



**A Guide to Safe Handling of
Diatomaceous Earth Products**
European Version

IDPA
International Diatomite
Producers Association

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The members of the International Diatomite Producers Association (IDPA) representing diatomaceous earth producers are prepared to help the users of their products in reducing workers' exposure to process-generated respirable crystalline silica (RCS) and to inform them of the relevant good practices for their particular situations. **This document** is the industry guideline for complying with regulatory obligations in Europe.

The Guide provides an overview of diatomaceous earth: Its uses, potential health effects and good practices for the safe handling of these products, as well as links to relevant legislation and additional sources. It is not intended to cover all aspects of these products or replace their Safety Data Sheets (SDS). Users should always consult occupational health and safety professionals regarding exposure to, and control of, specific substances and materials in their individual workplaces.

Disclaimer:

This guide has been assembled by IDPA on the basis of publicly available information and documentation supplied by its members and advisors. IDPA does not, either towards IDPA members or third parties, either expressly or impliedly, represent, warrant or guarantee the accuracy, reliability or completeness of the content and processes and methods it describes.

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1. DIATOMACEOUS EARTH

Diatomaceous earth - also known as DE, diatomite, diatomaceous silica, kieselguhr and infusorial earth - is actually a non-metallic mineral composed of the skeletal remains of microscopic single-celled aquatic algae called diatoms. Diatomaceous earth as it naturally occurs is predominantly composed of amorphous silica, that is, non-crystalline silicon dioxide. It may also contain small amounts of naturally occurring crystalline silica, typically in the form of quartz.

Diatomite ore is mined and then processed to produce a final product which falls into one of three categories: a natural grade, a calcined grade, or a flux-calcined grade. The processing includes milling, drying, calcination, classification to produce a variety of particle-sized products – from powders a few microns in size to centimeter-sized granules. Diatomaceous earth products are used in diverse applications ranging from absorbents to filtration aids to fillers and functional additives to carriers for active ingredients in products. Diatomite products may be shipped in a variety of containers, including paper or plastic bags, semi-bulk bags and cardboard containers, as well as in bulk by rail hopper cars and tank trucks.

1.1. Natural Grades

Natural grade products are dried at relatively low temperatures. These natural grade products are primarily made up of amorphous silica, but may contain small percentages of naturally occurring crystalline silica

1.2. Calcined Grades

Calcined grade products are produced by calcining, or sintering, at higher temperatures, typically up to 1000°C. During the calcination, some of the amorphous silica may undergo a physical mineralogical transformation to form crystalline silica, predominantly as cristobalite. As a result, calcined DE may contain from 0 to 40% crystalline silica.

1.3. Flux-Calcined Grades

Flux-calcined products are also produced by calcining at high temperatures, but in the presence of a fluxing agent such as soda ash (sodium carbonate). During flux calcination, the fluxing agent helps to fuse the diatoms, which considerably increases the particle size of the product. As with calcined grades, a portion of the amorphous silica undergoes a transformation to crystalline silica in the process. Flux-calcined grades can contain up to 70% crystalline silica.



2. DIATOMACEOUS EARTH AND CRYSTALLINE SILICA

Diatomaceous earth is composed primarily of amorphous silica. DE may also have a crystalline silica component which varies depending on ore source and processing method.

Crystalline silica minerals are among the most abundant in the world and comprise over 12% of the earth's crust. They exist in most types of rock, sand, and soil, and most people come into contact with crystalline silica every day. The most common forms of crystalline silica are quartz, cristobalite, and tridymite.

2.1. Health Effects of Silica and DE

Amorphous silica is a mild irritant of the upper respiratory tract and eyes and can irritate the skin because of its drying properties. Chronic health effects have rarely been reported for amorphous silica.

Prolonged inhalation of crystalline silica, on the other hand, has been associated with damage of the respiratory system, silicosis and cancer. According to the Health and Safety Executive in the UK: "The weight of evidence suggests that exposures to respirable crystalline silica insufficient to cause silicosis, would be unlikely to lead to an increased risk of lung cancer."

This Guide will concentrate on the potential health effects and exposure levels of respirable crystalline silica, i.e. the dust fraction corresponding to the proportion of an airborne contaminant which penetrates the pulmonary alveolar (gas exchange) region of the lungs. This fraction normally represents 10 to 20% of the inhalable dust fraction, but the proportion can vary considerably (see European standard EN481) depending on the particle size range of DE products.

Chronic inhalation of dust containing crystalline silica was a major contributor to occupational disease in mining, and other industries in past centuries, but implementation of improved industrial hygiene practices has greatly reduced worker exposure and the incidence of silica-related disease over the last 60 years.

The extent to which crystalline silica may present a health risk and how to control that risk remains a topic of debate in the scientific and regulatory community worldwide. The International Agency for Research on Cancer concluded in 2011 that "Crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (Group 1)" (IARC Monograph 100C (2011)).

A recommendation from the European Union Scientific Committee for Occupational Exposure



OEL) in June 2003 made the following significant conclusions:

“The main effect in humans of the inhalation of respirable silica dust is silicosis. There is sufficient information to conclude that the relative lung cancer risk is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk.”

In Europe, a multi-sector social dialogue agreement was signed in 2006 covering workers with potential exposure to crystalline silica dust. The 15 signatories (including both employer and employee organizations) form together NEPSI, the European Network on Silica, to implement effective protection measures and monitor the application of the Agreement over the years, see www.nepsi.eu. The majority of DE users have not yet participated in such dialogue.

The NEPSI Social Dialogue Agreement aims to: a) Protection of health of employees; b) Minimising exposure to RCS at the workplace by applying the Good Practices; c) Increasing knowledge of potential health effects of RCS and about Good Practices. The NEPSI Agreement is always open for new signatories.

The publication, Good Practice Guide on Workers Health Protection through the Good Handling and Use of Crystalline Silica and Products Containing It, is available in all EU languages and can be downloaded from <http://www.nepsi.eu/good-practice-guide>.

2.2. Classification & Labelling

The CLP Regulation (Regulation (EC) No 1272/2008 - Classification, Labelling and Packaging of substances and mixtures) implements in Europe the Globally Harmonised System on Classification and Labelling of Chemicals (GHS) developed by the United Nations.

In accordance with the CLP Regulation, industrial minerals producers have conducted a Review and Hazard Assessment of the health effects of respirable crystalline silica and have jointly determined that it is appropriate to classify crystalline silica fine fraction (quartz fine fraction and cristobalite fine fraction) as STOT RE 1 for the silicosis hazard.



STOT refers to Specific Target Organ Toxicity, the target organ being the lung. RE refers to "Repeated Exposure." Based upon scientific evidence, it is necessary to inhale significant quantities of RCS in an occupational setting for prolonged and repeated periods of time before long-term health effects may occur.

This classification applies to the fine fraction of quartz and cristobalite only, because it is scientifically demonstrated that it is only this fraction of crystalline silica which may cause health effects. It is also in compliance with the new CLP Regulation which allows consideration of the physical form(s) or physical state(s) of substance or mixture.

As a consequence of this classification, mixtures and substances containing quartz or cristobalite fine fraction, are classified as:

STOT RE 1 (Danger Notice), if the crystalline silica fine fraction (cristobalite or quartz) is equal to, or greater than 10%;

STOT RE 2 (Warning Notice), if the crystalline silica fine fraction (cristobalite or quartz) is between 1 and 10%.

If the crystalline silica fine fraction (cristobalite or quartz) content in mixtures and substances is below 1%, no classification is required.

A comprehensive package regarding RCS classification, metrology and prevention is available at the following dedicated website: www.crystallinesilica.eu.

2.3. REACH registration:

Naturally occurring and calcined minerals are exempted from the obligation to register in accordance with Article 2, paragraph 7b and Annex V.7 of the Regulation (EC) 1907/2006. However, flux-calcined DE grades have been registered under kieselguhr soda ash flux-calcined (CAS: 68855-54-9).



The REACH Consortium for kieselguhr soda ash flux-calcined has established a list of uses for kieselguhr soda ash flux-calcined (included in the e-SDSs).

All information available from IDPA, c/o IMA-Europe

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Belgium
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www.ima-europe.eu

3. WORKPLACE LEGISLATION

Each country comprising the European community has its own occupational exposure limit (OEL) or workplace exposure limit (WEL) for respirable crystalline silica (RCS) in the workplace.

See table of OELs in the different EU Members States at <http://www.nepsi.eu/workplace-exposure-crystalline-silica>

EUROPEAN DIRECTIVE ON THE PROTECTION OF WORKERS FROM THE RISKS RELATED TO EXPOSURE TO CARCINOGENS OR MUTAGENS AT WORK

The EU Commission has issued a proposal on 13 May 2016 [COM(2016)0248] to include “work involving exposure to respirable crystalline silica dust generated by a work process” in Annex I of the Carcinogens and Mutagens Directive (2004/37/EC). It proposes the establishment of a binding European occupational exposure limit at 0.1 mg/m³ (respirable fraction, 8h TWA) in Annex III.

Once this new European legislation is adopted, the different Member States will have two years to transpose the European Directive in their national legislation and occupational inspectors will be informed on the new law.

Article 4 of the Carcinogens and Mutagens Directive at work (CMD) states: “in so far as technically possible, employers must reduce the use of a carcinogen/mutagen by replacing it with substances/mixtures/processes which are not or less dangerous.”

In the case of respirable crystalline silica, the entry in Annex I of the proposed Directive

covers: “Work involving exposure to respirable crystalline silica dust generated by a work process”.

It means that the replacement obligation applies to the work processes which generate respirable crystalline silica dust. Typical examples of replacements are wet processes or closed ventilated systems which do not lead to exposure to respirable crystalline silica.

The supplied products would not have to be labelled as carcinogens, but the exposure of workers to the dust generated by handling and



processing DE products must be assessed and minimised by applying the new legislation and good practices.

This Guide aims to support the effective implementation of this new European legislation (such support for implementation is recognized in Recital 6 of the proposal, 2016/0130(COD)¹. More information can be found on the following websites:

www.crystallinesilica.eu

<http://www.crystallinesilica.eu/frequently-asked-questions>

¹ “Guides and good practice developed through initiatives such as the Social Dialogue “Agreement on Workers’ Health Protection Through the Good Handling and Use of Crystalline Silica and Products Containing it” (NEPSI) are valuable instruments to complement regulatory measures and in particular to support the effective implementation of limit values.”



4. WORKING SAFELY WITH DIATOMACEOUS EARTH

Working safely with DE products means assessing and managing the exposure risk.

If not already done, a risk assessment has to be carried out and exposure minimization must be applied in order to respect the 0.1 mg/m³ exposure limit value. Exposure must be monitored.

RISK ASSESSMENT

The following risk assessment procedure focuses on dry processes, as wet processes are not considered a risk factor and do not need to be considered.

Follow these steps:

- 1) Identify the dry processes in your workplace that may give rise to the generation of airborne DE dust
- 2) Identify which job functions that may be exposed, particularly job tasks

3) Identify the frequency and duration of exposure for each individual

4) Identify existing control measures. If the control measures are efficient and the duration/frequency of the exposure are controlled, apply 6), if not apply 5) first.

5) Carry out personal exposure monitoring in accordance with EU standard: EN 689

6) On basis of the results of your exposure monitoring, apply the good practices for the tasks identified to minimize the exposure in accordance with the legislation in place.

7) Review your exposure assessment regularly

CONTROL MEASURES

- **Collective Protection:**

First, Collective Protection has to be considered.

Dust collection systems are the most widely

used engineering control techniques employed to control dust and lower workers' exposure to respirable dust..

The most common dust control techniques utilize local exhaust ventilation systems (LEVs). These systems capture dust generated and then transport this dust via ductwork to a dust collection filtering device. By capturing the dust at the source, it is prevented from being liberated into the plant and contaminating the breathing atmosphere of the workers. LEV systems use a negative pressure exhaust ventilation technique to capture the dust before it escapes from the processing operation. Effective systems typically incorporate a capture device (enclosure, hood, chute, etc.) designed to maximize the collection potential.

See the ventilation NEPSI Task sheet 2.1.9. for more information

- **Personal Protection:**

When collective protection is not sufficient or feasible, however, respiratory protection consistent with the highest dust levels that might possibly be encountered should be used.

Properly selected, fitted, and maintained respiratory personal protective equipment is an integral component in the reduction of potential exposures, as are other personal protective equipment such as safety glasses and gloves.

See the specific Task sheet IDPA n°1 for more information

EXPOSURE MONITORING

Companies should check their national regulation and national standards to make sure their dust monitoring complies with their national requirements, notably regarding the minimum number of samples.

The following general requirements (taken from the European Standards EN 689 and EN 1232 – see references) must be followed:

- For personal sampling, the sampling equipment must be worn by the worker (within the breathing zone of the worker).
- The collected dust fractions must be at least respirable and (optional) inhalable and thoracic dust fractions.
- The sampling equipment used to collect the dust samples must be in conformity with the European standard EN 481.
- The sampling locations should follow at least a set of well-defined job functions.
- The sampling duration should correspond to a full shift (7-8 hours).
- The analytical technique to determine the quartz (and cristobalite) content must be either X-ray diffraction or Fourier transform infrared spectroscopy as required in different national standards.
- The laboratories involved in the quartz analysis should be accredited and/or should join an inter-laboratory round exercise to ensure the quality and validity of their procedures and results.

Main references:

EN 689 Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy, 1995, CEN.

EN 481 Workplace atmospheres - Size fraction definitions for measurement of airborne particles, 1993, CEN.

EN 1232 Workplace atmospheres - Pumps for personal sampling of chemical agents- Requirements and test methods, 1997.



5. GOOD PRACTICES

This section contains a range of task guidance sheets which describe good practice techniques for various common and specific tasks. The general guidance sheets apply to all the industries concerned with respirable crystalline silica exposure and can be found at www.nepsi.eu. For instance, the task sheets on cleaning, good hygiene and general ventilation are particularly relevant for the DE users.

NEPSI General Task Sheets
2.1.1. Cleaning
2.1.2. Design of buildings
2.1.3. Design of control rooms
2.1.4. Design of ducting
2.1.5. Design of dust extraction units
2.1.6. Dust monitoring
2.1.7. General indoor storage
2.1.8. General outdoor storage
2.1.9. General ventilation
2.1.10. Good hygiene
2.1.11. Handling and transport systems
2.1.12. Laboratory work
2.1.13. Local exhaust ventilation
2.1.14. Maintenance, service & repair activities
2.1.16. Removing dust or sludge from an extraction unit
2.1.17. Supervision
2.1.18. Systems of packaging
2.1.19. Training
2.1.20. Working with contractors

The specific task sheets in the Annex to the Guide relate to tasks concerning DE users. These relate to common tasks performed by DE users to assist them in complying with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

IDPA SPECIFIC TASK SHEETS
No.1 Personal protective equipment (PPE)
No.2 Bag emptying – small bags
No.3 Big bag emptying – bulk bags
No.4 Bulk silo truck unloading (pneumatic)
No.5 Dry mixing of materials
No.6 Transport systems for fine dry diatomaceous earth products

Proper handling techniques and engineered ventilation controls should ensure that dust concentrations in the workplace are minimised. IDPA recommends that personal protective equipment should also be used to provide an additional margin of protection.

Waste material and used packaging should be handled in a manner to avoid creating airborne dust.



DO YOU HAVE QUESTIONS?

Please contact IDPA or your supplier if you have any additional questions about the safe use of DE. The following links also provide more information that may be useful:

For information on Crystalline Silica in general:

- Respirable Crystalline silica (<http://www.crystallinesilica.eu>)
- Safety Data Sheets
- Information on the Social Dialogue Agreement on Respirable Silica (<http://www.nepsi.eu/>)
- Good Practice Guide on Workers Health Protection through the Good Handling and Use of Crystalline Silica and Products Containing It : <http://www.nepsi.eu/good-practice-guide>.

The International Diatomite Producers Association (IDPA) is a trade association representing major manufacturers of diatomaceous earth products worldwide. Founded in 1987, IDPA is committed to the safe

use of diatomaceous earth products and to advancing research and maintaining a dialogue with industry, regulatory agencies and the scientific community in support of the safety of our employees and the communities we serve.

IDPA Members:

Calgon Carbon

EP Minerals

Showa Chemical Industry

Imerys Minerals

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Task Sheet 1: Personal Protective Equipment (PPE)

This activity covers the use and maintenance of PPE for workers exposed to diatomaceous earth dust.

The use of PPE should be seen as a last resort, to be used only when all reasonable engineering and organisational control measures have been implemented and have failed to provide adequate control of exposure.

This guidance sheet is recommended to employers to help them comply with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on the use and maintenance of personal protective equipment (PPE). Following the key points of this task sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica, i.e., to apply appropriate protection and prevention measures.

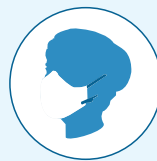
This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures that are implemented.

Access

- ✓ Restrict access to the work area to authorised personnel only. Work areas where the use of personal protective equipment is mandatory should be clearly demarcated through the provision of appropriate signage.

Design and equipment

- ✓ Personal protective equipment must comply with the relevant Community provisions on design and manufacture with respect to safety and health. All personal protective equipment must be provided by the company and it must carry a CE mark.
- ✓ Where PPE is used, a programme should be established covering all aspects of the selection, use and maintenance of the equipment.
- ✓ PPE should be selected on the basis of performance (e.g., protection factor), comfort and durability. For DE, the recommended respirator is the FFP3 half mask.
- ✓ Where it is necessary to wear more than one item of PPE, ensure that those items are compatible with each other.
- ✓ Protective clothes (overalls) must be used during all dusty tasks. Dark colours may be used to help indicate dust contamination. Your workwear supplier will be able to advise you of appropriate clothing
- ✓ Use the pictograms below in the workplace to explain where the use of PPE is required.



Respiratory mask



Ear protection



Eye protection



Safety Helmet

Maintenance

- ✓ Ensure equipment used in the task is maintained as advised by the supplier in efficient working order and in good repair.
- ✓ Protective clothes (overalls) should not be taken home. They should be cleaned by the employer.

Examination and testing

- ✓ Visually check PPE daily for signs of damage. If used infrequently, then check it before each use.
- ✓ Check effectiveness of respiratory protective equipment before use. Seek advice from the supplier on appropriate fit testing methods.
- ✓ Keep records of inspections for a suitable period of time which complies with national laws (minimum five years).

Cleaning and housekeeping

- ✓ Keep non-disposable items of PPE clean.
- ✓ Employers must provide clean storage facilities for PPE.
- ✗ **Do not clean clothing using compressed air.**
- ✓ Use vacuum or wet cleaning methods.

Respiratory Protective Equipment

- ✓ Risk assessment must be carried out to determine whether existing controls are adequate. If necessary, respiratory personal protective equipment (with the appropriate protection factor) should be provided and worn. Equipment should be selected that is compatible with other items of personal protective equipment, e.g., ear defenders, goggles, welding visors.
- ✓ Ensure that the operator achieves the essential face seal with the selected mask. This can be checked using simple testing methods, e.g., a mist of sugar solution can be dispersed in the air to check if the operator tastes it. If so there is evidence of leakage.

- ✓ Note that facial hair will reduce the effectiveness of a dust mask. Operators with facial hair should be provided with air-fed respirators or other suitable alternative.
- ✓ Provide storage facilities to keep personal protective equipment clean when not in use.
- ✓ For each work activity, make an assessment to determine how frequently respiratory personal protective equipment should be replaced in order to guarantee its effectiveness. Replace respiratory personal protective equipment at intervals recommended by its suppliers.

Training

- ✓ Give your employees information on the health effects associated with respirable crystalline silica dust.
- ✓ Provide employees with training on: dust exposure prevention; checking controls are working and used; when and how to use any respiratory personal protective equipment provided and what to do if something goes wrong. Refer to task sheet 2.1.19 and part 1 of the NEPSI Good Practice Guide.

Supervision

- ✓ Have a system to check that control measures are in place and that they are being followed. Refer to NEPSI task sheet 2.1.17.
- ✓ Employers should make sure that employees have all the means to perform the checklist given opposite.

Employee checklist for making the best use of the controls



- Look for signs of damage, wear or poor operation of any equipment used. If you find any problems, tell your supervisor.
- Even if you do not normally wear respiratory personal protective equipment, it may be necessary for you to wear it temporarily in the event other control measures fail.
- Use, maintain and store any personal protective equipment provided in accordance with instructions.
- Adjust your PPE so that it fits you correctly.
- If you have facial hair, this could reduce the effectiveness of a dust mask. Select an appropriate air-fed respirator or suitable alternative.
- When it is necessary for you to wear more than one item of PPE, ensure that all items are compatible with each other.

Bag emptying – small bags

This sheet provides advice on emptying small bags of diatomaceous earth

This guidance sheet is recommended to employers to help them comply with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on the use and maintenance of personal protective equipment (PPE). Following the key points of this task sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica, i.e., to apply appropriate protection and prevention measures.

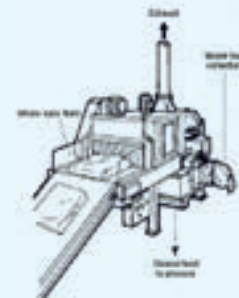
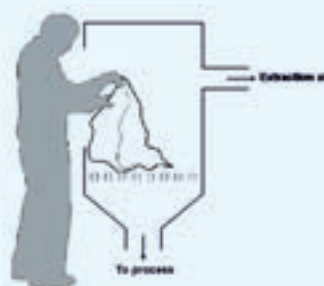
This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures that are implemented.

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

- ✓ Ensure bag emptying equipment is fit for purpose.
- ✓ Enclose the bag emptying equipment as much as possible and keep it under negative pressure by using a local exhaust ventilation system – refer to NEPSI task sheet 2.1.13. The hood's exhaust volume requirement is a function of the open hood area, with experience showing that air velocities of 1 m.s-1 (200 fpm) into the hood are adequate for DE dust capture.
- ✓ For small bags, the use of automatic or semi-automatic bag dumping stations is recommended for emptying the bags.
- ✓ Ensure workers tip the bag contents progressively – never dump them. Bags should be emptied with the open end facing away.
- ✓ Bag crushing creates a lot of dust. Workers should roll up empty bags within the extraction zone.
- ✓ In order to dispose of empty bags without creating dust, drop them into a large plastic sack supported and held open by a metal frame. When it is full, seal the sack and dispose of it in a suitable waste skip. Do not let the waste sack overflow. Alternatively, use a compactor equipped with a dust extraction system or which is fully enclosed. Another option is to spray the empty bags with water to limit the creation of dust.
- ✓ Bag emptying equipment should be connected to a suitable dust arrestment system (e.g., bag filter/cyclone). A permanent dust extraction system is preferred, though a stand-alone mobile unit is acceptable.
- ✓ Bag emptying equipment should be designed for easy access to all parts for maintenance, unblocking and cleaning. Access panels should be interlocked or have trip devices where necessary to prevent persons accessing dangerous parts of machinery.
- ✓ Consider providing mechanical/pneumatic assistance with bag handling.
- ✓ Where possible keep bag emptying equipment away from doors, windows and walkways to prevent draughts affecting the performance of dust extraction systems.
- ✓ Provide a clean air supply to the workroom to replace extracted air.



Maintenance

- ✓ Ensure equipment used in the task is maintained as advised by the supplier/installer in efficient working order and in good repair.
- ✓ Replace consumables (filters, etc.) in accordance with the manufacturer's recommendations.

Examination and testing

- ✓ Visually check the cleaning equipment for signs of damage at least once per week or, if it is in constant use, check it more frequently. If used infrequently, then check it before each use.
- ✓ Obtain information on the design performance of dust suppression and/or extraction equipment from the supplier. Keep this information to compare with future test results.
- ✓ Keep records of inspections for a suitable period of time that complies with national laws (minimum five years).

Cleaning and housekeeping

- ✓ Clean your workplace on a regular basis.
- ✓ Deal with spills immediately.
- ✗ **Do not clean clothing using compressed air.**
- ✓ Use vacuum or wet cleaning methods.

Personal Protective Equipment

- ✓ Refer to task sheet IDPA n°1 dedicated to Personal Protective Equipment.

- ✓ Risk assessment must be carried out to determine whether existing controls are adequate. If necessary, respiratory protective equipment (with the appropriate protection factor) should be provided and worn.
- ✓ Provide storage facilities to keep personal protective equipment clean when not in use.
- ✓ Replace respiratory personal protective equipment at intervals recommended by its suppliers.

Training

- ✓ Give your employees information on the health effects associated with respirable crystalline silica dust
- ✓ Provide employees with training on: dust exposure prevention; checking controls are working and using them; when and how to use any respiratory protective equipment provided and what to do if something goes wrong. Refer to NEPSI task sheet 2.1.19 and part 1 of the Good Practice Guide.

Supervision

- ✓ Have a system to check that control measures are in place and that they are being followed. Refer to NEPSI task sheet 2.1.17.
- ✓ Employers should make sure that employees have all the means to perform the checklist given opposite.

Employee checklist for making the best use of the controls



- Make sure the ventilation system is working properly. Make sure the dust extraction system is switched on and is working correctly before starting work.
- Look for signs of damage, wear or poor operation of any equipment used. If you find any problems, tell your supervisor.
- If you think there is a problem with your dust control equipment, ensure additional control measures are taken to reduce exposure to respirable crystalline silica dust while the problem persists.
- Use handling aids when available.
- Clear up spills straight away. Use vacuum or wet cleaning methods.
- Clean up work rooms using vacuum or wet cleaning techniques.
- Use, maintain and store any respiratory personal protective equipment provided in accordance with instructions.

Big bag emptying – bulk bags

This sheet provides advice on how to empty bulk bags (big bags or jumbo bags) of diatomaceous earth.

This guidance sheet is recommended to employers to help them comply with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on the use and maintenance of personal protective equipment (PPE). Following the key points of this task sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica, i.e., to apply appropriate protection and prevention measures.

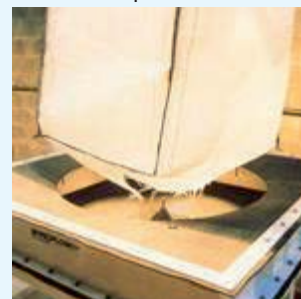
This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures that are implemented.

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

- ✓ Ensure bag emptying equipment is fit for purpose.
- ✓ Enclose the bag emptying equipment as much as possible and keep it under negative pressure by using a local exhaust ventilation system – refer to task sheet nepsi 2.1.13. . Experience shows that air velocities of 1 m.s⁻¹ (200 fpm) into the hood are adequate for DE dust capture.
- × **Manual bag cutting is not recommended without the use of personal protective equipment.**
- ✓ For single trip bulk bags without inner liner, use bag emptying equipment featuring pyramidal cutting knives and a rubber membrane to seal off the bag bottom.
- ✓ For multiple trip bulk bags, a discharge system with vibrator plate should be used and this should be equipped with local exhaust ventilation.
- ✓ Where multiple trip bulk bags are used, which have inner liners, special dust-free outlet connection systems are available which have double ring seals and fully enclosed product discharge.
- ✓ In order to dispose of empty bags without creating dust, do not manually compress the empty bags. Instead, drop them into a large plastic sack supported and held open by a metal frame. When it is full, seal the sack and dispose of it in a suitable waste skip. Do not let the waste sack overflow. Alternatively, use a compactor equipped with a dust extraction system or which is fully enclosed.
- ✓ Bag emptying equipment should be connected to a suitable dust arrestment system (e.g., bag filter/cyclone)
- ✓ Bag emptying equipment should be designed for easy access to all parts for maintenance, unblocking and cleaning. Access panels should be interlocked or have trip devices where necessary to prevent persons accessing dangerous parts of machinery.
- ✓ Consider providing mechanical/pneumatic assistance with bag handling.
- ✓ Where possible keep bag emptying equipment away from doors, windows and walkways to prevent draughts affecting the performance of dust extraction systems.
- ✓ Provide a clean air supply to the workroom to replace extracted air.



Maintenance

- ✓ Ensure equipment used in the task is maintained as advised by the supplier/installer in efficient working order and in good repair.
- ✓ Replace consumables (filters, etc.) in accordance with the manufacturer's recommendations.

Examination and testing

- ✓ Visually check the cleaning equipment for signs of damage at least once per week or, if it is in constant use, check it more frequently. If used infrequently, then check it before each use.
- ✓ Obtain information on the design performance of dust suppression and/or extraction equipment from the supplier. Keep this information to compare with future test results.
- ✓ Keep records of inspections for a suitable period of time which complies with national laws (minimum five years).

Cleaning and housekeeping

- ✓ Clean your workplace on a regular basis.
- ✓ Deal with spills immediately.
- ✗ **Do not clean up with a dry brush or using compressed air.**
- ✓ Use vacuum or wet cleaning methods.

Personal Protective Equipment

- ✓ Refer to IDPA task sheet n°1 dedicated to Personal Protective Equipment.
- ✓ Risk assessment must be carried out to determine whether existing controls are adequate. If necessary, respiratory personal protective equipment (with the appropriate protection factor) should be provided and worn.
- ✓ Provide storage facilities to keep personal protective equipment clean when not in use.
- ✓ Replace respiratory personal protective equipment at intervals recommended by its suppliers.

Training

- ✓ Give your employees information on the health effects associated with respirable crystalline silica dust.
- ✓ Provide employees with training on: dust exposure prevention; checking controls are working and using them; when and how to use any respiratory protective equipment provided and what to do if something goes wrong. Refer to NEPSI task sheet 2.1.19 and part 1 of the NEPSI Good Practice Guide.

Employee checklist for making the best use of the controls



- Make sure the ventilation system is working properly. Make sure the dust extraction system is switched on and is working correctly before starting work.
- Look for signs of damage, wear or poor operation of any equipment used. If you find any problems, tell your supervisor.
- If you think there is a problem with your dust control equipment, ensure additional control measures are taken to reduce exposure to respirable crystalline silica dust while the problem persists.
- Use handling aids when available.
- Clear up spills straight away. Use vacuum or wet cleaning methods.
- Clean up control rooms using vacuum or wet cleaning techniques.
- Use, maintain and store any respiratory personal protective equipment provided in accordance with instructions.

Bulk silo truck unloading (pneumatic)

This activity covers the discharge of diatomaceous earth from a silo truck into a storage silo

This guidance sheet is recommended to employers to help them comply with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on the use and maintenance of personal protective equipment (PPE). Following the key points of this task sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica, i.e., to apply appropriate protection and prevention measures.

This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures that are implemented.

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

Silo truck

- ✓ Limit the discharge rate to the design capacity of the receiving silo and dust extraction unit. Offloading pressures should be agreed with the silo operator.
- ✓ Tanker offloading pipes, connectors and seals must be designed to withstand the high air pressures and abrasion associated with blowing operations.
- ✓ Note that there will be a surge of air pressure as the last DE powder is blown into a silo. Hence the need for constant supervision of offloading operations.

Customer silo

- ✓ Storage silos should be purchased only from reputable suppliers.
- ✓ Appropriate engineering design methods should be employed to ensure adequate structural strength.
- ✓ Engineering controls must be employed to prevent over-pressurisation of the silo while it is being filled. Ensure that the silos are equipped with pressure relief devices and high-level alarms. They must also have dust extraction systems to remove and clean the displaced air.
- ✓ Silo dust extraction units must be fitted with filters that are appropriate to the particle size range of the product.
- ✓ Offloading pressures should be agreed with the tanker operator.
- ✓ Note that DE products have varying bulk density. Put in place procedures to ensure that silos are not overfilled.
- ✓ Silos should be equipped with a dust extraction system to prevent the emission of dust from the silo during tanker offloading.
- ✓ Pipework and ductwork should be designed to minimise shock losses (caused by bends, constrictions etc); to minimise dead spots where material may accumulate and to facilitate easy clearing of blockages.
- ✓ Silo connection points should be located as close as possible to the delivery tanker parking area. This will eliminate the need for long lengths of flexible hose.
- ✓ Safe means of access should be provided to those parts of the silo requiring inspection and maintenance.



Maintenance

- ✓ Maintain pipes/hoses, connectors and seals in good condition to reduce the likelihood of dust escaping during blowing operations.
- ✓ Dust extraction systems on silos must be maintained in accordance with manufacturers' instructions.

Examination and testing

- ✓ A competent person should test the performance of dust extraction systems at least annually.
- ✓ Tanker drivers should check the condition of pipes/hoses and seals daily and obtain replacements as necessary.
- ✓ Any faults with the pipes/hoses/connectors and silo dust extraction systems must be reported as soon as possible so that remedial action can be taken.

Cleaning and housekeeping

- ✓ The tanker offloading area should be kept clean and tidy.
- ✓ Clean your workplace on a regular basis.
- ✓ Deal with spills immediately.
- ✗ **Do not clean up with a dry brush or using compressed air.**
- ✓ Use vacuum or wet cleaning methods.

Personal Protective Equipment

- ✓ Refer to IDPA task sheet n°1 dedicated to Personal Protective Equipment.
- ✓ Risk assessment must be carried out to check the effectiveness of control measures.

- ✓ Respiratory protective equipment (with the FFP3 protection factor) may need to be worn when disconnecting the offloading pipe at the back of the tanker, when remedying any escape of dust or in the event control measures fail.
- ✓ Provide storage facilities to keep personal protective equipment clean when not in use. Replace this equipment at intervals recommended by suppliers.

Training

- ✓ Give your employees information on the health effects associated with respirable crystalline silica dust.
- ✓ Provide employees with training on: dust exposure prevention; checking controls are working and used; when and how to use any respiratory personal protective equipment provided and what to do if something goes wrong. Refer to NEPSI task sheet 2.1.19 and part 1 of the Good Practice Guide.

Supervision

- ✓ Ensure procedures are in place to prevent overfilling of silos.
- ✓ Have a system to check that dust control measures are in place and that they are being followed. Refer to NEPSI task sheet 2.1.17.
- ✓ Employers should make sure that employees have all the means to perform the checklist given opposite.
-

Employee checklist for making the best use of the controls



- Tanker drivers must supervise their offloading operations at all times.
- Agree on off-loading pressures with the customer.
- Check the condition of pipes, hoses and connectors daily.
- Look for signs of damage, wear or poor operation of any equipment used. If you find any problems, tell your supervisor.
- If you think there is a problem with your dust control equipment, ensure additional control measures are taken to reduce exposure to respirable crystalline silica dust while the problem persists.
- Clean up spillages of DE powder immediately, using vacuum or wet cleaning methods.
- Wear appropriate respiratory personal protective equipment when it is necessary to enter dusty areas in order to rectify any escape of dust, or in the event other control measures fail.
- Use, maintain and store any respiratory personal protective equipment provided in accordance with instructions.

Dry mixing of materials

This sheet provides guidance on the design and use of equipment used for the dry mixing of diatomaceous earth

This guidance sheet is recommended to employers to help them comply with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on the use and maintenance of personal protective equipment (PPE). Following the key points of this task sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica, i.e., to apply appropriate protection and prevention measures.

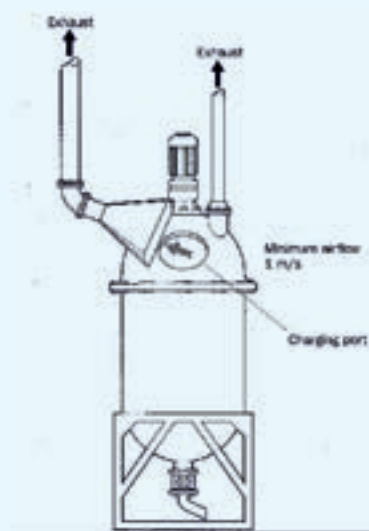
This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures that are implemented.

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

- ✓ Ensure that mixers are fit for the intended purpose and that they are well maintained.
- ✓ Enclose mixers as much as possible.
- ✓ Mixer lids and other access points should be sealed to prevent the escape of dust.
- ✓ All covers and access doors must be securely closed before starting the mixer.
- ✓ The mixer charging point should be enclosed and provided with local exhaust ventilation.
- ✓ Alternatively, local exhaust ventilation can be supplied at points inside the lid or rear of the mixer casing, so that there is a net influx of air through the charging point and into the mixer.
- ✓ All extraction systems should be designed so as not to draw excessive amounts of raw material from the mixer.
- ✓ When producing a dry mix, consider arrangements for dust-free discharge of mixed products, e.g., direct discharge to an enclosed conveyor system. Alternatively, provide local exhaust ventilation at the discharge point.
- ✓ Local exhaust ventilation systems must be connected to a suitable dust extraction unit.
- ✓ Where possible, mixer charging points should be located away from doors, windows and walkways to prevent draughts affecting the performance of local exhaust ventilation systems.
- ✓ Provide a clean air supply to the workroom to replace extracted air.



Maintenance

- ✓ Ensure equipment used in the task is maintained as advised by the supplier/installer in efficient working order and in good repair.
- ✓ Replace consumables (filters, etc.) in accordance with the manufacturer's recommendations.

Examination and testing

- ✓ Visually check the cleaning equipment for signs of damage at least once per week or, if it is in constant use, check it more frequently. If used infrequently, then check it before each use.
- ✓ Obtain information on the design performance of dust suppression and/or extraction equipment from the supplier. Keep this information to compare with future test results.
- ✓ Keep records of inspections for a suitable period of time which complies with national laws (minimum five years).

Cleaning and housekeeping

- ✓ Clean your workplace on a regular basis.
- ✓ Store containers in a safe place and dispose of empty containers safely.
- ✓ Put lids on containers immediately after use.
- ✓ Deal with spills immediately.
- ✗ **Do not clean up with a dry brush or using compressed air.**
- ✓ Use vacuum or wet cleaning methods.

Personal Protective Equipment

- ✓ Refer to IDPA Task Sheet n°1 dedicated to Personal Protective Equipment.
- ✓ Risk assessment must be carried out to determine whether existing controls are adequate. If necessary, respiratory personal protective equipment (with the appropriate protection factor) should be provided and worn.
- ✓ Provide storage facilities to keep personal protective equipment clean when not in use.
- ✓ Replace respiratory personal protective equipment at intervals recommended by its suppliers.

Training

- ✓ Give your employees information on the health effects associated with respirable crystalline silica dust.
- ✓ Provide employees with training on: dust exposure prevention; checking controls are working and used; when and how to use any respiratory personal protective equipment provided and what to do if something goes wrong. Refer to NEPSI task sheet 2.1.19 and part 1 of the Good Practice Guide.

Supervision

- ✓ Have a system to check that control measures are in place and that they are being followed. Refer to NEPSI task sheet 2.1.17.
- ✓ Employers should make sure that employees have all the means to perform the checklist given opposite.

Employee checklist for making the best use of the controls



- Make sure the work area is well ventilated and that any dust extraction system is switched on and is working correctly.
- Clear up spills straight away. Use vacuum or wet cleaning methods. Dispose of spills immediately.
- Look for signs of damage, wear or poor operation of any equipment used. If you find any problems, tell your supervisor.
- If you think there is a problem with your dust control equipment, ensure additional control measures are taken to reduce exposure to respirable crystalline silica dust while the problem persists.
- Use, maintain and store any respiratory personal protective equipment provided in accordance with instructions.

Transport systems for fine dry diatomaceous earth products

This guidance sheet is recommended to employers to help them comply with the requirements of workplace health and safety legislation by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on the use and maintenance of personal protective equipment (PPE). Following the key points of this task sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica, i.e., to apply appropriate protection and prevention measures.

This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures that are implemented.

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

- ✓ It is preferable to use closed handling systems when transporting diatomaceous earth powder.
- ✓ **Pneumatic systems** are appropriate for both horizontal and vertical transport of diatomaceous earth.
- ✓ For horizontal transport in **pneumatic systems**, pipes should be angled downwards where possible to prevent DE powder settling in the pipes and causing a blockage in the event system pressure is lost.
- ✓ The pipe work in **pneumatic systems** should be designed to minimise unnecessary obstacles and to minimise sharp bends. Pipe connections should be properly sealed. High transport velocities are required to avoid having particles settle in the duct. Typically, the target airflow is about 15 m.s-1 (3000 fpm) for DE.
- ✓ For **air slides**, the fluidising air will be drawn away by the dust extraction system. For this reason, air slides cannot be used if the product is too fine. If the surface area is more than 10,000 cm²/g, use screw conveyors. More than one de-dusting connection may be required on long lengths in order to correctly balance airflows.
- ✓ **Air slides** should be inclined slightly in order to assist the horizontal transport of DE powder. The quality of the cloth used in air slides should be selected to avoid excessive pressure loss for the fan, whilst also preventing DE powder from falling through the cloth and causing it to become blocked.
- ✓ For **screw conveyors**, the screw must be enclosed. Specialist design is required due to the abrasive properties of DE powder (contact an experienced supplier).
- ✓ **Screw conveyors** may need to be equipped with dust extraction systems unless they are connected to equipment that already operates under negative pressure. Refer to NEPSI task sheet 2.1.13.
- × **Conveyor belts** are not suitable for the transportation of loose DE powder. However, they may be used for the transport of other, coarser, materials and in machinery that handles bags of DE powder. Conveyors handling bags of DE powder, or other dusty materials, should be enclosed and equipped with dust extraction.
- ✓ **Elevators** are suitable for vertical transport, provided they are fully enclosed. Dust extraction systems may be required unless elevators are connected to equipment that already operates under negative pressure.

It may be necessary to apply fluidising air at the base of silos holding DE powder. Such systems should be designed so that the fluidising air is only applied at times when it is necessary to make the DE powder flow out of the silo. Fluidising air should not be left switched on permanently in situations where the air could migrate and cause DE powder to be emitted under pressure from elsewhere in the system.

Maintenance

- ✓ Ensure equipment used in the task and building are maintained as advised by the supplier/installer in efficient working order and in good repair.
- ✓ Replace consumables (filters, etc.) in accordance with the manufacturer's recommendations.

Examination and testing

- ✓ Visually check the cleaning equipment for signs of damage at least once per week or, if it is in constant use, check it more frequently. If used infrequently, then check it before each use.
- ✓ Obtain information on the design performance of dust suppression and/or extraction equipment from the supplier. Keep this information to compare with future test results.
- ✓ Keep records of inspections for a suitable period of time which complies with national laws (minimum five years).

Cleaning and housekeeping

- ✓ Clean your workplace on a regular basis.
- ✗ **Do not clean up with a dry brush or using compressed air.**
- ✓ Use vacuum or wet cleaning methods.

Personal Protective Equipment

- ✓ Refer to IDPA Task Sheet n°1 dedicated to Personal Protective Equipment.
- ✓ Provide pictograms on doors to indicate areas where respiratory personal protective equipment must be worn.

- ✓ Provide storage facilities to keep personal protective equipment clean when not in use.
- ✓ Provide enough places where personal protective equipment can be found (e.g., box with disposable dust masks). Indicate those places with pictograms.

Training

- ✓ Give your employees information on the health effects associated with respirable crystalline silica dust.
- ✓ Provide employees with training on: dust exposure prevention; checking controls are working and used; when and how to use any respiratory personal protective equipment provided and what to do if something goes wrong. Refer to NEPSI task sheet 2.1.19 and part 1 of the Good Practice Guide.

Supervision

- ✓ Have a system to check that control measures are in place and that they are being followed. Refer to NEPSI task sheet 2.1.17.
- ✓ Employers should make sure that employees have all the means to perform the checklist given opposite.

Employee checklist for making the best use of the controls



- Look for signs of damage or wear of building parts and of your work equipment. If you find any problems, tell your supervisor.
- Problems with DE powder transportation systems may be indicated by visible emissions of dust into the workplace air and by the appearance of piles of DE powder on floors and surfaces. Report any of these to your supervisor.
- If you think there is a problem with your dust control equipment, ensure additional control measures are taken to reduce exposure to respirable crystalline silica dust while the problem persists.
- Clear up spills straight away. Use vacuum cleaning or wet cleaning methods. Dispose of spills safely.
- Clean up control cabins using vacuum or wet cleaning methods.
- Use, maintain and store any respiratory personal protective equipment provided in accordance with instructions.



For more information:



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