SIEMENS

Siemens Building Technologies

SIEMENS

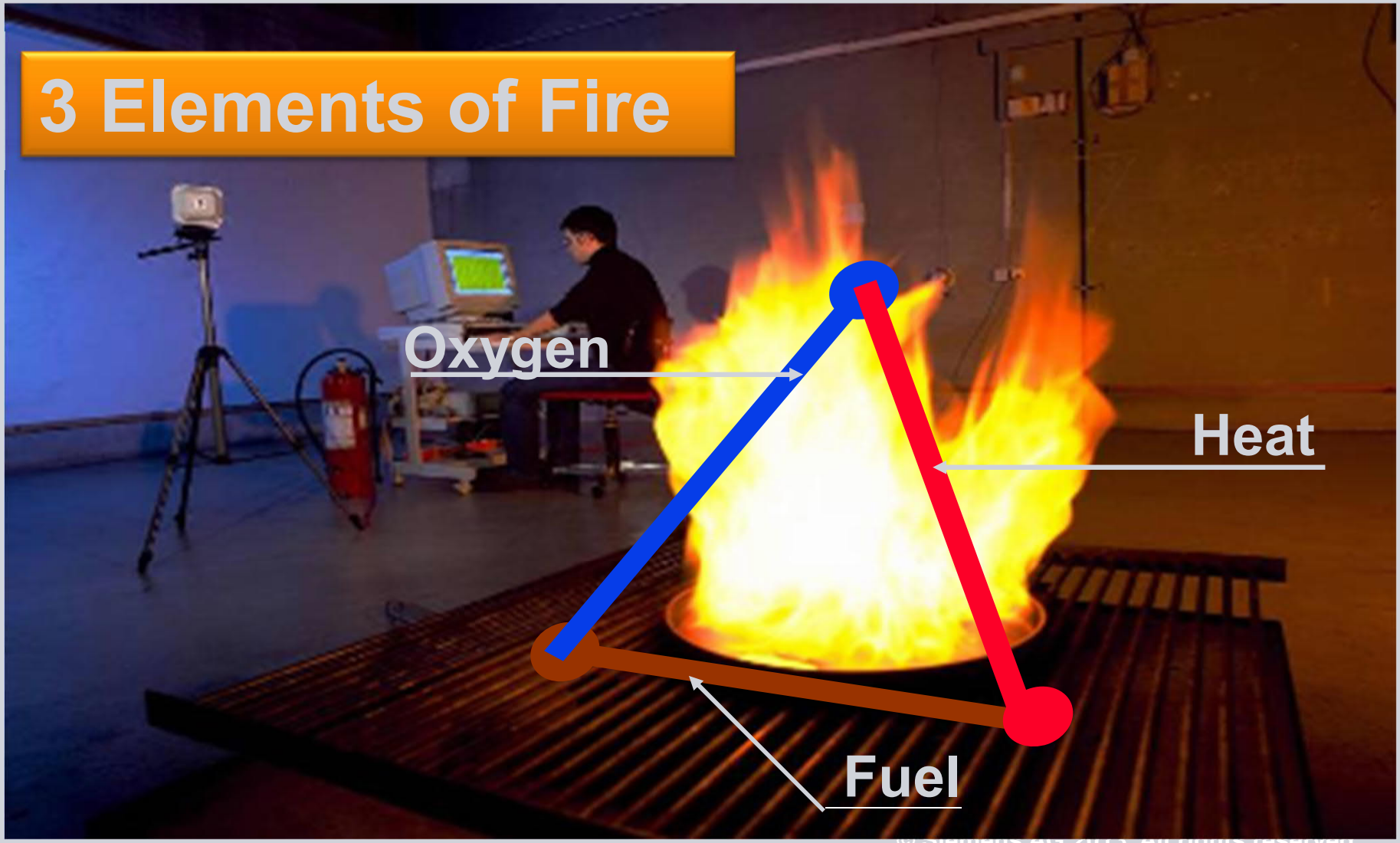
Fire Extinguishing Systems

Basics of fire Suppression systems

Overview of clean Agent systems

What is Fire ?

SIEMENS



Types of Fires & Media

SIEMENS

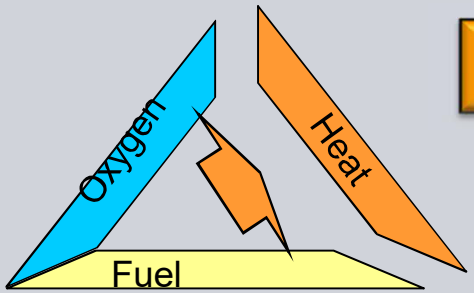
CLASSES OF FIRES	TYPES OF FIRES	PICTURE SYMBOL
A	Wood, paper, cloth, trash & other ordinary materials.	
B	Gasoline, oil, paint and other flammable liquids.	
C	May be used on fires involving live electrical equipment without danger to the operator.	
D	Combustible metals and combustible metal alloys.	

Suitable Media	
Water	
Foam	
Gas	
D C P	

Fire Protection Concept

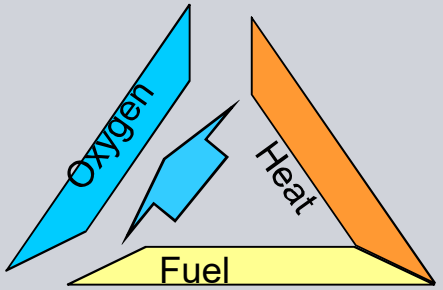
SIEMENS

Basic Extinguishing Principles



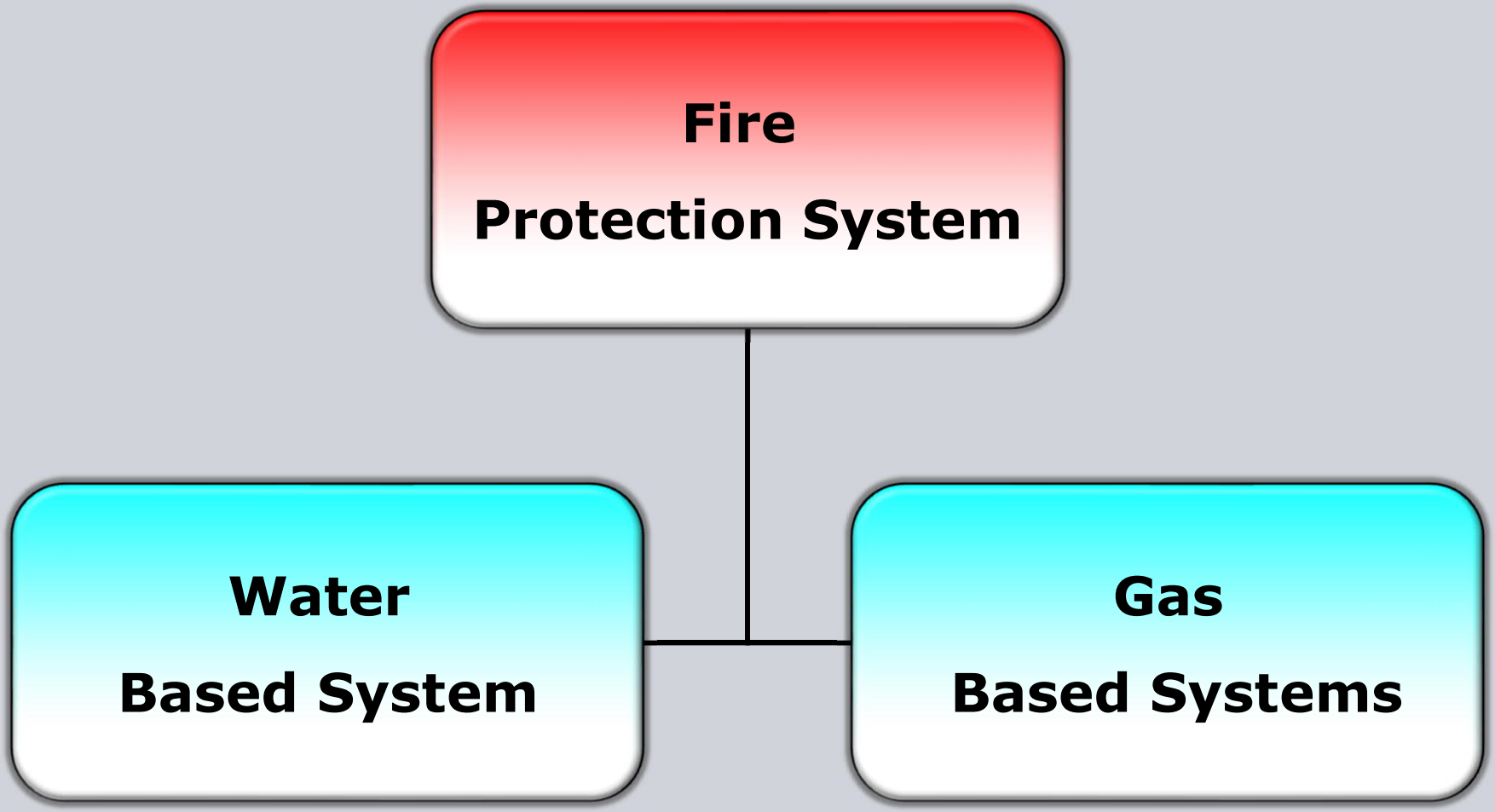
Eliminating the HEAT→ Chemical Gas

Eliminating the OXYGEN → Inert Gas



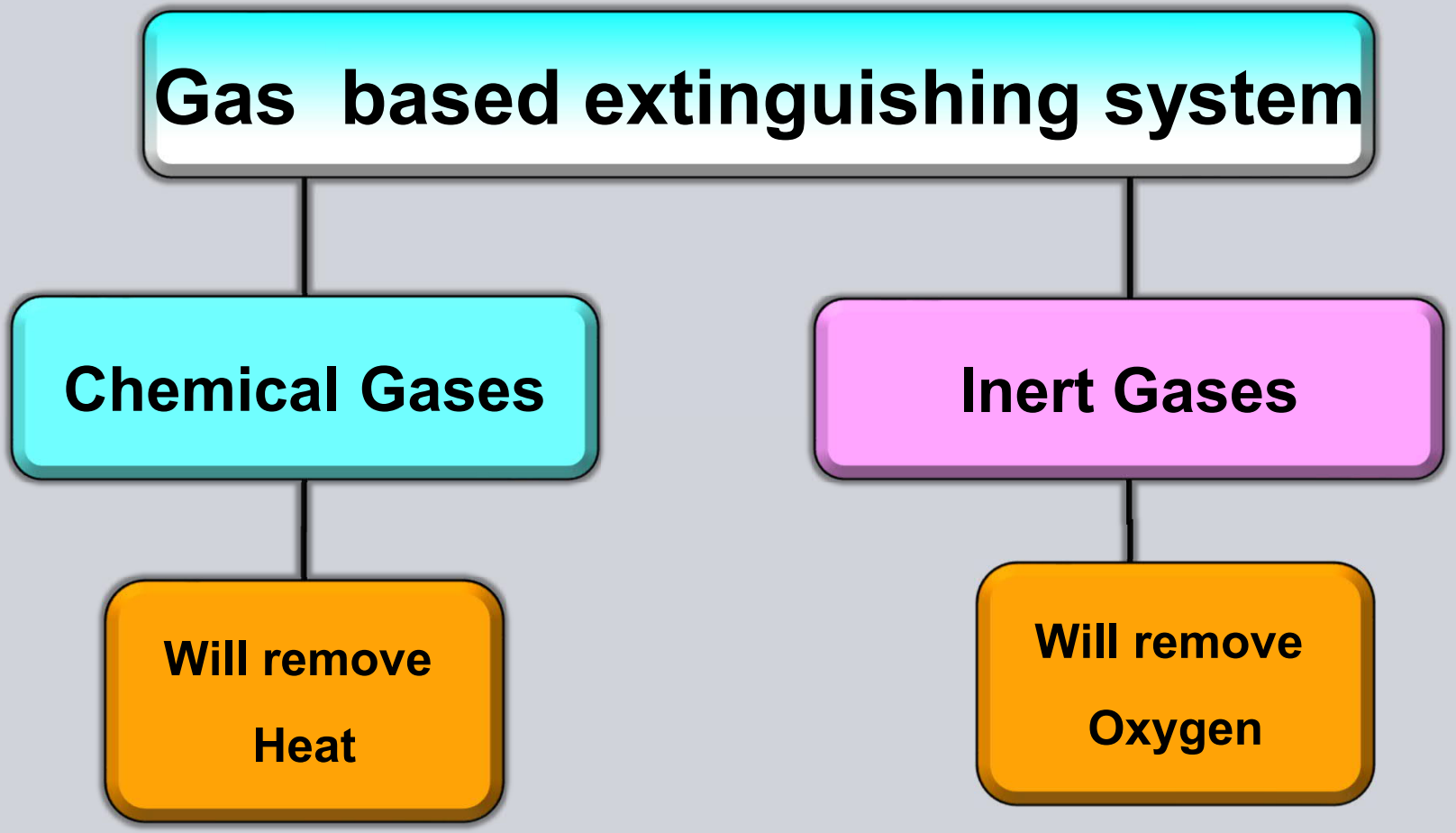
Type of Fire Protection Systems

SIEMENS



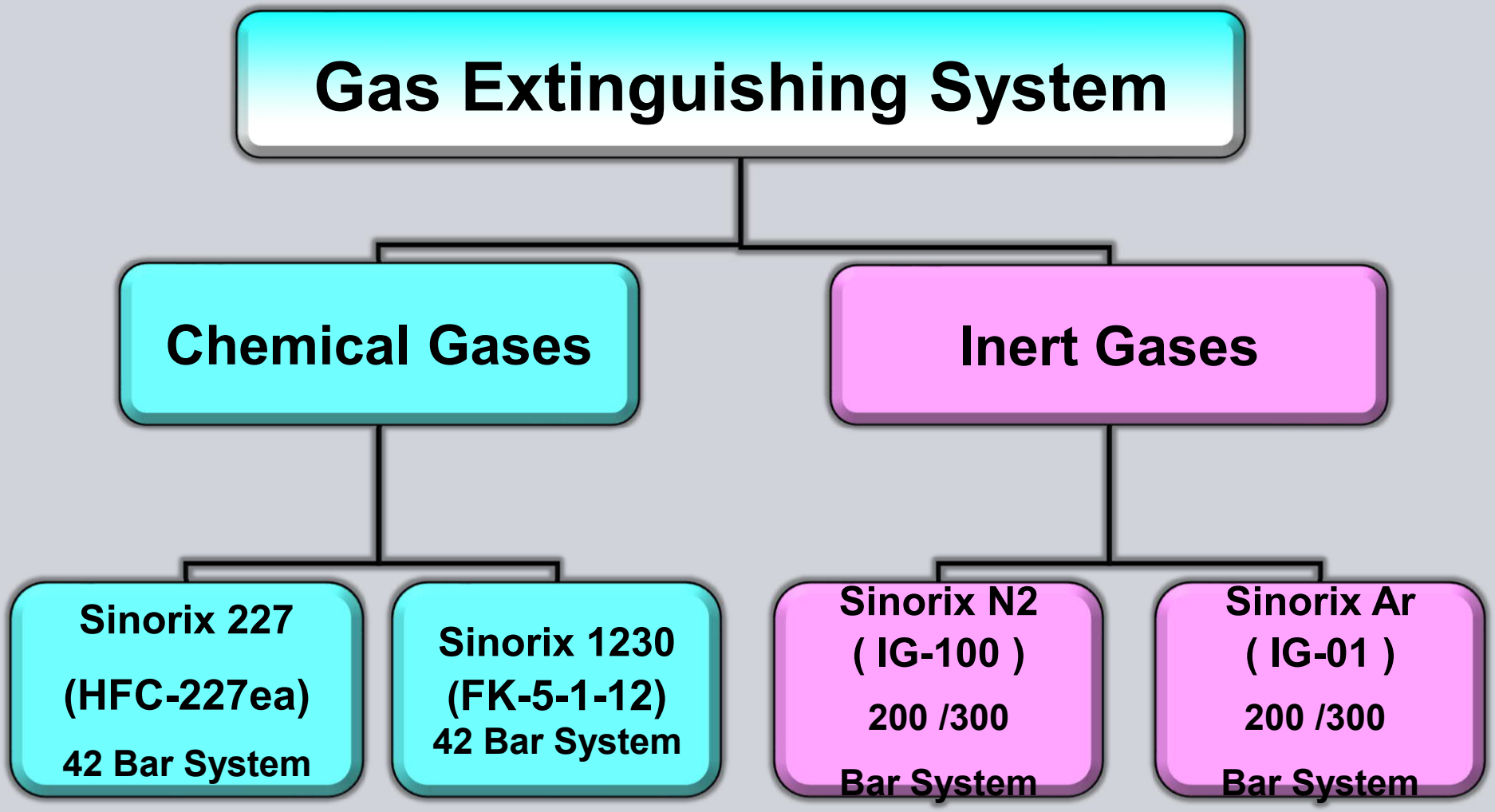
Gas based fire suppression.

SIEMENS



SIEMENS

Types of Agents -Siemens offers



Sinorix 227 Extinguishing System

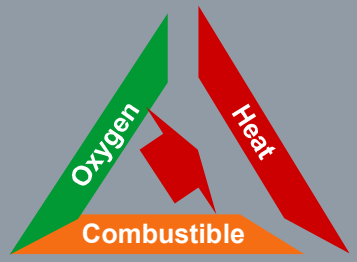
SIEMENS

Sinorix™ 227

Sinorix 227 – Chemical agent

SIEMENS

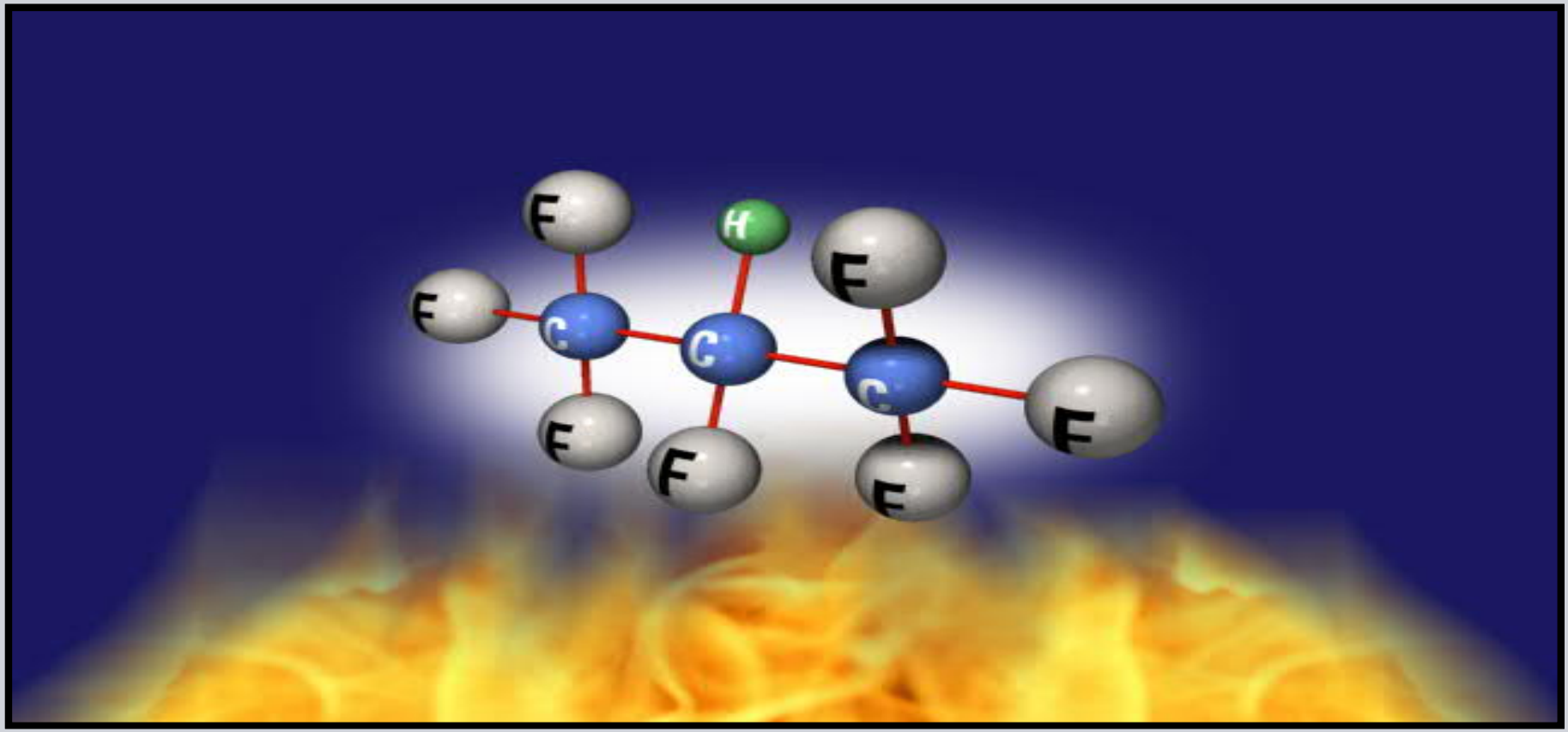
Sinorix is a solution, based on the globally known HFC 227ea with 42-bar technology for fast and reliable extinguishing.



Chemical gases absorb the fire heat, leaving the fire without energy, thus the fire is extinguished.

HFC 227ea Extinguishing Agent

SIEMENS



HFC 227ea - Heptafluoropropane (C_3F_7H)

Sinorix 227

Siemens Brand Name : Sinorix 227

Chemical Name : HFC 227ea

Standard : NFPA-2001(Std on Clean Agent System)

Environmental Parameters of HFC227

SIEMENS

Agent	ODP	GWP	ALT
HFC 227	0	3350 ppm	29 Yrs

ODP - Ozone Depletion Potential

GWP - Global Warming Potential

ALT - Atmospheric Life Time

Design Concentration of Sinorix227

SIEMENS

As per NFPA 2001 :
Design Concentration

1. Class A&C fire – 7.0 Vol %

2. Class B fire - 8.7 Vol %

Basic Gas Quantity :

$$W = \frac{V}{s}\left\{\frac{C}{100-C}\right\}$$

Design concentration is nothing but how much volume of gas is required to quench fire for Room volume %.

V: Volume
S:Specific wt of gas
C: Concentration

Calculating Agent quantity for Sinorix 227ea

SIEMENS

<u>Agent qty will be calculated as follows</u>:

Volume x Flooding factor

HFC227ea required per Cu.m is 0.5486 Kg/M3 @21 Deg.C.

For Ex: 100Cu.M : 100x 0.5486 Kg = 54.86 kg

To maintain 7% Design concentration @ 21Deg.C We need 0.5468 Kg Agent /Cu.M

Cylinder Capacity Available in Siemens

SIEMENS

We have following cylinderes measured in ltrs.

22 Ltr
34 Ltrs
47 Ltrs
67 Ltrs
80 Ltrs
100 Ltrs
120 Ltrs
140Ltr

- **All Cylinders shall be Seamless and PESO (CCoE) Approved, BIS Verified.**

Sinorix 227 Working Pressure

SIEMENS

System Working

Pressure 42 Bar

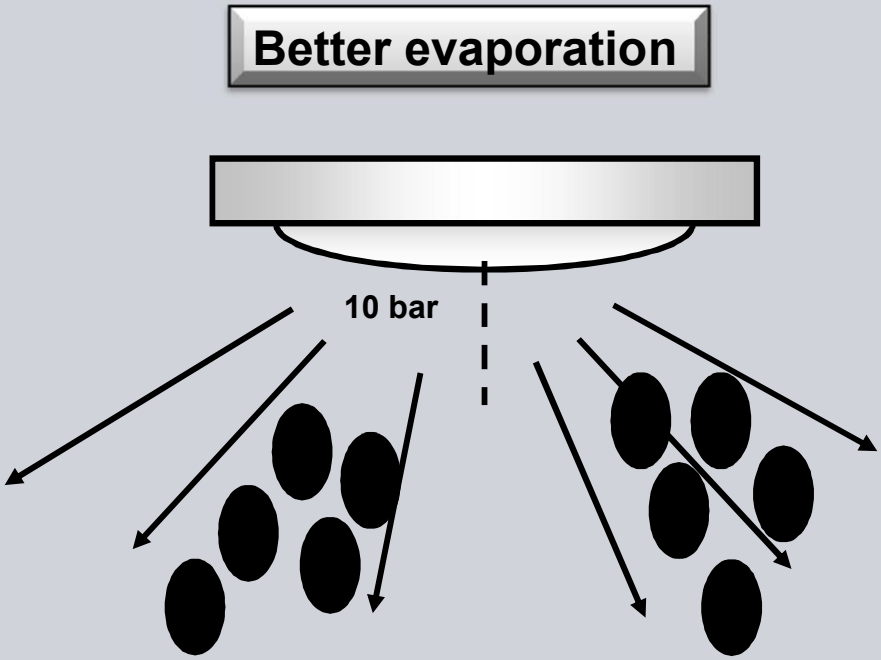
High Pressure Technologies

SIEMENS

- **Fast and total evaporation of the agent during discharge**
- **Perfect homogenisation in the room**
- **Average extinguishing time : 15 seconds**
- **Reduced damage to high value equipment**
- **Less shut down costs due to operational loss**
- **No risk of developing of by-products after extinguishing**

Pressure while discharge will be10 bar

SIEMENS



Extinguishing Behavior of HFC 227

SIEMENS

- **Best suited for all class of Fires**
- **Very fast extinguishing**
- **Discharge time : <10s**
- **Extinguishing time : 10s – 15s**
- **Low temperature reduction during discharge**
- **Electronically non conductive**
- **Excellent use to protect electronic risks**

Toxicology of the HFC 227

SIEMENS

- **Non toxic effect if released into protected area.**
- **Chemically inert and clean**
- **No residues after discharge due to complete evaporation**
- **No interaction with installed equipment**

Toxicology of the HFC 227

SIEMENS

- **We will keep design concentration is 7.0 Vol %**

If it is designed for Low concentration

- **Forming HF and danger to human and equipments**

If it is designed for Higher concentration:

- **Exceed of NOAEL / LOAEL**
- **NOAEL: 9.0 Vol %**
- **LOAEL : 10.5 Vol %**

- **NOAEL- No Observed Adverse Effect Level**

- **LOAEL – Lowest Observable Adverse Effect Level (Toxic)**

Applications

SIEMENS

- Computer Rooms
- Data Centers
- Server Rooms
- Telecommunication Rooms
- Switch Rooms
- UPS Rooms
- Control Rooms
- Tape Storage Rooms

Approvals of Sinorix 227

SIEMENS

- **VdS, Germany**
  - System Approval
  - Hardware
  - Flow calculation software
- **CNPP / APSAD**
- **Hong Kong FSD and China**
- **Chemically inert and clean**
- **National approvals in Europe & Asia Pacifc**

Finding gas quantity and no of cylinders

SIEMENS

Room volume

Min & Max Temperature of the room

Know the class of fire (A or B or C or D or K)

Decide the design concentration

Calculate the required Agent qt (in Kgs)

Choose the suitable cylinder capacity

Choose the fill density in cylinders.

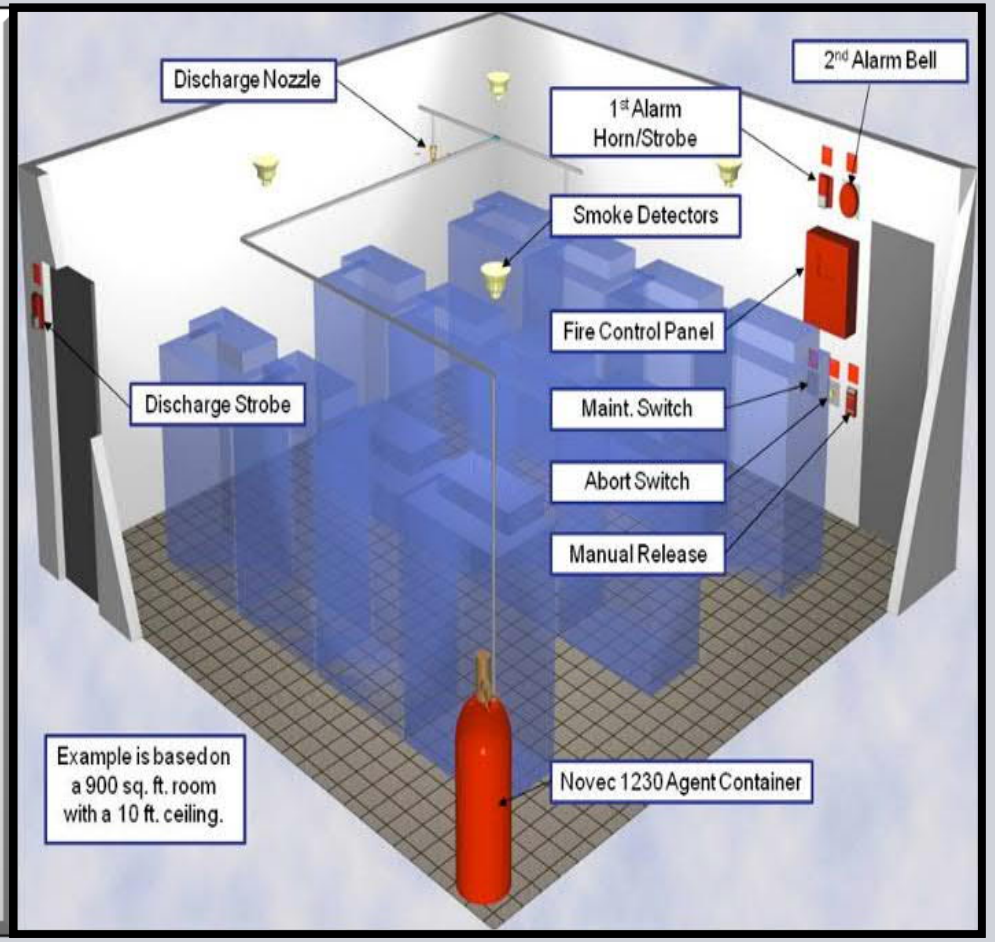
Calculate the No. of cylinders, No. of nozzles

Prepare a piping isometric sketch and BOQ

SIEMENS

Sinorix 1230 Extinguishing System

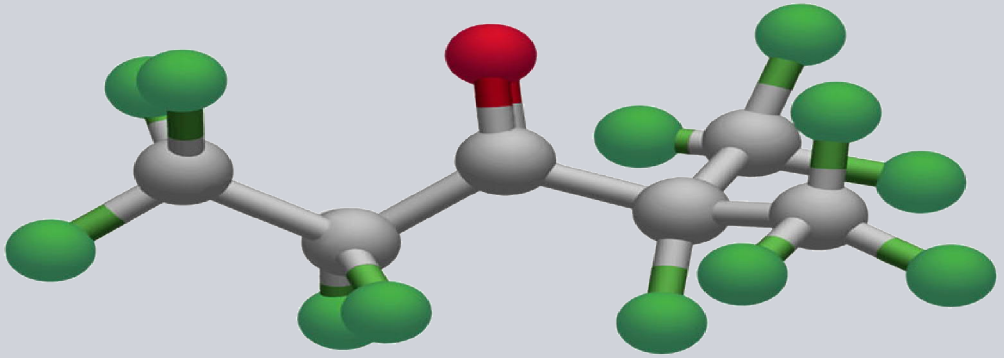
Sinorix™ 1230



NOVEC 1230 Extinguishing Agent

SIEMENS

Chemical Structure and Specifications



CF3CF2C(O)CF(CF3)2

C6 FluoroKetone

Molecular weight	**:**	**316.04**
Boiling point at 1 bar	**:**	**49.0°C**
Liquid density	**:**	**1.600 kg / m3**
Vapour pressure at 25°C	**:**	**0.4 bar**

Manufacturer

- Manufactured by 3M, USA
- Introduced in 2003
- Listed in NFPA-2001
- Designed to balance industry concerns for Human Safety, Fire Protection Performance and the Environment

SIEMENS

Environmental Parameters

Agent	ODP	GWP	ALT
NOVEC 1230	0	1	5 Days

Note:

Not affected by any laws and restrictions based on Kyoto Protocol.

SIEMENS

Fire Extinguishing Principles of NOVEC

Two basic cooling effects:

1. Direct Cooling of the flame

- Reduction of heat by heat absorption

2. Indirect Cooling effect

- Reduction of Oxygen

Note: For each extinguishing concept both cooling effects are present. One is always dominating and other is supportive.

This is common for all clean agents

SIEMENS

Design Concentration of Sinorix 1230

As per NFPA 2001 :

Class A&C fire – 4.7 Vol %

Class B Fire - 5.9 Vol %

Basic Gas Quantity :

$$W = \frac{V}{s}\left\{\frac{C}{100-C}\right\}$$

SIEMENS

Sinorix 1230 Working Pressure

System Working

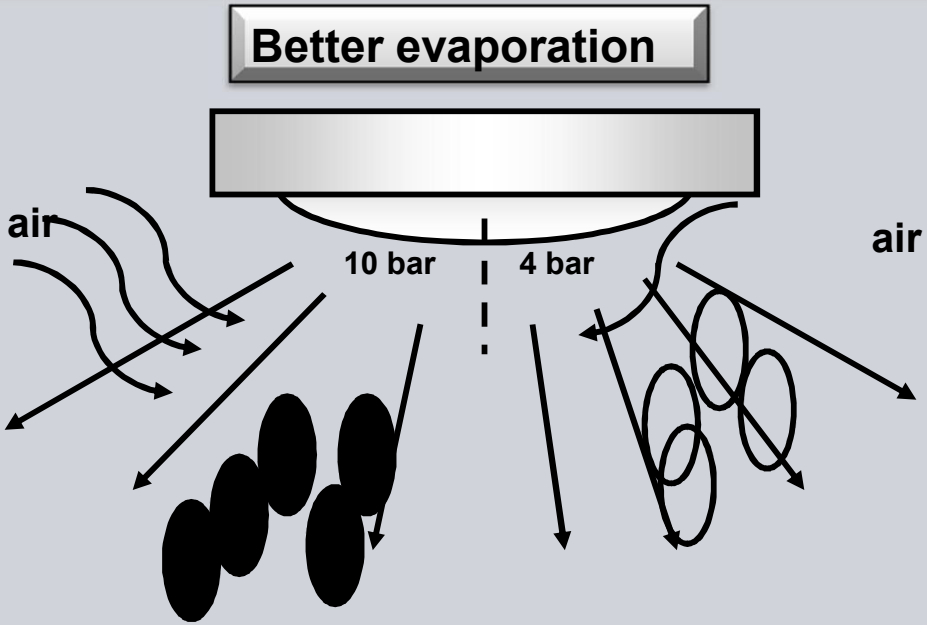
Pressure 42 Bar

High Nozzle Pressure

SIEMENS

- **Is reducing the effective extinguishing time compared**

to conventional low pressure systems by up to 50% by only using basic physical effects given at a minimum nozzle pressure of 10 bar.



SIEMENS

Extinguishing Behavior of Novec 1230

- **Best suited for all class of Fires**
- **Very fast extinguishing**
- **Discharge time : <10s**
- **Extinguishing time: 10s – 15s**
- **Low temperature reduction during discharge**
- **Electronically non conductive**
- **Excellent use to protect electronic risks**

Toxicology of the NOVEC 1230

SIEMENS

- **NOAEL : 10 Vol %**
- **LOAEL : >10 Vol %**

Advantages of NOVEC 1230

SIEMENS

- Highly effective at extinguishing fires
- Safe for valuable assets
- Safe for People
- Zero Ozone depletion potential
- Very short atmospheric lifetime
- Negligible global warming
- Accepted and Preferred around the world

Applications

SIEMENS

- Computer Rooms
- Data Centers
- Server Rooms
- Telecommunication
- Switch Rooms
- UPS Rooms
- Control Rooms
- Tape Storage Rooms
- Cell Sites
- Museum
- Science Labs
- Flammable Liquid Storage
- Archives
- Pharmaceutical
- Healthcare

Applications

SIEMENS

- Computer Rooms
- Data Centers
- Server Rooms
- Telecommunication
- Switch Rooms
- UPS Rooms
- Control Rooms
- Tape Storage Rooms
- Cell Sites
- Museum
- Science Labs
- Flammable Liquid Storage
- Archives
- Pharmaceutical
- Healthcare

SIEMENS

Comparison – HFC227 & NOVEC 1230

DESCRIPTION	HFC 227	NOVEC 1230
ODP	0	0
GWP	3220	1
ALT	29 Years	5 Days
NOAEL	9.0 %	10.0%
LOAEL	> 10.5 %	> 10.0 %
Design Concentration	7.0 %	4.7 %
Flooding Factor	0.5486 Kg/M3	0.684 Kg/M3
Gas Qty for 1000 M3	548.6 Kgs	684.0 Kgs
No. of 120 L cylinder	6 or 7	8 or 9

SIEMENS

Cylinder Capacity Available in Siemens

Sinorix 227 and Sinorix 1230

34 Ltrs

47 Ltrs

67 Ltrs

80 Ltrs

100 Ltrs

SIEMENS

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

SIEMENS

Left blank

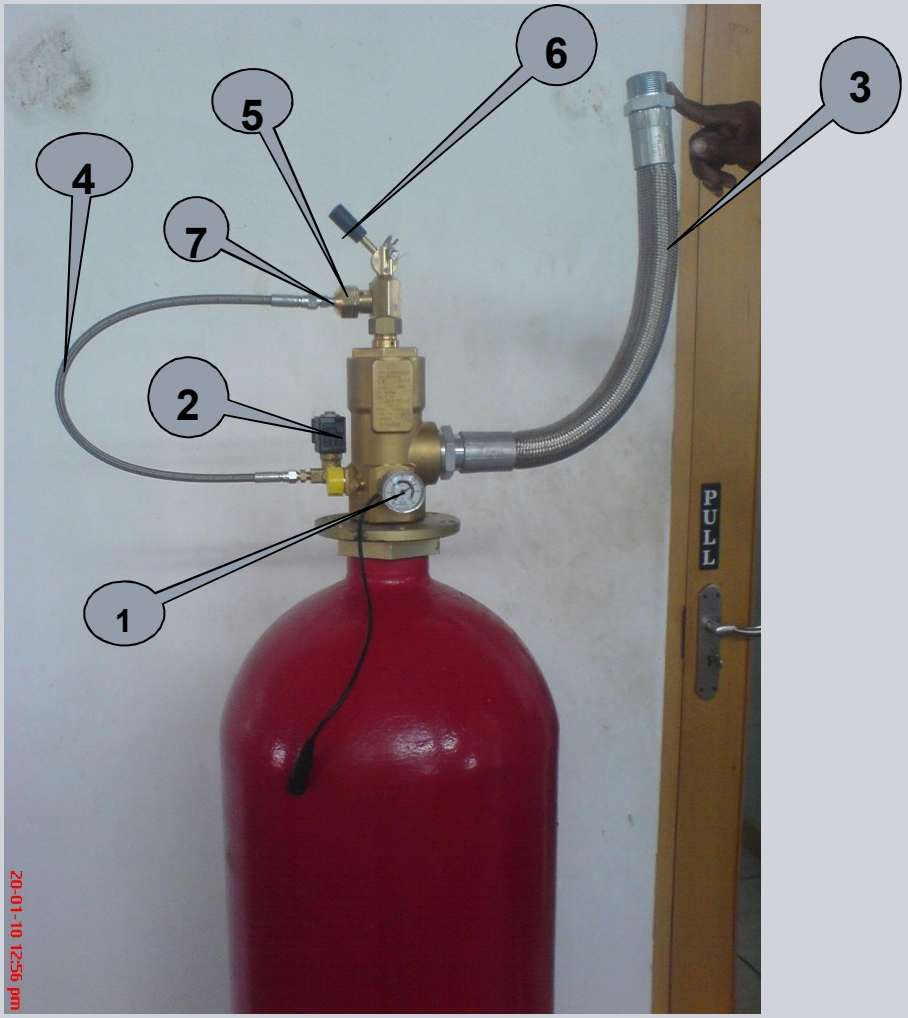
What Makes up a Complete System?

SIEMENS

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

Sinorix - Modular Systems Connections

SIEMENS



Sinorix - Modular Systems Connections

SIEMENS

1. **Pressure Gauge – 1 Nos.**
2. **Electric Actuator (Demadem) – 1 Nos.**
3. **Discharge Hose (FRF 33) – 1 Nos.**
4. **Actuation Hose (Flejic -4)– 1 Nos.**
5. **Pneumatic Actuator (Cp 16) – 1 Nos.**
6. **Pneumatic Manual Actuator (Depym) – 1 Nos.**
7. **Unjic – 1 Nos.**

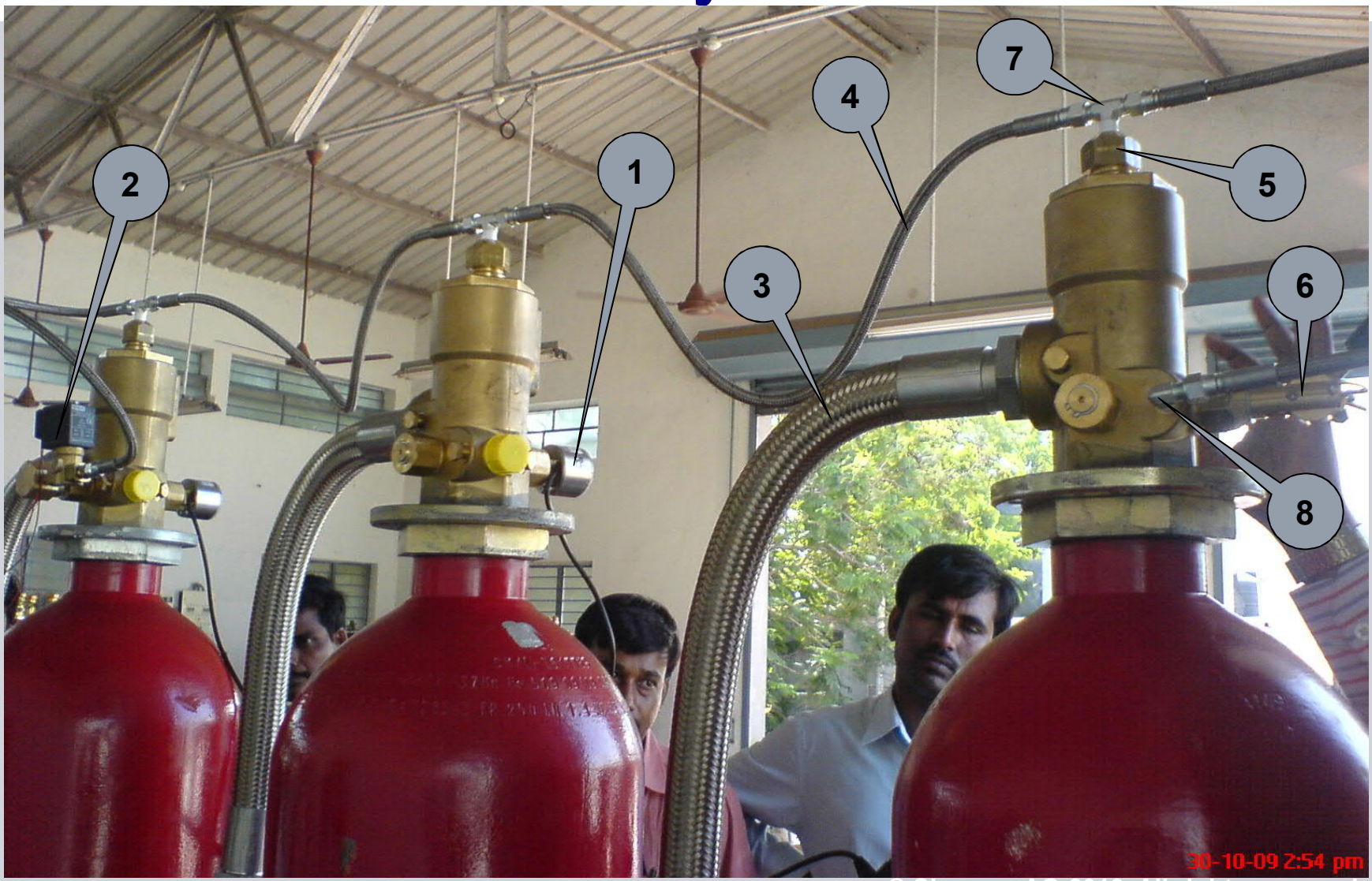
SIEMENS

VSB33 value. – Heart of Sinorix 227 and 1230

Single Cylinder connection

Manual and Pneumatic actuation will be from same point.

Sinorix - Centralised System Connections



Sinorix - Centralised System Connections

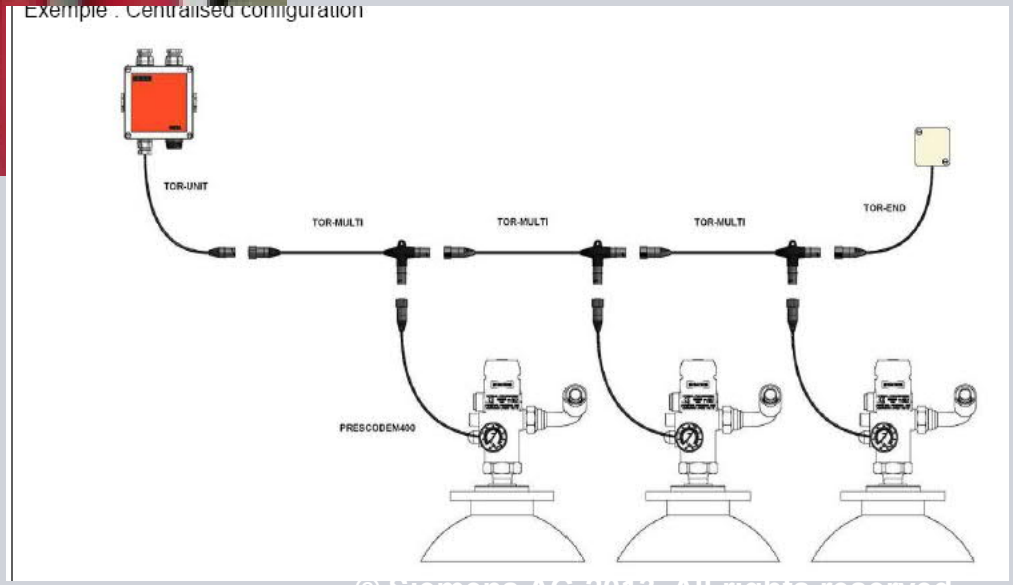
SIEMENS

1. Pressure Gauge (PRESSCODEM) – Nos. of Cyl.
2. Electric Actuator (DEMADEM) – 1 Nos.
3. Discharge Hose (FRF 33) – Nos. of Cyl.
4. Actuation Hose (FLEJIC– 4) – Nos. of Cyl. +1 Nos.
5. Pneumatic Actuator (CP16) – Nos. of Cyl.
6. Manual Actuator (CM16) – 1 Nos.
7. Tee (TEJIC) – Nos. of Cyl.
8. Elbow (EQJIC) – 1 Nos.
9. Check Valve (CARF 33) – Nos. of Cyl.

Sinorix - Centralised System Connections

Centralised Bank- low pressure monitoring connections

SIEMENS



Single cylinder (Modular)

SIEMENS

SIEMENS

Left Blank

Room Integrity test

The purpose:

This is mainly used to find out any leakage in the gas suppression rooms. In case if any holes are there, the gas will leak out through the holes and the purpose of suppressing the fire will not happen.

Hence we need to find those leakages and close those.

We do Gas integrity test.

SIEMENS

Leakage paths has to be arrested.

SIEMENS

Thank you for your Attention