

Reducing respirable crystalline silica dust effectively on construction sites



A good practice guide,
assigned by activities and professions.

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With the 2017 revision of the CARCINOGENS AND MUTAGENS DIRECTIVE 004/37/EC, an occupational exposure limit value of 0.1 mg/m³ 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 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/



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	Rofer ▲
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



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



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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

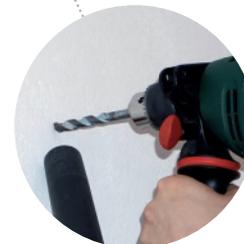
- grinder with extraction

- 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



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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; *Doarsicoat*, 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

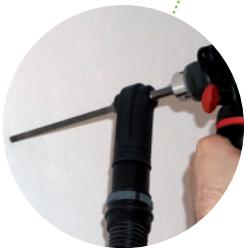
- use of bagged material: extraction devices on the bucket or bag opening aids

- 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

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.



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



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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

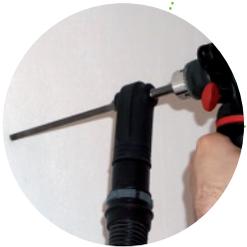
- use of bagged material, extraction devices at the bucket and bag opening aids

- 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



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.

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



DRILL WITH EXTRACTION DEVICE

- 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



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.

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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.rokamat.com



- 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

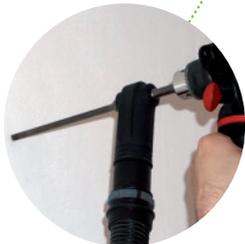
- without protective measures

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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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)

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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 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.