Switch to GREEN Nitrogen for Safety, Low Refill Cost and High Availability
System Design and Operation

PA Vision inertex® systems are designed, installed and maintained according to NFPA 2001 (Clean Agent Fire Extinguishing Systems and ISO 14520 Gaseous Fire Extinguishing Systems) standards.

inertex® is a total flooding system whereby the required amount of gas is discharged into an enclosed area to extinguish fire. The gas is stored as compressed gas at 200bar. The system can be actuated electrically from a control panel or manually from the cylinder bank, and the discharged gas pressure is reduced from 200bar to less than 60 bar after the manifold via the pressure reducing unit. The system is normally designed as such that 95% of the gas will be discharged into the protected area within 60 seconds.

Multiple storage options are possible with inertex® as the system has been designed for long distance delivery. This means that the cylinder bank can be stored remotely from the risk area when storage space is a concern.

1. Smoke / heat detector
2. Nozzle
3. Slave cylinders
4. Master cylinder
5. Pressure reducer unit
6. Manifold
7. Control panel
8. Alarm bell
9. Manual Call Point (break glass)
10. Discharge light

When two or more areas of protection do not require flooding of gas at the same time, directional or selector valves can be used to allow the same bank of cylinders to protect multiple areas. Such sub-systems can reduce substantial equipment costs and storage area for cylinders. Maintenance and inspection locations can also be reduced accordingly.

### Example of typical calculation for inertex® total flooding requirement:

- **Dimensions of room to be protected:** 10.0m x 5.3m x 3.0m (H)
- **Volume of room to be protected:** 159.0m³
- **Design Temperature:** 20°C
- **Extinguishing Design Concentration:** (NFPA 2001) 37.2% (for Class A & C hazards)
- **Flooding Factor:** (NFPA 2001) 0.4652

Therefore,

- **Agent required:** Volume of room to be protected x Flooding Factor
  = 159.0m³ x 0.4652
  = 73.97m³
- **Agent capacity per 80 litre cylinder:** 15.2m³ (17.5kg)
- **Number of cylinders required:** Agent required / Agent capacity per cylinder
  = 73.97 / 15.2
  = 4.87
  Round up to next integer
  = 5

Therefore the number of cylinders required = 5 numbers of 80L cylinders of inertex®

### Gas Flow & Pipe Sizing Table

<table>
<thead>
<tr>
<th>Inert Gas Flow Rate (m³ / min)</th>
<th>Inert Gas Flow Rate (m³ / min)</th>
<th>Nominal Pipe Size DN (mm)</th>
<th>Nominal Pipe Size Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>15</td>
<td>½</td>
</tr>
<tr>
<td>15</td>
<td>30</td>
<td>20</td>
<td>⅞</td>
</tr>
<tr>
<td>30</td>
<td>50</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>90</td>
<td>32</td>
<td>1⅜</td>
</tr>
<tr>
<td>90</td>
<td>120</td>
<td>40</td>
<td>1⅜</td>
</tr>
<tr>
<td>120</td>
<td>220</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>220</td>
<td>410</td>
<td>65</td>
<td>2⅜</td>
</tr>
<tr>
<td>410</td>
<td>720</td>
<td>80</td>
<td>3</td>
</tr>
<tr>
<td>720</td>
<td></td>
<td>100</td>
<td>4</td>
</tr>
</tbody>
</table>

### Deciding The Flow Rate

- Each 80 Litre contains 15.2 m³ Volume Nitrogen Gas
  - 1  2  = 15.2 x 5 = 76 m³
  - 2  3  = 76 m³
  - 3  4  = 76 m³
  - 4  5  = 76 m³
  - 5  6  = 76 m³
  - 6  12,13 = 76 + 2 = 78 m³
  - 12  14  = 38 m³
  - 13  17  = 38 m³

From Pipe Sizing Table

- From Sizing Table
- Section 1-6 should use 1⅜
- Section 12-17 should use 1"

Note: The above is just estimate, the actual pipe size shall be determined using Vdp Software. Please contact PA Vision for Vdp calculation.

Each Nozzle can Cover 5 x 6 metre area.
### Comparative table - inert and chemical gases

#### Comparison Chart - Alternatives Fire Suppression Agents to Halon 1301

<table>
<thead>
<tr>
<th>Agent</th>
<th>Chemical Formula</th>
<th>ODP</th>
<th>GWP (100 Years Time Horizon)</th>
<th>Atmospheric Lifetime (years)</th>
<th>Noael (%)</th>
<th>Loael (%)</th>
<th>Storage Pressure</th>
<th>Minimum design concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halon 1301</td>
<td>CF3Br</td>
<td>10</td>
<td>6,900</td>
<td>65</td>
<td>5</td>
<td>7.5</td>
<td>25/42 Bar</td>
<td>5</td>
</tr>
<tr>
<td>InerfeC100</td>
<td>100% N2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>43</td>
<td>52</td>
<td>200 Bar</td>
<td>32</td>
</tr>
<tr>
<td>INERGEN</td>
<td>52% N2 40% Ar 8% CO2</td>
<td>0</td>
<td>&lt; 1</td>
<td>0</td>
<td>43</td>
<td>52</td>
<td>150/200 Bar</td>
<td>35</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>CO2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td>CO2 in design concentration kills people</td>
<td>58 Bar at 20°C</td>
</tr>
<tr>
<td>FM-200 HFC 227ea</td>
<td>CF3CHFCF3</td>
<td>0</td>
<td>2,050</td>
<td>31-42</td>
<td>9</td>
<td>10.5</td>
<td>25/42 Bar</td>
<td>7</td>
</tr>
<tr>
<td>FE-13 HFC 23</td>
<td>CHF3</td>
<td>0</td>
<td>9,000</td>
<td>280</td>
<td>50</td>
<td></td>
<td>25/42 Bar</td>
<td>16</td>
</tr>
<tr>
<td>NAF S III</td>
<td>82% HCFC-22 4.75% HCFC-123 9.5% HCFC-124 3.75% organic substance</td>
<td>0.05</td>
<td>1,600</td>
<td>16</td>
<td>10</td>
<td>&gt; 10.0</td>
<td>25/42 Bar</td>
<td>8.6</td>
</tr>
</tbody>
</table>


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#### Diagram and Parts List

**Diagram:**
- Room A
- Room B
- 1194mm line
- 6, 7, 5, 14, 15, 16

**Item List:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Part No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ING011</td>
<td>Valve series B 0480 1</td>
<td>Brass</td>
</tr>
<tr>
<td>2</td>
<td>ING012</td>
<td>Pneumatic and Manual actuator B 0480 1</td>
<td>Brass</td>
</tr>
<tr>
<td>3</td>
<td>ING017</td>
<td>Pressure gauge B 0297 2</td>
<td>Plastic</td>
</tr>
<tr>
<td>4</td>
<td>ING018</td>
<td>Pressure gauge cw leakage monitoring switch B 02972</td>
<td>Wire braided rubber hose</td>
</tr>
<tr>
<td>5</td>
<td>ING008</td>
<td>Discharge hose DN12</td>
<td>Brass Alloy 352</td>
</tr>
<tr>
<td>6</td>
<td>ING009</td>
<td>Pressure reducer unit, DN50</td>
<td>Steel Alloy</td>
</tr>
<tr>
<td>7</td>
<td>ING038</td>
<td>Manifold single socket</td>
<td>Sch 160</td>
</tr>
<tr>
<td>8</td>
<td>ING039</td>
<td>Manifold double socket</td>
<td>Sch 160</td>
</tr>
<tr>
<td>9</td>
<td>ING010</td>
<td>Pilot hose DN8</td>
<td>Wire braided rubber hose</td>
</tr>
<tr>
<td>10</td>
<td>ING013</td>
<td>Electromagnetic Actuator B 0480 1</td>
<td>Brass</td>
</tr>
<tr>
<td>11</td>
<td>ING024</td>
<td>80L/140L, TFED CE or DOT Cylinder</td>
<td>Chromium Molybdenum Steel</td>
</tr>
<tr>
<td>12</td>
<td>ING046</td>
<td>Cylinder Strap</td>
<td>Steel</td>
</tr>
<tr>
<td>13</td>
<td>ING044</td>
<td>Cylinder wall bracket</td>
<td>Steel/Alloy</td>
</tr>
<tr>
<td>14</td>
<td>ING027</td>
<td>Selector Valve DN50 GB2</td>
<td>Aluminium Alloy</td>
</tr>
<tr>
<td>15</td>
<td>ING026</td>
<td>Discharge pressure switch model FF4</td>
<td>Brass</td>
</tr>
<tr>
<td>16</td>
<td>CO2003-AD6112</td>
<td>Solenoid valve 2way model AD6112</td>
<td>Brass</td>
</tr>
<tr>
<td>17</td>
<td>ING033</td>
<td>Pressure regulator model 0-300 Bar, Output -8 Bar</td>
<td>Brass</td>
</tr>
</tbody>
</table>
INERTEC VALVE SERIES B0480 1

Material
Valve Body: Brass
Max. Working Pressure: 250 Bar
Temperature Range: -15°C to +50°C
Inlet Connection: W 28.8 x 1/14" DIN
Outlet Connection: W 21.8 x 1/14" DIN
Release Device
Connection: M 42 x 1.5
Pressure Gauge
Connection: M 10 X1
Burst Disc: 270 Bar
Approval: VdS
Approval No: G302023 Typ B0480 1 208
Part No: ING014

ELECTROMAGNETIC RELEASE DEVICE FOR SERIES B0480 1

Material
Body: Brass, Stainless Steel
Actuating Pin: Stainless Steel
Nominal Voltage: 24 Vdc
Nominal Current: 1.2 A
Valve Connection: M 42 x 1.5
Approval: VdS
Approval No: G302023 Typ B04420575
Part No: ING013

PNEUMATIC RELEASE DEVICE FOR SERIES B0480 1

Material
Body: Brass
Min. Actuating Pressure: 15 Bar
Max. Working Pressure: 250 Bar
Valve Connection: M 42 x 1.5
Pneumatic Connection: 1/8" BSP
Approval: VdS
Approval No: G302023 Typ B04420066
Part No: ING019

DISCHARGE HOSE TYP DN12

Material: Synthetic rubber Hose with 2 high tensile steel wire braids reinforcement
Max. Working Pressure: 280 Bar
Temperature Range: -15°C to +50°C
Hose Connections: W 21.8 x 1/14" DIN
Approval: VdS
Approval No: G304026 Typ DN12
Part No: ING008

PILOT LINE HOSE TYP DN08

Material: Synthetic rubber Hose with 2 high tensile steel wire braids reinforcement
Max. Working Pressure: 350 Bar
Temperature Range: -15°C to +50°C
Hose Connections: 1/8" BSP
Fitting Connections: 1/8" BSP
Adapter Connection (used on pilot cylinder only)
Inlet: W 21.8 x 1/14" DIN
Outlet: 1/8" BSP
Approval: VdS
Approval No: G304027 Typ DN08
Part No: ING010 - Hose, ING022 - Adapter
**Inertec System Components**

**80 LITER INERTEC CYLINDER**

- **Material**: Chromium Molybdenum Steel
- **Cylinder**: 15.8m³ / 22.2kg – IG55
- **Filling**: 15.2m³ / 17.5kg – IG100
- **Test Pressure**: 17.1m³ / 27.4kg – IG01
- **Filling Pressure**: 200 Bar @ 20°C
- **Test Pressure**: minimum 300 Bar
- **Approx. Weight**: 115 kg (Tare), 137 kg (gross)
- **Standard of Compliance**: DOT 3AA / TPED 1999/36/CS or according to International Standards
- **Colour**: Red or Grey according to National Regulation
- **Part No**: ING014-CS-080

**INERTEC SELECTOR / DIRECTIONAL VALVE**

- **Type**: Ball valve GB2: 2way;
- **Body**: round
- **Material**: A105
- **Size**: GB2: from DN32 up to DN50
- **O-Rings**: NBR, FPM, MQV, EPDM, FFKM
- **Operating Pressure**: GB2: 350 Bar
- **Temp Range**: -10°C to +100°C depending on seal materials selected
- **Air for actuator**: 5.6 Bar
- **Part No**: ING027-GM-050

**SOLENOID VALVE**

- **Operating voltage**: 24VDC, 0.75A
- **Part No**: CO2003-AD6112

**DN50 CYLINDER MANIFOLD**

- **Material**: 2" Sch.160 ASTM A105B or API 5L seamless pipe, galvanized
- **Check Valve Connection**: 3/4” BSPT
- **Max. Working Pressure**: 240 Bar
- **Test Pressure**: 360 Bar
- **Approximate Weight**: 11.5kg / m
- **Part No**: ING038-CS-002 to ING038-CS-019

**INERTEC PRESSURE GAUGE WITH INTEGRATED PRESSURE SWITCH**

- **Temperature Range**: -15°C to + 50°C
- **Connection to Valve**: M 10 X 1
- **Indication Range**: 180 - 360 Bar
- **Nominal Size**: 50mm
- **Electrical Data**: -
- **Contact Pin and Lug**: Gold Plated
- **Switch Voltage**: 4.5 to 24 VDC / VAC
- **Switch Current**: 5 mA to 100 mA
- **Contact Load**: max 3 W
- **Switch Point**: nominal 180 Bar
- **Setting**: increasing pressure max 185 bar, decreasing pressure min 160 bar
- **Series**: B 02972
- **Part No**: ING018

**DISCHARGE NOZZLE TYP 1/2" AND TYP 1"**

- **Material**: Brass
- **Orifice Plate**: Brass
- **Max. Area Coverage/ Nozzle**: 30m² (5m x 6m)
- **Max. Height**: 5m
- **Working Pressure**: 20 Bar (min), 60 Bar (max)
- **Available Orifice Diameter**: 1/2" Nozzle: 3mm - 10mm (in 1mm increments)
  - 1" Nozzle: 11mm - 20mm (in 1mm increments)
- **Approval**: VdS
- **Approval No**: G 305005
- **Part No**: ING002 - 1/2" Nozzle, ING004 - 1" Nozzle

**INERTEC PRESSURE GAUGE**

- **Type**: Spring Tube Manometer
- **Temperature Range**: -15°C to + 50°C
- **Connection to Valve**: M 10 X 1
- **Series**: B 02972
- **Part No**: ING017
The 

100 gas extinguishing system is approved by VdS Schadenverhütung (Loss Prevention) Germany to VDS 2452 Gas Extinguishing System Requirements and Test Methods.

All 

100 gas extinguishing system equipment such as manifold, valve, actuator, pressure reducer, nozzle, discharge hose and check valves are certified by VdS.

VdS is a company of the German Insurance Association Gesamtverband der Deutschen Versicherungswirtschaft (GDV). For further details visit www.vds.de

Why Nitrogen Gas Suppression Is Considered The Ultimate Choice?

100 The Natural Solution.

PA Vision introduced the 

100 fire suppression systems which meets all three objectives of a responsible and modern fire protection system; Protect Lives, Protect Properties and Protect the Environment.

- Safe for Human
  Nitrogen is a natural gas which occupies the biggest percentage (78%) of atmospheric air. It produces no toxic or corrosive decomposition by-products, and no post-fire hazard. The discharge of nitrogen does not impair visibility which is necessary for the safe evacuation of occupants.

- GREEN
  It is 100% environment friendly, it has zero Ozone Depletion Potential (ODP) and zero Global Warming Potential (GWP). The use of 

100 is in line with the current global Green Initiatives for buildings e.g, Green Building Index (GBI) in Malaysia.

- Limited Professional Liability
  The whole system, all its components including manifolds and the hydraulic software has gone through rigorous tests and validations by in-house R & D and also listed by independent certification body e.g, VdS Germany, which is compulsory in order to comply to NFPA 2001. A peace of mind solution in terms of potential exposure to professional liability.

- Safe For Sensitive Equipment
  Since it is inert in nature, nitrogen is electrically non-conductive and does not leave residue or damage the protected equipment. There is no condensation of moisture in the air upon discharge of the agent. It is the safest solution without secondary damage.

- Advantages for Owner & Contractor
  Nitrogen gas, elements of the 

100 fire suppressant is readily available everywhere and is affordable. There is no dependency on specialised authorised suppliers. System discharge tests can be carried out regularly by facility managers to ensure system functionality.

- Low Cost Refills
  It is the cheapest gas for refilling due to any accidental or false discharge. Its refill cost is about 3-5 times cheaper than premixed inert gas and more than 10 times cheaper compared with genuine halocarbon gas.

Sole Distributor:

PA VISION SDN BHD (662605-K)
22-1, Jalan Awan Makmur, OUG Square, Off Jalan Klang Lama, 58200 Kuala Lumpur
Tel: 603-7783 6512 Fax: 603-7783 6510
Email: pavision@streamyx.com
Website: www.pavision.com.my

Reseller: