NAFFCO
PASSION TO PROTECT

NAFFCOInert®
Fire Suppression System
(IG01, IG100, IG55, IG541)

AN INTRODUCTION TO **NAFFCO**

NAFFCO was founded in Dubai, UAE to become the world's leading producer and supplier of life safety solutions. By recognizing the importance and convenience of having easy access to multiple safety services, we became specialized by offering complete solutions under one roof for all types of high quality firefighting equipment, fire protection systems, fire alarms, addressable emergency systems, security systems,custom-made vehicles such as fire trucks, ambulances, mobile hospitals and airport rescue firefighting vehicles (ARFF).

With the most talented and dedicated employees from around the world, NAFFCO has over 450 passionate engineers and over 3 million square feet of manufacturing facilities. We are currently exporting to over 100 countries worldwide.

Our products have been consistently certified by UL, FM, BSI, LPCB and Global Mark according to the latest International Quality Standard for their strict adherence to ISO 9001 quality management system and certified for ISO 14001 environmental management systems and BS OHSAS 18001 for occupational safety by UL DQS.

Our success is driven by our passion to protect; our vision is to become the world's number one provider of innovative solutions in protecting life, environment and property.

INERT GAS FIRE SUPPRESSION SYSTEM

NAFFCOInert® fire suppression system is an engineered system using with fixed nozzle agent and pipe network. **NAFFCOInert®** systems are designed in accordance with latest edition of NFPA 2001,"Standard on clean agent systems". This system shall be designed for Class A, Class B & Class C application, it extinguish fire by reducing residual oxygen concentration to a level will no longer support combustion.

The system can actuate by detection and control equipment for automatic operation along with providing local manual operation when needed. Accessories are used to provide alarms, ventilation control, door closures or other auxiliary shutdown or functions. Two or more hazard areas can be protected with a single group of agent cylinders by means of directional or selector valve.

NAFFCOInert® fire suppression system comes with IG01(100% Argon), IG100(100% Nitrogen), IG55(50%Argon, 50% Nitrogen) and IG541(Argon, Nitrogen, CO_2) gases. It is available as 200 Bar and 300 Bar system which provides optimum design options to the protected hazard.

Basic Uses: **NAFFCOInert®** fire suppression system is particularly useful for suppressing fires in hazard areas where an electrically nonconductive medium is essential or desirable. Where the clean environment and the hazard obstructions require the use of a gaseous agent. It is an ideal replacement agent for Halon 1301 alternative.

- Telecommunication facilities
- Electrical and Electronics hazard areas
- Data Centers
- Control Rooms
- Museums / Archives
- Military Installations
- Libraries
- Medical facilities

PRESSURE REGULATOR TECHNOLOGY

Pressure Regulators modulate the discharge pressure to a constant 40-60 Bar which still delivers the design concentration within 60 seconds, but with significant performance and cost benefits:

BETTER SAFETY

- Prevents discharge freeze-up
- Prevents explosive force of discharge

SAVES TIME AND MONEY

- Enables low pressure manifolds & pipework to be used that are of lower cost and easy to install
- Reduces the difficulty and cost of locating/fitting pressure vents in the protected space

EASY MAINTENANCE

- After a system discharge, simply remove the regulator, recharge, and reconnect. No reconditioning necessary
- Functional tests are possible even while the system is armed.

INERT EXTINGUISHANT AGENT

Inert Gas is a colorless, odorless, electrically non-conductive gas with a density approximately the same as air. (See Physical Properties for additional information).

Inert Gas is stored as pressurized gas within the cylinder assembly. It is available at storage pressures of 200 Bar and 300 Bar.

When discharged into a protected space, it is clear and does not obscure vision. It leaves no residue and has zero ozone depleting potential and zero global warming potential.

FEATURES & BENEFITS

- Natural gas present in the atmosphere
- Suitable for occupied areas
- Non Toxic and Non Corrosive
- Colorless, odourless and compressed gas
- Stored and discharge as gas
- Fogging does not occur when agent is discharged
- Electrically non – conductive
- Leaves no residue
- Zero Ozone Depletion
- Zero Global warming
- Zero Atmospheric Life Time

USE AND LIMITATIONS

Inert Gas extinguishes a fire by reducing the residual oxygen concentration to a level that will no longer support combustion.

System shall be used on the following Class of Hazards:

Class A & C : Electrical and Electronic Hazards, Telecommunication Facilities. High Value assets where the associated down time be costly

Class B : Flammable liquid and Gases

System shall "**NOT**" be used on fires involving the following materials:

- Chemical or mixtures of chemical that are capable of rapid oxidation in the absence of air. (Example include: Cellulose Nitrate and Gunpowder)
- Reactive metal such as lithium, sodium, potassium, magnesium, Titanium, Zirconium, Uranium and plutonium.
- Metal Hydrides such as sodium hydride and lithium aluminum hydride.
- Chemical capable of undergoing auto-thermal decomposition (Example: Organic Peroxide and Hydrazine).

EXPOSURE LIMITATION

Hazard Type	Design Concentration/Oxygen Levels	Maximum Human Expose time
Normally Occupied Space	Up to 43% / 12% minimum	5 Min
	43% to 52% / 12% to 10%	3 Min
Normally Un-Occupied Space	52% to 62% / Minimum 8%	30 Sec
	Above 62% / 8% or lower	0 Sec (Personal CANNOT be exposed)

NOTES: *EN 15005, ISO 14520 & NFPA 2001 does not allow Clean Agent Systems to be used in any occupiable spaces where the design concentration required is above 52% unless provided with supervised system lockout valve, pneumatic pre-discharge alarm, pneumatic time delay and warning signs. NAFFCO does not recommend* **NAFFCOInert®** *systems to be used in normally occupied spaces where the design concentration required is above 52%.*

PHYSICAL PROPERTIES OF IG-01

Chemical Name	Ar (Argon)
Molecular Weight	39.9
Boiling Point at 1.013 Bar	-185.9°C
Critical Pressure	49 Bar
Critical Temperature	-122.3°C
Design Concentration for Class A Fire (NFPA)	38.7%
Flooding Factor for Class A Fire (NFPA)	0.481 m^3/ m^3
NOAEL	43%
LOAEL	53%

PHYSICAL PROPERTIES OF IG - 100

Chemical Name	N_2 (Nitrogen)
Molecular Weight	28
Boiling Point at 1 ATM (1.013 Bar)	-196°C
Critical Pressure	40 Bar
Critical Temperature	-146.9°C
Design Concentration for Class A Fire (NFPA)	37.2%
Flooding Factor for Class A Fire (NFPA)	0.457 m^3/ m^3
NOAEL	43%
LOAEL	53%

PHYSICAL PROPERTIES OF IG - 55

Chemical Name	N_2/Ar
Molecular Weight	33.95
Boiling Point at 760 mm Hg	-190.1ºC
Critical Pressure	602 psia
Critical Temperature	-134.7ºC
Design Concentration for Class A Fire (NFPA)	37.2%
Flooding Factor for Class A Fire (NFPA)	0.457 m^3/ m^3
NOAEL	43%
LOAEL	52%

PHYSICAL PROPERTIES OF IG - 541

Chemical Name	N_2/Ar/CO_2
Molecular Weight	34
Boiling Point at 1 ATM (1.013 Bar)	-196ºC
Critical Pressure	N/A
Critical Temperature	N/A
Design Concentration for Class A Fire (NFPA)	37.2%
Flooding Factor for Class A Fire (NFPA)	0.457 m^3/ m^3
NOAEL	43%
LOAEL	52%

CYLINDER /VALVE ASSEMBLY

NAFFCOInert® cylinders shall be High Pressure Seamless Cylinder available in different capacities (i.e. 67, 80 & 140 Ltrs).

The Cylinder filling pressure shall be either 200 Bar or 300 Bar to meet suitable system requirement. Cylinders arrives with valves pre-assembled.

SPECIFICATION

Working Pressure	200 Bar	300 Bar
Test Pressure	300 Bar	450 Bar
Material	34CrMO4 EN 10 083	
Colour	RAL 3000	
Thread Connection	W28.8 x 1/14" - EN 629-1	
Conformity	ISO 9809 Part 1&2/TUV+UN	
Mounting	Vertical	
Cylinder Actuation	Electric/Pneumatic - Input from Control Panel Manual/ Pneumatic - Input from Push Knob	
Cylinder Storage Temperature	-20°C to 50°C	

CYLINDER DIMENSIONS

	67 Litres	67 Litres	80 Litres	80 Litres	140 Litres	140 Litres
Working Pressure	200 Bar	300 Bar	200 Bar	300 Bar	200 Bar	300 Bar
Diameter	267/360 mm	267/360 mm	267/360 mm	267/360 mm	360 mm	360 mm
Height	1470/900 mm	1526/900 mm	1710/1025 mm	1780/1090 mm	1690 mm	1760 mm
Model Number (IG01)	NFIG01-200-067A/B	NFIG01-300-067A/B	NFIG01-200-080A/B	NFIG01-300-080A/B	NFIG01-200-140	NFIG01-300-140
Model Number (IG100)	NFIG100-200-067A/B	NFIG100-300-067A/B	NFIG100-200-080A/B	NFIG100-300-080A/B	NFIG100-200-140	NFIG100-300-140
Model Number (IG55)	NFIG55-200-067A/B	NFIG55-300-067A/B	NFIG55-200-080A/B	NFIG55-300-080A/B	NFIG55-200-140	NFIG55-300-140
Model Number (IG541)	NFIG541-200-067A/B	NF IG541-300-067A/B	NFIG541-200-080A/B	NFIG541-300-080A/B	NFIG541-200-140	NFIG541-300-140

VALVES FOR INERT GAS CYLINDERS

NAFFCOInert® cylinder head valve shall be pressure seat type valve. The head valve is available in two different working pressure 200 Bar / 300 Bar to meet the suitable system requirement.

The head valve can be operated by electric actuator, pneumatic actuator or pneumatic /manual actuator. The head valve is equipped with pressure gauge / pressure switch to monitor the cylinder pressure.

Model No.	B04801218-NF	B04802020-NF
Operating Pressure @ 15°	200 Bar	300 Bar
Test Pressure	300 Bar	450 Bar
Material	Brass	
Discharge Port	W21.8 x 1/14"	
Connection for Release Device	M42 x 1.5	
Port for Pilot Hose	G 1/8"	
Monitoring Port	M10 x 1	
Orifice Size	Ø12mm	
Temperature	-20°C to 50°C	
Flow Rate	Kv= 2.66; Cv= 3.09	

PRESSURE REGULATOR

The pressure regulator modulates the discharge pressure to a constant pressure, which still delivers the extinguishing agent within 60 seconds, but with significant performance and cost benefits. It prevents discharge freeze-up and explosive force of discharge. Low-pressure manifolds and pipework can be used - that means lower costs.

After a system discharge, no reconditioning of the pressure regulator is necessary. Functional tests are possible even while the system is armed. The pressure regulator is screwed with a gasket on the discharge port of the valve.

Model No	B08400003-NF
Material	Brass
Inlet Pressure	200 / 300 Bar
Maximum Inlet Pressure	360 Bar
Orifice diameter	12 mm
Inlet Connection	W21.8 x 1/14" DIN 477
Outlet Connection	W21.8 x 1/14" DIN 477
Static outlet pressure	60 Bar

ELECTROMAGNETIC RELEASE DEVICES

The electromagnetic release device is used to actuate the system electrically. It is mounted on top of the master valve and is operated by an electrical signal from a fire detection system. In order to actuate the electromagnetic release device a constant DC voltage of 24V is required.

The electromagnetic release device can be combined with the manual/pneumatic release device or the pneumatic release device.

Model No	B04425148-NF	B04425149-NF
	with Diode	without Diode
Nominal Voltage	24 VDC	
Material	Brass and stainless steel Plastic protection cap	
Nominal Current	0.5A	
Protection class	IP 65	
Valve Connection	M42 x 1.5	

MANUAL/PNEUMATIC RELEASE DEVICE

The manual/pneumatic release device allows manual or pneumatic actuation of several system components. This release device is used for pneumatic actuation of multiple cylinders in series, which are connected to the master cylinder by a pilot hose. Manual actuation is accomplished by pulling the hand lever on the manual/pneumatic release device. In the closed position the manual/pneumatic release device is secured with a safety pin. By removing the safety pin, the hand lever can be manually pressed down to activate the valve so that inert gas is released

Model No	B04420065-NF
Material	Brass & Stainless Steel
Working Pressure	300 Bar
Valve Connection	M 42 x 1.5
Pneumatic Connection	G 1/8"
Actuation Force	<150N
Actuation Force/ Pressure	**200 Bar System:** P Min = 15 Bar; P Max = 240 Bar **300 Bar System:** P Min = 21 Bar; P Max = 360 Bar

PNEUMATIC RELEASE DEVICE

This release device is used for pneumatic actuation of multiple cylinders in series, which are connected to the master cylinder by a pilot hose. Cylinders equipped with the pneumatic release device serve as slave cylinders.

Model No	B04420066-NF
Material	Brass
Working Pressure	300 Bar
Valve Connection	M 42 x 1.5
Pneumatic Connection	G 1/8"
Actuation Force/ Pressure	**200 Bar System:** P Min = 15 Bar; P Max = 240 Bar **300 Bar System:** P Min = 21 Bar; P Max = 360 Bar

PRESSURE GAUGES

The pressure gauge measures the pressure in the cylinder. It is equipped with an integrated pressure switch to supervise the loss of pressure in the cylinder. A separate 200 Bar or 300 Bar pressure gauge is used for each inert gas.

Each valve must be equipped with a pressure gauge. The pressure gauge is connected to the monitoring port of the valve.

Working Pressure	200 Bar	300 Bar
Connection	M10 x 1	M10 x 1
Model Number(IG01)	**029720221-NF**	**029720217-NF**
Model Number(IG100)	**029720219-NF**	**029720215-NF**
Model Number(IG55)	**029720220-NF**	**029720216-NF**
Model Number(IG541)	**029720222-NF**	**029720218-NF**

PILOT HOSE

The pilot hose is used to build up the pilot line, e.g. for the connection of several release devices and/or for the connection of the valve to the release device.

The pilot hose may only be used in accordance with component approval in stationary inert gases fire extinguishing systems. Several cylinders, equipped with valves, can be connected with pilot hoses.

Model No.	B06920211-NF	B06920212-NF	B06920213-NF
Length	400 mm	700 mm	500 mm
Connection	2 x M12 x 1.5		
Bending Radius	75 mm		
Nominal Diameter	DN 6		
Working Pressure	400 Bar		
Burst Pressure	1600 Bar		
Material	• Connection - Galvanised steel • Hose inner layer - Oil resistant synthetic rubber • Hose insert - Two high tensile steel wire braided inserts • Hose outer layer - Oil resistant and weatherproof synthetic rubber		

DISCHARGE HOSE

The discharge hose is used for the connection of the pressure regulator to the check valve. The W21.8 x 1/14“ nut with the inserted gasket is installed on the pressure regulator. The G3/4“ nut with the inserted gasket is connected to a check valve.

Model No.	B06920224-NF	B06920225-NF
Length	400 mm	400 mm
Connection	W21.8 x 1/14” • G3/4”	W21.8 x 1/14” • G3/4”
Bending Radius	130 mm	180 mm
Nominal Diameter	DN 12	DN 16
Max. Working Pressure	380 Bar	350 Bar
Burst Pressure	1400 Bar	1520 Bar
Material	• Connection - Galvanised steel • Hose inner layer - Oil resistant synthetic rubber • Hose insert - Two high tensile steel wire braided inserts • Hose outer layer - Oil resistant and weatherproof synthetic rubber	

CHECK VALVE

The check valve prevents a back-flow of the extinguishing agent into the cylinder. The check valve is provided with a connection thread R1“ DIN EN 10226-1 for the connection to the manifold and a connection thread G3/4“ DIN ISO 228-1 for the connection to the discharge hose.

Model No	B04600008-NF
Material	• Housing - Brass • Ball - Stainless Steel • Sealing - Thermoplastic
Connection Thread Inlet	G3/4" DIN ISO 228-1
Connection Thread Outlet	R1” DIN EN 10226-1
Nominal Diameter	DN 12
Working Pressure	300 Bar
Pressure to Open	<0.1 Bar

BLEED VALVE

The bleed valve is a part of the pilot line. The device must be mounted at the end of each pilot line at the last pneumatic release device. This device is a security part, which protects the system from unwanted tripping when a cylinder has a leak and the pressure would increase in the pilot line. It allows a bleeding till the pressure in the pilot line is under 0.7 Bar. The bleed valve prevents an accidental system release.

Model No	029730040-NF
Material	Brass
Working Pressure	360 Bar
Connection Thread	G1/8" DIN ISO 228-1
Nominal Diameter	DN 1.5
Closing Pressure	0.7 - 1.5 Bar

DISCHARGE NOZZLE

Discharge nozzles are made of brass in four different sizes, for different application. Nozzles are available with a connection thread R1½“, R1“, R½“ and R¾“ and can be screwed into every fitting corresponding to the pressure stage and the thread. Orifice design to particular requirement with computer aided calculation to assure the effectiveness of extinguishing agent and reliable system design.

The nozzle is used to discharge the agent from the cylinder through piping network to the enclosed hazard volume. The nozzle selection depends on the hazard and location to be protected. The nozzle has to be mounted at the ceiling level with the orifice tip pointed vertically down. The nozzle outlet must point downwards to distribute the extinguishing agent effectively and to prevent pollution. The discharge pattern of the nozzle shall be 360°.

The nozzle distributes the extinguishing agent evenly in the extinguishing zone in the calculated flooding time. Nozzles are designed to direct the discharge of inert gas using the stored pressure from the cylinders.

Model No.	B046111**-NF	B046112**-NF	B046113**-NF	B046114**-NF
Size	R½"	R¾"	R1"	R1½"
Thread	EN 10226-1			
Orifice Diameter	Ø3-Ø9.5 mm	Ø7-Ø13.5 mm	Ø10-Ø17.5 mm	Ø15-Ø25.5 mm
Material	Brass			
Working Pressure	60 Bar			
The orifice diameter is defined with flow calculation software				

PRESSURE & FLOW DETECTOR SWITCH

Used to send a signal that the system is discharging. Sends a signal to a control panel or alarm box at the earliest phase of discharge.

The pressure and flow detector switch is connected to the manifold and to a power supply. It reacts in the earliest stage of extinguishing agent discharge at 2 Bar pressure and energises or de-energises electrically operated equipment.

Model No	0282550050-NF
Operating Pressure	2 Bar
Connection	G½" or G¾"
Power Source	400 VAC/3A or 24 VAC/10A
IP Rating	IP65

PRESSURE RELIEF DEVICE FOR MANIFOLD

The pressure relief device for manifold is a safety device to prevent overpressure during discharge.

Model No	029730037-NF
Set pressure	66 bar at 20°C / 957 psi at 68°F
Connection Thread	G½"

PRESSURE GAUGE FOR MANIFOLD

The pressure gauge for manifold is used to monitor the discharge pressure. It is mandatory when using directional valves..

Model No	028200231-NF
Diameter	80 mm
Connection Thread	G½"
Pressure Gauge Scale	0-400 Bar
Quality Class	1.6

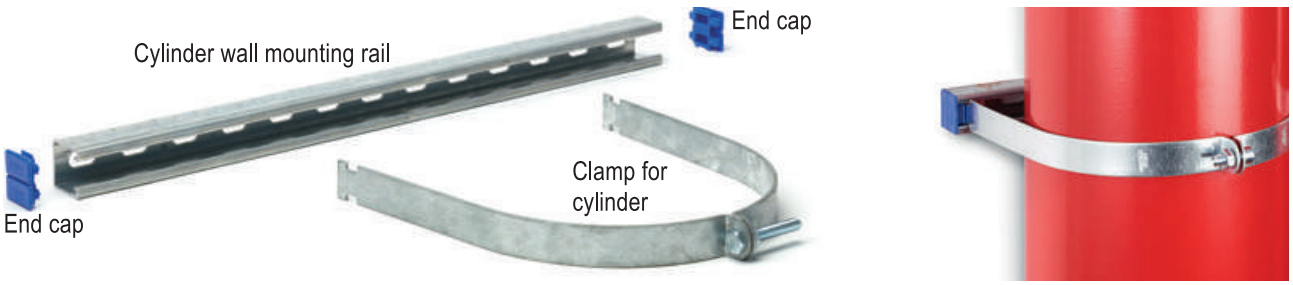
MANIFOLD

Manifolds are used to connect several cylinders at 100 bar pressure. They can only be used with valves with pressure regulators it available in 1 row and 2 row arrangement to connect 2 to 20 cylinders.

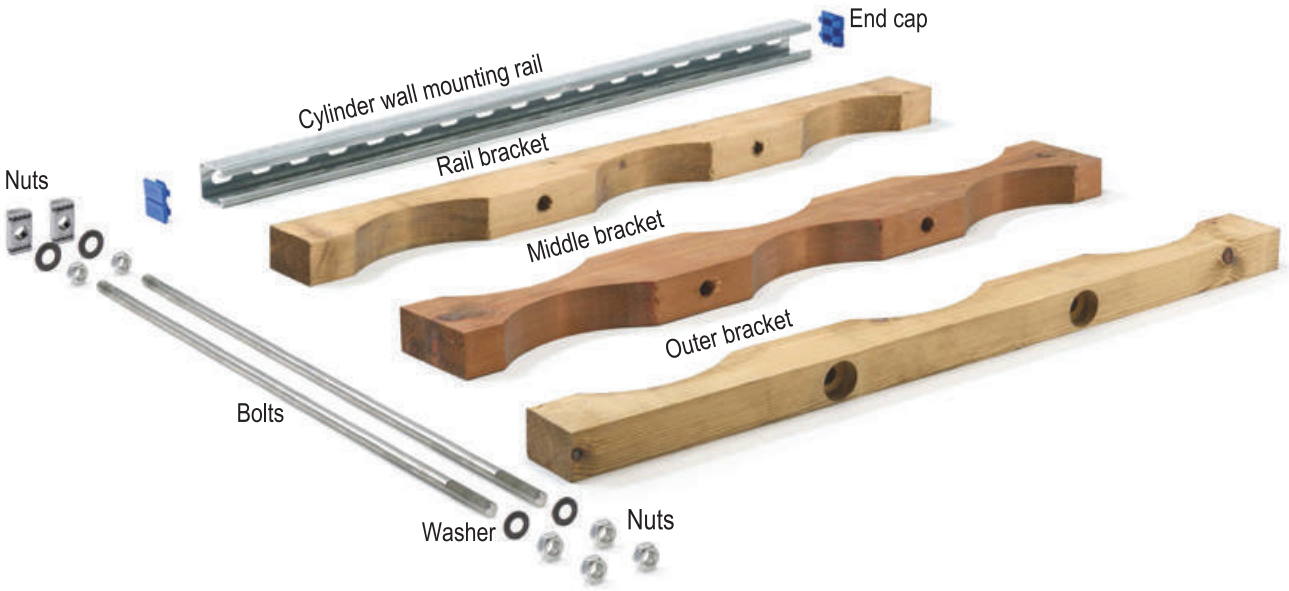
Model No	B0580001*-NF
Working Pressure	100 Bar
Test Pressure	150 Bar
Inlet Connection	Rc1"
Outlet Connection	R2"
Material	Galvanized Steel

CYLINDER MOUNTING PARTS

Galvanised steel wall mounting rails and clamps are used to mount the cylinders in a vertical position to the wall for single row arrangement and with wooden bracket for double row arrangement. Metal brackets also available upon request for double row arrangement.



CYLINDER MOUNTING PARTS SINGLE ROW ARRANGEMENT



CYLINDER MOUNTING PARTS DOUBLE ROW ARRANGEMENT

NOTE: STEEL BRACKETS AVAILABLE UPON REQUEST

WARNING SIGN

Model No.: 02800318-NF

GAS STORAGE AREA

The purpose of this sign is to warn the personal that the room is stored inert gas cylinders. Attach warning signs to all entrance doors of the gas storage room.

Model No.: 02800319-NF

WARNING

The purpose of this sign is to warn the personal that the room is protected by inert gas system and to leave the room upon system activation. Attach warning signs to all entrance doors of the protected enclosures

Model No.: 02800320-NF

UPON SYSTEM ACTIVATION

The purpose of this sign is to warn the personal that to leave the room upon system activation is stored inert gas cylinders. Attach warning signs to all exit doors of the protected enclosures

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