

Amicus Guide to Controlling Silica Dust

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■ FOREWORD BY AMICUS GENERAL SECRETARY, DEREK SIMPSON



“Ensuring that workers are protected from occupational disease is one of the most important roles of a trade union. That is why Amicus has been proud to sign up to a European wide agreement that will protect hundreds of thousands of UK workers from the effects of silica dust.

Silica is found in many of the materials that are used in the buildings we all live and work in. Silica itself is not harmful but silica dust can cause a whole host of health problems for those who work with this mineral, including silicosis the world’s oldest known occupational disease.

This guide explains how Amicus health and safety reps can work with their employers to remove the risks associated with working with silica.”

■ INTRODUCTION

This booklet has been produced by Amicus to explain the hazards of breathing in silica dust, and the measures that can be taken to remove silica dust from the workplace, and failing that, control silica dust to the lowest possible levels. Technically the booklet refers to Respirable Crystalline Silica (RCS), but in practice, the term silica dust will normally be used.

This booklet is relevant to all workers who could be exposed to silica dust, whatever industry they work in.



■ WHAT IS RESPIRABLE CRYSTALLINE SILICA (RCS)?

Crystalline silica is one of the most abundant minerals in the earth's crust and is a major constituent of construction materials such as bricks, tiles and concrete.

Many common workplace activities such as cutting, drilling, grinding and polishing, produce fine dust containing respirable crystalline silica (RCS). The term 'respirable' means that the dust particles are small enough to get deep into the lungs when they are inhaled.

Crystalline silica consists of silicon and oxygen atoms (SiO_2) arranged in a regular crystalline structure. There are different crystalline forms of silica, with the most common being quartz. In some circumstances, for example in the high temperatures of industrial furnaces and kilns, quartz may convert to another crystalline form of silica known as cristobalite. Quartz is found in varying amounts in almost all types of rock, sands, clays, shales and gravel. For example, sandstone is almost pure quartz, whereas granite might contain 15-30% quartz.

There is very widespread occupational exposure to silica dust in a diverse range of industry sectors including mining and quarrying, construction, ceramics, heavy clay, foundries and stonemasonry. The Health and Safety Executive (HSE) estimates that in the UK at least 100,000 workers are regularly exposed to silica dust, and that many more workers may be exposed on a less regular basis.

■ THE HEALTH EFFECTS OF SILICA DUST

For many years, it has been known that breathing in fine dust containing crystalline silica can cause lung damage (silicosis). In fact, silicosis is the world's oldest known occupational disease.

Silicosis is a slowly progressive, irreversible disease that usually takes some years to develop. Silicosis can cause breathing problems, the severity of which can range from mild through to severely disabling, depending on the amount of dust inhaled. In severe cases, silicosis leads to premature death. In people who have had exceptionally high exposures over just a few months or years, a rapidly progressive and often fatal condition known as "acute silicosis" can occur.

Future cases of silicosis can be reduced by removing silica dust altogether, and where that is not possible, implementing appropriate measures to reduce exposure to silica-containing dusts. Such measures include improved work practices, engineering controls, respiratory protective equipment and training programmes.

• Silica and cancer risk

Heavy and prolonged exposures to Respirable Crystalline Silica under conditions that produce silicosis can also cause lung cancer.

In 1997 the International Agency for Research on Cancer concluded that inhaled respirable crystalline silica from occupational sources is carcinogenic to humans and in 2003 the EU Scientific Committee for Occupational Exposure Limits stated:

"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. Since a clear threshold for silicosis development cannot be identified, any reduction of exposure will reduce the risk of silicosis."

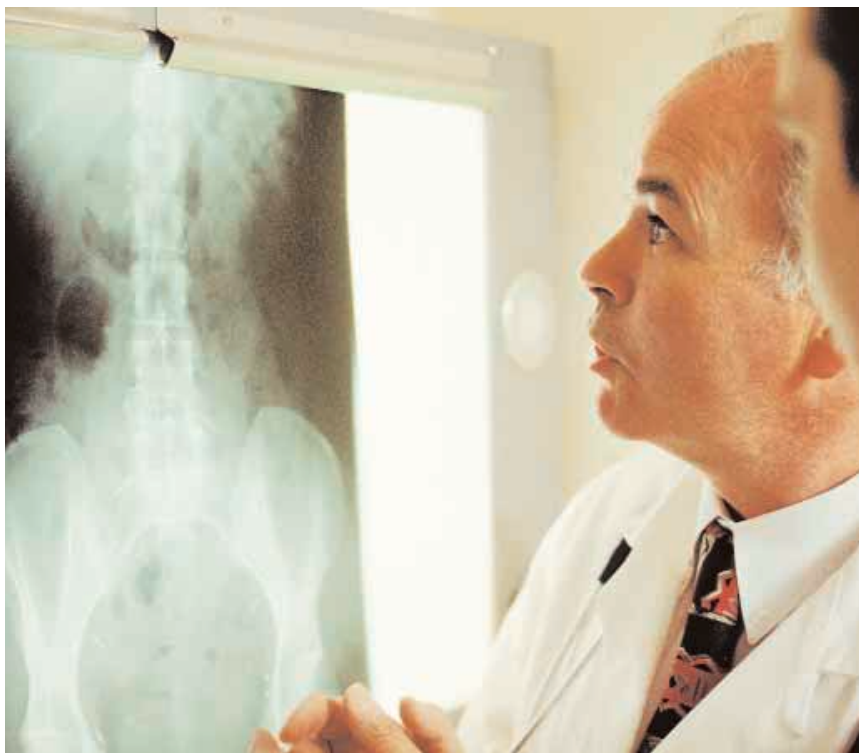
• Chronic obstructive pulmonary disease (COPD)

The symptoms of COPD are chronic cough, sputum production and breathlessness. The condition is slow to develop and is rarely seen in people under 40. It can be very disabling and is a leading cause of death. Severe unremitting asthma is classed as a COPD.

COPD is associated with exposure to silica dust. COPD encompasses bronchitis and emphysema, and in essence means that people suffer breathing difficulties. Most COPDs are caused by cigarette smoking, but at least 15% of COPDs are work related. Silica dust is strongly linked to occupational causes of COPD.

- **Other health effects**

In scientific literature, papers are published about the possible association between silica exposure and scleroderma (an autoimmune disorder) and increased risk of kidney disease.



■ WHO IS AT RISK FROM SILICA DUST IN THE UK?

Workers are exposed to Respirable Crystalline Silica in a diverse range of industries. There are limitations in the amount of quantitative exposure data available for many of the industry sectors in which exposure to silica dust occurs. Aside from coal mining, the HSE estimated exposures in the UK are given below.

• Foundries

There are about 500 foundry sites that use sand and employ around 25,000 workers. Limited data from the foundries indicates that some exposures exceed 0.3 mg/m³ but these are task-based exposure measurements, not time-weighted.

• Ceramics industry

There are approximately 70 pottery companies in the UK with about 25,000 employees. There will also be a number of small "craft" potteries around the country where silica dust exposure is sporadic. Data for the larger potteries indicates that exposures are generally below 0.1 mg/m³ (8-hr TWA).

• Brick-making

There are about 70 brick-making sites in the UK with about 6,000 workers. Clay tile manufacture is similar to brick manufacture. The total workforce in tile making is around 1,000 spread over about 15 sites. Exposure data available suggests that only a small percentage of exposures exceed 0.3 mg/m³ (8-hr TWA), but this is based on data from only three work sites.

• Quarry industry

There are around 2000 quarry sites with around 35,000 employees. Exposures in the quarrying sector show a wide variation and depend on the rock type. From the data available, there is a low to moderate percentage of personal exposures that exceed 0.1 mg/m³ (8-hr TWA).

• Industrial minerals and the production and use of silica sand and flour

There are 25 silica sand sites in Great Britain. There are also about 20 working mines in which industrial minerals (such as potash, gypsum, limestone) are extracted, but with one exception the silica content is low. Recent data indicates that for certain tasks exposures can exceed 0.3 mg/m³ (8-hr TWA) but in these circumstances respiratory protective equipment is used.

- **Construction industry**

Several hundred thousand workers in the construction industry could be exposed to silica dust on an occasional basis, and about 140,000 workers exposed on a more regular basis. There is very little information on quantitative exposures to silica dust in construction although some tasks can generate high airborne concentrations.

- **Stonemasonry**

2,000 stonemasons are exposed to silica dust. Exposures vary according to the type of stone used but this industry sector has potential for exposures in excess of 0.3 mg/m³ (task-based).

■ NEW WORKPLACE EXPOSURE LIMIT (WEL) FOR SILICA DUST

In 2006 the Health and Safety Commission (HSC) set a new exposure limit for respirable crystalline silica (RCS) of 0.1 mg/m³.

A Workplace Exposure Limit is the maximum concentration of an airborne substance, averaged over a reference period, to which employees may be exposed by inhalation. This means it is a figure that, at worst, should not be exceeded.

In practice, however, employers will be expected to keep exposures well below 0.1 mg/m³. More importantly, employers are expected to apply good control practice, as well as getting below the WEL.

Because silica dust has been identified as a carcinogen, and because of the links to COPD, Amicus policy is that levels should be as low as reasonably practicable.

■ ADEQUATE CONTROL

As of 6 April, 2005 adequate control of exposure does not rely merely on numerical limits, but places greater emphasis on good control practice.

The Control of Substances Hazardous to Health (COSHH) Regulations require employers to:

- apply the eight principles of good practice for the control of substances hazardous to health (regardless of whether a substance has an exposure limit);
- ensure that the Workplace Exposure Limit is not exceeded; and
- ensure that exposure to substances that can cause occupational asthma; cancer; or damage to genes that can be passed from one generation to another; is reduced as low as is reasonably practicable

■ PRINCIPLES OF GOOD PRACTICE

Employers already have a clear responsibility to manage and minimise the risks from work activities. They must develop suitable and sufficient control measures and ways of maintaining them. They should:

- identify hazards and potentially significant risks
- take action to prevent and control risks
- keep control measures under regular review

To be effective in the long term, control measures must be practical, workable and sustainable. The principles of good control are now part of the COSHH Regulations - they appear in Schedule 2A, aligned with Reg. 7(7). Employers who do not follow these principles are not properly protecting their employees.

They are to:

1. Design and operate processes and activities to minimise emission, release and spread of substances hazardous to health
2. Take into account all relevant routes of exposure
3. Control exposure by measures that are proportionate to the health risk
4. Choose the most effective and reliable control options which minimise the escape and spread of substances hazardous to health
5. Where adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable personal protective equipment
6. Check and review regularly all elements of control measures for their continuing effectiveness
7. Inform and train all employees on the hazards and risks from the substances with which they work and the use of control measures developed to minimise the risks
8. Ensure that the introduction of control measures does not increase the overall risk to health and safety

■ PRINCIPLES OF GOOD PRACTICE

Silica Essentials is part of the COSHH Essentials programme which has been developed to help firms comply with the Control of Substances Hazardous to Health Regulations (COSHH). COSHH requires employers to:

- assess the risks to health from chemicals and decide what controls are needed;
- use those controls and make sure workers use them;
- make sure the controls are working properly;
- inform workers about the risks to their health;
- train workers.

The Health & Safety Executive's COSHH Silica Essentials sheets set out the different approaches employers can use to limit silica dust levels and control exposure. They also suggest how often tasks should be carried out such as testing, cleaning and maintaining protective equipment in different industry sectors and processes.

In general, employers have to continue to follow principles of good practice (as listed above) to control silica. However, the COSHH Silica Essentials sheets offer employers practical guidance on keeping silica exposure within the WEL.

Details of the currently available COSHH Silica Essentials Sheets are given on the next page.

They are available free of charge from the HSE web site at:
<http://www.hse.gov.uk/pubns/guidance/index.htm>

■ COSHH SILICA ESSENTIALS CONTROL GUIDANCE SHEETS PRODUCED BY THE HSE

- **brick and tilemaking**

BK0 Advice for managers
BK1 Clay milling (pug-mill)
BK2 Sand handling and screening
BK3 Facing green bricks with sand
BK4 Moving green and fired bricks
BK5 Manual dehacking and batching
BK6 Tile pressing
BK7 Ventilated vehicle cabs

- **ceramics**

CR0 Advice for managers
CR1 Glaze and colour preparation
CR2 Casting
CR3 Fettling
CR4 Kiln loading (placing) and unloading
CR5 Spraying glazes and colours

- **foundries**

FD0 Advice for managers
FD4 Sand plant
FD5 Coremaking and shell moulding (small scale)
FD6 Knock-out, shakeout, etc
FD7 Fettling small castings
FD8 Fettling large castings
FD9 Abrasive blasting small castings in a cabinet
FD10 Gouging
FD14 Furnace relining

- **manufacturing**

MN0 Advice for managers
MN1 Making products that include silica flour
MN2 Making products that include mineral powder
MN3 Dry-mixing powders containing silica
MN4 Small packing operations: Dry products containing silica

- **quarries**

QY0 Advice for managers

QY1 Rock drilling
QY2 Excavating and haulage
QY3 Crushing
QY4 Drying and cooling
QY5 Dry screening
QY6 Dry grinding
QY7 Jumbo bag filling: 500-1500 kg
QY8 Silica flour: Small bag (15-50 kg) filling and transfer
QY9 Mineral powders: Small bag (15-50 kg) filling and transfer
QY10 Cleaning up silica dusts
QY11 Control cabins and vehicle cabs

• **slate**

SL0 Advice for managers
SL1 Primary sawing
SL2 Automated slate sawing
SL3 Sawing slate into special sizes and shapes
SL4 Manual slate splitting
SL5 Dressing slate (edge bevelling)

• **stonemasons**

ST0 Advice for managers
ST1 Primary and secondary sawing
ST2 Rotary tools: Boring and polishing
ST3 Hand-held rotary tools: Cutting and polishing
ST4 Hand and pneumatic chiselling

• **construction**

CN0 Advice for managers
CN1 Concrete scabbling
CN2 Chasing with hand-held power tools
CN3 Drilling and coring with hand-held rotary power tools
CN4 Crushing and screening demolition material
CN5 Clearing and removing rubble
CN6 Cutting paving and kerbstones with rotary cutters
CN7 Abrasive blasting
CN8 Tunnelling and shaft sinking
CN9 Pneumatic breaker in poor ventilation (eg indoors)
CN10 Cutting silica-filled composites
CN11 Control cabins and vehicle cabs

■ EUROPEAN-WIDE SOCIAL DIALOGUE AGREEMENT (SDA) ON SILICA

Amicus is part of a European-wide Silica agreement to control silica dust in the following industries:

Aggregates, Cement, Ceramics, Foundry, Glass fibre, Special Glass, Container Glass & Flat Glass, Industrial Minerals, Mineral Wool, Mines, Mortar, Natural Stones and Pre-cast Concrete (the agreement does not cover the construction industry)

The Silica Agreement covers the entire production and use of crystalline silica and materials/products/raw materials containing crystalline silica.

The Silica Agreement aims to:

- protect the health of employees
- minimise exposure to RCS by applying the good practices and
- increase knowledge about potential health effects of RCS and about good practices

The principles of the Silica Agreement are:

- Compliance with national and EU law, including national Workplace Exposure Limits
- Application of the agreement and good practices
 - Initial risk assessment to identify RCS exposures and application of general prevention principles
- Continued use of crystalline silica
 - Though the risk assessment process will need to consider the possibility of substitution
- Additional obligations
 - Training
 - Dust monitoring
 - Health surveillance
 - Cooperation to increase knowledge (R&D)
- Reduction of failures (continuous improvement)
- Monitoring application at site level through indicators
- Biennial reporting through the signatory sectors to a bipartite Council
- Summary report published by the Council

Biennial reporting

The agreement requires reporting at least every two years at a site, company, country and sector level.

The good practice guide for dust prevention in the workplace Respirable Crystalline Silica

A key feature of the Silica SDA is the good practice guide which sets out the hazards of silica dust and the measures that can be taken to reduce exposure. It comes in two parts:

- Respirable Crystalline Silica essentials
- Task Guidance Sheets describing good practice techniques for various common tasks

Implementation of the Agreement

The Agreement came into force on 25th October, 2006. From 2007 onwards there is preliminary reporting on the status of implementation, with official reporting to the NePSi bipartite Council from 2008, and every two years from then on.

The NePSi Council

NePSi, is the Negotiating Platform on Silica, and each signatory European industry sector association and trade union federation will be represented within a bipartite Council, which will meet at least every reporting year.

This Council will be in charge of:

- follow-up of the implementation of the agreement
- interpretation and application issues
- adaptation of the Good Practices
- communication with third parties
- review of the sectors' biennial consolidated reports
- drafting of summary reports and executive summaries every two years.

Action plan for companies

Every company covered by the agreement must:

- Nominate a responsible person at company and site levels
- Organise necessary training
- Identify RCS exposure (risk assessment/dust monitoring)
- Organise reporting

Details of all the task guidance sheets are given at the end of this booklet.

The SDA Silica Good Practice Guide and Task Guidance Sheets are available free on the web from:

■ SILICA DUST IN THE CONSTRUCTION INDUSTRY

Hundreds of thousands of workers in the construction industry are exposed to silica dust in the course of their work. However, there is very little information about the actual levels of exposure. Although the Silica Social Dialogue Agreement does not formally cover the construction industry, there is a considerable amount of useful information in the SDA Good Practice Guide and Good Practice Sheets.

Jobs where there could be significant exposure to silica dust include:

- Drilling in poorly ventilated undercroft
- Drilling into brickwork under arch blocked at one end
- Using jackhammers to break out concrete in large open indoor area
- Chasing out cracks in screeded cement floor in large open indoor area
- Chasing out mortar between bricks prior to re-pointing
- Cutting paving kerb (33% silica) in open area
- Cutting blue brick (32% silica) in open area
- Cutting breeze block (3% silica) in open area
- Cutting window openings in concrete wall with wall saw/ Cutting concrete with floor saw
- General clearing and removing rubble
- Concrete crushing from demolition job for use as hard core

Exposure to silica dust is covered by the Control of Substances Hazardous to Health Regulations. Guidance available from the HSE includes COSHH Silica Essentials, for which there are a number of control guidance sheets covering the construction industry. (see pages16/17).

■ ACTION BY HSE INSPECTORS

HSE and Local Authority Inspectors enforce the COSHH Regulations. In terms of controlling exposure, they will expect employers to comply with Regulation 7 and the principles of good control practice detailed in Schedule 2A as well as ensuring the WEL for RCS of 0.1 mg/m³ is not exceeded.

COSHH Silica Essentials sheets provide good control practice guidance, but they do not form part of the Regulations. Dutyholders could use “other equally effective measures” to comply which could include the SDA.

HSE has welcomed the SDA good practice guidance as it will contribute to the overall aim of the initiatives; to improve good practice in industries where there is exposure to Respirable Crystalline Silica.

In practice, the differences between COSHH Silica Essentials Sheets and SDA Task Guidance Sheets will be small.

■ WHAT SHOULD AMICUS REPS BE DOING ABOUT SILICA DUST?

As with many health and safety issues it is the role of the health and safety rep to ensure that employers are complying with their responsibilities.

- Ensure you are involved in the COSHH assessment, so that no silica containing substance is used without having first been fully assessed for its potential to generate silica dust.
- Use your rights to health and safety information to request and take copies of COSHH assessments and records of monitoring, including the results of local exhaust ventilation tests.
- Check that the WEL has not been exceeded.
- Press for exposure levels to be as far below the WEL as is reasonably practicable, in line with Amicus policy.
- Check that measures to first prevent and then control exposure are introduced.
- Ensure that the employer provides information and training in the risks and alternative means of working with substances hazardous to health.
- Ask your employer whether there is a COSHH Silica Essentials control solution for the jobs you do. If there is, make sure it is applied.
- If you are covered by the Social Dialogue Agreement on silica, make sure that your employer is applying all of the requirements of the agreement, implementing the recommended control measures and training, and reporting exposures.
- If you are not formally covered by the agreement, there may still be many examples of good practice within it that are relevant to your work.
- Remember, all UK workplaces are covered by the COSHH Regulations, the WEL for silica, and Silica Essentials.

■ SOURCES OF INFORMATION

UK COSHH Essentials - Silica Essentials Sheets -
<http://www.hse.gov.uk/pubns/guidance/index.htm>

More sources of information on silica dust hazards, including the:
European Social Dialogue Agreement Task Guidance Sheets can be found at
<http://www.amicustheunion.org/silica/>

	Aggregates	Cement	Ceramic	Precast Concrete	Foundry	Glass	Industrial Minerals	Mineral Wool	Mining	Mortar	Natural Stones
2.2.6. Crushing of minerals	X	X		X			X		X		
2.2.7. Cutting and polishing refractory materials and glass			X		X	X					
2.2.8. Drying minerals	X	X					X			X	
2.2.9. Dry pressing			X								
2.2.10. Fattling larger castings in foundries					X						
2.2.11. Fattling smaller castings in foundries					X						
2.2.12. Final treatment (dry)			X	X							
2.2.13. Firing (biscuit, glaze, final, decoration)			X								
2.2.14. Glass furnace batch charging - container glass						X					
2.2.15. Glass sandblasting						X					
2.2.16. Grinding of minerals	X	X		X			X				
2.2.17. Grinding of glass						X					
2.2.18. Isostatic pressing (dry)			X								
2.2.19. Jumbo bagging	X	X			X		X			X	
2.2.20. Knock-out and shake-out in foundries					X						
2.2.21. Lining and Break-out					X						
2.2.22. Mixing of materials		X	X	X	X	X	X			X	
2.2.23. Periodic and continuous drying			X	X	X						
2.2.24. Plastic shaping			X	X							
2.2.25. Preparation			X								
2.2.26. Preparing sand in foundries					X						
2.2.27. (a) Proportioning (small quantities)			X								
(b) Proportioning of bulk materials			X	X							
2.2.28. Quarry middle start – excavation and haulage	X	X					X		X	X	
2.2.29. Screening	X	X					X		X		
2.2.30. Shot blasting in foundries					X						
2.2.31. (a) Small bag filling – coarse products							X			X	
(b) Small bag filling - fours		X					X			X	
2.2.32. Spray drying			X	X							
2.2.33. Spray glazing			X								
2.2.34. Transport systems for fine dry silica products		X	X				X		X		
2.2.35. Use of a drilling rig	X	X					X		X		
2.2.36. Water assisted dust suppression		X	X	X							

Task Guidance Sheets

	Aggregates	Cement	Ceramic	Precast Concrete	Foundry	Glass	Industrial Minerals	Mineral Wool	Wiring	Worls	Natural Stones
2.1. General Guidance Sheets											
21.1. Chinking	X	X	X	X	X	X	X	X	X	X	X
21.2. Design of buildings	X	X	X	X	X	X	X	X	X	X	X
21.3. Design of control rooms	X	X	X	X	X	X	X	X	X	X	X
21.4. Design of ducting	X	X	X	X	X	X	X	X	X	X	X
21.5. Design of extractor fans	X	X	X	X	X	X	X	X	X	X	X
21.6. Ductwork fitting	X	X	X	X	X	X	X	X	X	X	X
21.7. General indoor storage	X	X	X	X	X	X	X	X	X	X	X
21.8. General outdoor storage	X	X	X	X	X	X	X	X	X	X	X
21.9. General exhausts	X	X	X	X	X	X	X	X	X	X	X
21.10. Good hygiene	X	X	X	X	X	X	X	X	X	X	X
21.11. Handing and tool sports systems	X	X	X	X	X	X	X	X	X	X	X
21.12. Laboratory work	X	X	X	X	X	X	X	X	X	X	X
21.13. Local exhaustive exhaust	X	X	X	X	X	X	X	X	X	X	X
21.14. Mobile test cell, service & repair activities	X	X	X	X	X	X	X	X	X	X	X
21.15. Personal protective equipment	X	X	X	X	X	X	X	X	X	X	X
21.16. Removing dust or sludge from an extractor fan	X	X	X	X	X	X	X	X	X	X	X
21.17. Separators	X	X	X	X	X	X	X	X	X	X	X
21.18. Systems of packaging	X	X	X	X	X	X	X	X	X	X	X
21.19. Tinting	X	X	X	X	X	X	X	X	X	X	X
21.20. Working with contractors	X	X	X	X	X	X	X	X	X	X	X
2.2. Specific to sk sheets											
22.1. (a) Bag emptying - small bags	X	X	X	X	X	X	X	X	X	X	X
(b) Bag emptying - big bags	X	X	X	X	X	X	X	X	X	X	X
22.2. Batch change into the process - Glass	X	X	X	X	X	X	X	X	X	X	X
22.3. (a) Batch hood transfer hooding	X	X	X	X	X	X	X	X	X	X	X
(b) Batch hooding	X	X	X	X	X	X	X	X	X	X	X
22.4. (a) Batch hood transfer exhaust hooding (blowing off)	X	X	X	X	X	X	X	X	X	X	X
(b) Batch hooding	X	X	X	X	X	X	X	X	X	X	X
22.5. Core mixing at demolition if for debris	X	X	X	X	X	X	X	X	X	X	X

