

Exposure to respirable crystalline silica (RCS)

Training programme in accordance with the European quartz agreement

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Content

- European agreement on respirable crystalline silica (RCS)
- Silica, quartz and RCS in brief
- Health effects of RCS
- How to avoid/reduce exposure to RCS
 - Correct/good occupational hygiene
 - Technical/personal protective equipment
- Exposure monitoring/measuring dust

Quartz agreement

- A sector agreement between the major employers and the employee organisations in the EU/EEA.
- The agreement aims to protect employees' health through good/safe handling and use of crystalline silica and products containing it.
- The agreement was signed on 25 April 2006, and came into force on 25 October 2006.

Quartz agreement obligations:

- Monitor (measure) the exposure to respirable crystalline silica dust (RCS) in the working atmosphere
- Reduce the exposure to RCS with good occupational hygiene (good practice)
- Inform/train employees
- Monitor the health of employees exposed to respirable crystalline silica dust
- Report the status to the EU Committee every two years from 2008

Who does the agreement apply to?

- ✓ Workplaces within the EU/EEA
- ✓ Existence of crystalline silica in raw materials or products
- ✓ Employers that are direct/indirect members of a European trade organisation that has signed the agreement
- ✓ Employees that are direct/indirect members of a European employees' organisation that has signed the agreement

Examples of affected industries

- Gravel/stone/mining industry
- Ceramics industry
- Smelting industry
- Foundry industry
- Insulation manufacturers
- Cement/mortar/concrete industry

Silica and quartz ¹⁾

- Quartz and silica are used interchangeably in every day speech.
- Silica, SiO_2 , can be crystalline or amorphous.
- Crystalline silica encompasses three minerals:
 - Quartz
 - Tridymite (metastable)
 - Cristobalite (metastable)
- Quartz consists of two forms:
 - α -quartz (only α -quartz is stable in nature)
 - β -quartz
- Amorphous silica is non-crystalline, e.g. opal, diatomite, fused silica

¹⁾ Tom Myran, Professor NTNU,
presentasjon på "Stein i vei",
Tønsberg 2005

Examples of quartz



Amethyst



Rock crystal

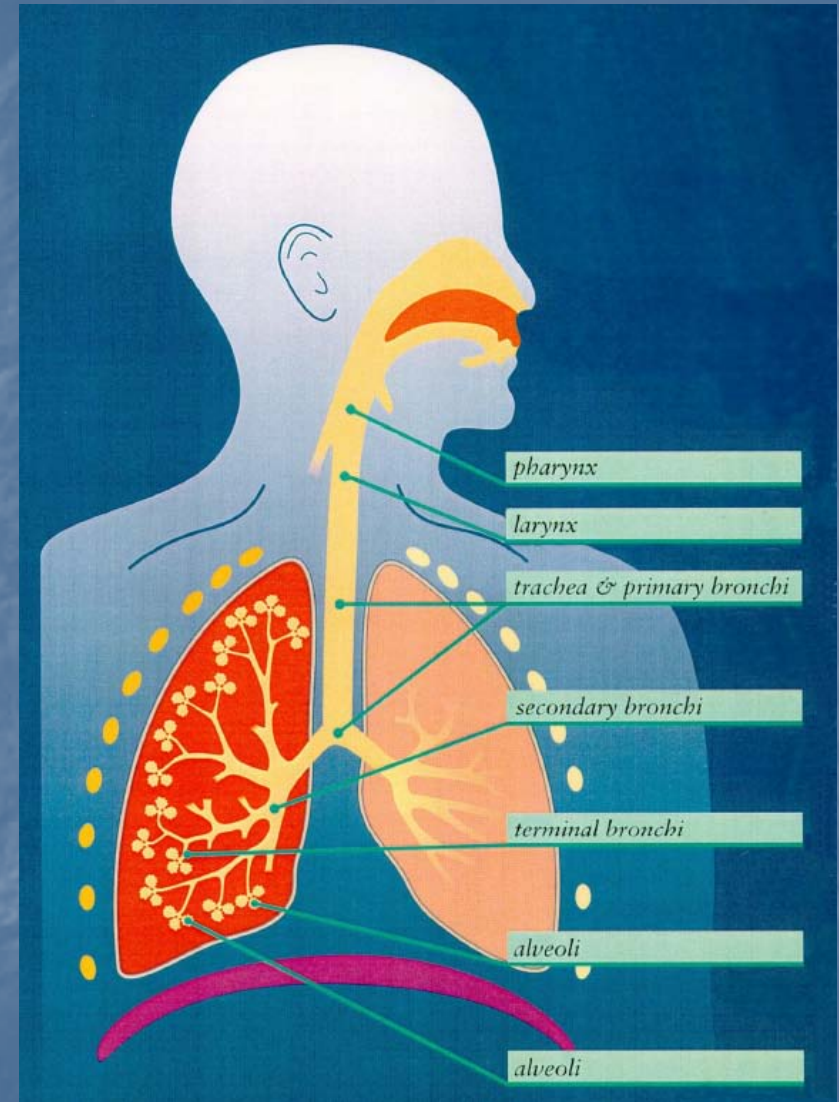
Deposits ¹⁾

- The earth's crust consists on average of 12% crystalline silica.
- Quartz breaks are found with approximately 100% quartz.
- 52% of the 274 norwegian gravel deposits that in autumn 2004 were in operation/sporadic operation, had a quartz content of more than 25%.
- In asphalt in Norway, aggregates with 0 to 65% quartz are used.

1) Tom Myran, Professor NTNU,
presentasjon på "Stein i vei",
Tønsberg 2005

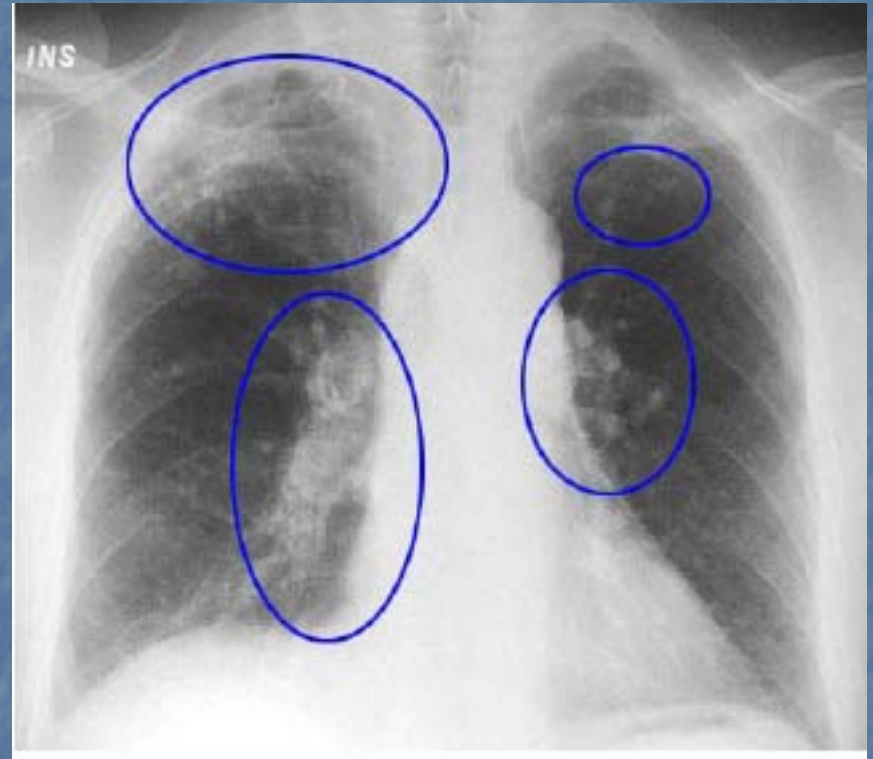
Health effects of silica

- Only the crystalline form of silica is harmful to health.
- The health risk is related to inhaling respirable crystalline silica dust (RCS).
- Respirable dust is the finest fraction of the dust (< 5 micrometres), which when inhaled goes all the way to the air sacs (the alveoli).



Health effects cont'd.

- Repeated and long-term exposure to RCS can cause chronic pulmonary diseases such as COPD (chronic obstructive pulmonary disease) and silicosis.
- Silicosis increases the risk of developing lung cancer and tuberculosis.
- Quartz is therefore regarded as carcinogenic. (Marked K in OEL)



Hard lumps of scar tissue appear in the lungs when silicosis is contracted, as shown on the x-ray.

Medical examination

- Lung function testing (spirometry – see photo)
- X-ray
- Mapping state of health/symptoms
- Mapping of other exposure conditions (smoking)/work history



Medical examination cont'd.

- The medical examination should be carried out before, during and after an employee leaves, in the event of a risk of exposure to RCS.
- Employees with no special symptoms shall undergo a medical examination every three years, with x-rays taken every six years.

Symptoms

- Chronic cough, often with sputum containing blood
- Heavy breathing
- Frequent pneumonia, weight loss, reduced general health
- **NB:** Employees with persistent symptoms from the respiratory passages must contact the Occupational health service/their GP for an examination.

Quartz in the working atmosphere

- Regulated through Occupational Exposure Limits (OEL) for contamination in the working atmosphere, as an average of an 8-hour working day.
- The limits are determined based on technical, medical and financial considerations.
- OEL applicable in Norway for quartz dust:
 - Total dust: 0.3 mg dust/m³ air
 - Respirable dust: 0.1 mg dust/m³ air
- European quartz agreement

Exposure/dust measurements

- Stationary and/or portable samplers
- Samples must be taken under representative conditions
 - Must cover a normal working day
 - Must cover all relevant operations



Exposure/dust measurements cont'd.

- Results from the dust measurements are presented as an average quantity of RCS per m³ air (mg/m³) for a working day
- Results are compared with current OEL
- Measured results shall be conveyed to the employees

How to avoid exposure to RCS

- The quartz agreement requires good practice routines to be introduced.
- Good practice is organisational and technical measures to reduce the formation of dust and thereby the exposure.
- Good practice is described in 20 generally applicable task sheets and 14 task sheets for specific operations.

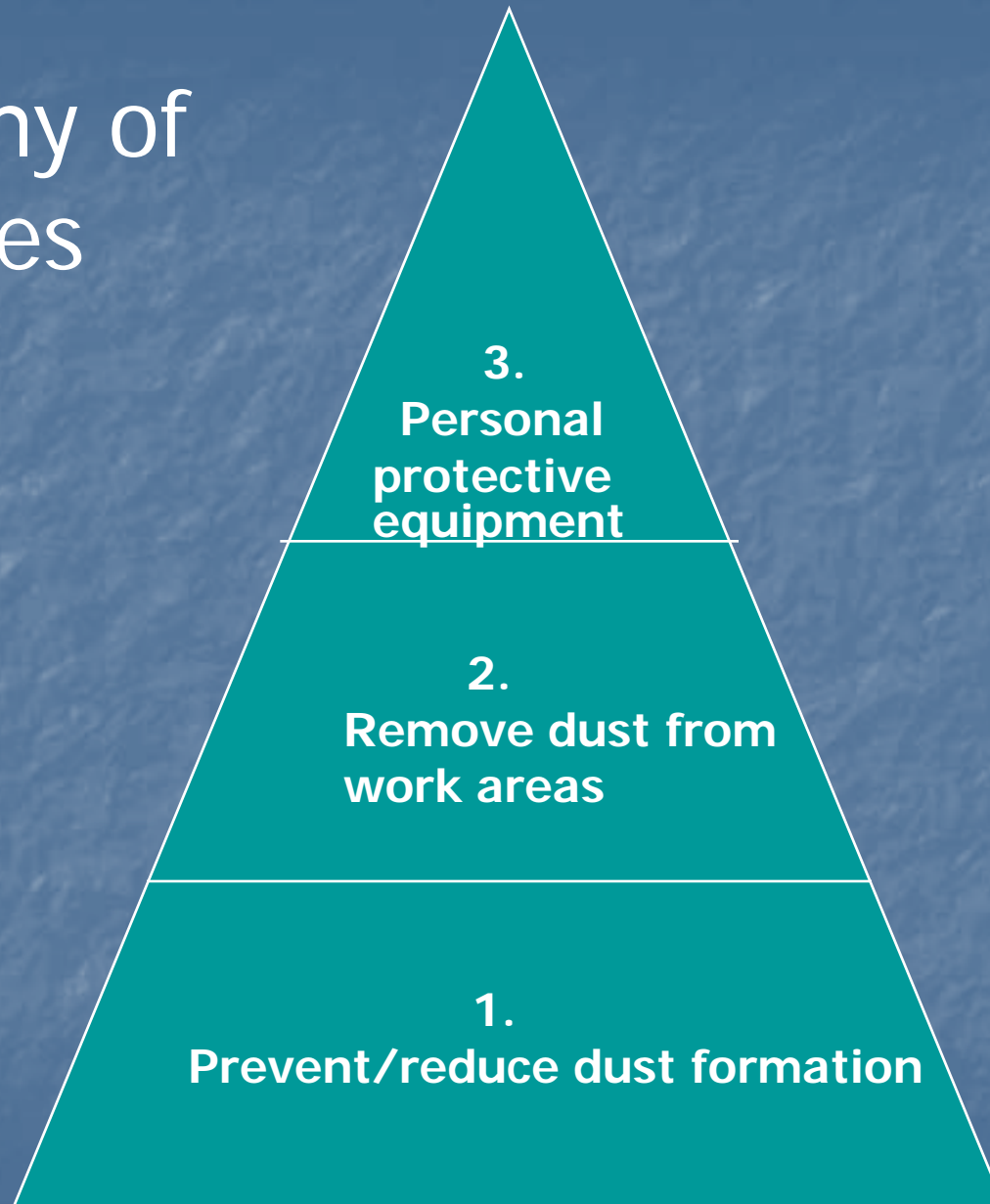
Good practice introduced for

- Drilling
- Crushing and painting stone
- Drying minerals
- Blending materials
- Filling small and large sacks
- Opening and emptying sacks
- Cleaning
- Training
- Other

Good practice?



Hierarchy of measures



Combating dust with water

- Tools with a water supply for sawing, painting, moulding
- Sprinkler system



In-house provisions?

- Routines for handling materials that contain or generate RCS?
- Dust-abatement measures?
- Use of personal protection equipment?
- Medical examinations?
- Exposure/dust measurements?

Exercises

1. In what areas of the activity is quartz found/handled?
2. What operations within these areas can lead to exposure to RCS?
3. What operations has good practice been established for?
4. What can be done to reduce exposure?

Enter in a table!

Example of table

Work area with quartz	Operations that can lead to exposure to RCS	Good practice?
Crusher	Emptying of wheeled loader	
	Rodding/spiking	
Transport	Repair of belt	
	Cleaning	
Warehouse	Loading/unloading	

References

- Tom Myran
- Quartz agreement
- Health monitoring guide
- Exposure monitoring guide