RESPIRABLE CRYS FLLINE SILICA IN THE GLASS INDUSTRIES

EXECUTIVE SUMMARY

Glass Alliance Europe is aware of the European Commission’s intention to modernize the regulatory framework meant to reduce the exposure of workers to Respirable Crystalline Silica (‘RCS’). In the context of the on-going assessment by consultants and Commission services, Glass Alliance Europe wishes to shed light on the handling of RCS in our industry, the potential exposure of workers, and the risk prevention measures already in place. Europe’s glass industries believe that workers in the glass industry are well protected against health risks arising from exposure to respirable crystalline silica.

✓ Exposure of workers to fine airborne dust in the glass industries is low and concentrations are well below the exposure limit values already in place at national levels. Worker exposure is limited to the activities of handling, mixing and transporting of raw materials to the glass furnace where the melting process occurs. Potential exposure is therefore confined to two sections of the factories, i.e. the ‘batch house’ and the ‘melting area’. The proportion of workers potentially exposed to RCS in the glass sector is below 10%1.

✓ Monitoring and control of exposure of workers potentially exposed to RCS, based on a risk assessment, are generally in place and well disseminated in the glass industries. Technical and organizational measures are systematically being improved and are integrated into companies’ general health and safety programs and management systems. Over 90%2 of the workers potentially exposed to RCS are covered by risk assessment and at least 65%3 covered by exposure monitoring.

✓ Voluntary industry commitment towards employees. Since April 2006, the glass industries have been signatories of the voluntary agreement on workers ‘health protection through the good handling and use of crystalline silica and products containing it’, the so called NEPSI agreement. This has proved to be a responsible and effective way for industry employers to commit towards the highest health and safety standards for workers. In particular, the associated NEPSI reporting facilitates the collection of data about the implementation of risk assessments, the decrease of exposure levels and the exchange of best practices, which is particularly valuable for Small and Medium sized Enterprises (SMEs).

✓ Risk reduction measures should be implemented according to the effective risk in each industrial setting. The variety of glass installations, the sectors’ differentiations and specificities, range of production, etc., all need to be considered for the effective protection of workers. The best means of ensuring adequate protection of workers need to be based on site-by-site risk assessments to define tailored risk reduction measures.

✓ Techniques and procedures have developed and improved significantly over the last decade. Preventative medical screening of the possibly exposed employees already shows the effectiveness of the applied measures. However, the positive results of the measures already implemented in preventing new cases of silicosis will only be confirmed statistically in the medium to long term. The few silicosis cases reported so far in the glass industries in Europe reflect working conditions and exposures from the distant past.

1 source: NEPSI Reporting (years 2008, 2010 & 2012)
2 source: NEPSI Reporting (years 2008, 2010 & 2012)
3 source: NEPSI Reporting (years 2008, 2010 & 2012)
Economics of the glass industries

Glass Alliance Europe represents about 90% of the glass manufacturing companies present in the European Union, which corresponds to 100 glass companies. Overall, it can be estimated that about 5% of the glass manufacturing companies are SMEs.

The variety of glass installations, the differences between the sectors and their specificities (in terms of technology), range of production (from small furnaces producing less than 20 tonnes per day to very large furnaces up to 1000 tonnes per day) and size of the companies (from small and medium sized enterprises to large multinationals) suggest that one-size-fits-all solutions would not be the best approach to adequately protect workers.

Classification of the economic activities (NACE 4) provide a wrong assessment

The economic activity of glass manufacturing is classified in Eurostat according to NACE Rev. 2, (from 2008 onwards) under the 23.1 code (manufacture of glass and glass products). The complete structure of this code is presented in annex I. The relevant activities associated with the manufacture of glass can be identified at NACE 4 level and they are the following:

- 23.11 Manufacture of flat glass
- 23.13 Manufacture of hollow glass
- 23.14 Manufacture of glass fibres
- 23.19 Manufacture and processing of other glass, including technical glassware

At NACE 4 level, EUROSTAT data does not differentiate between manufacturing and shaping and/or processing of glass, except in the case of flat glass. In the latter case, there are two different Prodcom codes, 23.11 (Manufacture of flat glass) and 23.12 (Shaping and processing of flat glass).

Considering that once glass is formed there is no risk of exposure to RCS, all workers involved in the glass shaping and processing activities should not be considered as ‘potentially exposed to RCS’. As a consequence, the use of EUROSTAT data for estimating the number of workers in the glass sector potentially exposed to respirable crystalline silica, leads to a substantial overestimate of the number of workers potentially exposed. In that regard, the SHECan report\(^4\) provides a wrong estimate.

Exposure to RCS in glass industries: only pre-melting activities are concerned

As far as glass industries are concerned, the definition of respirable crystalline silica is based on the particle size distribution, i.e. based on a purely physical classification (with no specific CAS number). An important issue arising from the definition of respirable crystalline silica is how to evaluate its fraction present in the mixture and how to classify the crystalline silica quartz according to it.

Glass manufacturers do not generally operate activities and/or processes that generate Respirable Crystalline Silica on-site. The glass industries’ on-site processes only include handling and mixing of raw materials and their transportation to the glass furnace without further processing that may generate significant amounts of smaller particles.

RCS is an impurity present in the raw materials (sand) supplied to glass producers and is generally present in a fraction well below 1% by weight\(^5\). The majority of sand supplied has a moisture content of 3 – 4% which greatly reduces dust formation.

Raw materials that are used in the manufacture of glass, including crystalline silica, are transformed in the furnace into the new substance glass. Exposure to RCS is therefore no longer relevant once glass has been formed.

Based on the employers’ reporting under the Social Dialogue Agreement on Crystalline Silica Good Handling and Use (NEPSi SDA), it can be estimated that a maximum of 100,000 employees work in glass manufacturing activities in the European Union, excluding shaping and processing activities.

From the number of employees working in glass manufacturing activities referred to above, a maximum of 10\(^6\), for the overall sector, has been assessed as potentially exposed to respirable crystalline silica, as some of their functions may imply activities in the ‘sections’ of the factory where RCS may be found.

### Type, level and duration of worker exposure

For the employees potentially exposed, the effective level of exposure to fine airborne is dust is low and below the exposure limit values already in place at national levels.

This is due in particular to the fact that exposure in the glass industries is confined and limited mainly to two particular areas of the factories and their related activities. These activities are performed firstly in the ‘batch house’ and relate to cleaning and maintenance of batching machines (silos, delivering system, etc.) and batch preparation. Secondly, activities are performed in the ‘melting area’ where they are associated with the storage & delivery of mixed batch materials being fed into the furnace prior to melting and also with activities during the preparation and maintenance of the furnace.

The high degree of automation of the batch and melting areas in many factories means that the amount of time that workers spend in these areas is low (maximum one hour per eight hour shift).

In the case of non-regular activities, such as cleaning and maintenance, the use of collective protection is not always feasible. This is why these activities are the most exposed even if they are exceptional operations. In these cases, specific risk assessments and the use of Personal Protective Equipment like Powered Air Purifying Respirators are used to reduce the exposure to an acceptable level.

All these activities are executed under controlled conditions and exposure is regularly monitored to ensure and constantly improve worker protection. Monitoring is routinely carried out both via static samplers mounted,  

\(^5\) Information based on Safety Data Sheet of quartz sand  
\(^6\) source: NEPSI Reporting (years 2008, 2010 and 2012)
for example, on the moving sand conveyor and also using personal samplers worn by a batch plant operative carrying out general maintenance and/or cleaning operations.

Trends over time

Over the last decades, exposure has been reduced, by regular and systematic implementation of best practice programmes, and technical and organizational improvements.

The design of new plants allows the reduction of exposure to particles by using best available techniques improving unloading areas, using de-dusting systems or pneumatic transfer to the silos. When this is not possible the use of standard ventilation systems, and the control of the moisture of the raw material, batch blanket coverage, particle size, gas velocity and burner positioning all help to reduce exposure to RCS in the batch house and furnace areas.

Risk management measures

Results from the reporting system established under the NEPSI voluntary agreement show that of the employees potentially exposed to RCS, more than 90% are covered by risk assessment and at least 65% are covered by exposure monitoring. Since 2010 (NESPI reporting) over 90% of the employees potentially exposed are covered by generic health surveillance and between 25 and 30% are covered by health surveillance protocols for silicosis7.

Generally, monitoring procedures follow standard analytical methods for sampling and analysis of free crystalline silica (in particular AFNOR, HSE and NIOSH methods) and are performed by either internal or external accredited laboratories.

NESPI SDA includes good practices and measures which are general procedures in place and widely spread among glass companies. This good practice is even extends outside the NEPSI agreement worldwide. These measures include:
- Best Practices for the reduction of silica exposure
- Periodical information sessions, instructions and training of workers
- Periodical dust monitoring to evaluate workplace exposure
- Health protocols, including specific silicosis surveillance protocol

Risk management and control measures are generally well integrated and disseminated within the companies via the general health and safety programs and management systems. Risk reduction measures include for example
- Design of buildings and control rooms
- Design of general indoor and outdoor storage
- Design of ducting and dust extraction units
- Design of handling and transport systems
- General ventilation and local exhaust ventilation as required

7 source: NEPSI Reporting (years 2008, 2010 and 2012)
• Procedures for maintenance, service & repair activities
• Supervision and training
• Dust monitoring
• Good hygiene
• Personal protective equipment

These measures can vary from sector to sector and are usually driven by the size of the installations, products manufactured, technological requirements, etc.

**Cases of Illness related to the exposure to RCS in the glass industry**

Over the last 10 years a few cases of silicosis were reported in the glass industry in Europe. However, it should be borne in mind that cases identified today and during the last decade reflect working conditions and exposure of the distant past.

Techniques and procedures have developed and improved significantly over the last decade. Although preventative medical screening of the possible exposed employees already shows the effectiveness of the measures applied, the positive results of all measures already implemented in preventing new cases of silicosis will only be confirmed statistically in the medium to long term.

The glass manufacturing industry has no record of work-related cases of lung cancer in the last decade.

**Impacts of including RCS in the CMD (Annex I/Annex III) and stringent protective measures foreseen under the Directive**

The Carcinogens and Mutagens Directive is based on the substitution principle and on a hierarchy of mandatory measures, regardless of compliance with the occupational limit value in place or with the existence of exposure risk. Such an approach, not based on a risk assessment, would require industry to reduce exposure beyond the any threshold level, with very high costs and no additional health benefits.

The substitution principle is impossible to apply in the glass industries, as silica is an essential raw material to the glass production. When using silica, RCS will be always be present at very low levels, as an ‘impurity’ of the raw material.

Glass manufacturers already operate in enclosed systems to the extent that it is technically and economically feasible. To work in enclosed systems may not be possible in all cases and, more importantly, would not necessarily increase the level of protection of workers. As said before, the workers most exposed to RCS are associated with maintenance and cleaning activities, where the level of exposure will not be impacted by the use of closed systems. Thus, the efficiency of implementation closed systems would be limited, as it would not address the highest risk. Nevertheless, the concept of operating in closed systems, so as to be understood in the context of the CMD, should be clearly defined so as to prevent any diverging interpretation across companies.
Given the specificities of the different glass sectors and companies, it is not feasible to provide an accurate estimate of costs.

**Chemical Agents Directive in comparison with the Carcinogens and Mutagens Directive**

The appropriateness of the legislative framework to regulate RCS depends on the principle of the relevant directive and not directly on the costs of implementation. The Chemical Agents Directive (CAD, 98/24/EC) bases protection and prevention measures on the outcome of a risk assessment, which is, in Glass Alliance Europe’s views, a more appropriate principle to address the different levels of risk existing in the different industrial settings.

As noted by the International Agency for Research on Cancer (IARC) working group in 1997, "carcinogenicity in humans was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity [...]." **Risk reduction measures should therefore be implemented according to the effective risk in each industrial setting.**

The regulation of RCS via the CAD would not undermine the continuity of the application of the NEPSI voluntary agreement, to which the industry and in particular employers are committed, and which has proved to be working well. It is a unique example of a social voluntary agreement implemented in the EU on health and safety issues and its effectiveness should not be disregarded.

The CMD requires a lowering of workers’ exposure as much as technically feasible. Even when in compliance with the no-silicosis risk threshold determined by the Scientific Committee on Occupational Exposure Limits (SCOEL), companies would still be required by law to put in place additional risk reduction measures. The legal uncertainty on whether workers could claim ever lower occupational exposure levels would also trigger further additional costs and provisions which would divert capital from innovation and growth.

In the long term, the inclusion of RCS in the CMD could have uncontrolled and disproportionate consequences and impacts on other legislation, such as REACH, without any real scientific justification.

**Terminology**

Lastly, Glass Alliance Europe has noticed the use of different terminology linked to ‘Silica’ in a scientifically incorrect and inconsistent manner. As scientifically acknowledged, in occupational circumstances the agent of concern is respirable crystalline silica. However other terminology such as Quartz (SiO₂), SiO₂, etc., is being used in other frameworks and lists put forward for assessment and potential classification and/or substitution of substances. Examples are the ‘trade union priority list’ proposing substances of very high concern (SVHC) under REACH and the Community rolling action plan (CoRAP) listing substances for evaluation by the Member States Competent Authorities under the substance evaluation process of the REACH Regulation. The use of terminologies other than RCS may be misunderstood and misused in different forums with uncontrolled consequences.

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**About Glass Alliance Europe**

Glass Alliance Europe (GAE) represents Europe’s glass industries. **The EU is the largest glass producer in the world.** It employs 183,000 people in tableware, flat glass, packaging, fibres and special glass industries. Glass industries operate facilities in nearly all EU Member States of the EU with Germany being the EU’s biggest...
producer, closely followed by France, Italy, Spain and the UK.

http://www.glassallianceeurope.eu/
ANNEX I
EUROSTAT NACE Rev. 2 – Statistical classification of economic activities in the European Community

23 Manufacture of other non-metallic mineral products

This division includes manufacturing activities related to a single substance of mineral origin. This division includes the manufacture of glass and glass products (e.g. flat glass, hollow glass, fibres, technical glassware etc.), ceramic products, tiles and baked clay products, and cement and plaster, from raw materials to finished articles. The manufacture of shaped and finished stone and other mineral products is also included in this division.

23.1 Manufacture of glass and glass products

This group includes glass in all its forms, made by any process, and articles of glass.

23.1.1 Manufacture of flat glass

This class includes:
- manufacture of flat glass, including float glass and cast glass.

23.1.2 Shaping and processing of flat glass (downstream processing of glass that has already been melted / no silica involved)

This class includes:
- toughening and laminating of flat glass
- flat glass bending
- assembly of insulating glass units

23.1.3 Manufacture of hollow glass

This class includes:
- manufacture of bottles and other containers of glass or crystal
- manufacture of drinking glasses and other domestic glass or crystal articles
This class excludes:
- manufacture of glass toys, see 32.40

23.1.4 Manufacture of glass fibres

This class includes:
- manufacture of glass fibres, including glass wool and non-woven products thereof
This class excludes:
- manufacture of woven fabrics of glass yarn, see 13.20
- manufacture of fibre optic cable for data transmission or live transmission of images, see 27.31