

AS/NZS ISO 23875: Mining - Air quality control systems for operator enclosures – Performance requirements and test methods

AIOH Qld Chapter Meeting

25 October 2023

Liam Wilson - Committee Member AS ME-018 Mining, ISO TC-82 Mining WG9


Site Senior Executive (Qld SSE), Certified Occupational Hygienist (COH)

← ICS ← 73 ← 73.020

ISO 23875:2021/Amd 1:2022

Mining — Air quality control systems for operator enclosures —
Performance requirements and test methods — Amendment 1

General information

Status :  Published Publication date : 2022-06
Edition : 1 Number of pages : 2
Technical Committee : ISO/TC 82 Mining
ICS : 73.020 Mining and quarrying | 13.040.30 Workplace atmospheres

 Preview



This standard contributes to the following Sustainable Development Goals:

Buy this standard

Format Language

PDF + ePub English

Paper English

CHF 17

 Buy

Please note that the ballot for following draft has been finalised

Designation: AS/NZS ISO 23875

Title: Mining - Air quality control systems for operator enclosures — Performance requirements and test methods

Committee: ME-018 - MINING EQUIPMENT

Ballot Closed Date: 23/03/2023 11:59 AEST

To view ballot results please select [here](#).

Kind Regards

Standards Australia

Disclaimer

I have no affiliation with, am not employed by or receive payment from any Original Equipment Manufacturer (OEM) or Supplier of control equipment. I do not represent any OEM or Supplier.

Any technologies, products that are shown or discussed throughout the presentation are to provide case studies/examples and each individual/company should conduct their own due diligence to confirm the product performance and company capabilities.

I present today as a representative of AS/ISO Standard Committees for Industry.

Background/History

2009 RESPA Trial in a Qld Quarry to manage respirable crystalline silica in a sandstone mine (Fritz Djurkic – Senior Inspector (Occupational Hygiene) RSHQ);

2012 ISEEE formed – USA Non-Profit to protect the lung health of equipment operators by developing best practices and educational materials in the field of environmental enclosure air quality engineering;

No universal standard for the design, testing, operation and maintenance of operator enclosures for airborne particulate control;

2018 Development of ISO Standard commenced

2021 February, ISO23875 Published: Mining – Air quality control enclosures - Performance requirements and test methods;

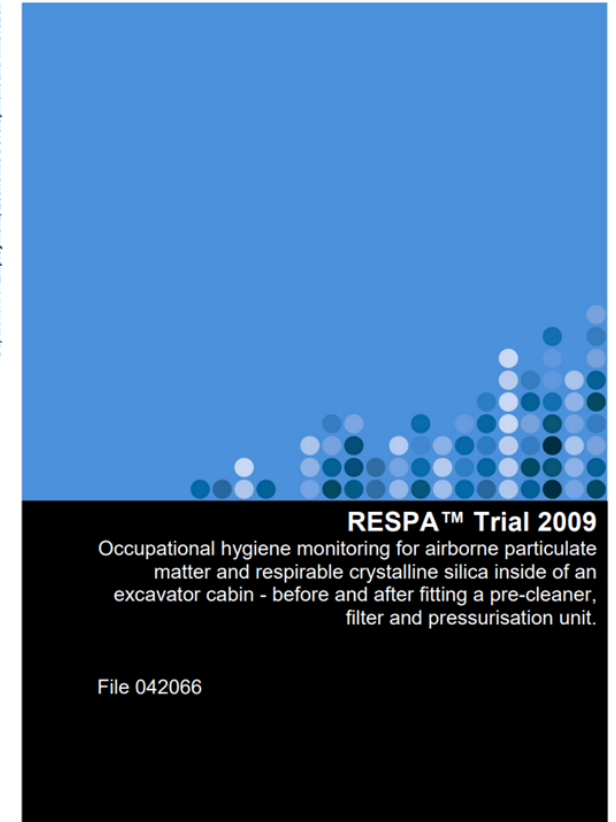
2022 June, Amendment 1 Published: ISO 23875:2021/Amd 1:2022
Mining — Air quality control systems for operator enclosures — Performance requirements and test methods — Amendment 1;

2023 Aug, Adopted with Amendment as AS/NZ Standard

Only covers dusts, gas standard development commenced

Legislated: Columbia, Denmark, Sweden. Being reviewed in USA

Department of Employment, Economic Development and Innovation



50%
HIGHER LUNG
CANCER
MORTALITIES
AMONG
CONSTRUCTION
WORKERS THAN
AMONG THE
GENERAL
POPULATION

Objective of the Standard

Barriers to Participation in the NIOSH Coal Workers Health Surveillance Program

IOC responds to silica dust study findings in Labrador City

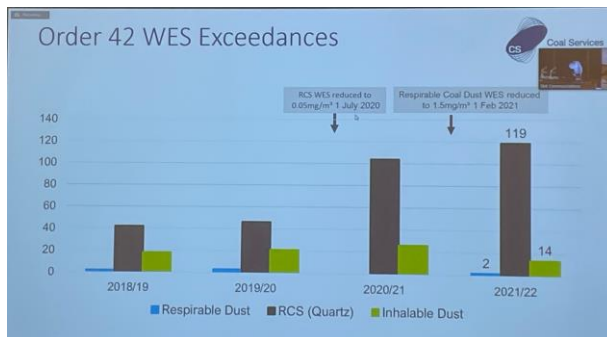


Company encourages employees with health concerns to contact a doctor

Jacob Barker · CBC News · Posted: Feb 08, 2017 9:48 AM EST | Last Updated: February 9, 2017

COMMODITIES MAY 3, 2018 / 9:39 PM / UPDATED 5 YEARS AGO

South Africa miners reach \$400 million silicosis settlement with mining companies



Cases of mine-dust lung disease and silicosis increasingly found in Queensland coal mine workers

ABC Capricornia / By Jemima Burt and Rachel McGhee

Posted Tue 25 Feb 2020 at 5:55pm, updated Thu 27 Feb 2020 at 3:23pm

NSW outcomes

13 cases of pneumoconiosis reported to the NSW Resources Regulator

- 5 cases of silicosis
- 1 case of silicosis and COPD
- 2 cases of mixed dust disease
- 3 cases of CWP
- 2 cases of diffuse dust-related fibrosis

- 6 underground workers
- 5 surface workers
- 2 surface and underground workers

> Am J Public Health. 2018 Sep;108(9):1220-1222. doi: 10.2105/AJPH.2018.304517. Epub 2018 Jul 19.

Continued Increase in Prevalence of Coal Workers' Pneumoconiosis in the United States, 1970–2017

David J Blackley¹, Cara N Halldin¹, A Scott Laney¹

Affiliations + expand

PMID: 30024799 PMCID: PMC6085042 DOI: 10.2105/AJPH.2018.304517

Objective of the Standard

- We can't change the past, we can mitigate it now and into future

South African human rights lawyer Richard Spoor announced yesterday that he had filed a class action against global mining companies South32, BHP Billiton and Seriti Power, seeking legal remedies for sick miners and the families of workers who died due to coal mine dust lung disease (CMDLD) in the form of pneumoconiosis and chronic obstructive pulmonary disease (COPD).

Spoor filed the class action in the High Court of South Africa, Gauteng Local Division, and he said this application for certification of a class action seeks recourse for current and former coal miners, as well as dependants of deceased workers who contracted the illness.

[Spoor files class action lawsuit on behalf of coal miners against South32, BHP Billiton, Seriti Power \(iol.co.za\)](https://www.iol.co.za). 16 Aug 2023

Spoor files class action lawsuit on behalf of coal miners against South32, BHP Billiton, Seriti Power



South African human rights lawyer Richard Spoor. File picture: Karen Sandison/African News Agency (ANA)

Published Aug 16, 2023

Objective of the Standard

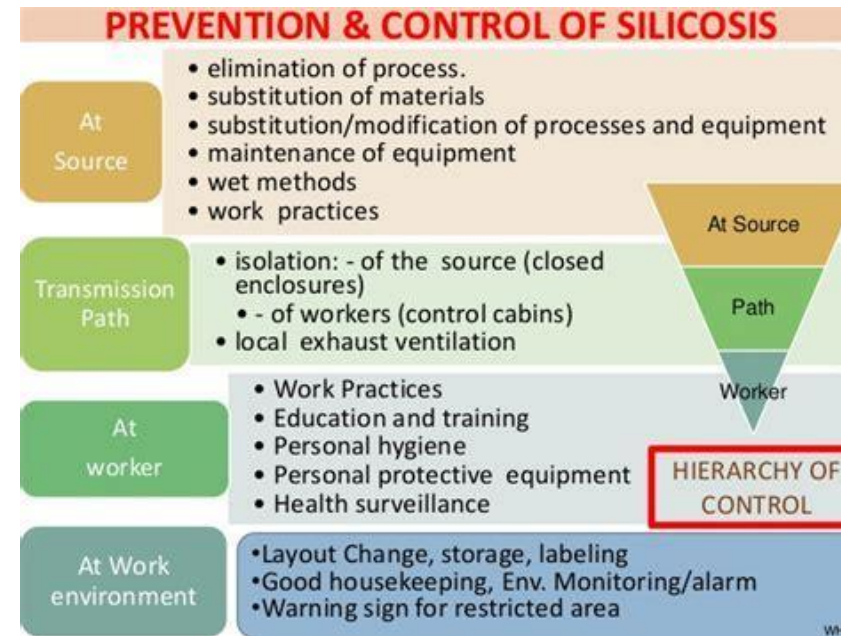


- Standardised approach: Protect workers in operator enclosures (mining equipment/other industries) from harmful levels of respirable particulate matter and CO₂ (and impact fatigue);
- One component of a holistic airborne particulate control management system to prevent occupational illness;

OSHA sets out a hierarchy of controls for silica

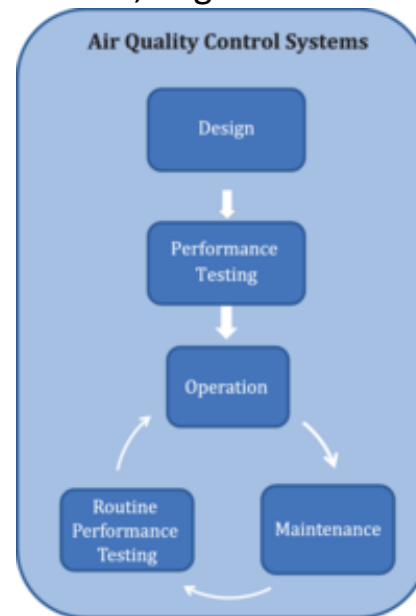


Source: OSHA



Development

- Different approach taken in development;
- Lifecycle approach – end to end;
- Different people involved:- broad cross section, Safety professionals/Industrial Hygienists;
- Reviewed/commented on by OEMs, Operators, Consultants, Regulators Internationally;
- Goal: Usable by Industry



Source: ISO 23875, Figure 1, pg. v

Cross-Industry Team of Experts

Committee that wrote standard composed of cross-functional members, including:

- 22 Subject matter experts
- 10 Countries
- 6 Industrial hygienists
- 6 Mining machine manufacturers
- 3 International mining companies
- 3 Consultants to the mining industry
- 2 Suppliers to the mining industry
- 1 Field engineering company

Additional comments on draft from:

- TC-42 WG4 – ISO 29463
- Rio Tinto
- Volvo
- EPIROC
- EMERST – Australia
- NIOSH – USA
- MSHA – USA
- OSHA – USA

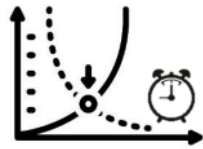
Requirements of the Standard

ISO 23875 Standardizes Machine Requirements



Maintain Defined CO₂ Levels

First alarm for CO₂ = Ambient CO₂+400ppm
Second alarm is the Action Level of 2500 ppm



Recirculation Efficiency

Maximum respirable particulate matter concentration $\leq 25 \mu\text{g}/\text{m}^3$ at start/end of decay test, maximum of 120 seconds decay time



Increased Filter Efficiency

A filter that meets more stringent test criteria, > 94% efficiency at 0.3μ , that meets the labelling requirements, and passes the system leakage and decay tests



System Maintains Cab Pressurization

Minimum sustained pressurization, when the machine starting device moves to the "on" position shall be ≥ 20 Pa, maximum sustained pressure shall not exceed 200 Pa



Real-time Operator Cab Monitoring

Cab pressurization and CO₂ levels monitored by permanently installed monitoring system

**All engineer controls must be applied to provide supplier's declaration of conformity
– No short cuts**

Why is it Relevant?



Recognised Standard 20

Summary of audits & inspections



Coal Inspectorate

September 2022 | Version 1

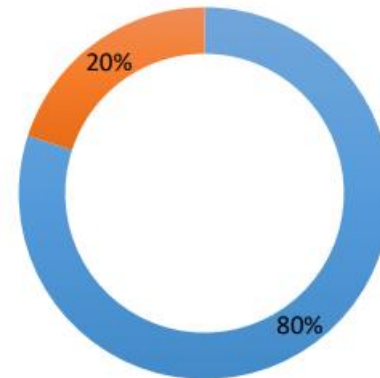


Figure 9: Grader Intake air filter – Engine grade. Not HEPA.



Figure 10: Cat 992K Loader Intake air filter – Engine grade. Not HEPA

Cabin ventilation compliance



■ RS20 Partial / non compliant ■ RS20 Complaint

Note: Qld Quarrying lagging mining

Figure 2: Cabin ventilation systems compliance to RS20

Why is it being implemented?

- Values/Duty of Care: Worker protection against exposure risk;
- Regulatory Compliance (OEL's) – SWA Proposed reduction in Respirable Crystalline Silica (RCS) to 0.025 mg/m³ (half), 3yr transition period;
- Holistic and due to other benefits e.g. monitors pressure and CO₂ real time (A number of operations also putting in real-time particulate monitors);
- Due to CO₂ and fatigue risk;
- Other benefits e.g. reduced maintenance SEG exposure, integrated into maintenance schedules, reduced maintenance and parts costs (e.g. filters, electrical components).

A number of Studies planned to investigate cab CO₂ and fatigue risk and reduction based on Standard:

- Dr Robin Burgess-Limerick (UQ SMI) – Proposed ACARP Study – CO₂ against recorded fatigue events;
- Rio Tinto Kennecott Operation Study 2023/24;
- Anglo South Africa;
- Glencore South Africa

Real Time Particulate sensors:

- NIOSH low cost real time particulate sensor/cab research: [CDC - Mining Project - Emerging Respirable Dust Sensing and Control - NIOSH](#) Justin Patts;
- [ECU | Overview : Real time monitoring research : School research areas](#)¹[Our research : Medical and Health Sciences : Schools](#) – Ben Walsh

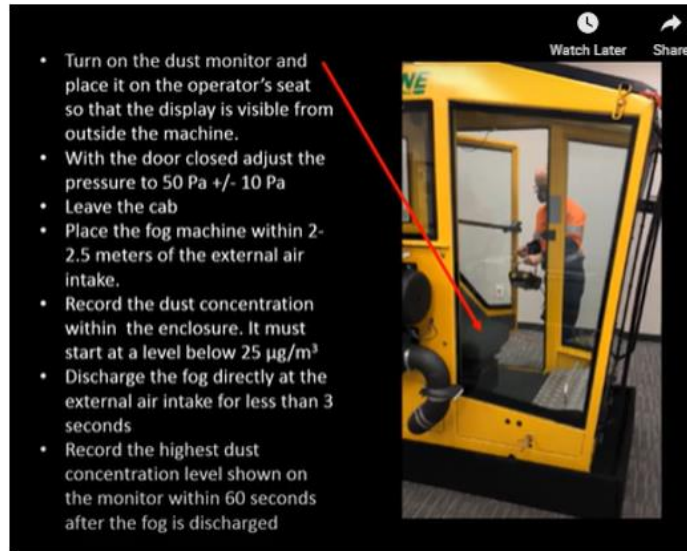
Standard Tools

Practicalities

- Tools, checklists, training materials etc;
- OEM's, Operators integrating Standard into Specs, equipment

Appendix 1: Performance Test Results Report Template

Machine Asset #		External Air Filter Classification	<input type="checkbox"/> ISO 15 E <input type="checkbox"/> ISO 15 H <input type="checkbox"/> _____	
Make/Model Serial number		Recirculation Air Filter Classification	<input type="checkbox"/> ISO 15 E <input type="checkbox"/> ISO 15 H <input type="checkbox"/> _____	
Date of Performance Test:		Serial #	Calibration Date	
Equipment Type	Make	Model		
Aerosol Generator (fog machine)			N/A	N/A
Dust Monitor				
1) Pressure Test				
Pressure	Fan Speed			
	No fan Key "On."	Low	Med	High
<input type="checkbox"/> Pa <input type="checkbox"/> In-H ₂ O				
2) External Air System Leakage Test				
External air System Leakage	Pressure	Max Concentration (required <100 µg/m ³) (µg/m ³)		
	<input type="checkbox"/> Pa <input type="checkbox"/> In-H ₂ O			
3) Decay Time Test				
Decay Time (performed on low fan speed)	Initial Concentration (µg/m ³)	Max Concentration >2000 µg/m ³ but less than <5000 µg/m ³	Decay time from Max Concentration to ≤25 µg/m ³ (in seconds)	Pressure (requirement ≥0 Pa ± 10 Pa) <input type="checkbox"/> Pa <input type="checkbox"/> In-H ₂ O
4) CO ₂ Levels Test				
Carbon Dioxide Check one:	Pressure	Ambient concentration (ppm)	Concentration after 15 minutes of CO ₂ (ppm)	
	<input type="checkbox"/> Pa <input type="checkbox"/> In-H ₂ O		Requirement: (≤ ambient + 400 PPM)	
<input type="checkbox"/> One operator <input type="checkbox"/> Two operators <input type="checkbox"/> Three operators				
Additional Comments:				



- Turn on the dust monitor and place it on the operator's seat so that the display is visible from outside the machine.
- With the door closed adjust the pressure to 50 Pa +/- 10 Pa
- Leave the cab
- Place the fog machine within 2-2.5 meters of the external air intake.
- Record the dust concentration within the enclosure. It must start at a level below 25 µg/m³
- Discharge the fog directly at the external air intake for less than 3 seconds
- Record the highest dust concentration level shown on the monitor within 60 seconds after the fog is discharged

With permission: <https://www.ise3.com/>

Appendix 6: Operator Enclosure Planned Maintenance Inspection Form Template

Machine Asset #									
Total hours in the planned maintenance cycle									
	PM Inspection # 1 (within 24 hours)			PM Inspection # 2 (~50%)			PM Inspection # 3 (~80%)		
Date of inspection									
Machine hours at planned maintenance									
Pressure	Fan Speed			Fan Speed			Fan Speed		
	Low	Med	High	Low	Med	High	Low	Med	High
____ (Pa) ____ (In-H ₂ O)									
Is HVAC airflow at vents unrestricted through all fan speeds?	Yes / No			Yes / No			Yes / No		
Visual inspection of external/recirculation filters?	Good / Fair / Poor			Good / Fair / Poor			Good / Fair / Poor		
Visual evidence of particulate accumulation on surfaces in operator enclosure?	Low / Med / High			Low / Med / High			Low / Med / High		
Visual inspection of operator enclosure integrity – door/window seals, presence of cracks, ability to close all windows and doors tightly	Good / Fair / Poor			Good / Fair / Poor			Good / Fair / Poor		
Operator enclosure housekeeping	Good / Fair / Poor			Good / Fair / Poor			Good / Fair / Poor		
Is HVAC cooling/heating efficiently?	Good / Fair / Poor			Good / Fair / Poor			Good / Fair / Poor		
Notes:									

Implementation Approaches?

Seeing a few different strategies (Blanket, Regulation, Risk):

- Most effective, specifying ISO 23875 compliance in HV Equip Purchasing Specifications (Provide certificate and evidence – hard/electronic);
 - Anglo American;
 - Rio Tinto
- Others, 2-3 step:
 - Implement technology on future/new HM equipment;
 - Retrofit technology existing based on risk;
 - Then look to ISO certification

- Regulation vs. Risk
- Qld coal mines: e.g. Glencore, BMA, Anglo American etc
- Qld metals , quarries following

Priority	P1 - High	P2 - Medium	P3 - Low
Equip Type	Drills, Ex/Shovels >100T, Tracked dozers	Ex/Shovels <100T, scrapers, loaders, wheel dozers	Graders, IT carriers, Haul Trucks, Water Tankers, Services Trucks, EME floats
Mandatory from:	30/09/22	30/06/23	Procured after 01/01/20

- Some companies doing organisationally wide, others regionally/commodity based on exposure risk (e.g. Teck, BHP)

What maintenance is required?

- Manufacturer warranty conditions;
- Maintenance carried out in conjunction with existing schedules e.g. 250, 500, 1000Hr services;
- Check, replacement, re compliance/certification intervals;
- Maintenance frequency adjustable (i.e. filter replacement) based on environment and performance;
- Standard provides a number of tools and inspection frequencies. Recertification annually;
- Use of pre filter/cleaner to extend life of filters;
- Main cost is filter replacement, calibration of monitors (can do at scheduled maintenance)

Applicability?

- Open cut mining,
 - U/G metals mining;
- Principles/technologies can be applied to:**
- Mobile equipment e.g. construction/demolition
 - Stationary/fixed cabs e.g. ship loader/unloader, train loadout, control rooms (various industries), draglines;
 - Electrical Cabinets;

Broader Application of Principles

- Recent installation on Port Gantry Crane cabin



Case Studies – Drills

Date	Drill 08	Similar Drill
10-Mar-15	0.0090	0.019
13-Mar-15	0.0087	0.021

The silica result in light green are close to the Action Level (0.024).

Asbestos:

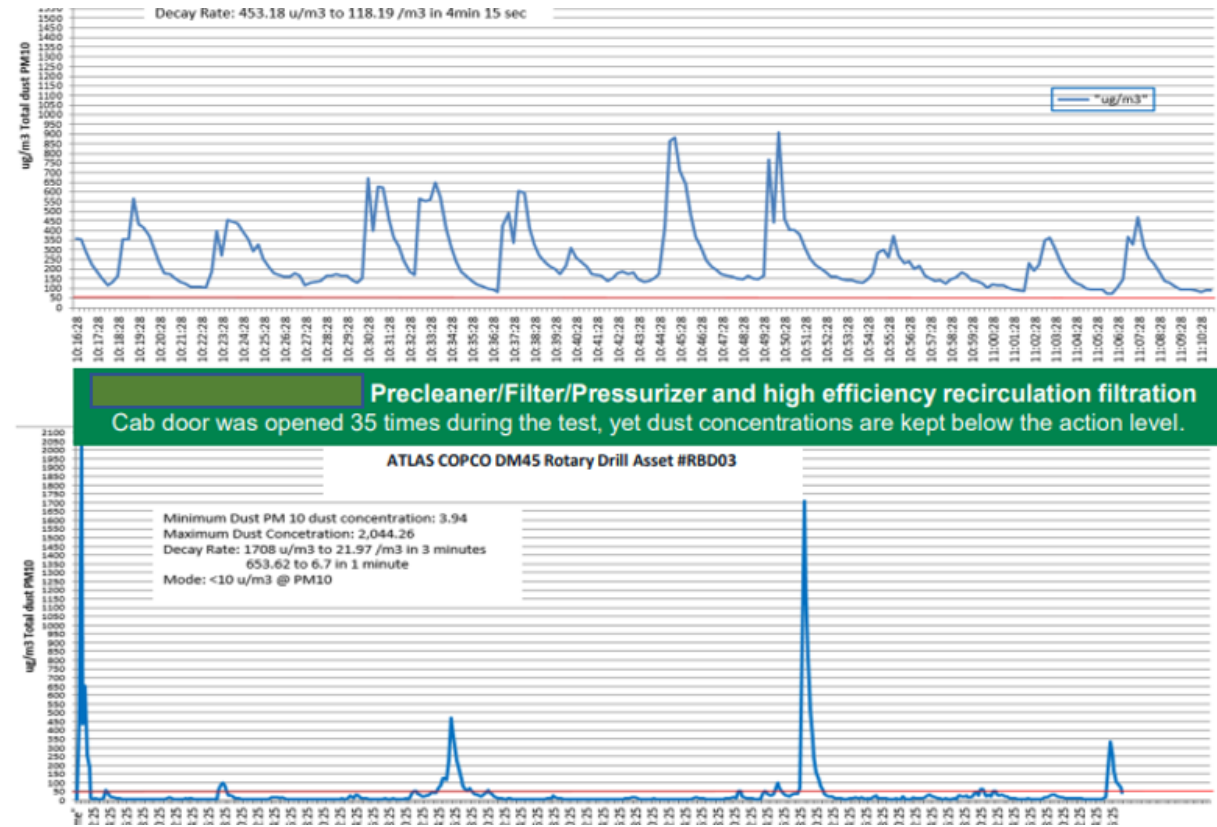
Date	Calculated TWA for Asbestos (f/cc)	
	Drill 08	Similar Drill
10-Mar-15	0.030	0.080
13-Mar-15	0.011	0.251

Therefore as you can see, there is a significant difference between both results.

That is a good news! ☺

Regards,

KM
Industrial Hygienist



Case Studies – Haul Trucks

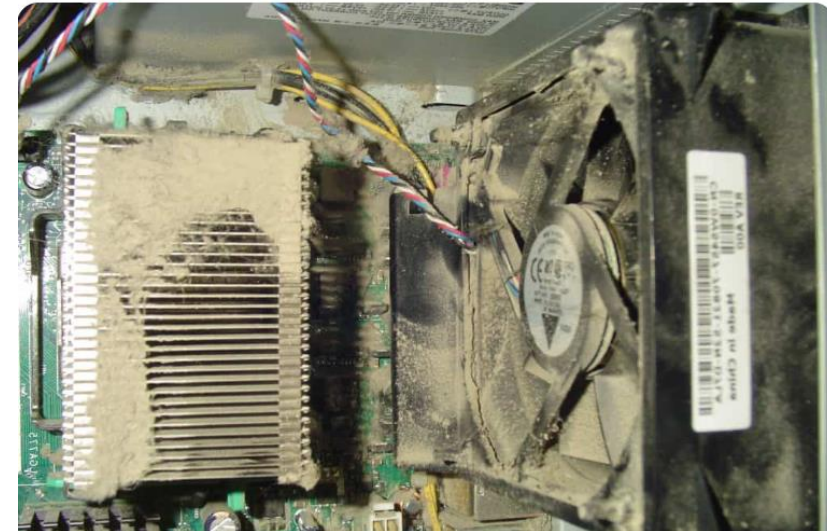
- Winner of the 2021 NIOSH Mine Safety and Health Technology Innovations Award- Hanson (Heidelberg)
- Total dust concentrations in the cab averaging $6 \mu\text{g}/\text{m}^3$, 94% below the MSHA requirement for silica of $100 \mu\text{g}/\text{m}^3$ (24% of future SWA Resp. silica WES);
- CO_2 concentrations within the cab are consistently within a range of 750 PPM to 800 PPM, 50% lower than the maximum allowed under ISO 23875:2021.
- Dust contamination of the HVAC duct work and internal components i.e. the evaporator core have been almost entirely eliminated;
- Dust brought into the cab is removed from the air, restoring dust concentrations to levels well below $25 \mu\text{g}/\text{m}^3$ within two minutes of the door being closed.





Case Studies – 830E Electric Cabinets

- Dust build up in cabinets, electrical failures, worker cleaning exposure
- Over 12 months and still going with original parts and filters following PM inspections



Installations

Fresh air and recirculated systems



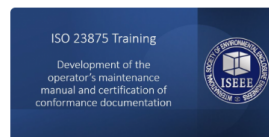
Installations

Dozers



Education/awareness

- www.iseee.net



Get this course (\$295.00)
















Standards Education

Development of ISO 23875:2021 with Amendment 1 Declaration of Conformity (101)

Who should take this course? Anyone that is using ISO 23875 to design, retrofit, performance test, certify, or maintain an operator enclosure. The course is focused on the implementation of the testing, reporting, and maintenance manual requirements. It provides a template for each of these administrative areas which are designed to save time and speed up the process of operator enclosure compliance certification as required under ISO 23875.

To maximize the benefit of this course, you will need to have access to ISO 23875. We strongly encourage you to read the standard thoroughly before starting this course. Many of the concepts presented presuppose a working understanding of the standard and its contents. ISO 23875 can be purchased from your national standards organization or from www.iso.org/standards. This course is designed to give assistance in understanding and completing the administrative requirements of the standard.

CONTENT

-  Operators Maintenance Manual Part 1 Sections 1-10 and Appendix 1
-  Operator's Maintenance Manual Part 2 Appendices 2-9
-  Operator's Maintenance Manual Appendices 7-9
-  Part 1
-  Part 1 Quiz
-  Please submit your questions on Part 1
-  Part 2
-  Part 2 Quiz
-  Please submit your questions on Part 2
-  Part 3
-  Part 3 Quiz
-  Please submit your questions on Part 3
-  Part 4
-  Quiz Part 4
-  Please submit your questions on Part 4
- Please complete end of course survey

What does it mean for IH's?

- Provides another tool/engineering solution to reduce worker exposure (one control as a part of system);
- Use of real time monitoring/data;
- Move to control effectiveness (is it working as should, is it effective at managing risk?);
- Can provide a sound business case based on cost/benefit

ROI - KOMATSU HAUL TRUCK ELECTRICAL HV CABINET BREATHE SAFE HEPA PRESSURISED SYSTEM VERSUS MANUAL CLEANOUTS AT 4000-HOURS INTERVAL			
NOT COMPLIANT WITH OHS DIRECTIVES FOR RESPIRABLE DUST		SUPPLY BREATHE SAFE HEPA KIT	\$ 9,772.36
		COST OF INSTALL	\$ 2,650.00
		COST OF KIT AND INSTALLATION	\$ 12,422.36
		REPLACE FRESH AIR FILTER	
PPE PER WORKER - PPE FILTERS FOR FACEMASK	\$ 50.00	TLF700EN HEPA H14 (BREATHE SAFE FILTER COST @409.71 X3)	\$ 1,229.13
COST PER WORKER EVERY 500-HOURS	\$ 80.00		
2 WORKERS	\$ 260.00		
LABOUR 1.5	\$ 145.00		
3 HOURS AT SERVICE INTERVAL	\$ 435.00		
COST PER SERVICE	\$ 695.00		
COST OF SERVICE 4000/500 = 8	\$ 5,560.00	COST OF FILTERS PER 4000 HOURS	\$ 1,229.13
COST OF PPE FACEMASKS PER WORKER	\$ 800.00	COST OF SERVICE PER MACHINE PER YEAR	\$ 1,229.13
COST PER 365 DAYS	\$ 7,160.00	COST PER 365 DAYS 1ST YEAR	
		COST PER 365 DAYS FILTER REPLACEMENT	\$ 1,229.13
12 MONTH TOTAL COST	\$ 7,160.00	12 MONTH TOTAL COST	\$ 12,422.36
24 MONTH TOTAL COST	\$ 14,320.00	24 MONTH TOTAL COST	\$ 13,651.49
36 MONTH TOTAL COST	\$ 21,480.00	36 MONTH TOTAL COST	\$ 14,880.62
48 MONTH TOTAL COST	\$ 28,640.00	36 MONTH TOTAL COST	\$ 16,109.75

Will it be Mandatory? Jurisdictions?

- Doubtful will be mandatory in Australia, referenced and promoted through Regulations, Codes, MDG's etc;
- Adoption of the Standard into legislation in Columbia, Sweden, Denmark. All EU countries will require it to be put into legislation in coming years;
- Potential to be mandated in the USA through the Silica Rule;

Australia:

- **Queensland:** RS20 Dust Control in Surface Mines in review, included as reference to meet RS20 requirements:

Priority	P1 - High	P2 - Medium	P3 - Low
Equip Type	Drills, Ex/Shovels >100T, Tracked dozers	Ex/Shovels <100T, scrapers, loaders, wheel dozers	Graders, IT carriers, Haul Trucks, Water Tankers, Services Trucks, EME floats
Mandatory from:	30/09/22	30/06/23	Procured after 01/01/20

- New Electrical Cabinet Documents 2023/24, referenced
- **NSW:** Standing Dust Committee
- Tier 4 engines to reduce DPM mandate (2024 purchases Proposal)
- Other states currently silent: risk based approach

Challenges/How can we get it implemented? It's not easy

Business Priorities

- Financial: Conflict with other challenges/priorities; Capex/OpEx budgets – annual/MTP e.g. 3 years;
- Acute e.g. Fatality risk vs Chronic exposures:
 - Collision detection/avoidance;
 - Auto Haul Solutions – eliminates exposure;
 - Carbon reduction/neutral equipment.

Knowledge/ education

- Might be in company Specs, I use my drive saved Spec!
- Standard fairly new, not known, not understood by operations, maintenance, functions;

Technology

- Additional equipment;
- Interface/notifications – data overload, need to get notification processes right – visual vs. sound, who, when (acute vs notification)? Integrate into existing systems (Modular, Wenco, SAP), records etc;
- Business enablers: external – regulations, internal – commitments/targets?
- Prioritisation of exposure risks
- Socialise, educate, Develop the business case (Cost/benefit – prevention, associated benefits)

What Next?

- Adopted identically as an AS/NZ Standard 4th August 2023;
- Further develop/implement education for different roles on the Standard;
- The development of an ISO Standard has commenced;
 - Operator enclosures – Gas filtration;
- Covers gas filtration performance and operational integration of gas filtration;
- Expands to include additional industries e.g. waste management;
- Can be applied for gaseous environments e.g. operating cranes in smelting operations;
- Current draft field testing @ Teck Coal, RTA;
- WG meeting held 28th Sept to continue development

Please note that the ballot for following draft has been finalised

Designation: AS/NZS ISO 23875

Title: Mining - Air quality control systems for operator enclosures — Performance requirements and test methods

Committee: ME-018 - MINING EQUIPMENT

Ballot Closed Date: 23/03/2023 11:59 AEST

To view ballot results please select [here](#).

Kind Regards

Standards Australia

Discussion

Questions?



Manufacturers/Suppliers of equipment

In Australia there are a number of manufacturers and suppliers/installers that can assist in selecting, installing and maintaining the right High Efficiency Particulate Air (HEPA) air system for your working environment including;

- BreathSafe - BreatheSafe Air Pressurisers and HEPA H14 Filtration Systems (breathe-safe.com.au);
- NB Industries (East Coast). Sy-Klone - www.nbindustries.com.au;
- LSM Q-CabAir - <https://lsm.com.au/>;
- SmartTech. FreshFilter -<https://www.smarttechaustralia.com.au>;
- Sigma - <https://www.sigma-hvac.com/en/>;
- Freudenberg - <https://microfreshfilters.com.au/>;
- United Safety &Survivability Solutions. Sy-Klone - <https://unitedsafetycorporation.com.au/>
- Lyons Auto Electrical & AC (West Coast). Sy-Klone - www.lyonsaircon.com.au.

Filter Manufacture:

- AES Environmental [Home Page - AES Environmental: Clyde-APAC, Email Airhandling & Vokes Filtration Technology](#)

Additional Information

Why is it Relevant?

I think we've answered this question: We want to effectively manage risk & prevent airborne particulate related occupational illness;

- Industry conducts activities and uses equipment that creates airborne particulate and in turn an exposure risk to operators i.e. we create a hazard;
- We know the impacts of exposure to airborne particulate on human health (inhalable, respirable, silica, DPM etc);
- We are seeing reductions in airborne OEL's;
- Research is identifying mineralogy that had previously been dismissed (e.g. [La Branche](#) UQ SMI);
- We continue to see occupational lung disease as a result of workplace exposure, we aren't effectively controlling it;
- We can't eliminate the exposure (e.g. automated equipment still requires maintenance);
- Provides one engineering control as a part of a holistic particulate control management system;

Standards/Guidelines etc (not exhaustive)

Federal/International:

- SafeWork Australia Workplace exposure standards for airborne contaminants;
- [Overview - National Silicosis Prevention Strategy \(lungfoundation.com.au\)](#)
- Standards Australia ME-018 Mining, ME-063 Earth Moving Equipment;
- NIOSH Dust Control Handbook for Industrial Minerals Mining and Processing
- NIOSH Handbook for Dust Control in Mining;
- NIOSH Best Practices for Dust Control in Coal Mining

State:

[Recognised standards, guidelines and guidance notes | Business Queensland](#)

- Qld Recognised Standard 20: Dust Control in Surface Mines;
- Qld Guidance Note 04 (QGN04): Guideline for management of respirable dust in Queensland mineral mines and quarries;
- Qld Guidance Note (QGN21): Management of diesel engine exhaust in metalliferous mines;
- Qld Managing respirable crystalline silica dust exposure in construction and manufacturing of construction elements Code of Practice 2022;

[Technical reference guidelines | NSW Resources Regulator;](#)

- NSW Airborne Dust: [Airborne contaminants and dust | NSW Resources Regulator;](#)
- NSW Mining Design Guideline (MDG29): Management of diesel engine pollutants;
- Victoria OHS Amendment (Crystalline Silica) Regulations 2021;
- SA Work Health and Safety Act/Regs 2012, Mining Act 1971
- WA Dust: [Dust and fibres | Department of Mines, Industry Regulation and Safety \(commerce.wa.gov.au\);](#)
- WA Underground air quality: [Guidance about underground air quality and ventilation \(dmp.wa.gov.au\)](#)

Industry Bodies:

- AIOH POSITION PAPER RESPIRABLE CRYSTALLINE SILICA (RCS) - PUBLISHED DECEMBER 2018;
- ICMM – Cleaner Safer Vehicles;
- CCAA - Workplace Health and Safety Guideline - Management of Respirable Crystalline Silica in Quarries