SILICOSIS
PREVENTION PROGRAMME
A GUIDELINE
1. INTRODUCTION

Silicosis is a well known fibrogenic lung disease caused by exposure to respirable silica dust. Silica dust exposures occur in variety of industries including: extraction and cutting of quartzite, granite and slate, foundries, glass manufacturing, manufacturing of pottery, porcelain and refractory materials, farming, construction and explosive blasting work.

It is a form of pneumoconiosis caused by inhalation of the crystalline silica dust, and is marked by inflammation and scarring in forms of nodular lesions in the upper lobes of the lungs. Silicosis, especially the acute form, is characterised by shortness of breath, fever and cyanosis (bluish skin). The best way to prevent silicosis is to identify workplace activities that produce crystalline silica dust and then to eliminate or control the dust.

Despite all efforts to prevent it, silicosis still persists world wide. It affects millions of workers engaged in hazardous dusty occupations in many countries. Experiences of some countries have convincingly demonstrated that it is possible to significantly reduce the incidence rate of silicosis with well organised silicosis prevention programmes. In the absence of effective specific treatment of silicosis, the only approach towards the protection of workers’ health is the control of exposure to crystalline silica dust. The effectiveness of prevention largely depends on a range of preventive measures.

2. HOW TO PREVENT SILICOSIS

An effective silicosis programme should be based on the primary prevention approach.

Primary prevention includes the following:

1. Control of silica hazard at source by the engineering methods of dust control
2. The surveillance (risk assessment) of the working environment to assess the adequacy of dust control measures
3. Air monitoring to assess the health risks for workers
4. Medical surveillance of the workers’ health for early detection of the disease.

Primary prevention is achieved when occupational exposure to silica dust is avoided, this will ensure that silicosis will cease to exist. The application of primary prevention is the only way to eliminate silicosis.
Primary prevention aims at interrupting the "chain of exposure", the process by which hazardous agents are formed/used and transmitted from their source to the worker. Control at the source aims at preventing or minimising the use or generation/release of the hazardous agent.

Examples of measures in this category include:

1. Substitution of materials and equipment
2. Modification of processes
3. Wet methods
4. Adequate work practices.

Whenever a control measure at the source is not feasible or sufficient, measures should be taken somewhere along the transmission path to prevent hazardous agents from being disseminated or propagated thus reaching workers, by means of, for example:

1. Isolation (to perform the operation inside and enclosure)
2. Local exhaust ventilation (to remove the particles, as they are generated thus preventing them to disperse in the work environment and be inhaled)
3. Good housekeeping (to avoid dust accumulation and formation of secondary sources).

It is very important that any engineering control, such as exhaust ventilation, be well designed, properly installed and operated, routinely checked and well maintained, otherwise it will not be efficient and it might give a “false sense of security”. Examples of inadequacies, which may hinder the performance of local exhaust ventilation systems, include the following:

1. Insufficient air velocity at the entry (hood) thus not properly capturing and removing the airborne particles
2. Low transport velocity in the ducts or very sharp changes of direction, causing dust to deposit
3. Perforation of ducts, not noticed due to lack of proper checks and maintenance.

Control at the worker level includes measures such as adequate work practices, education and training, personal hygiene and health surveillance. Control at the worker level also includes preventing dust from reaching workers breathing zone, by means of some form of respiratory protection, such as masks and helmets. Although a respirator may be a good solution for sporadic, temporary or short duration tasks, it should be considered as the last option for routine full-shift work.

If respiratory protection has to be utilised, it should be of good quality, of proven efficiency for the dust in question, well adapted to the worker, comfortable, routinely checked and well maintained. Worker education is essential.
If all reasonable practical measures have been taken to prevent the exposure from the source, but still employees are exposed to silica dust, then the following measures need to be taken:

• **Surveillance of the working environment to assess the adequacy of dust control measures (risk assessment)**

A risk assessment needs to be conducted by a competent person and at intervals not exceeding two years after the initial assessment. The following information need to be contained in a risk assessment:

1. The effects of respirable silica dust on the employee
2. The source of exposure
3. The routes of exposure
4. The control measures in place.

• **Air monitoring to assess the health risks for workers**

1. It should be carried out by an approved inspection authority (AIA) or by the person whose ability to do measurements is verified by an AIA
2. Air monitoring should be carried out every year.

• **Medical surveillance of the workers' health for early detection of the disease**

It should be carried out prior to the workers starting employment and after that on an annual basis, or as directed by the occupational medical practitioner and when the employee leaves the employment. Medical surveillance programmes includes the following:

1. Chest X-ray
2. Spirometry (lung function test)
3. Physical examination.

Efficient and sustainable hazard prevention can only be ensured through a multidisciplinary approach, involving occupational health professionals, employers, and employees.
1 Change in:
   • Processes
   • Legislation
   • Material used

2 New technology available

3 Results of:
   • Personal exposure monitoring
   • Health surveillance programme

Continuous review

Identify the substances and processes in your workplace which may give rise to the generation of airborne respirable crystalline silica dust

Identify which workers may be exposed, in which locations and under what circumstances this exposure may occur

Identify the frequency and duration of exposure for each individual

Identify existing control measures

Carry out personal exposure monitoring

Compare the results to the relevant exposure limits

Perform medical surveillance

Figure 1: Assessment of personal exposure levels to respirable crystalline silica
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