IMPORTANCE OF SELECTING THE CORRECT PIPE SIZE & NOZZLE ORIFICE CODE IN CO_2 FIRE SUPPRESSION SYSTEM

Why choosing the correct Nozzle orifice Code is important?

The effectiveness of any Fire Suppression System depends on the delivery characteristics and discharge parameters of the Nozzles.

It is not true that only clean agent systems are to be designed carefully and that it is not necessary for CO_2 systems. It is true that clean agent (chemical gas) system are to be designed correctly because discharge time is 10 seconds. However it does not mean that design of other gas system design is not important.

Improper selection of orifice leads to many design related issues such as,

- **Improper Agent / Gas flow in the Pipe Distribution line:**

  CO_2 System shall be designed to provide uniform gas flow to achieve the design concentration within the required time as per the design guidelines stated in the National & International Standards. CO2 agent is flowing through pipeline in two phase ie. Liquid phase & vapor phase. It is important to maintain liquid phase as much as possible up to the nozzle to achieve best extinguishing capability. Poor selection of nozzle orifice may cause delay or even failure to achieve required Design Concentration.

  This is possible only with properly designed pipe size & nozzle orifice.

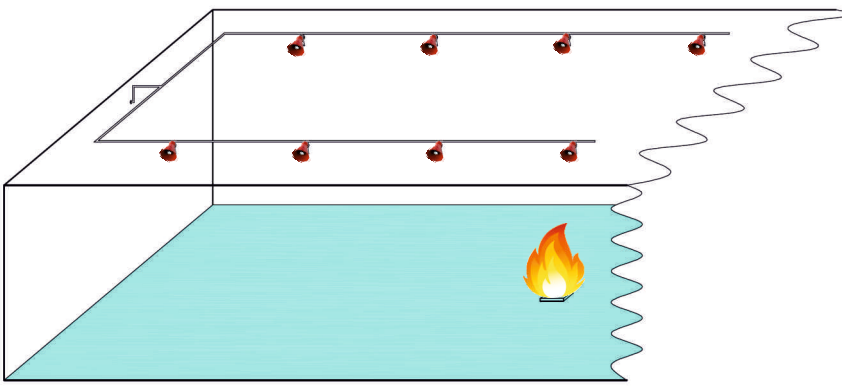
- **Discharge Duration may vary:**

  Discharge Duration is not as per the design requirement. (i.e.)., The System may be designed for 60 Seconds. However it can be found that the actual discharge is more than 200 seconds.

- **Danger of Freezing and Starving for gas:**

  One of the highly overlooked factors are the result of poor hydraulic pipeline design and incorrect selection of pipe sizes and nozzle orifices. Minimum Nozzle orifices and extreme pressure drop in the pipeline may cause freezing and this may lead to nozzle obstruction and blocks the gas release in the risk area at the time of emergency.

Consider a CO_2 Discharge scenario,



Here, the room/risk area is protected with 8 Nozzles. As per design requirement, all the 8 Nozzles should release CO_2 Gas uniformly to achieve the desired CO_2 Concentration. If you think all nozzles will release CO_2 uniformly, you may be wrong.

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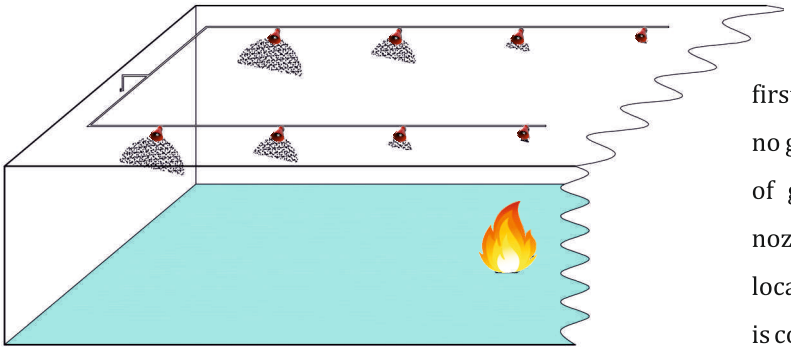
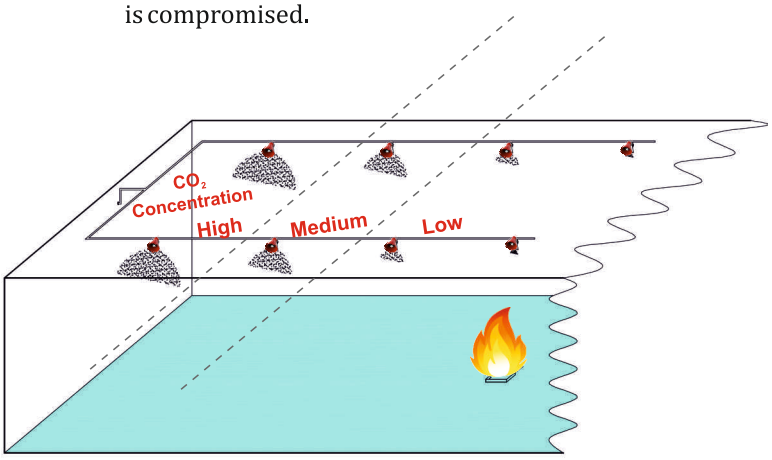
GAS BASED FIRE SUPPRESSION SYSTEM

35 YEARS 1985 - 2020

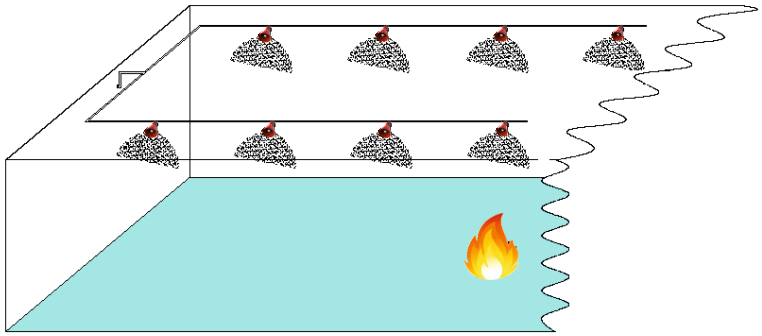


Here, you can see that CO_2 is being released in the first few nozzles and the last few nozzles (remotest) have no gas coming out. The remote nozzles starve since most of gas are already discharged through the first few nozzles. If fire is originating at the remote nozzle location, the direct extinguishing capability of the system is compromised.

CO_2 Gas Starvation at the remotest nozzles may not only affect the extinguishing capability, it can also expedite the fire spread and flame propagation. This condition may worsen if the risk area has any uncloseable openings where even the total flooding and minimum O_2 Concentration cannot be achieved to suppress (or) extinguish the Fire.



How to solve and improve the situation?



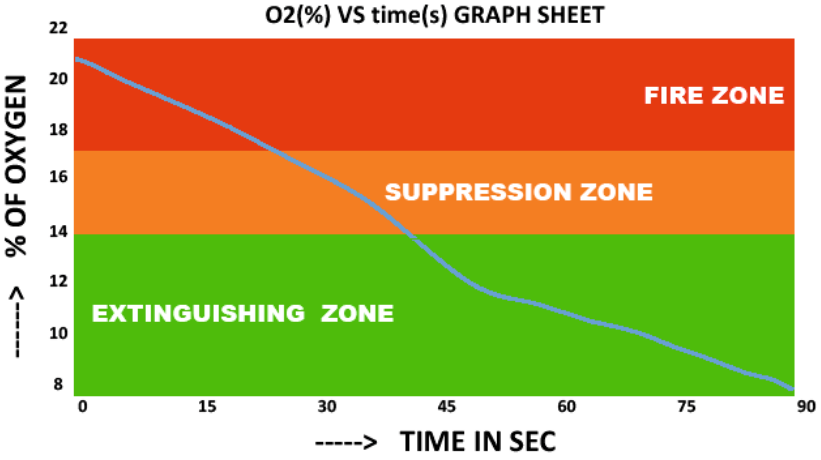
bala-wa series.. CO_2 Systems are precisely engineered using the licensed VdS CO_2 Calculation program.

Calculate & arrive the required No. of Nozzles and its orifices.

Ensure the Nozzles are installed at site as per their orifice code in accordance to the calculation program.

Now the Gas Discharge will be uniform to ensure better extinguishing capability.

For critical applications, we recommend to ensure the effectiveness by an actual CO_2 dump test. The actual CO_2 Concentration can be monitored & recorded using designated instruments during the actual dump test and a report will be generated with a graph showing the extinguishing capability.



Discharge Time Vs O_2 % in air chart.