CHEMETRON™ Fire Systems

CARDOX

CO_2 Application Bulletin

CARBON DIOXIDE FIRE SUPPRESSION —

Vent Stack *Snuffing*

When it's necessary to extinguish a fire at the end of a vent pipe, boom, or stack, CO_2 can be used — and it has become a popular choice.

CO_2 is introduced into the venting pipe to flow along with the gas being vented. The introduction point is near the end of the venting pipe (within 10 feet/3 meters). The amount of CO_2 needed is that required to make the gas (normally methane/natural gas) non-flammable when any amount of air is added.

In the past there has been some misunderstanding as to the CO_2 quantities required. This is not the same as a room flooding application. The design concentration given in NFPA Standard No. 12 for protecting a hazard where methane gas is the combustible does not apply. In that total flooding application, the combustible is assumed to be in the protected enclosure in the proper amount, so that when mixed with air, it is in the combustible range. Adding the proper amount of CO_2 will put out the fire.

In this application, a specific amount of gas, which burns when it reaches air at the end of the pipe, is flowing through a vent pipe. It is necessary to add a sufficient quantity of CO_2 to the gas flow so that the resultant mixture is non-flammable when any amount of air is added.

For this application, the reference document is Purging Principles and Practices, published by the American Gas Association. From the table on the next page, you can see that good design calls for adding 82% CO_2 when venting methane.

System Design

Let's assume that gas flow is 150 cubic meters/ hour (5300 cubic feet/hr). That is 88.3 cfm.

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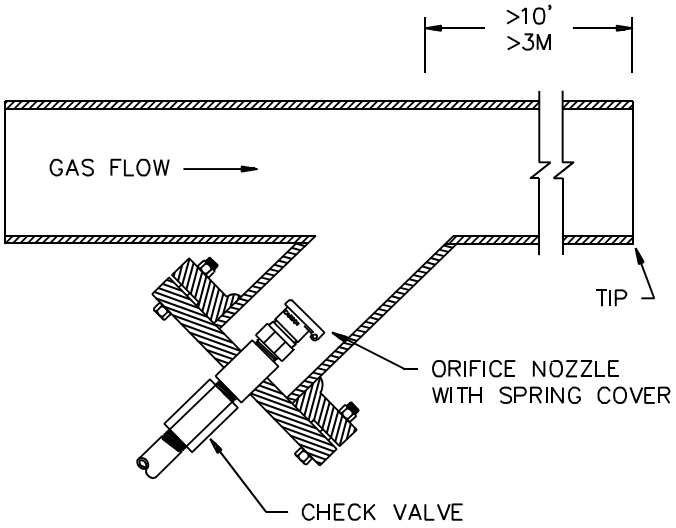
Branded: 06/2023 20230601SM

If the mixture of CO_2 and gas is to be 82% CO_2 and 18% gas, then the 88.3 cfm of gas can be only 18% of the total flow. Total flow would be 88.3 ÷ 0.18, or 490.7 cfm. CO_2 flow at 82% will be 490.7 x 0.82, or 402.4 cfm.

Assuming an expansion of 1 lb. of CO_2 to 8.3 cubic feet, this works out to 48.5 lbs. per minute (call it 50 lbs/min).

It is recommended that CO_2 sufficient for a 5 minute discharge be provided to allow for adequate cooling.

An arrangement such as that illustrated below is recommended to assure good gas introduction, mixing, and nozzle projection.



SUGGESTED NOZZLE ARRANGEMENT

Inert Gas End Points for Purging Out of Service				
Combustible	Purge Medium			
	% Required to render mixtures non-flammable when any amount of air is added		Purging end point with 20% safety factor	
	CO_2	N^2	CO_2	N^2
Hydrogen	91	95	93	96
Carbon Monoxide	68	81	74	85
Methane	77	86	82	89
Ethane	88	93	91	95
Propane	89	94	91	95
Butane	91	95	93	96
Iso-butane	91	95	93	96
Pentane	96	97	97	98
Hexane	96	97	97	98
Gasoline	93	96	95	97
Ethylene	90	94	92	95
Propylene	94	96	95	97
Benzene	93	96	95	97