martin engineering®

Understanding Engineered Controls to

# REDUCE SILICA DUST

# TABLE OF CONTENTS

# INTRODUCTION

## COMBATING SILICA DUST: THE CASE FOR ENGINEERING CONTROLS

It is not uncommon for bulk material handling facilities to battle dust issues. One significant source of dust creation is a belt conveyor transfer point or load zone. Load zones create dust as bulk material is transferred from one belt to another or from a crusher to a belt because the material is in a state of free fall and exposed to significant airflow. This airflow, if severe enough, will carry dust throughout an operation.

Dust can quickly get out of hand once it's airborne. It not only decreases safety, productivity, and morale - it draws the attention of regulatory agencies. Given MSHA's attention to the permissible exposure limit, we want to help operations understand why and how to best combat silica dust. A large emphasis has been placed on "using engineering controls," a method we have favored, suggested to use, and executed for material handlers over the course of our 80 years in business.

# NONCOMPLIANCE

The permissible limit is being cut in half, from 100 micrograms to 50 micrograms with sampling required at 25 micrograms.

## SAMPLING

Once found in violation, sampling is required/ mandated and can be time-consuming, repetitive, and costly.

## PPE

Personal protective equipment is a temporary solution and will not be acceptable as a compliance measure.

## HASSLES OF NONCOMPLIANCE

Once you're found noncompliant, getting back on track is far more challenging than simply following the rules from the start.

# SAMPLING

As the proposed rule currently reads, MSHA-governed facilities, if found in violation, will have to undergo continuous sampling and testing, which might present a significant burden to the operation. If your operation doesn't know where you fall, it is recommended to get a sampling. MSHA will look for "representative groups" to use in sampling including a few people from similar work areas across the entire operation.

## BASELINE SAMPLING

**Between 25-50mg**
Periodic sampling is triggered

**Greater than 50mg**
Triggers corrective action (required to be remedied within the next shift) and monitoring

**The first time falling below 25mg**
Sample again in 3 months

**Repeat sampling still below  25mg**
Discontinue periodic sampling

# PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) will not be an acceptable solution to comply. PPE such as masks and respirators are only temporary solutions while proper engineering controls are implemented. One notable change is an N95 mask will no longer be acceptable. A dual-cartridge respirator will be needed.

# HASSLES OF NONCOMPLIANCE

Taking into account the inconvenience of repeated sampling, potential citations with associated costs, and the health & safety risks, it is in an operation's best interest to get ahead of the proposed ruling. By fully understanding the proposed ruling, you can choose how to best move forward in controlling silica dust and complying.

# MATERIAL CONTAINMENT

One of the easiest and most effective methods to reduce fugitive dust is to contain it, minimizing the amount of fugitive dust that becomes airborne in the first place. This prevents the hazards caused by runaway dust – such as health issues, silicosis, and lung disease that can result from dust inhalation – by stopping it at the source. While it is unlikely dust can be completely eliminated, the first consideration in dust control should always be the minimization of the amount of airborne dust created. Therefore, any change in system design or production technique that will reduce the amount of dust produced should be considered. For example, minimizing the drop height reduces the amount of energy imparted to the fines and cuts the amount of dust driven off into the air.

## BELT SUPPORT

## BELT SEALING

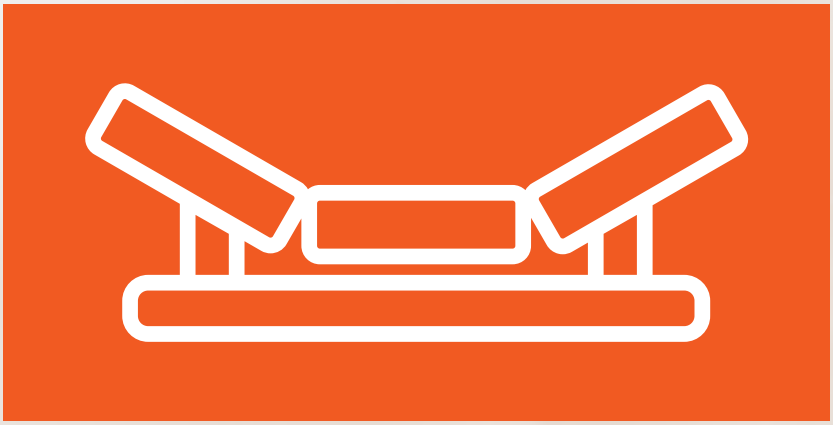
## SLOWING AIRFLOW

## DUST CURTAINS

## DUST COLLECTION AND SUPPRESSION

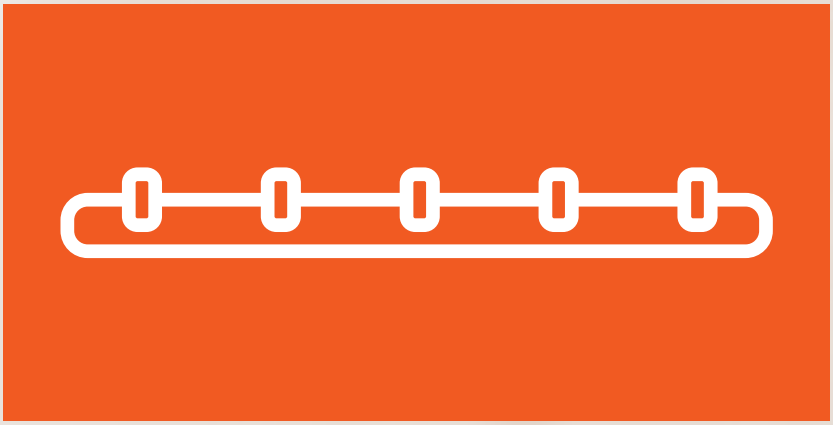
# BELT SUPPORT

Properly supporting a conveyor belt will eliminate belt sag and better absorb the force of falling material at transfer points, cutting down on fugitive material and runaway dust, which can cause substantial health and safety hazards. When two or more belt support cradles are installed, the use of intermediate idlers—that is, idlers placed between the adjacent cradles—is recommended. Installing an idler set between two cradles (or putting each cradle between two idlers) will reduce the drag of the conveyor belt over the bars.



# BELT SEALING

Belt sealing solutions include skirting products that ride on the belt and self-adjust to maintain an effective seal to prevent spillage without requiring regular maintenance. Wear liners shield the sealing system from the material load, prolonging the seal's life. These products are engineered to minimize fugitive dust and fine particulates from escaping the belt in the first place. Belt support plays an important role in properly sealing a belt. A flat, sag-free belt line in the skirted area is essential to successfully sealing the load zone. If the belt sags between idlers below the loading zone or flexes under the stress of loading, fines and lumps will work their way out the sides of the conveyor, dropping onto the floor as spillage or becoming airborne as a cloud of dust.



# SLOWING AIRFLOW

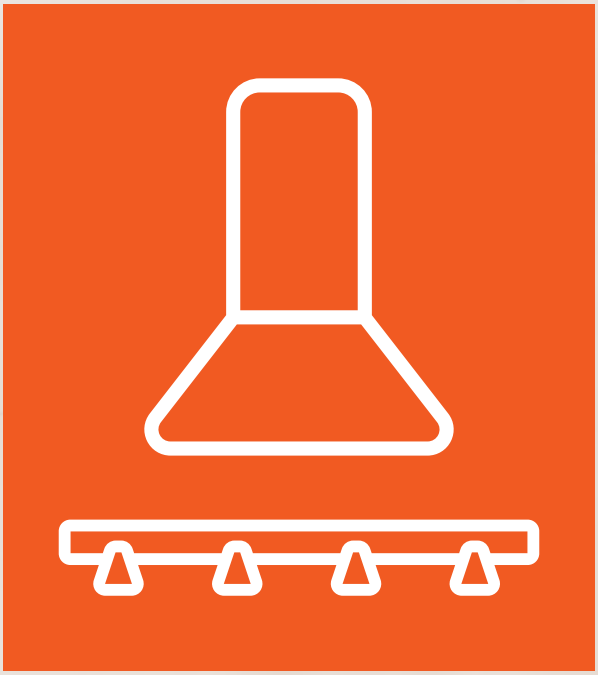
Since it is generally impossible to totally prevent the creation of dust, other systems to manage it must be employed. In their simplest form, these dust control systems involve nothing more than attention during the engineering of the transfer point to reduce airflow. Airflow through the system can be managed by minimizing the amount of air entering the transfer point, building the enclosure large enough to slow or minimize airflow, and utilizing additional control measures to slow air movement. As air velocity is reduced, airborne particles are too heavy to be supported by the reduced airspeed and begin dropping from the air stream.

# DUST CURTAINS

Another technique for passive dust control is the installation of dust curtains near the exit end of the transfer point's settling/stilling zone area. Where the belt leaves the transfer point, the rubber curtains provide a barrier, or baffle, that quiets air velocities, allowing airborne material to fall back onto the belt. The curtains form a "settling/stilling zone" to reduce airflow and allow dust to settle.

# DUST COLLECTION AND SUPPRESSION

While dust collection and suppression are solutions to control dust, they are widely overused and over-relied upon. Only after containment has been achieved, should suppression and collection be explored. Dust must be contained in order for collection and/or suppression to be effective and efficient.



# DUST REDUCTION CHECKLIST

## ✓ TEST AIR SPEED

As air exits the settling zone, ensure it has slowed to a velocity unsuitable for carrying dust. This can be achieved by installing/extending settling and stilling zones as well as utilizing dust curtains.

## ✓ SUPPORT THE CONVEYOR BELT

Make sure idlers/cradles are adequately spaced to eliminate belt sag.

## ✓ SEAL THE CONVEYOR BELT

Install/inspect skirting system to prevent material from escaping. The belt must be properly supported and maintain a stable belt line in order to effectively seal it.

## ✓ PROTECT THE SEALING SYSTEM

Utilize a wear liner to shield the sealing system from damage.

## ✓ ALIGN THE CONVEYOR BELT

Prevent belt wander and consequential fugitive dust and spillage by utilizing belt tracking systems.

## ✓ CLEAN THE BELT

By reducing carryback with belt cleaners, the likelihood of airborne dust is also minimized.

## ✓ CONTAIN DUST BEFORE EXPLORING COLLECTION/SUPPRESSION

**MARTIN-ENG.COM | INFO@MARTIN-ENG.COM | 800-544-2947**

martin engineering®

# WANT MORE?

- eBooks
- Product Offerings
- Case Studies
- Videos
- On-Demand Webinars
- Blogs
- Fully-Interactive 3D Transfer Point Model

**CLICK HERE FOR AN ENTIRE LIBRARY OF RESOURCES!**