



FIREREX



FIREREX INERT GAS

Fire Suppression System
For 200 / 300 BAR
IG01 / IG55 / IG100 / IG541

FIREREX INERT GAS

Clean Agent Fire Suppression System

The FIREREX-IG System is a fire suppression system, that is particularly useful for suppressing fires in hazards where an electrically non-conductive medium is required; where clean-up of other extinguishing agents is a problem; or where the hazard is normally occupied and requires a non-toxic extinguishing agent and where an extinguishing capability with low weight is required.

Agent Characteristics

The FIREREX-IG System used inert gas as extinguishing agent. According to Environmental Protection Agency (EPA) & National Fire Protection Association (NFPA 2001:Standard on Clean Agent Fire Extinguishing System), inert gas is a colorless, odorless, electrically non-conductive gas that's highly efficient as a fire suppression agent. Inert gases are the best choice for extinguishing agents as they extinguish fires by oxygen depletion by lowering the normal oxygen concentration in the air from 21% to about 12%, below the limit required for combustion while still providing a safe and breathable atmosphere.

FIREREX INERT GAS
System have the following combination of inert gases

IG 01
100% Argon

IG 55
50% Argon
50% Nitrogen

IG 100
100% Nitrogen

IG 541
52% Nitrogen
40% Argon
8% Carbon Dioxide

Physical Properties of Inert Gas Extinguishing Agents (SI Units)

	IG01	IG55	IG100	IG541
Chemical formula	Ar	N ₂ / Ar	N ₂	N ₂ / Ar / CO ₂
Molecular weight	39.90 g/mole	33.95 g/mole	28.02 g/mole	34.00 g/mole
Boiling point at 760 mm Hg	-189.85°C	-190.10°C	-195.80°C	-196.00°C
Boiling point at 1013 bar	-185.90°C	-196.00°C	-195.80°C	-196.00°C
Freezing point	-189.35°C	-199.70°C	-210.01°C	-78,5°C
Critical temperature	-122.30°C	-134.7°C	-146.95°C	N/A
Critical pressure	4903 kPa	4150 kPa	3399 kPa	N/A
NOAEL	43%	43%	43%	43%
LOAEL	52%	52%	52%	52%
Specific heat, vapour at constant pressure (1 atm) at 25°C	0.519 kJ/kg	0.782 kJ/kg	1.04 kJ/kg	0.574 kJ/kg
Heat of vaporization at boiling point	163 kJ/kg	181 kJ/kg	199 kJ/kg	220 kJ/kg
Relative dielectric strength at 1 atm at 734 mm Hg at 25°C (N ₂ = 1.0)	1.01	1.01	1.0	1.03
Solubility of water in extinguishing agent at 25°C	0.006%	0.006%	0.0013%	0.015%
Ozone Depletion Potential (ODP)	0	0	0	0
Global Warming Potential (GWP)	0	0	0	0



Advantages

As inert gases are derived from gases present in the earth's atmosphere, therefore the advantages of inert gases are:

ZERO

- Ozone Depletion Potential (ODP)
- Global Warming Potential (GWP)
- Atmospheric Lifetime (ALT)

NO

- Decomposition products
- Fogging when discharged
- Residue to clean up after discharge
- Colour & Odour

NON

- Toxic
- Corrosive
- Electrically Conductive

System Application



Power Generation

- Power Plant
- Power Transmission
- Substation



Military

- Combat Vehicles
- Military Aviation
- Control Rooms



Healthcare

- CT Scan & MRI Control Room
- Medical Record Storage
- UPS Rooms



Data Processing

- Computer Rooms
- Data Storage Facilities
- Server Rooms



Transportation

- Light Rapid Transits
- Mass Transit Vehicles
- Commercial Aviation



Cultural

- Museums
- Libraries
- Archives



Telecommunication

- Cellular Sites
- Microwave Relay Towers
- PBX & IDF Rooms



Commercial Marine

- Engine Rooms
- Control Rooms
- Storage Rooms



Miscellaneous

- Bank Vaults
- Radio & TV Stations
- Laboratories

Approval & Certificates



VdS Schadenverhütung Certificate



Bomba Certificate



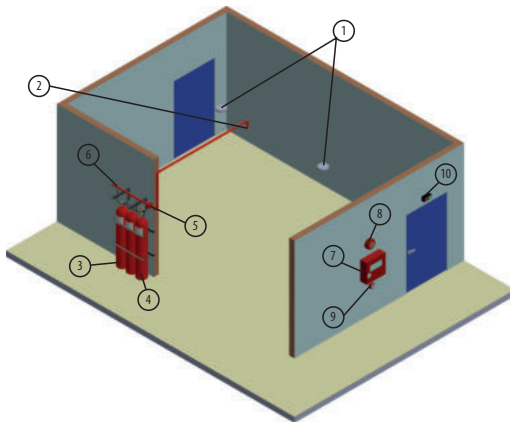
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System Design and Operation

The FIREREX-IG System is design for total flooding in accordance with NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems and ISO 14520-1 Gaseous fire-extinguishing systems.

The inert gas is stored in steel cylinders located in a safe and accessible location at 200 Bar or 300 Bar. The inert gas is distributed and discharged into the area affected by fire through a network of pipes and nozzles. The system can be actuated electrically from a control panel or manually actuated from the cylinder bank, and the discharged gas pressure is reduced to less than 60 Bar after the manifold. The system is normally designed as such that 95% of the gas will be discharged into the protected area within 60 seconds.

Cylinder banks can be stored remotely from the risk area when storage space is a concern.



1	Smoke / Heat detector	6	Manifold
2	Nozzle	7	Control Panel
3	Slave Cylinders	8	Alarm Bell
4	Master Cylinder	9	Manual Key Switch
5	Pressure Reducer Unit	10	Twin Flashing Light

Protection Efficiency

System have an excellent extinguishing efficiency with fires of Class A, B and C.

Class of Fire (NFPA 2001)	Class of Fire (Asia)	Type of Fire	Fire Sources
A	A	Surface Fires	Wood, Rubbers, Paper, Fabric, etc
B	B	Flammable Liquid Fires	Gasoline, Kerosene, etc
	C	Flammable Gas Fires	Methanol, Propane, LPG, etc
C	E	Energized Electrical Fire	Energised Electrical Equipment

Example of Typical Calculation for **FIREREX INERT GAS** System:

Agent	IG 55		IG 100		IG 541	
Dimension of Protected Room	7.0m (L) x 8.7m (W) x 4.0m (H)		7.0m (L) x 8.7m (W) x 4.0m (H)		7.0m (L) x 8.7m (W) x 4.0m (H)	
Volume of Protected Room	243.6m ³		243.6m ³		243.6m ³	
Design Temperature	20°C		20°C		20°C	
Extinguishing Design Concentration (according to NFPA 2001 : 2018 Class A Hazards)	37.9%		37.2%		34.2%	
Flooding Factor	0.48		0.4653		0.42	
Agent Required = Volume of Room to be Protected x Flooding Factor						
Volume of Agent Required	116.92m ³ (243.6m ³ x 0.48)		113.34m ³ (243.6m ³ x 0.4653)			
System Pressure	200 Bar	300 Bar	200 Bar	300 Bar	200 Bar	300 Bar
Agent capacity per 80 litre cylinder	15.8 m ³	22.3 m ³	15.4 m ³	21.3 m ³	16.8 m ³	22.9 m ³
Number of Cylinders Required = Agent Required / Agent Capacity per Cylinder						
	116.92/ 15.8	116.92/ 22.3	113.34/ 15.4	113.34/ 21.3	102.31/ 16.8	102.31/ 22.9
	7.40	5.24	7.36	5.32	6.09	4.47
No. of Cylinders Required (Round Up)	8	6	8	6	7	5

Fire Suppression System Components



Seamless Steel Cylinder

Cylinder Type		200 Bar	300 Bar	
Part No.		ISO 9809-2	ISO 9809-2	ISO 9809-2
Water Volume		80 Litre	80 Litre	140 Litre*
Material		34CrMo ₄		
Filling	IG-01	17.1 m ³	24.6 m ³	43.05 m ³
	IG-55	15.8 m ³	22.3 m ³	42.5 m ³
	IG-100	15.4 m ³	21.3 m ³	40.63 m ³
	IG-541	16.8 m ³	22.9 m ³	43.81 m ³
Height with Valve (L)		1770 ± 10mm	1850 ± 10mm	1755 ± 10 mm
Empty Weight (Approx.)		87 kg	111 kg	210 kg
Diameter		267 mm ± 1		360 mm ± 1
Filling Pressure (Bar)		200	300	
Test Pressure (Bar)		300	450	
Standard of Compliance		TPED/ ISO 9801		
Colour		Red		

* VdS Approval In Progress

Electromagnetic Release Device



Part No.	B0442XXXX	
Material	Body	Brass & Stainless Steel
	Actuating Pin	Stainless Steel
Valve Connection	M42 x 1.5	
Nominal Voltage	24 VDC	
Nominal Current	0.5 A	
Protection Class	IP 65	

Pressure Gauge



Part No.	111.12.040
Type	Spring Tube Manometer Temperature
Temp. Range	-15°C to +50°C
Connection to Valve	M 10 X 1
Pressure Range	0 - 360 Bar
Diameter	40 mm

Check Valve



Part No.	B04600008
Max. Working Pressure	360 bar
Test Pressure	150 bar
Material	Brass
Inlet Connection (Hose)	G 3/4"
Outlet Connection (Manifold)	R 1"



Series B0480

Valve Assembly

Part No.	B04801208	B04802007
Valve Body	Brass	
Temperature Range	-20°C to +60°C	
Release Device Connection	M 42 x 1.5	
Inlet Thread	W28.8 x 1/14" / 1" NGT	
Outlet Thread	W21.8 x 1/14" DIN 477	
Working Pressure (Bar)	200	300
Burst Disc Pressure (Bar)	300	450

Pneumatic Release Device



Part No.	B0442XXXX
Material	Brass
Min. Actuating Pressure	20 Bar
Max. Working Pressure	300 Bar
Valve Connection	M 42 x 1.5
Pneumatic Connection	G 1/8"



Manual/ Pneumatic Release Device

Part No.	B0442XXXX	
Material	Body	Brass
	Lever	Stainless Steel
	Safety Pin	Stainless Steel
Min. Actuating Pressure	< 20 Bar	
Max. Working Pressure	300 Bar	
Valve Connection	M 42 x 1.5	
Pneumatic Connection	G 1/8"	

Pilot Line Hose


Part No.	B069202XX
Length	400 mm, 500 mm & 700 mm
Material	Synthetic Rubber Oil Resistant
Max. Working Pressure	400 Bar
Burst Pressure	1600 Bar
Temp. Range	-40°C to +100°C
Interior Diameter	G 1/8"
Min. Bending Radius	75 mm

Discharge Hose DN12


Straight 90° Elbow

	Straight	90° Elbow
Part No.	B0692022X	
Length	400 mm	450 mm
Material	Synthetic Rubber Oil Resistant	
Working Pressure	380 Bar	
Burst Pressure	1520 Bar	
Temp. Range	-40°C to +100°C	
Inlet Connection	W 21.8 x 1/14" DIN 477	
Outlet Connection	G 3/4"	
Min. Bending Radius	130 mm	

Discharge Nozzle


Part No.	1/2"	B046111XX
	3/4"	B046112XX
	1"	B046113XX
	1-1/2"	B046114XX
Material	Brass	
Working Pressure	60 bar at 15°C	
Max. Working Pressure	300 Bar	

Pressure Reducer Unit


Flange	Carbon Steel
Orifice Plate	Brass
Type	Orifice Restriction
Max. Working Pressure	300 Bar
Test Pressure	450 Bar

Cylinder Manifold


	Single Row	Double Row
Part No.	FIG-M001	FIG-M002
Material (Pipe)	2" 6000PSI Sch. 160 ASTM A106B or API 5L Seamless Pipe, Galvanized	
Check Valve Connection	1" BSPT	
Max. Working Pressure	300 Bar	
Test Pressure	450 Bar	

FIREREX INERT GAS
Optional Items
Constant Discharge Pressure Regulator


Part No.	B0840000X
Nominal Inlet Pressure	300 bar
Max Inlet Pressure	360 bar
Inlet Orifice Size	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

Pressure Switch


	200 Bar	300 Bar
Part No.	PGS 21.050	
Mounting	Radial	Radial
Connection	M10 x 1	M10 x 1
Scale	0 - 315 Bar	0-400 Bar
Switch Pressure	180 Bar	270 Bar
Position	NO	NO

Silent Discharge Nozzles

Cylinder Mounting Brackets


Single Row



Double Row

Fire Detection System Components



Gas Extinguishing Panel

Part No.	EP203
Material	Back Box (Metal) / Lid (Plastic)
Main Supply Voltage	230 VAC, 50/60Hz
Internal Power Supply	24 VDC Nominal
Output Current	3A @ 230 VAC (Max)
Battery Requirement	2 x 12 VDC 7AH
Sounder Output Rating	21-28 VDC, Fused@200mA per Circuit
Relay Contact Rating	30 VDC, 1A Max
Maximum Detectors per Zone	20 Nos.
Extinguishant Release Output	21-28 VDC, Rated at 1A for 5mins
Dimensions	439 mm x 276 mm x 70 mm

ROR & Fixed Temperature Heat Detector



Part No.	55000-139 IMC
Voltage DC	9 to 33V
Standby Current (Max) μA	55 μ A
Alarm Current (Max)	52mA at 24 VDC
Temperature Range	0°C to 37.770°C
Material of Body	Polycarbonate
Dimension	ϕ 100 x 42mm

Photoelectric Smoke Detector



Part No.	55000-326 IMC
Voltage DC	9 to 33VDC
Standby Current (Max) μA	45 μ A at 24 VDC
Alarm Current (Max)	52mA at 24 VDC
Temperature Range	-20°C to 60°C
Material of Body	Polycarbonate
Dimension	ϕ 100 x 42mm

Evacuate Sign



Part No.	D-110L
Operating Voltage	24 VDC
Operating Currents	240mA-Bulb / 20mA-LED
Dimension (mm)	88 (L) x 260 (W) x 110 (H)

Double Flashing Light



Part No.	D-104
Operating Voltage	24 VDC
Operating Current	120mA-Bulb / 20mA-LED
Dimension (mm)	78 (L) x 210 (W) x 105 (H)

Alarm Bell



Part No.	D-122
Operating Voltage	24 VDC
Alarm Current	0.02A
Decibel Rating @3m (10ft)	95db

Sealed Lead Acid Battery



Part No.	MT 12V 7.0
Normal Voltage	12V
Capacity	7AH min at 20 Hours Discharging Time
Dimension (mm)	151 (L) x 65 (W) x 95 (H)

Manual Abort Station



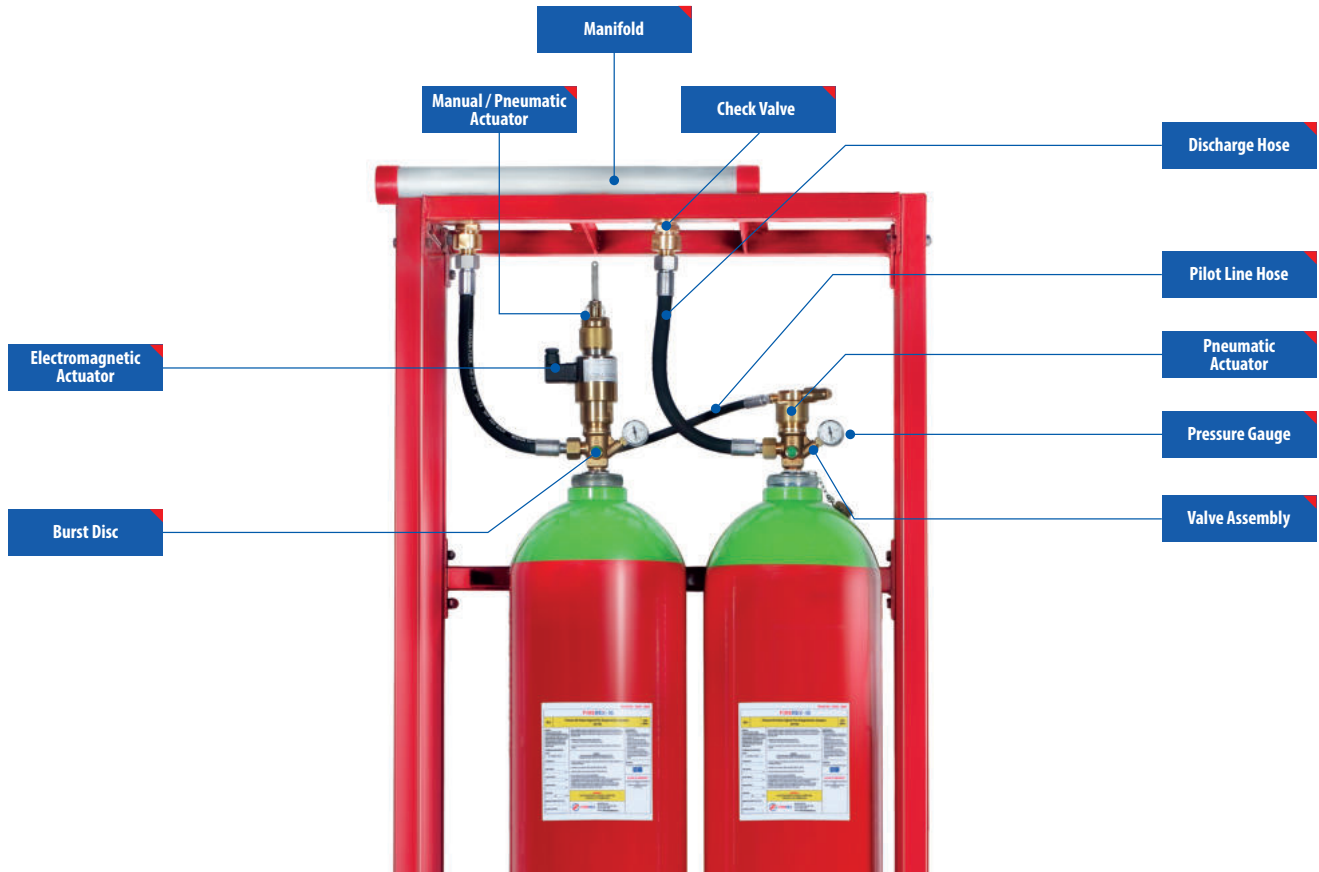
Part No.	D-108
Protection Rating	IP24D
Current Ratings	1Amp @ 240 VAC/ 2Amps @ 24 VDC
Dimension (mm)	88 (L) x 88 (W) x 55 (H)

Manual Key Switch



Part No.	D-105 / KP-307
Dimension (mm)	D-105 105 (L) x 100 (W) x 105 (H) KP-307 110 (L) x 90 (W) x 110 (H)

System Setup



Room Integrity Test

According to NFPA 2001 standards, it is crucial for the extinguishing agent to be retained in the protected room for an extended period of time (minimum 10 minutes) to prevent re-ignition and spread of fire. To achieve this goal, **Firerex Technology Sdn. Bhd.** provides this service using a calibrated door fan test unit without discharging any extinguishing agent.

The extinguishment effectiveness of any gaseous system depends largely on achieving the designed concentration in a room and how long it can be maintained to prevent re-ignition and spread of the fire. Based on the standards, the agent needs to be maintained for 10 minutes.

To achieve this, the door blower fan system is used to check the leak-tightness of the room. The values obtained from these tests will be evaluated and compared to known tested values to show that the room is sufficiently tight to contain the extinguishing agent for the required period of time.



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