate the pilot cylinders and initiate the system discharge. They are available with a brass or stainless steel body and coupled to one or two solenoids. Each actuator may be coupled to a pressure gauge indicating the cylinder pressure, with the option of SPDT contacts for remote indication of the cylinder charge. Actuators with double solenoids are designed for use within SIL compliant installations and therefore specifically addressed to protect



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valuable process applications such as server farm, data centre, highly valuable systems or equipment. The actuators can be installed directly on the valve or connected to a separate nitrogen pilot cylinder when a separate source of actuation is preferred.

CHECK VALVE

Check valves are available in brass or stainless steel. There are two types of check valve installed into the SA Inert gas fire extinguishing system. The standard check valve is used for flow control purposes, allowing gas to flow only in one direction. The restricted check valve is used for flow control and for diverting part of the pilot cylinder gas to keep the pilot line always under permanent pressure.



WEIGHING SYSTEM

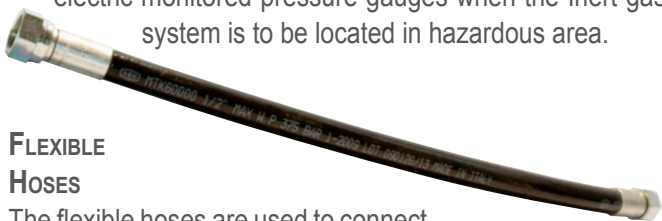
Minor gas losses within valve and valve components may happen in the gaseous based fire extinguishing system. The weighing device is a system that monitors the cylinder weight overtime and gives visual and remote indication in the case of cylinder weight losses. The weighing device is a concentric brass and stainless steel mechanism that connects a counterweight with a cylinder. The counterweight is then calibrated to be in perfect equilibrium with the charged cylinder in a way to detect very precisely any loss of weight from the container. In the case of loss of gas, the counterweight moves downwards,

indicating that the cylinder has lost its charge. Each weighing system may be equipped with a micro switch that provides signalling to remote fire panels. These weighing device application is used on inert gas instead of electric monitored pressure gauges when the Inert gas system is to be located in hazardous area.



FLEXIBLE HOSES

The flexible hoses are used to connect discharge valves with a manifold and to interconnect pneumatic actuation circuits with each valve. Flexible hoses are designed for multiple connection types and lengths depending on the service they should provide within the



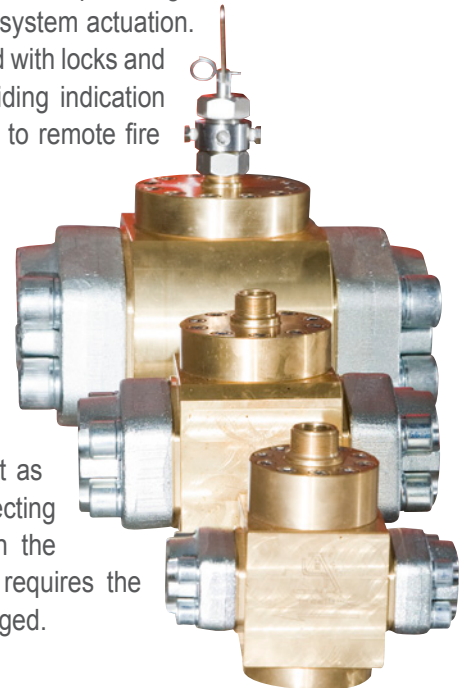
extinguishing system. Like the other components, the flexible hoses are thought to withstand all difficult industrial environments and therefore their materials have been selected accordingly. In this respect, the hose internal is made of an oil resistant polyamide substrate, reinforced with two aramid fibre braids and one steel braid covered by a micro-perforated polyurethane resistant to abrasion, oil and atmospheric agents.

SHUT OFF UNITS

Shut off units are devices used to isolate the SA Inert Gas fire extinguishing system when personnel are required within the protected spaces. The shut off is installed on the pilot cylinder actuating the circuit providing a mechanical block to system actuation. Each unit is equipped with locks and micro switches providing indication of the system status to remote fire panels.

DIRECTIONAL VALVES

Selector or directional valves are used to protect multiple areas using a common cylinder bank. The valves act as blocking devices directing the gas flow only in the compartment which requires the system to be discharged.



NOZZLES

SA Inert Gas nozzles are designed for total flooding and are available in a variety of flow directional configurations. The gas flow can be distributed at 45°, 90°, 180° or 360° for a perfect gas distribution within the protected space. Nozzles are manufactured in brass or stainless steel and may be provided with protection caps to avoid nozzle clogging in dirty environments.

ACTUATION METHODS

The SA Inert Gas extinguishing system may be selected with two actuation methods. The first method uses an auxiliary cabinet with one or two nitrogen pilot cylinders. In this case, the nitrogen cylinders may be actuated electrically using a solenoid valve (single or redundant) or manually by means of a manual pull lever. In any case, when actuated the



nitrogen is released towards the Inert gas valves resulting in their sequential opening. In this installation, all the Inert gas cylinders are configured as slaves while the pilots consist of an external source of nitrogen cylinder(s). The second possible actuation method is that of connecting the solenoid actuators directly onto the top of the Inert gas valves. In this case, the pilot cylinder(s) are represented by the same cylinders present in the system. Upon actuation, the agent is released from the pilot(s) and then diverted to the slave cylinders resulting in a quick and sequential actuation of the whole system.

SPECIAL CONFIGURATIONS & ACCESSORIES

The SA Inert gas fire extinguishing system is mainly used for the protection of fire risks involving valuable equipment. In this respect SA systems are featured with several accessories and configurations developed in order to fulfil all safety and process requirements for securing a highly reliable fire suppression unit.

REDUNDANT CYLINDER BANKS

Redundant cylinder banks are a common practice for all those protections where it is paramount that the fire extinguishing system must be kept in service at all times. To cope with such requirements, the SA Inert gas system can be arranged in a redundant cylinder bank configuration where the first bank is used as the main one, while the second is used as a stand-by unit.

If the first system experiences a discharge or simply is undergoing a regular inspection, the second bank is activated as the main protection, allowing for the first bank to be disabled. In this configuration, active fire protection is always granted. The redundant cylinder bank is made of two twin systems connected to the same manifold where wiring for actuators and signalling devices is collected in one or two JB's and uses a main switch to select from first to second bank and vice versa.

SIL ACTUATORS

Due to the increase in safety requirements for systems in the Oil & Gas, Chemical and Power Generation industries, SA has

developed a special series of actuators which complies with IEC 61508 & IEC 61511 meeting the requirements of Safety Integrity Level (SIL 2). These actuators are used within fire systems that protect industrial processes where the probability of failure on demand (PFD) is reduced to a minimum.

The redundant actuators are installed on a single pilot valve and allow the system to be actuated by one or two separate signals ensuring operation even if one of two should fail.

PERSONNEL SAFETY SYSTEMS

Inert gases fire extinguishing systems are a very effective solution for fire protection. However, due to their physical property and extinguishing technique, these systems may be dangerous for human life and therefore are designed by professional fire protection engineers and managed by trained personnel. One of the most dangerous hazards related to gaseous based extinguishing systems is the accidental release of the agent while personnel are present within the protected zone. To avoid such situations, the introduction of a shut off unit in the actuating circuit prevents accidental discharge into the protected space. SA has developed a series of shut off devices with interlocks that allow for the implementation of "safe to enter" procedure controlled by position switches and remote signalling of system status. The lock off devices can be installed in the system skid providing isolation of the pneumatic actuation line. This solution provides safe entering of personnel by means of a set safety procedure as well as providing the possibility of reporting the system status to remote control panels or DCS.

APPLICATION

The SA Inert Gas fire extinguishing system is used mainly to protect industrial fire risks involving valuable machinery or process such as: Electronic rooms; Server farms; Archive Storage; Control Rooms; Financial Centres; Pharmaceutical processes; Switchgear rooms; Telecom centres.

APPROVALS

CPD/CPR EN 12094 Approved

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