NEWAGE FIRE PROTECTION ENGINEERS PVT LTD

$CO_2$ SYSTEM PRESENTATION
CO₂ SYSTEM

Oldest Fire Fighting System available to mankind, its existence dates back to year 1928 and earlier.

**PROPERTIES OF CO₂ GAS.**

- Colorless, Odorless, Electrically non-conducting inert gas.
- 1.5 times heavier than air.
- Ratio of expansion of liquid CO₂ to gas is very high.
HOW DOES CO2 SYSTEM WORK?

• Fire Triangle.

• Fuel, oxygen, heat – all three are required to sustain a fire.

• Removal of any element of fire triangle results in suppression.

• Principle of Extinguishments.

  1. By reducing concentration of Oxygen below 16% by volume.

  2. By producing cooling effect on CO2, stored in cylinder at sub zero temperatures.
ADVANTAGES OF USING CO2 SYSTEM

- Inert, electrically non-conductive medium is achievable.
- Non-corrosive in nature.
- No clean up required after discharge.
- Economical to install.
- Eco-Friendly. (zero ODP)
- Abundantly available in any part of nation.
- Refill cost is minimal.
APPLICATIONS OF CO₂ SYSTEMS.

CO₂ SYSTEMS CAN BE PROVIDED ONLY ON UNMANNED AREAS.

- Paint Shop Booths & Paint Storage & Mixing Rooms.
- Can be used on Class A, Class B & Class C (E)Hazards.
- Transformers.
- Color Printing machines.
- Battery Rooms.
- Flammable Liquid Storage.
ADVANTAGES OF USING CO2 SYSTEM

- Only System in the world for past 100 years.
- Practically zero down time as stand by Bank can be provided due to economical cost.
- Simplest and easiest construction.
- Very easy to maintain, no specialist required, even the Owner can maintain the System.
- Suited for unmanned area only, but can be provided for manned area with time delay provision.
- NFPA recommends of 60 seconds which ensures uniform & longer discharge, hence no chance of reignition.
- 100% discharge test possible & no mock test. Possible to see the functionality of each & every component thus ensuring 100% surety.
Different types of CO\textsubscript{2} SYSTEM

- High Pressure – Storage Pressure 850 PSI AT 27\textdegree{}C.

- Low Pressure – Storage Pressure 300 PSI which is to be maintained at -18\textdegree{}C.

- Local Application: Rate by Area method. Rate by Volume method.

- Total Flooding: For Surface Fires. For Deep Sealed Fires.

- Combination System
**Design Basis**

- **Applicable Standard**: NFPA 12, 2015 Ed.
- **Room temperature considered**: 21 Deg.C
- **Minimum conc. of agent as per**: 
  - (For Dry Electrical Hazard): 50% (Class ‘A’ and ‘C’ Fire).
  - (For Record (bulk paper) storage, ducts, covered trenches): 65% (Class ‘A’ Fire).
  - (For Fur storage vaults, dust collectors): 75% (Class ‘A’ Fire).
- **System pressure**: 60 Bar
- **Maximum discharge time**: 
  - Total flooding 60 Seconds.
  - Local flooding 30 Seconds
- **Safety during maintenance**: As per NFPA 12, 2015 edition, a manually operated Supervisory lockout valve which can be locked in close position
CO2 GAS Engineered System

- Distribution Pipe
- Containers
- Discharge Nozzle
- Smoke Detectors
- Raised Floor
- Manual Station
SAMPLE CALCULATION.

- Area : Electrical room.
- Dimensions L X W X H : 10 MTR X 5 MTR X 3 MTR
- Enclosed /Open : Enclosed.
- Type of Flooding : Total
- Volume in Cu mtr (V) : 150.
- Room temperature considered : 21 Deg.C
- Minimum design concentration : 50%
- Material Conversion factor (MCF) as per NFPA 12 : 1.6
- Flooding factor (Kg/ Cu Mtr ) (FF) as per NFPA 12 : 0.8
- Basic Quantity of CO2 gas in Kg : $V \times MCF \times VF = 150 \times 1.6 \times 0.8 = 192$
- Capacity of each CO2 Cylinder : 45 Kg.
- No of CO2 Cylinders required : 4.26, say 5 Nos.
Newage Co2 system has provision to actuate the system Automatically, Pneumatically, or Manually.

- **Automatic**: From Fire Detectors
- **Pneumatically**: Through Nitrogen /CO2 gas
- **Manual**: Through Manual Release switch or Through Manual lever on Master CO2 cylinder

Flow calculation can be provided with the help of UL Listed software.
APPLICATIONS OF CO₂ SYSTEMS

- Electric Generators.
- Switchgear Equipments.
- Panels.
- Transformers.
- Drawing Offices.
- Diesel & Electrical Locomotives.
- Cables Galleries.
- Record Data Storages
- Engine test cells
DATA REQUIRED FROM OWNER

- Hazard is Enclosed or Open.
- Materials involved in the protected area.
- Dimensions of Hazard. Length x Width x Height.
- Height should give details of Main void + False ceiling + False flooring.
- Surrounding area that could affect protected hazard.
- Any opening or outlets.
- Other electrical appliances like A/C or Fuel devices etc.
- Discharge to be Automatic or Manual or Both.
- Location of CO2 Cylinders and Control panels.
- Site location.
- Main Bank & Standby Bank is required.
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<th>APPROVAL</th>
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<td>1</td>
<td>CO2 CYLINDER</td>
<td>68 LTR WATER CAPACITY FILLED WITH 45 KG CO2 GAS</td>
<td>IS 7285 AND PESO</td>
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<td>DISCHARGE AND INTERCONNECTION HOSES ,</td>
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<td>MANIFOLD CHECK VALVE , NOZZLES</td>
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<td>DEVICE WITH LIMIT SWITCH</td>
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<td>5</td>
<td>DIRECTIONAL VALVES , PIPING , FITTINGS</td>
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CO2 CYLINDER BANK.
CO2 VALVES, HOSES AND WEIGHING DEVICE.
WEIGHING SCALE. MAIN & STANDBY BANK.
MIMIC PANELS AND DIRECTIONAL VALVES
CO2 GAS RELEASE PANELS.
CO2 SYSTEM INSTALLED AT GAIL.
SAFETY ASPECT FOR CO₂ SYSTEM INSTALLED

- Direct contact with co2 can cause severe frostbite burn to skin. This hazard is limited to vicinity of nozzle.

- Detail and glow sign must be prominently displayed in hazardous area to aware persons for protection provided by co2.

- Exit system in glow sign must be clearly and prominently displayed for safe passage of personnels.
SAFETY ASPECT FOR CO₂ SYSTEM INSTALLED

- Alarm should be strategically located for clear audible.

- Necessary equipments must be provided for removing the discharge.

- Co₂ after fire incident to ensure removal of co₂ before entry of personnel.

- BA set must be provided for safety people.