Extinguishing Systems
For Critical Infrastructures
Building Technologies
Contents

✓ Know the components and functional in detail
✓ Know the integration of Fire Alarm System
✓ How does gas system operates in fire scenario
✓ Do’s and Don’t of the system
✓ Comparison of Cylinder Quantity for various Clean Agents
✓ Why Siemens and our Strength
Discharge Valve

Model : VSB 33

QTY : 1 No per Cylinder
Pressure Gauge with Low Pressure Switch

Model: PRESCODEM60

QTY: 1 No per Cylinder
Model: TOR MULTI

QTY: 1 No per Cylinder
TOR UNIT

Model : TOR UNIT

QTY : 1 No per System
Model: TOR END

QTY: 1 No per System
Flexible Discharge Hose

Model: FRF 33

QTY: 1 No per Cylinder
Check Valve

Model : CARF 33

QTY : 1 No per Cylinder

- Check valves are used only for centralised system.
- Fixed between the discharge hose and manifold.
Electrical Actuator with Solenoid

Model: DEMADEM

QTY: 1 No per System

Note: The cable assembly must not be connected to the solenoid until all the testing has been completed, and the system is ready to be put into service.
Manual Actuator

Model : CM 16 (Centralised)

QTY : 1 No per System
Manual Pneumatic Actuator

Model: DEPYM (Modular)

QTY: 1 No per System
Pneumatic Actuator

Model: CP 16

QTY: 1 No per Cylinder
Actuation Hose

Model: FLEJIC - 4

QTY: 1 No per Cylinder + One
Model: TEJIC

QTY: 1 No per Cylinder
ELBOW

Model : EQJIC

QTY : 1 No per System
Model: UNIJIC (Modular)

QTY: 1 No per System
Pressure Switch

Model : PRESSBOX

QTY : 1 No per System

- Pressure switch is mounted on the manifold.
- It operates upon gas discharge and gives an indication to the panel as “Gas discharged”.
Nozzle

Model: BUCEFA / BFFP

There must not be any obstruction adjacent to the nozzle, such as beams or columns, ducts, racks, panels etc., that could affect the discharge pattern.
## Consolidated List of Hardware

<table>
<thead>
<tr>
<th>SL No</th>
<th>H/w Description</th>
<th>Model</th>
<th>Qty</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Discharge Valve</td>
<td>VSB 33</td>
<td>1</td>
<td>Per Cylinder</td>
</tr>
<tr>
<td>2</td>
<td>Pressure Gauge</td>
<td>PRESCODEM</td>
<td>1</td>
<td>Per Cylinder</td>
</tr>
<tr>
<td>3</td>
<td>Elect. Actuator</td>
<td>DEMADEM</td>
<td>1</td>
<td>Per System</td>
</tr>
<tr>
<td>4</td>
<td>Manual Actuator</td>
<td>CM 16</td>
<td>1</td>
<td>Per System (Centralised)</td>
</tr>
<tr>
<td>5</td>
<td>Manual Actuator</td>
<td>DEPYM</td>
<td>1</td>
<td>Per System (Modular)</td>
</tr>
<tr>
<td>6</td>
<td>Pneumatic Actuator</td>
<td>CP 16</td>
<td>1</td>
<td>Per Cylinder</td>
</tr>
<tr>
<td>7</td>
<td>Flex. Discharge Hose</td>
<td>FRF 33</td>
<td>1</td>
<td>Per Cylinder</td>
</tr>
<tr>
<td>8</td>
<td>Flex. Actuation Hose</td>
<td>FLEJIC-4</td>
<td>1</td>
<td>Per Cylinder + One</td>
</tr>
<tr>
<td>9</td>
<td>Pressure Switch</td>
<td>PRESSBOX</td>
<td>1</td>
<td>Per System</td>
</tr>
<tr>
<td>10</td>
<td>Check Valve</td>
<td>CARF 33</td>
<td>1</td>
<td>Per Cylinder (Centralised)</td>
</tr>
<tr>
<td>11</td>
<td>Tee</td>
<td>TEJIC</td>
<td>1</td>
<td>Per Cylinder</td>
</tr>
<tr>
<td>12</td>
<td>Elbow</td>
<td>EQJIC</td>
<td>1</td>
<td>Per System</td>
</tr>
<tr>
<td>13</td>
<td>Union</td>
<td>UNIJIC</td>
<td>1</td>
<td>Per System (Modular)</td>
</tr>
</tbody>
</table>
Silent nozzle for Data Centre

Hard disc will damage due to sound level higher than 100 db during a gas discharge
Integration with FAS

SCHEMATIC DIAGRAM OF FIRE SUPPRESSION SYSTEM

LEGEND:

1. • IONISATION SMOKE DETECTOR (Excluded in DATS scope.)
2. © OPTICAL SMOKE DETECTOR (Excluded in DATS scope.)
3. o NOZZLE
4. z SOLENOID VALVE
5. p PRESSURE SWITCH
6. m Master Cylinder
7. s Slave Cylinder

FIRE ALARM CONTROL PANEL
(Provided by Gillett)

10 core x 0.75 Sq mm. unarmoured cable
Fire Signal

Main & Standby Cylinder for UPS Room

Standby Cylinder for Server Room

SERVER ROOM

UPS Room

FIRE DAMPENER PANEL

Server Room

CYLINDER ROOM
Optional:

- The dump test using N2 gas shall be performed to verify the flow is continuous and that the piping and nozzles are unobstructed
DO’s AND DON’Ts

GAS RELEASE PANEL

DO’s:
1. Ensure to keep the panel in auto mode
2. Keep the key in isolate position.

DON’Ts:
1. Press manual release unless it is necessary
2. Isolate zones unless essential
DO’s AND DON’Ts

CYLINDER

DON’Ts:
1. Remove solenoid from discharge valve
2. Pull manual lever unless it is necessary

AFTER FIRE

DON’Ts:
1. Open Doors / Windows until the fire is Completely put out.
2. Enter the protected area until the clean agent has been removed from the area / the area is ventilated.
In case of accidental discharge OR leakage during the installation of cylinders, the following First Aid measures should be adopted:
First Aid Measures …

**Inhalation:**
- Remove the victim to fresh air.

**Eye Contact:**
- Blow away excess chemical quickly.
- Flush eyes with warm water for 20 minutes.
First Aid Measures …

Skin Contact:

- For frostbite—immediately flush affected area with warm water for 20 minutes.

- Under running water carefully cut away clothing that sticks to damaged skin and remove rest of the garments.
First Aid Measures ...

**Ingestion:**

- Make the victim to drink 300 ml of water, if conscious.

**Medical Attention:**

- Obtain medical attention immediately by calling or visiting a physician.
Inert Gas Extinguishing Systems

Inert Gas
Basic Product
&
System
Information's
## Types Inert Gases

<table>
<thead>
<tr>
<th>Gas</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N₂)</td>
<td>N₂ – 100%</td>
</tr>
<tr>
<td>Argon (Ar)</td>
<td>Ar – 100%</td>
</tr>
<tr>
<td>Argonite</td>
<td>Ar – 50%</td>
</tr>
<tr>
<td></td>
<td>N₂ – 50%</td>
</tr>
<tr>
<td>Inergen</td>
<td>Ar – 40%</td>
</tr>
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</table>
Extinguishing principle

Inert gas systems aim to drop the O2 to between 10% and 14%. Ideally inert gas systems aim for 12.5% O2.
Nitrogen – an Inert Gas

Characteristic of Nitrogen (N2)

Room Ambient

Nitrogen: 79%

After Extinguishing

Nitrogen: 89%

Oxygen: 10-12%
Inert Gas – Design Concentration

**Sinorix N₂**

<table>
<thead>
<tr>
<th>NFPA 2001</th>
<th>Class A&amp;C -- 36.0 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class B</td>
<td>43.7 %</td>
</tr>
<tr>
<td>Filling / Cylinder</td>
<td>17.9 Kgs -- 200 Bar</td>
</tr>
<tr>
<td>Filling / Cylinder</td>
<td>24.9 Kgs -- 300 Bar</td>
</tr>
<tr>
<td>Flooding Factor</td>
<td>0.519 Kgs / M³</td>
</tr>
</tbody>
</table>

**Sinorix Ar**

<table>
<thead>
<tr>
<th>NFPA 2001</th>
<th>Class A&amp;C -- 36.8 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class B</td>
<td>51.0 %</td>
</tr>
<tr>
<td>Filling / Cylinder</td>
<td>28.2 Kgs -- 200 Bar</td>
</tr>
<tr>
<td>Filling / Cylinder</td>
<td>40.3 Kgs -- 300 Bar</td>
</tr>
<tr>
<td>Flooding Factor</td>
<td>0.759 Kgs / M³</td>
</tr>
</tbody>
</table>
Toxic Level for the Inert Gases

- **NOAEL**: 43 Vol %
- **LOAEL**: 52 Vol %
Discharge Time for Inert Gases

Maximum Discharge Time
60 Sec
Working Pressure

System working Pressure
200 / 300 Bar

Pressure after the Orifice
60 Bar
Advantages of N2 & Ar

- Zero ODP
- Zero GWP
- No toxicity to human
- Low Cost re-fill
- No damage to the equipment
- Centralised cylinder location
Better Gas compared to Pre-mixed gases

- Faster re-filling due to local availability
- Lower shut down cost
- No dependency on specialised suppliers
- No expensive license-fees on a Natural gas
Cylinder Bank Configuration - 1

1 to 15 Cylinders in a Single Row. One Manifold

1 Cyl = 418mm
2 Cyl = 790mm
3 Cyl = 822mm
4 Cyl = 934mm
5 Cyl = 1046mm
6 Cyl = 1158mm
7 Cyl = 1270mm
8 Cyl = 1382mm
9 Cyl = 1493mm
10 Cyl = 1605mm
11 Cyl = 1717mm
12 Cyl = 1829mm
13 Cyl = 1941mm
14 Cyl = 2053mm
15 Cyl = 2165mm
Cylinder Bank Configuration - 2

2 to 30 Cylinders in Two Rows. One Manifold
Cylinder Bank Configuration - 3

4 to 60 Cylinders in Two Rows. Two Manifold
Cylinder Bank With Selector Valves

System with Selector Valves
Alternative Arrangement

Legend:
- YV: Vent Valve
- LS: Limit Switch
- PS: Pressure Switch
- LS1: Low Pressure Switch
- A: Actuator
- FE: Electrical Actuator
- MA: Manual Actuator
- JB: Junction Box

SIEMENS
Ingenuity for Life
Min. Requirement on Storage Space

Compact cylinder assemblies allow significant reduction of storage space! →
maximum of 60 cylinders (≈ 1700 m³ EDP-Room)

Four-line arrangement exclusively offered by Siemens Fire Safety!
Use of total volume of storage rooms is possible only with four line arrangement!
All extinguishing systems using Inert gases do need Over-Pressure Relief openings to avoid complete destruction of the protected area.
Approvals of Sinorix N2

VdS, Germany
CNPP French
LPC
Hong Kong FSD and China
## Comparison

### Chemical Gases:
- Rapid discharge
- Low extinguishing concentration
- Less gas quantity
- Lesser cylinder storage space
- Lower working pressure
- Formation by products
- Shorter Pipe network

### Inert Gases
- Longer discharge time
- High extinguishing concentration
- More gas quantity
- More cylinder storage space
- Very high working pressure
- No formation of by products
- Longer Pipe network
System design Costs as influencing factor

System costs are affected by a number of factors. The ratios can change with increasing room size.

Schematic representation

Costs

Room volume

300 m³ 500 m³

System with chemical extinguishing agent
System with natural gas

Natural Gas
System technology

Chemical Agent
System technology
Multi Sector Protection - 42 bar

Room 1
5 cyl

Room 2
10 cyl

Room 3
15 cyl

Directional Valves
Multi-sector system using chemical agents
Multi-sector system ...
Multi-sector system ...
Multi-sector system ...
Multi-sector system
What Makes up a Complete System?

- Fire Detection and Alarm System
- Control and Gas Release Panel
- Agent Cylinders
- Hardware
- Piping Network and Manifold
- Discharge Nozzles
Why Siemens?

- Guaranteed genuine agent and hardware
- Credible Source
  - Perfect audit trail of purchase and sale
  - Open book approach. Ready for Audit
- Design validation and confirmation
- An organization with high level of governance and ethical practice
- Ability to assist in analyzing the facility and implementation of the system

Contd…
Our Strength

- Full fledged in-house technical / design team
- Specialize in design & supply of both chemical and inert gas system
- The filling station located at Pondichery has the “State of the Art Technology” to fill in clean agents offered
- Maintain a stock of the agent in bulk quantities for immediate re-filling of discharged systems
Silent Nozzle for 42bar Sinorix™1230 System
VdS Approval Certificates
Further Connect

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Thank you