ABSTRACT
In this document, we aim to give you a plain English guide to the impact & effects of Respirable particles RCS, Asbestos, EMPs & Hazardous fibres on your site.

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Best practice for protection against respirable airborne particulate

BEST PRACTICE ADVISE FOR THE PROTECTION AGAINST RESPIRABLE AIRBORNE PARTICULATE
Best practice advice for the prevention of Respirable Dust Ingress into Enclosed Mobile Equipment Cabins

The HAZARD: Airborne Respirable Crystalline Silica (RCS), Asbestos, Elongated Mineral Particles Hazardous fibres in the respirable range between 0.3 microns to 10 microns.

- Mining/Quarry work operations lead to airborne respirable particles.
- Naturally occurring respirable particles are disturbed during mining quarrying operations.
- Continuous exposure to respirable size particles is dangerous and can lead to chronic lung disease (Silicosis).
- Smoking reduces the lung's ability to expel dust (increases silicosis risk factor).

What causes Airborne Respirable particles?

High concentrations of respirable dust levels result from:

- The transfer of material to and from vehicles, vehicle loading (free fall of materials)
- Haulage of the material on sealed & unsealed roads
- Uncovered material during production, vehicle loading (free fall of materials)
- All dry processing and dry screening processes
- Wind-blown dust from exposed areas

How to prevent High concentrations of respirable dust

Wash down roadways regularly
- Use erosion and dust control products & chemical dust suppressants
- Limit vehicle speeds
- Cover loads where possible
- Veneering of loads with dust suppressants if loads are uncovered
- Undertake hygiene health monitoring yearly to ensure you continue to identify tasks that track dust into the vehicle and attempt to eliminate these tasks where possible.

Mobile Equipment with Enclosed Cabins

The Operators cabin should have the following features: (Exceeds DIN EN15695 in qualifying cabin)

Cabin Pressuriser

Filtered fresh air cabin pressuriser capable of maintaining 25Pa of cabin pressure through the service life of the HEPA filter with a minimum of 30 cubic meters per hour of fresh air to ensure there is no CO2 build up. The filter must be HEPA with a minimum efficiency of H13 and be tested after manufacture as per EN1822.

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Cabin Sealing

Cabin sealing must be to a standard where the cabin pressure can be maintained at 25Pa over the service life of the filter.

Differential Pressure Gauge

A DPG must be installed in the cabin to ensure the system is working correctly and to warn the operator of a fault.

Return air filter HEPA

A Return air filter with a minimum efficiency of H13 (tested to EN1822) should be installed in the HVAC system to ensure that particles in the cabin are captured & not recirculated. The return air filter is best located close to operators’ feet to trap any contaminants from shoes.

Engineering control design and notes:

US study found:

An enclosed cabin which has been sealed and is equipped with pressurisation and with air conditioning has a protection factor of 52.

An enclosed cabin which has only an air conditioning system (HVAC) but the cabin is not effectively sealed or pressurised has a protection factor of 0.

A cabin with the above configuration creates a higher risk of exposure. It is understood that the contaminant is carried into the cabin by wind & by the worker (on shoes & clothes) the HVAC system then dries it out & then by normal body movement particles become airborne inside the cabin and the worker then inhales the particulate.

- Where Respirable Crystalline Silica (RCS), Asbestos, Elongated mineral particles (EMP) or Hazardous fibres are present use only HEPA filters with a minimum efficiency of H13 tested after manufacture as per EN1822. MERV 16 type filters may not have the same efficiency and should not be used on these sites.
- In high risk areas, it is recommended that door & window alarm switches are installed to warn of any external contamination.
- HEPA filters cannot be cleaned as HEPA media is easily damaged.
- For underground mines, it is recommended that a brushless pressuriser motor is used (Spark free operation).
Important notes on effective dust control:

- International trials* have determined that the optimum protection factor is achieved if the cabin pressure is maintained between 20 Pa & 30 Pa of cabin pressure. We recommend that systems maintain a cabin pressure of 25 Pa throughout the service life of the system whenever the machine ignition is turned on.
- A primary HEPA filter has a serial number with test date. This is a record which can be maintained each time the filter is replaced.
- A data recorder to maintain an electronic register showing that positive pressure has been maintained over the service life of each filter and the machine’s service life if required.
- A real time positive pressure display D.P.G. to show the system is working correctly. 
  (Recommended accuracy of less than 2 Pa)
- An alarm / warning device to advise operator if the system is not working correctly.
  - Message on display if there is a fault saying “Low Cabin Pressure” with a, Warning light & Optional warning buzzer
- A pre-cleaner is required to protect the filter from coarse silica dusts – Recommend centrifugal type as daily maintenance is not required.
- An air volume system delivering a minimum of 30 cubic meters per hour of fresh air to prevent respiratory acidosis is needed. (This prevents excessive CO2 Build up in the body and/or Hypoxia-lack of sufficient oxygen within the cabin).
- Workers should keep doors and windows closed always.

Service maintenance

- Personnel to wear RPE/PPE when handling old filters and/or when any HVAC maintenance is to be carried out
- Check that the cabin pressurisation system is working when the ignition is turned on and maintains a minimum level of 25Pa of cabin pressure
- Abrasive dusts can wear out equipment quickly. Plan and carry out regular checks of the critical parts.
- Vacuum clean the vehicle cab at least once a week. Use a Type H vacuum cleaner fitted with a HEPA filter
- Change HEPA filters as advised by the manufacturer.
- Qualified personnel to inspect & test the system every 6 months.
- Down load & archive data from the data recorder.
- Caution: Do not clean up with a brush or with compressed air