

The LPG IG-541 Fire Suppression system, manufactured by Tyco, is an engineered clean-agent system utilising a fixed nozzle agent distribution network. When properly designed, the LPG IG-541 system will suppress surface burning fire in Class A, B and C hazards by lowering the oxygen content below the level that supports combustion.

The LPG IG-541 agent has been tested by Schadenverhütung Vertragen durch Sicherheit (VdS) for inerting capabilities. The system can be actuated by detection and control equipment for automatic system operation along with providing local and remote manual operation as needed. Accessories are used to provide alarms, ventilation control, door closures, or other auxiliary shutdown or functions.

A system installation and maintenance manual is available containing information on system components and procedures concerning design, operation, inspection, maintenance and recharge. The system is installed and serviced by authorised distributors that are trained by the manufacturer.

Basic Use

The LPG IG-541 system is particularly useful for suppressing fires in hazards where an electrically non-conductive medium is essential or desirable; where clean-up of other agents presents a problem; or where the hazard is normally occupied and requires a non-toxic agent. The following are typical hazards protected by LPG IG-541 systems:

- Archives
- Libraries
- Museums
- Computer Rooms
- Telephone Exchange Equipment
- Normally occupied or unoccupied electronic areas where equipment is either very sensitive or irreplaceable

Composition and Materials – The basic system consists of extinguishing agent stored in high strength alloy steel cylinders. Various types of actuators, either manual or automatic, are available for release of the agent into the hazard area. The main cylinder bank is actuated by operating a pilot cylinder. The agent is distributed and discharged into the hazard area through a network of piping and nozzles. Each nozzle is drilled with a fixed orifice designed to deliver a uniform discharge to the protected area. On large hazards, where three or more cylinders are required, a threaded or welded pipe manifold assembly is employed. The cylinders are connected to the distribution piping or the manifold by means of a flexible discharge bend and check valve assembly.

Additional equipment includes – Control panels, releasing devices, remote manual pull stations, corner pulleys, door closers, pressure trips, bells and alarms, and pneumatic switches. All or some are required when designing a total system.

LPG IG-541 Agent – The extinguishing agent IG-541 is a colourless, odourless, electrically non-conductive gas with a density approximately the same as that of air.

It is an inert gas mixture consisting nominally of 52% Nitrogen, 40% Argon and 8% Carbon Dioxide, with the following mixture specification (based on 8% carbon dioxide with tolerance of +/- 5%).

- Carbon dioxide: 7.6% ~ 8.4%
- Argon: 37.2% ~ 42.8%
- Nitrogen: 48.8% ~ 55.2%

IG-541 extinguishes fires mainly by a reduction of the reduction of the oxygen concentration in the atmosphere of the hazard enclosure. If the oxygen level is reduced below 15%, most ordinary combustibles will cease to burn. IG-541 agent will reduce the oxygen content to approximately 12.5% while increasing the carbon dioxide content to about 3%.

Cylinders – The cylinders are constructed, tested and marked with the requirements of the EN1964/ISO9809. As a minimum, the cylinders must meet the requirements of the Gas Cylinder Rules and approval of the Petroleum & Explosives Safety Organization (PESO).

Cylinder Assembly – The 80 liter cylinder assembly is of steel construction with a red body and green shoulder standard finish. Each cylinder is equipped with a pressure seat-type valve. The LPG 128-65 valve is constructed of forged brass and is attached to the cylinder providing a leak tight seal. The cylinder charging pressure is 300bar at 15° C. The cylinders are shipped with a shipping cap attached. The cap is attached to the threaded collar on the neck of each cylinder to protect the valve while in transit. The cylinder serial number and date of manufacture are stamped near the neck of each cylinder.

Pilot Cylinder Assembly – The pilot cylinder is available in 13 and 50 liter capacities. The pilot cylinders are charged with Nitrogen at 100bar at 15° C. Each 13 liter pilot cylinder has the ability to actuate selector valves and up to 150 main cylinders. For very large systems, the 50 liter pilot cylinder has the ability to actuate more than 150 main cylinders. Each pilot cylinder is equipped with a pressure seat-type LPG 128-90 valve that can be actuated manually and/or electrically. The pilot cylinder is shipped with a shipping cap attached as well.

Electric Actuator – Electric actuation of a pilot cylinder is accomplished by a 24VDC electric actuator interfaced with a releasing control panel. An electric actuator is also used on selector valve systems to ensure the correct selector valve is operated by the pilot cylinder. To enable auxiliary or override applications, a manual lever actuator is installed on the pilot cylinder.

Pneumatic Actuators – The main cylinders are pneumatically actuated by a pneumatic cone. The pneumatic cones come in 1, 2 or 3 way connections which allow flexible installation of pneumatic actuation lines. The pneumatic cone on the last cylinder in the bank will come with a vent to bleed actuation pressure after system actuation is complete.

Selector Valves – Selector valves are to direct the flow of IG-541 agent into a single hazard or a multiple hazard system. In order to use this system, there must be no chance for fire to occur in two of the protected hazards simultaneously.

The selector valve comprised of a high pressure ball valve, a pneumatic piston with one pressure inlet and one pressure outlet. The whole set stands on a ASTM Sch80 steel reel threaded on both sides NPT of the diameter as the valve.

Nozzles – Nozzles are designed to direct the discharge of IG-541 agent using the stored pressure from the cylinders. Nozzles are available in either 360° or 180° discharge patterns. The system design specifies the nozzle and orifice size to be used for proper flow rate and distribution pattern. The nozzle selection depends on the hazard and location to be protected.

Pressure Reducer – The pressure reducer is required in the distribution piping to restrict the flow of IG-541 agent, thus reducing the agent pressure downstream of the reducer. The pressure reducer contains a stainless steel orifice plate which is drilled to the specific size hole required based on the hydraulic calculation. The orifice plate provides readily visible orifice identification.

Pipe and Fittings – System manifold piping must be constructed to withstand a minimum pressure of 300bar. Distribution piping downstream from the orifice union must be constructed to withstand the maximum downstream pressure as determined by the flow calculations.

Limitations – The LPG IG-541 system must be designed and installed within the guidelines of the manufacturer's design, installation, operation, inspection, recharge and maintenance manuals. Systems are designed for indoor applications and for temperature ranges between -20°C and 50°C.

Technical Data

Applicable Standards – The LPG IG-541 system complies with the VdS and LPCB requirements, as well as the EPA Significant New Alternate Policy (SNAP) Program.

The cylinders used with LPG IG-541 system are PESO approved.

Installations

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

Availability and Cost

Availability – LPG IG-541 systems are sold and serviced through a network of independent distributors located in many countries.

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

Maintenance

Maintenance is a vital step in the performance of a fire suppression system. As such, it must be performed by an authorised Tyco distributor in accordance with the manufacturer's design, installation, operation, inspection, recharge and maintenance manuals. When replacing components on the LPG IG-541 system, use only LPG approved parts.