

# Reducing respirable crystalline silica dust effectively on construction sites



A good practice guide,  
assigned by activities and professions.

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of Building  
and Woodworkers



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With the 2017 revision of the CARCINOGENS AND MUTAGENS DIRECTIVE 2004/37/EC, an occupational exposure limit value of 0.1 mg/m<sup>3</sup> was set for Respirable Crystalline Silica (RCS). Against this background, the European social partners of the construction industry EFBWW and FIEC launched the EU-funded project REDUCING RESPIRABLE CRYSTALLINE SILICA DUST EFFECTIVELY to support the implementation of the new occupational exposure limit value for RCS on construction sites.

The project partners believe that solutions for prevention of exposure to RCS are achievable for most construction activities. To achieve this, a dialogue was conducted between the social partners with participation from various countries, the respective prevention bodies and other stakeholders, including technical equipment suppliers and scientists.

The outcome of this project is the description of good and poor practices for activities on construction sites in a MAPPING. This MAPPING is based on an in-depth study of the current state of knowledge on exposure during different types of construction work, advances in workplace prevention and related technologies. Of course, proper use of protective measures is a prerequisite for low-dust work. For example, dust bags from vacuum cleaners must be disposed of properly or, in the case of air cleaners, vacuumed as close as possible to the source of emissions.

The recommendations in the MAPPING are based on exposure data and experience on construction sites.

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In this MAPPING, it is indicated how dust exposure can be kept as low as possible for activities on construction sites. In three columns, a gradation is made between good ● and poor ● practice. The grey column ● lists the activities that are neither red nor green or for which there is too little knowledge – ○ means: rather poor practice; ○ means: rather good practice.

The recommendations are based on exposure data and experience on construction sites.

There are different limit values for inhalable dust, respirable dust and RCS in Europe. Furthermore, traditions regarding working techniques and enforcement of regulations are not uniform. The mapping tries to break down this high complexity in a meaningful way. However, the dust situation is always significantly improved when working according to good practice, and as a rule the regulations are also largely complied with.

Activities are assigned to the different occupations. However, there are activities like “cleaning” or “drilling” that are listed in many occupations and technical solutions are not known for all activities, so in some cases respiratory protection must be used.



The background for this mapping is explained in the report of the project **REDUCING RESPIRABLE CRYSTALLINE SILICA DUST EFFECTIVELY** based on dust exposures and experiences on construction sites, published in parallel with this guide.

<https://www.efbww.eu/publications-and-downloads/reports-and-studies/reducing-respirable-crystalline-silica-effectively-on-constructi/1601-a>







- The green column describes how to work with little or no dust.



- The grey column lists the activities that are neither red nor green or for which there is too little knowledge.
- means: rather poor practice;
- means: rather good practice.



- If work is carried out according to the red column, the dust load is very high and the limit values are usually exceeded.



The recommendations on vacuum cleaners, air cleaners, extraction systems on handheld tools, extraction drills refer to the lists recommended by the BG BAU (Berufsgenossenschaft BAU, the German prevention authority for the construction sector) [www.bgbau.de/themen/sicherheit-und-gesundheit/staub/low-dust-techniques/](http://www.bgbau.de/themen/sicherheit-und-gesundheit/staub/low-dust-techniques/)



**AIR CLEANERS** must be positioned so that the suction opening is close to the dust source, see also manufacturer's instructions.

**CHANGING THE FILTERS** and disposing of the dust collection bags must be done dust-free, see also manufacturer's instructions.

Wearing respiratory protection means **A NEW MASK EVERY DAY**, taking breaks from wearing it, checking its effectiveness and much more.

# Table of Contents

## Page

6	Bricklayer ▲
7	Carpenter ▲
7	Chimney sweeper
8	Cleaner
9	Concrete worker ▲
10	Corrosion protector
10	Driver of construction machines and vehicles ▲
11	Demolition worker
12	Drywall builder ▲
13	Electrician ▲
14	Facade builder ▲
15	Floor layer ▲
16	Furnace builder ▲
17	Heating and sanitary engineer ▲
17	Insulator ▲
18	Painter ▲
19	Parquet layer ▲
20	Paver ▲

## Page

21	Pipeline constructor, Trench digger ▲
22	Plasterer ▲
23	Plumber, Pipe fitter ▲
24	Refractory engineer
24	Road builder ▲
25	Roofer ▲
26	Sandblaster
26	Scaffolder ▲
27	Screed layer ▲
28	Stonemason on construction sites
29	Tiler ▲
30	Tracklayer
30	Tuckpointer ▲
31	Tunnel constructor
31	Waterproofing constructor
32	Well builder
32	Window builder ▲
33	Picture source reference

Interesting for:

- ▲ Shell construction
- ▲ Finishing/Restoration
- ▲ Road construction

# Bricklayer



## MIX THE MORTAR

- use of large silos or One-Way (single-use) container

- use of bagged materials and extraction at the mixer

- use of bagged materials



## LAYING STONES WITHOUT CUTTING

- cleaning the site every day

- without cleaning

## CUTTING STONES

- cutting dry with extraction, indoors additional air cleaner or cutting wet with daily fresh water; cleaning the site every day

- cutting wet

- cutting dry without extraction

## REMOVING BUILDING RUBBLE

- push the debris together with a robust Hoover nozzle, put the coarser debris into the wheelbarrow and vacuum up the remaining dust. Indoors also use an air cleaner

- the debris should be sprayed, the coarser parts are placed in a wheelbarrow or bucket, the remaining debris is vacuumed up

- without protective measures



## CLEANING

- with vacuum cleaner

- with broom



## Carpenter



### DRILLING

● extraction drill or vacuum cleaner adapter

● hold vacuum cleaner nozzle under the drill hole

● without protective measures



## Chimney Sweeper



● for larger combustion plants, a vacuum cleaner is recommended for cleaning, otherwise respiratory protection should be worn

● respiratory protection

● without protective measures



## REMOVING BUILDING RUBBLE

- push the debris together with a robust Hoover nozzle, put the coarser debris into the wheelbarrow and vacuum up the remaining dust. Indoors also use an air cleaner



- the debris should be sprayed, the coarser parts are placed in a wheelbarrow or bucket, the remaining debris is vacuumed up



- without protective measures



## CLEANING CONSTRUCTION DUST

- with vacuum cleaner



- with broom



**AIR CLEANERS** must be positioned so that the suction opening is close to the dust source, see also manufacturer's instructions.

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# Concrete Worker



**POURING CONCRETE**

- no dust problems

**SPRAYING CONCRETE**

- full protective suits with helmet with forced ventilation
- full protective suits with breathing mask

- without protective measures

**STRIP THE FORMWORK FROM CONCRETE COMPONENTS**

- no dust problems

**CLEANING FORMWORK, INSIDE / OUTSIDE**

- no dust problems

**DRILLING IN CONCRETE**

- extraction drill or vacuum cleaner adapter

- without protective measures

**BLOW OUT BOREHOLES**

- with dust removal systems

- without protective measures



## Corrosion protector



### ABRASIVE BLASTING

- full protective suits with helmet with forced ventilation

- full protective suits with breathing mask

- without protective measures

### REMOVE BLASTING MATERIAL

- push the blasting material together with a robust Hoover nozzle, put the coarser debris into the wheelbarrow and vacuum up the remaining dust

- without protective measures

## Driver of construction machines and vehicles



- doors and windows of cabins closed

- doors and/or windows of cabins open

### DUST FROM CONSTRUCTION SITE ROADS

- keeping moist with water and dust binder

- keeping moist with water

# Demolition worker



**DEMOLITION BY HAND**

● with air cleaner

● respiratory protection

● without protective measures

**DEMOLITION WITH JACKHAMMER**

● jackhammer with extraction and air cleaner

○ respiratory protection

● without protective measures

**DEMOLITION WITH EXCAVATOR**

● doors and windows of cabins closed

● doors and/or windows of cabins open

**WORKER BETWEEN EXCAVATORS**

● helmet with forced ventilation

● respiratory protection

● without protective measures

**DEMOLITION WITH ROBOT**

● operator in closed cabin

● operator beside robot

**CONSTRUCTION WASTE CHUTE**

● enclosed

● open



# Drywall builder



## MIX THE GYPSUM

- use of bagged material, extraction at the bucket and air cleaner

- use of bagged material, extraction devices at the bucket and bag opening aids

- use of bagged material without protective measures

## LAYING, FILLING

- break plasterboard only, no cutting with handheld tools; with air cleaner; cleaning the site every day

- without cleaning

## DRILLING

- extraction drill or vacuum cleaner adapter

- hold vacuum cleaner nozzle under the drill hole

- without protective measures

## CUTTING PLASTERBOARD

- with extraction and air cleaner

- with extraction

- without protective measures

## SMOOTHING

- with air cleaner; cleaning the site every day

- without protective measures

## DRYWALL SANDING

- grinder with extraction and air cleaner

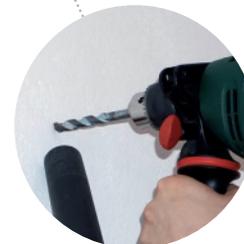
- grinder with extraction

- without protective measures

## CLEANING

- with vacuum cleaner

- with broom





## BOX COUNTERSINKING

● core drill with extraction and air cleaner

○ core drill with extraction

● without protective measures

## WALL CHASING

● wall chaser with extraction and air cleaner

○ wall chaser with extraction

● without protective measures

## DRILLING

● extraction drill or vacuum cleaner adapter

● hold vacuum cleaner nozzle under the drill hole

● without protective measures

## CLEANING

● with vacuum cleaner

● with broom





## KNOCKING OFF PLASTER

● handheld tools with extraction

○ with hammer and chisel

● without protective measures

## MIX THE PLASTER

● use of large silos or One-Way (single-use) container

○ use of bagged materials, extraction at the mixer

● use of bagged materials

## PLASTER SPRAYING

● respiratory protection

● without protective measures

## SCRAPING OF FACADE PLASTER

● cleaning the site every day

● without protective measures



The recommendations on vacuum cleaners, air cleaners, extraction systems on handheld tools, extraction drills refer to the lists recommended by the BG BAU (*Berufsgenossenschaft BAU*, the German prevention authority for the construction sector) [www.bgbau.de/themen/sicherheit-und-gesundheit/staub/low-dust-techniques/](http://www.bgbau.de/themen/sicherheit-und-gesundheit/staub/low-dust-techniques/)



# Floor layer



## MIXING FLOOR LEVELLING COMPOUNDS

- use of large silos or One-Way (single-use) container; bagged material with extraction devices at the bucket, bag opening aids and air cleaner

- use of bagged material, extraction devices at the bucket and bag opening aids

- use of bagged material without protective measures

## SANDING HARDENED LAYER OF LEVELLING COMPOUND

- grinder with extraction and air cleaner

- without protective measures

## SCATTERING SAND ON RESIN FLOORS

- low-dust quartz bedding materials; *Dorsicoat*, [www.dorfner.com](http://www.dorfner.com)

- respiratory protection

- without protective measures



**AIR CLEANERS** must be positioned so that the suction opening is close to the dust source, see also manufacturer's instructions.

**CHANGING THE FILTERS** and disposing of the dust collection bags must be done dust-free, see also manufacturer's instructions.

Wearing respiratory protection means **A NEW MASK EVERY DAY**, taking breaks from wearing it, checking its effectiveness and much more.

# Furnace builder



## FURNACE DEMOLITION

- full protective suits with helmet with forced ventilation; Indoors also use an air cleaner

- respiratory protection

- without protective measures



## REMOVING RUBBLE

- push the debris together with a robust Hoover nozzle, put the coarser debris into the wheelbarrow and vacuum up the remaining dust. Indoors also use an air cleaner

- the debris should be sprayed, the coarser parts are placed in a wheelbarrow or bucket, the remaining debris is vacuumed up

- without protective measures

## BUILD FURNACE WITHOUT CUTTING STONES

- cleaning the site every day

- without cleaning

## CUTTING STONES

- cutting dry with extraction; indoors additional air cleaner or cutting wet with fresh water; cleaning the site every day

- cutting wet

- cutting dry without extraction

## CORE DRILLING

- core drill with extraction

- drilling wet

- without extraction

## CLEANING

- with vacuum cleaner

- with broom



# Heating and sanitary engineer



## DRILLING

- extraction drill or vacuum cleaner adapter

- hold vacuum cleaner nozzle under the drill hole

- without protective measures

## MILLING SLOTS

- milling slots with extraction and air cleaner

- milling slots with extraction

- without protective measures

## MIXING POWDERY PRODUCTS

- bagged material with extraction devices at the bucket, bag opening aids and air cleaner

- use of bagged material: extraction devices on the bucket or bag opening aids

- use of bagged material without protective measures

## CLEANING

- with vacuum cleaner

- with broom



# Insulator

## REMOVING INSULATION

- respiratory protection, indoor air cleaner, cleaning the site every day

- respiratory protection

- without protective measures

## INSULATE WITH MINERAL WOOL

- respiratory protection, indoor air cleaner, cleaning the site every day

- respiratory protection

- without protective measures



## REMOVE PLASTER

- jackhammer with extraction; indoors additional air cleaner

- jackhammer with extraction

- without protective measures

## MIX THE PLASTER

- use of large silos or One-Way (single-use) container; bagged material with extraction devices at the bucket, bag opening aids and air cleaner

- extraction at the mixer; use of bagged material, extraction devices at the bucket and bag opening aids

- use of bagged material without protective measures



## PLASTERING BY HAND

- cleaning every day

## PLASTER SPRAYING

- respiratory protection

- without protective measures

## SMOOTHING

- air cleaner; cleaning every day

- without protective measures



## SANDING

- grinder with extraction, air cleaner

- grinder with extraction

- without protective measures

## CLEANING

- with vacuum cleaner

- with broom



## Parquet layer



### MIXING FLOOR LEVELLING COMPOUNDS

- use of large silos or One-Way (single-use) container; bagged material with extraction devices at the bucket, bag opening aids and air cleaner



- when using bagged materials, use of extraction devices on the bucket and bag opening aids



- use of bagged material without protective measures

### SANDING HARDENED LAYER OF LEVELLING COMPOUND

- grinder with extraction and air cleaner

- grinder with extraction

- without protective measures

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**CHANGING THE FILTERS** and disposing of the dust collection bags must be done dust-free, see also manufacturer's instructions.

Wearing respiratory protection means **A NEW MASK EVERY DAY**, taking breaks from wearing it, checking its effectiveness and much more.



## PAVING

- without cutting stones

## CUTTING PAVING STONES

- cutting dry with extraction or cutting wet, fresh water every day

- cutting wet

- without protective measures

## SWEEPING SAND INTO JOINTS

- keep moist

- dry sweeping

## LEVELING THE PAVEMENT

- keep moist

- dry shaking



# Pipeline constructor, Trench digger



## CUTTING CONCRETE PIPES

- cutting dry with extraction; cutting wet with fresh water

- cutting wet

- cutting dry without extraction

## COMPACTING

- keep soil moist

- compacting soil dry

## COMPACTING IN THE TRENCH

- using liquid soil

- compacting soil dry



The recommendations on vacuum cleaners, air cleaners, extraction systems on handheld tools, extraction drills refer to the lists recommended by the BG BAU (Berufsgenossenschaft BAU, the German prevention authority for the construction sector) [www.bgbau.de/themen/sicherheit-und-gesundheit/staub/low-dust-techniques/](http://www.bgbau.de/themen/sicherheit-und-gesundheit/staub/low-dust-techniques/)



# Plasterer



## KNOCKING OFF PLASTER

- with hammer and chisel or with handheld tools with extraction; indoors both additional with air cleaner

- handheld tools with extraction

- without protective measures

## MIXING THE PLASTER

- use of large silos or One-Way (single-use) container; bagged material with extraction devices at the bucket, bag opening aids and air cleaner

- use of bagged materials with extraction at the mixer

- use of bagged materials



## PLASTERING BY HAND

- cleaning every day

## PLASTER SPRAYING

- respiratory protection

- without protective measures

## SMOOTHING

- cleaning every day

## SANDING

- grinder with extraction and air cleaner

- grinder with extraction

- without protective measures

## CLEANING

- with vacuum cleaner

- with broom



# Plumber, Pipe fitter



## DRILLING

- extraction drill or vacuum cleaner adapter

- hold vacuum cleaner nozzle under the drill hole

- without protective measures

## MILLING SLOTS

- milling slots with extraction and air cleaner

- milling slots with extraction

- without protective measures

## MIXING POWDERY PRODUCTS

- use of bagged material, extraction at the bucket and air cleaner

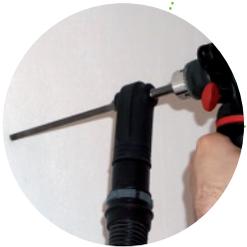
- use of bagged material, extraction devices at the bucket and bag opening aids

- use of bagged material without protective measures

## CLEANING

- with vacuum cleaner

- with broom



## Refractory engineer



**DEMOLITION,  
CHISELLING**

- full protective suits with helmet with forced ventilation

- respiratory protection

- without protective measures

**REBUILDING**

- respiratory protection; air cleaner

- respiratory protection

- without protective measures



## Road builder



**MILLING ASPHALT  
PAVEMENTS**

- small milling machines less than 2 hours per day; large milling machines with extraction systems

- respiratory protection

- small milling machines more than 2 hours per day; large milling machines without extraction systems

**CUTTING SLOTS  
IN ROAD**

- cutting wet

- respiratory protection

- cutting dry





**ROOFING**

- without cutting

**CUTTING ROOF TILES ON THE ROOF**

- cutting with extraction or cutting wet; use respiratory protection; *unsolved technical problem*

- cutting with extraction or cutting wet

- without protective measures



**BREAKING ROOF TILES**

- roof tiles scoring or "perforating" and then breaking [www.hytile.eu/Videos/en](http://www.hytile.eu/Videos/en)



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**CHANGING THE FILTERS** and disposing of the dust collection bags must be done dust-free, see also manufacturer's instructions.

Wearing respiratory protection means **A NEW MASK EVERY DAY**, taking breaks from wearing it, checking its effectiveness and much more.

## Sandblaster



### ABRASIVE BLASTING

- full protective suits with helmet with forced ventilation

- full protective suits with breathing mask

- without protective measures

### COLLECTING BLASTING DEBRIS / CLEANING

- push the debris together with a robust Hoover nozzle, put the coarser debris into the wheelbarrow and vacuum up the remaining dust; indoor air cleaner in addition

- without protective measures



## Scaffolder



### DRILLING

- drill with extraction device

- without protective measures

### SCAFFOLD DISMANTLING



- without protective measures



# Screed layer



## MIX CEMENT SCREED

- use of large silos or One-Way (single-use) container; when using bagged materials, use of extraction devices on the bucket and bag opening aids and air cleaner

- extraction at the mixer; when using bagged materials, use of extraction devices on the bucket and bag opening aids

- use of bagged material without protective measures



## SMOOTHING

- grinding with extraction and air cleaner

- grinding with extraction

- without protective measures



## SCATTERING QUARTZ SAND ON MASTIC ASPHALT SCREED

- use of washed sand or quartz-free bedding, e.g. from recycled glass

- without protective measures



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# Stonemason on construction sites



## POLISHING / GRINDING

- grinder with extraction and air cleaner; cleaning the site every day

- grinder with extraction

- without protective measures

## CUTTING

- cutting with extraction; indoors additional air cleaner or cutting wet with daily fresh water; cleaning the site every day

- cutting with extraction; cutting wet with fresh water

- without protective measures



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**CHANGING THE FILTERS** and disposing of the dust collection bags must be done dust-free, see also manufacturer's instructions.

Wearing respiratory protection means **A NEW MASK EVERY DAY**, taking breaks from wearing it, checking its effectiveness and much more.



## REMOVE TILES

- with hammer and chisel or with handheld tools with extraction; indoors both additional with air cleaner

- with hammer and chisel or
- with handheld tools with extraction

- without protective measures

## MIX THE TILE GLUE

- use of low-dust glue

- use of extraction devices on the bucket and bag opening aids

- use of bagged material

## CUTTING TILES

- cutting with extraction or breaking, indoors with air cleaner or cutting wet with daily fresh water; cleaning the site every day

- cutting wet

- without protective measures

## CLEANING

- with vacuum cleaner

- with broom



## Tracklayer



TRACK BED  
RENOVATION WITH  
"FAST TRACK"

- working in closed cabins;  
otherwise, respiratory  
protection



- respiratory protection



- without protective measures



TRACK BED  
RENOVATION, MANUAL

- respiratory protection

- without protective measures



## Tuckpointer



TUCKPOINT GRINDING

- grinder with extraction;  
*Piranha cutter*,  
[www.rockamat.com/en/products/  
joint-cutter/piranha-cutter/](http://www.rockamat.com/en/products/joint-cutter/piranha-cutter/)



- without protective measures



## Tunnel constructor



### VENTILATION

- sufficient tunnel diameter for optimal ventilation

- without ventilation

### RUBBLE TUNNELING

- enclose primary crushers and remove dust, enclose, and spray transfer points

- work without housing, without dedusting, without wetting

## Waterproofing constructor



### CUTTING OF CONCRETE SLABS

- cutting with fresh water

- without protective measures

### REMOVAL OF CONCRETE SLABS

- cutting with fresh water

- without protective measures

## Well builder



### CUTTING STONES OR CONCRETE

- cutting dry with extraction; cutting wet with fresh water

- cutting wet

- cutting dry without extraction

### COMPACTING

- keep soil moist

- compacting soil dry

## Window builder



### REMOVE WINDOW

- jackhammer with extraction and air cleaner

- jackhammer with extraction

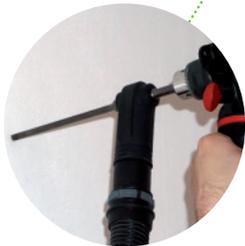
- without protective measures

### DRILLING

- extraction drill or vacuum cleaner adapter

- hold vacuum cleaner nozzle under the drill hole

- without protective measures



## PICTURE SOURCE REFERENCE

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BG ETEM (p. 13)

Bibermax (p. 25)

Branstett (p. 25)

Caparol (p. 14)

Concept Resine (p. 15)

CooperM (pp. 9, 30)

Duss (p. 13)

Dustbox (p. 11)

FCC Construction (p. 11)

Heylo (pp. 12, 18)

Hilti (pp. 9, 16)

Hytile (p. 25)

Joest (p. 28)

Milwaukee (p. 26)

Nalbach (p. 13)

Neiss (p. 20)

Network Italiana Silica (p. 18)

OPPBT (pp. 6, 9, 14, 24, 30)

Preuß (pp. 6, 9, 26)

Starmix (pp. 13, 27)

Weiss (p. 13)

Wirth (p. 30)

# Reducing respirable crystalline silica dust effectively on construction sites

Dust is the permanent companion of all construction workers and dust is in principle a health threat. Some kinds of dust have disastrous health effects – like respirable crystalline silica (RCS) dust.

The current European exposure limit value of  $0.1 \text{ mg/m}^3$  shall protect workers from negative health effects. Having an exposure limit value is one thing, making it a common practice is another thing. This mapping gives advice on how to reach the limit value for many specific construction activities each with its specific conditions of exposure and related prevention measures.

The mapping is the result of a European Social Partner project jointly run by EFBWW and FIEC.