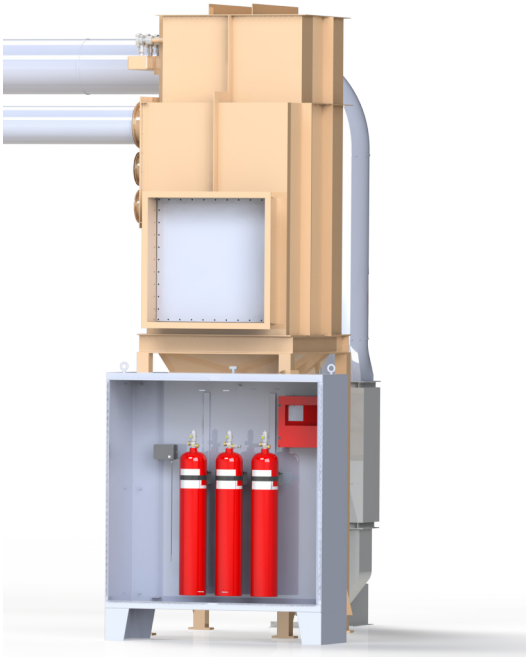
RAPTOR BREATH DESIGN AND SELECTION GUIDE

2024 - First Edition - Version 0001



NFPA

BOSS PRODUCTS LLC

RAPTOR Series

Revision Change Log

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Introduction

The Raptor Breath Extinguishing system is a fire suppression system designed for use with dust collecting systems and other equipment. It uses compressed CO2 as a way to displace oxygen and absort heat to starve and cool fires.
The Raptor Breath Extinguishing system minimizes the amount of engineering time required when evaluating a design for a specific application. So long as the discharge piping, tubing, and nozzles are installed within the limits prescribed in this design selection guide, no calculations are required for pressure drop, flow rates or discharge time. When the additional limitations of hazard volume, design concentration, agent quantity, detector arrangement, etc., are also met, the unit installation can be understood to comply with the design requirements and NFPA-12.

Raptor Breath Co_2 Fire Extinguishing System How It Works

The Raptor Breath CO2 Fire Extinguishing System is a complete package that is designed to protect a dust collecting vessel against deepseated fires. The Raptor Breath operates on 3 main principles which are crucial to smooth and proper extinguishing of fires, Detect, Isolate, Suppress.

Detect: Thermal Probes attached to the protected dust collecting vessel are able to sense a rapid rise in termperature, alerting the RS-CU1610SD that a fire has occured.

Isolate: When a fire is detected the RS-CU1610SD responds by isolating the dust collector closing installed inlet and outlet Firebreak Shutters. This contains smoke, fire, embers, and CO2 to the dust collector.

Suppress: The Raptor Breath suppresses fires by way of oxygen displacement through the use of CO2 gas. Simultaneously to isolating the fire, when a fire is detected, CO2 gas is released into the now contained dust collector to suffocate any fires. Gas concentration should remain inside for up to 20 minutes and be 70% or higher.

Each Raptor Breath consists of these main components and many other smaller subcomponents:

- CO2 Tank, up to 3
- RS-CU1610SD Control Unit
- Dual Pressure Switch Assembly with pressure gauge
- Solenoid
- Thermal Probes
- Firebreak Shutters

The mechanism for releasing the gas is a valve fixed to the CO2 tank called an IHP valve, and a pressurized tube with attached solenoid and dual pressure switch assembly. When a fire is detected by the thermal probes, the control unit responds by opening the solenoid and releasing all nitrogen gas in the pressurized line. This line is connected to the IHP valve which works by using pressurized gas to compress a piston and keep the CO2 gas inside the tank. When the nitrogen line is depressurized the IHP valve piston is released and lets the CO2 tank discharge into the attached fire suppression lines connected to the dust collector.

The dual pressure switch is responsible for monitoring the pressure in the nitrogen line. It communicates with the control unit to notify the user when pressure drops below 170 PSI and 70 PSI. Each of these notifications is responsible for energizing a relay to optionally activate customer owned devices.

Design Considerations

The following procedures should be used to select the proper Raptor Breath CO_2 System. In addition, the applicable requirements specified in NFPA- 12 should be followed. Provisions must be made to provide means to close all openings in the hazard enclosure and shut-off ventilation at the time of discharge.

The total flooding quantity of CO_2 agent needed to protect an enclosure containing a material requiring a 75% design concentration. The Raptor Breath system already takes this into account with the system designs and eliminates the need to do additional calculations. It's important not to exceed the prescribed design criteria noted below. Doing so may lessen the effectiveness of the Raptor Breath Extinguishing system and add extra hazard to personnel. The maximum volume that can be protected by the CO_2 tanks is dependent on the minimum design concentration.

1. RB-1 - 300ft^3 - (50lbs)
2. RB-2 - 600ft^3 - (100lbs)
3. RB-3 - 900ft^3 - (150lbs)

Selection of System

1. Conduct a survey and analysis of the hazard to be protected
2. Determine the height, length, and width of the enclosure
3. Calculate the volume
4. Based on the volume select the correct package size (see above)

Guidelines

- Ensure the Raptor Breath final installation location will not be in temperatures outside the range of 0°F - 130°F. Note that if Raptor Breath is installed out of this temperature range then design considerations need to be made to have NFPA Approval (NFPA 4.6.5.5.1)
- The final installation location should not be father than the supplied 16ft of piping can reach when connected to the dust collector.
- For FM approval, one side L x W x H of the hazard volume to be protected must be under 2ft in length. This ensures that a space is unoccupiable.
- Ensure that entering and exiting air flows can be blocked off during activation of the Raptor Breath. We recommend using our Firebreak Shutters for this purpose.
- Ensure a minimum of one thermal probe, used for triggering the release of CO2, is in the clean air plenum and one thermal probe is in the hopper. More are recommended for bigger hazard volumes.
- The Raptor Breath should not experience mechanical, chemical, or other damage, which could render the Raptor Breath inoperable. The Raptor Breath must be installed in accordance with the instructions in this manual and NFPA 12.
- Raptor Breah not to be installed in normally occupied enclosures unless end user follows NFPA guidlines.
- Determine the location and quantity of nozzles required, based on the size and configuration of the enclosure (1 Tank= 2 nozzles, 2 Tanks= 4 Nozzles, 3 Tanks= 6 Nozzles)
- Prepare system drawings, bill of materials list, etc; following Section 4.4 of NFPA-12 2005 Edition.

In addition to these guidelines, it is imperative that any NFPA guidelines regarding CO2 Extinguishing System Standards be followed as well.

Design Considerations - Cont.

One size nozzle is to be used with all Raptor Breath CO_2 extinguisher systems in total flooding applications.

Placement of nozzles shall be such that discharge of CO_2 will not splash flammable liquids or create dust clouds that could extend the fire.

More than one nozzle can be used to protect a particular hazard, as long as the "Equivalent Length of Hose" for Raptor Breath CO_2 systems is not exceeded.

Boss products should determine on a case by case basis what the optimal hose assembly is based on information provided by the customer. Information such as nozzle locations (discussed later in this manual) and placement of the Raptor Breath all determine what kind of hose assembly will be purchase, shipped, and installed for the end user. Boss Products ships the Raptor Breath System with the hose assembly that we have determined fits your application.

The maximum "Equivalent Length of Piping" shall not exceed 24ft. The "Equivalent Length of Piping" includes individual lengths of hose and all hose fittings. See below for the equivalent lengths of ½ inch threaded hose fittings that need to be considered when determining the total "Equivalent Length of Piping".

Hose Component (1/2")	Equivalent Length (ft)
45° Elbow	0.8
90° Elbow	1.7
90° Elbow long Radius & Tee Thru Flow	1.0
Tee Side	3.4
Union Coupling	0.4

All components should be installed to facilitate proper inspection, testing, recharging, and any other required service or maintenance as may be necessary. Equipment must not be subjected to severe weather conditions or mechanical, chemical, or other damage, which could render the equipment inoperative. The equipment must be installed in accordance with instructions in this manual and NFPA 12.

The CO_2 System should be located as close as possible to the protected enclosure. The assemblies shall be located in a readily accessible location to allow for ease of inspection service and maintenance.

Cylinder and bracket must be mounted in the vertical plane with the cylinder valve facing up.

Recommended Location of Thermal Probes

Positioning and Number of Thermal Probes on Dust Collectors, Filters, Silos, Dust Bins, Conveyors:

Dust Collectors:
Either:
- 2 opposing probes installed in clean air plenum (above filter bags)
- 1 probe in clean air plenum (above filter bags) and 1 in the dust collector hopper

Silos:

- 1 probe in clean air plenum (above filter bags) and 1 in the internal storage area

NOTE 1 : In dust collectors longer than 16.5 ft (5m) it is recommended to install 4 thermal probes that are equally divided between filter and hopper sections.

NOTE 2 : In silos and dust bins larger than 13 ft (4m) it is recommended to install 4 thermal probes that are equally divided between filter and storage sections.

NOTE 3 : Each individual application should be closely studied to ensure the correct location and the quantity of thermal probes to be installed. Special considerations include mounting location, fire hazard of the dust, collector design (to ensure all areas are covered/consideration to varying temperatures in compartments) and timeliness. It is always better to error on the side of caution and install more probes at closer spacing.

NOTE 4 : When applying the thermal probe detection system on dust collecting applications not described above, the same design parameters for “prevention”, timeliness of detection are to be considered.
Please contact factory for design guidance and application viability.

Recommended Location of Nozzles on Dust Collector For (1 and 2) Tanks Systems

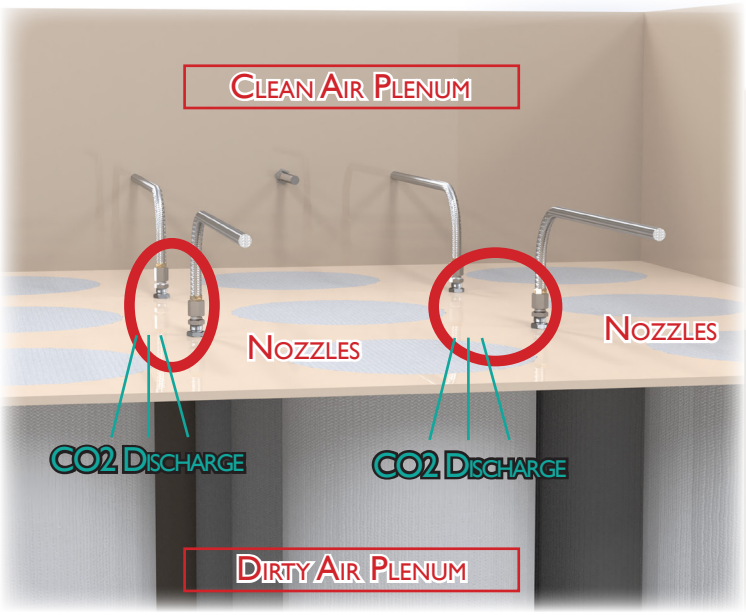
Nozzle installation locations should already be selected before installation of your Raptor Breath as part of our design and selection guide, and will be done on a case by case basis because all dust collecting systems are different. However, there are some general rules to follow listed below:

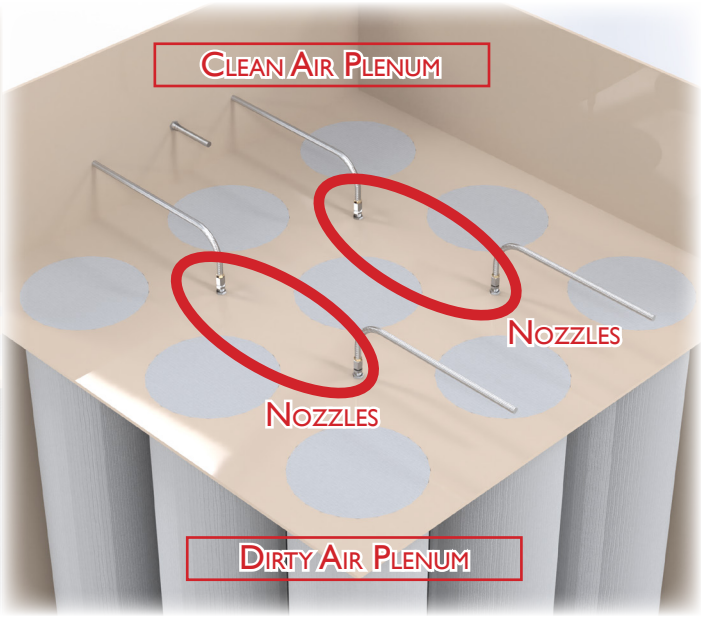
- Nozzles should be placed near hazards
- Nozzles should not discharge directly into hazards which could otherwise kick up/stir up more flammable debris (such as filters)
- Nozzles should avoid blockages, or areas where their discharge flow is immediately blocked
- Nozzles sharing the same tank should avoid changes in height from nozzle to nozzle to keep discharge times and CO2 discharge quatity the same for both nozzles
- 2 nozzles recommended be used per 50lb tank
- A general rule of thumb is nozzles go in the clean air side and discharge into the dirty side for verticaly oriented filters of dust collectors. If height is an issue then nozzles should be installed in the dirty side of the dust collector.
- For horizontaly oriented filters of dust collectors, if direct access is open to filter ends then nozzles should be placed in such a way that they discharge down the length of filters.

For veritcally oriented filters of dust collectors the ideal installation of the nozzles is inside the clean air plenum penetrating into the dirty air plenum between the filters. The nozzles must be located in way that they are not discharging directly into filter media. This configuration is only possible if the maximum hose length including equivalent hose lengths from all fittings have been taken into account

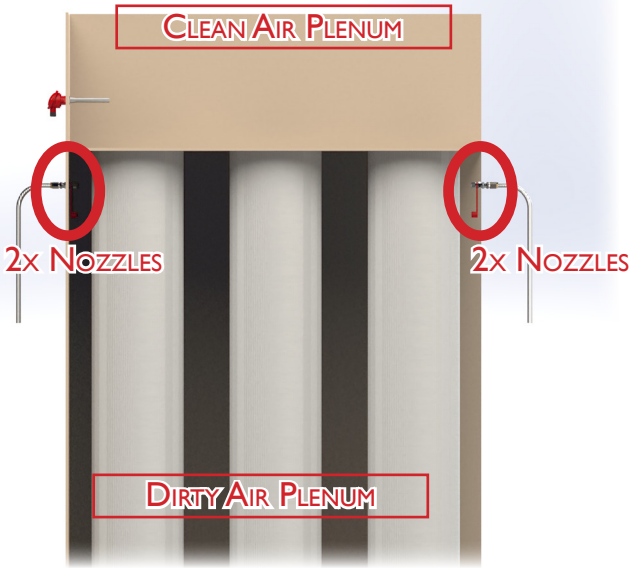
For horizontally oriented filters of dust collectors the ideal installation of nozzles is on the side from which nozzles can discharge down the length of the filters maximizing the coverage of CO2 agent over the filters. Ensure that ample space is provided between nozzles and filters so that additional dust is not distributed throughout the hazard volume.

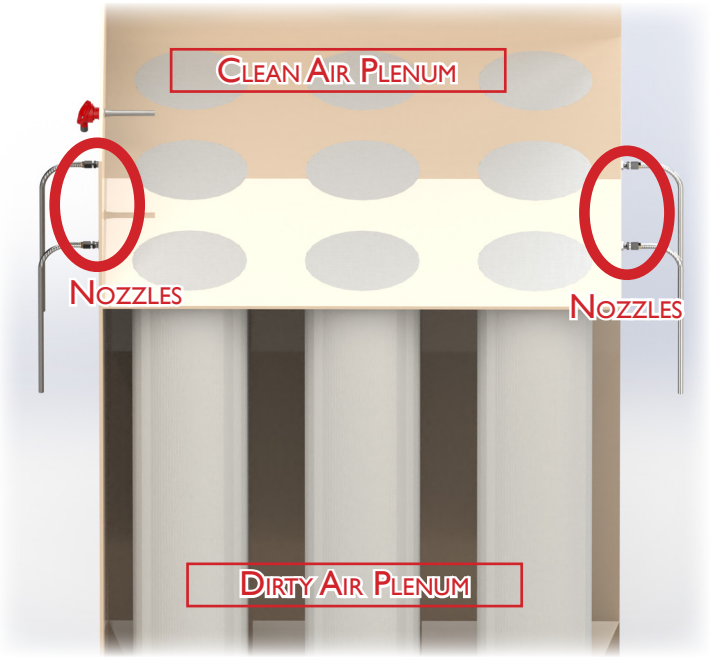
The images depicted below show the installation of CO2 nozzles installed in the clean air plenum with additional thermal probe installations.



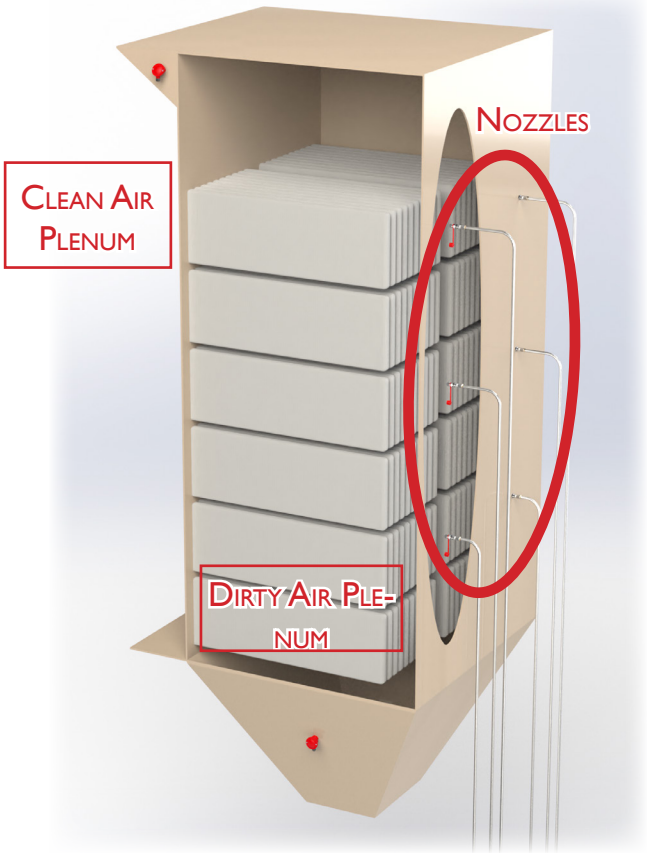


If the maximum hose length limitation does not allow for the nozzles to be located in the clean air plenum as shown above then the nozzles will need to be located in the dirty air plenum between the filter media. See figures below.





The images depicted below show the installation of CO2 nozzles and thermal probes installed on a dust collector with horizontally oriented filters. When available, CO2 nozzles can be installed on the side of the dust collector that is open to filter ends to allow CO2 nozzles to discharge down the length of the filters.



RAPTOR BREATH™

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