





In partnership with The Safety Regulation Group (DMIRS), WorkSafe WA, & Master Builders WA, we welcome you to...

Silica & Construction Roadshow

Official Partners



Government of Western Australia Department of Mines, Industry Regulation and Safety

The Safety Regulation Group











Do you breathe freely?







Do you Breathe Freely?

Dr Julia Norris Australian Institute of Occupational Hygienists







The UK Health and Safety Executive published these alarming figures recently



Fatal injuries to workers in 2017/18

Source: RIDDOR



Lung disease deaths each year estimated to be linked to past exposures at work

Source: Counts from death certificates and estimates from epidemiological information

Source: HSE <u>Summary statistics for Great Britain 2018</u> and www.hse.gov.uk/ statistics/causdis/







Safe Work Australia reported that workers in Australia are <u>8 times</u> more likely to die from occupational illness or disease than an accident at work.

So why is the AIOH running with this?

Occupational hygienists use their scientific knowledge, skills and experience to assess the workplace for potentially hazardous exposures.

Our ultimate goal is the protection of workers from the hazardous chemicals and other agents they have to work with.

"We want Australian workers to be able to go home healthy as well as safe at the end of each day to their family and friends".





Australian Institute of Occupational Hygienists (AIOH) approached its British counterpart to see what they were doing.

They introduced us to the Breathe Freely program which has been made available to the AIOH.





The program covers a wide spectrum of airborne exposures across a number of industries. Which includes:

Engineered Stone Construction Welding Mining









Controlling exposures in CONSTRUCTION

Controlling exposures in WELDING Controlling exposures in ENGINEERED STONE Controlling exposures in MINING











Some tasks are often quite obviously dusty









But it's not always that obvious































Potential respiratory health issues include asthma and cancer (6 to 7% of cases of cancer in construction due to painting)











Get the worker health professionals engaged and involved





















We need to

Provide & Share Solutions

What can we expect from Breathe Freely?









22 WELDING

CONSTRUCTION



Controlling exposures to prevent occupational lung disease in MINING

ENGINEERED STONE

0000

In recent years coal miner's pneumoconiosis and silicosis have made a re-emergence in the mining industry highlighting the need for continued surveillance and minimisation of dust exposures.

Web based information hub

www.breathefreelyaustralia.org.au



supplied court

Controlling exposures in CONSTRUCTION



Controlling exposures in WELDING

partmen

Welders are exposed to metal fume and gases which can potentially cause lung diseases and cancer.

Resources & more



Controlling exposures in

Engineered stone workers are at

high risk of acute and chronic

Resources & more

silicosis if dust controls are not

ENGINEERED STONE

appropriate.



Controlling exposures in MINING

Silicosis has made a re-occurrence in miners resulting in greater focus on controlling exposures and medical surveillance.

Resources & more

Resources & more









Managers Toolkit Engineered Stone Silica Dust

Managers Toolkit 😑

Let's Talk: Silica Dust - Working with Engineered Stone

BREATHE FREELY Australia

Controlling Exposures to prevent occupational lung disease in the construction industry



Engineered Stone Worker

HAZARDS AND RISKS	CONTROL OPTIONS	MANAGING THE RISK
Engineered stone bench tops contain up to 95 per cent crystalline silica. Natural stone such as granite may contain from 20 to 60 per cent. When engineered stone is worked by cutting, grinding and polishing with power tools, airborne dust is generated that can cause serious lung	 Engineering controls Water suppression: Automate systems for large cut outs and use water for dust suppression and, if necessary, local exhaust ventilation. Water is key for dust suppression and 	Training & communication, supervision, maintenance & testing of controls and air monitoring [*] are all vital aspects of managing the risk, in addition to health surveillance which can be a requirement in certain circumstances.







We also have a number of guides being developed and others in the pipeline





















The Health in Industry Management Standard

HI Standard Self-Assessment Tool



The HI Standard is a self assessment tool to help companies manage their workplace health risks, by identifying their strengths and weaknesses and potential areas for improvement.



And it's not just Silica



(AIOH : BOHS

Hi State

Dust Control in Hard Demolition



Water Suppression on Tools





Welding Fume



Removal of Lead-Based Paint













Delivering the message









Breathe Freely

Join us and be part of the solution www.breathefreelyaustralia.org.au

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Health in Stone Top Bench Industry: The Regulator's View

Sally North Service Industries & Specialists Directorate WorkSafe WA



Government of Western Australia Department of Mines, Industry Regulation and Safety



Silica The regulator's view



Sally North Director, WorkSafe Service Industries and Specialists



Overview



- What is silica?
- Where is it found?
- Legislation
- Controlling the risk
- WorkSafe proactive campaign
- Industry considerations



Silicosis death of Anthony White sparks calls for action to address 'nationwide epidemic'

By Elise Kinsella Posted Wed 13 Mar 2019, 10:09am



PHOTO: Gold Coast stonemason Anthony White was diagnosed with silicosis in 2017. (Supplied: Shine Lawyers)

A Gold Coast stonemason, who died from the lung disease silicosis, is being remembered for publicly exposing the dangers of silica dust, amid what's being described as a "nationwide epidemic".

Anthony White, who spoke to the ABC in February about his health battle, died last Saturday.

He was the first person from the engineered stone industry in Queensland to die from the disease, but his family have warned he will not be the last.

RELATED STORY: Death dust audit reveals deadly lung disease epidemic with almost 100 workers diagnosed

RELATED STORY: What is silicosis, and why are doctors so concerned?

RELATED STORY: Dying benchtop workers lodge silicosis claims, prompting urgent health warning

RELATED STORY: Australia's love of stone kitchen benchtops is killing workers

Source: www.abc.net.au

What is silica and where is it found?



- Silicon dioxide SiO2
- Occurs naturally in rocks, clay, sand etc
 - Aggregate / "bluemetal"
 - Concrete (20-60% silica)
 - Bricks
 - Mortar
 - Engineered stone (up to 95% silica)
 - Tiles
- Respirable form is known as "respirable crystalline silica" or RCS

How silica dust is created in workplaces

Abrasive processes on natural or engineered products:

- Crushing
- Cutting
- Drilling
- Grinding
- Sawing
- Polishing

Dry grinding or cutting



- Dry grinding/cutting creates unsafe levels of RCS
- RCS levels greatly exceed the workplace exposure standard
- Dry methods must be used with effective dust extraction system
- Wet methods preferred
- No uncontrolled dry grinding or cutting





Legislation



Sect. 19(1)	Employer's general duty of care
Sect. 20	Employee's duty of care
Sect. 21	Employer's and self-employed person's duty of care
Sect. 23	Duties of manufacturers etc (includes manufacturers, suppliers and importers of substances and person who designs or constructs a building/structure)
Reg. 5.15	Risk assessment – hazardous substances
Reg. 5.16	Assessment report in relation to risk assessment
Reg. 5.19	Exposure standard not to be exceeded (0.1 mg/m ³)
Reg. 5.20	Risks from hazardous substances to be reduced
Reg. 5.21	Information and training – hazardous substances
Reg. 5.22	Conducting air monitoring
Reg. 5.23	Health surveillance to be provided
Reg. 5.24	Duties of appointed medical practitioners (AMP)
Reg. 5.25	AMP to inform employer of improvements needed
Reg. 3.40	Respiratory protective equipment to comply with standard and be used in accordance with standard



- Inhalable dust
- Respirable dust

• RCS (8 hour TWAs) 10 mg/m3 5 mg/m3 **0.1 mg/m3**

What does this mean ? In a volume measuring 1 x 1 x 1 m only a match head of RCS in the air is allowable – over an 8 hour shift





RCS dust

Control measures – Hierarchy of controls

Elimination

- Choose building materials that are silica free
- Design buildings to reduce the need for chasing, drilling and grinding e.g. use direct fastening methods

Substitution

- Source materials (e.g. composite stone benchtops) with a lower percentage of silica
- Natural products contain lower silica levels than engineered products
- Use crushed (recycled) glass in place of sand

Control measures – Hierarchy of controls

Isolation of the hazard

 Separate workers from processes that generate dust – use enclosures / automation

Engineering controls

- Using technology to reduce the level of dust released into atmosphere
- Use coring instead of drilling to create holes
- Local exhaust ventilation (LEV)
- Water suppression (keep it wet!)
- Wet methods + LEV

Control measures – Examples



Tools with inbuilt dust collection

• E.g. hollow drill bits with vacuum attachment



Image source https://www.hilti.com.au/



Image source https://www.hilti.com.au/





Wet grinding



Control measures – Examples



Grinder and saws with on tool extraction









Image source https://www.hilti.com.au/

Control measures – Examples



Chasing



Image source https://www.hilti.com.au/

Control measures – Hierarchy of controls

Administrative controls

- Good housekeeping clean as you go
- Clean with HEPA vacuum (M or H) or wet methods
- No dry sweeping or compressed air

Information and training

• Include hazards, health effects and control measures



The biggest lung disease crisis since asbestos: Our love of stone kitchen benchtops is killing workers

7.30 By Michael Atkin Updated Wed 10 Oct 2018, 11:47am



PHOTO: Tahir Ozkul covered with dust after cutting stone (Supplied: Tahir Ozkul)

Doctors are worried Australia is facing the worst occupational lung disease crisis since the peak of the asbestos disaster.

Stonemasons who cut engineered stone into a popular type of kitchen benchtop are contracting accelerated silicosis at alarming levels, after being exposed to unsafe levels of silica dust. RELATED STORY: Dying benchtop workers lodge silicosis claims, prompting urgent health warning

RELATED STORY: 'Tip of the iceberg': Coal miner's death after silicosis diagnosis a warning on dust levels

RELATED STORY: Brisbane tunnel workers face lung disease from silica exposure: expert

Last month the Queensland Government issued an urgent warning after 22 silicosis claims were lodged with WorkCover, including for six people who were diagnosed as terminally ill. **Control measures – Hierarchy of controls**

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A combination of controls will normally be required to adequately protect workers



Image source https://www.hilti.com.au/

Consider all occupations

Construction supervisors & managers, visitors and other workers in the vicinity

- Assess the risk before entering
- Any dust generation?
- Need for respiratory protection?
- Induction



Health surveillance



- Workers must be provided with health surveillance if their health is at risk as a result of exposure to respirable crystalline silica
- Health surveillance to be supervised by an Appointed Medical
 Practitioner (AMP)
- AMP reports findings to worker, employer and WorkSafe
- Notices will be issued if required

WorkSafe WA silica proactive campaign

- Stone fabrication/installation
 - 3 teams
 - 120 site inspections planned
 - 57 inspections so far
 - 476 improvement notices
 - 5 prohibition notices
- Air monitoring planned
 - Stone fabrication/installation
 - Assay laboratories
 - Wall chasing

WorkSafe WA silica proactive campaign - findings

- Wet cutting in fabrication shops
- Respirator use intermittent
- Not clean shaven
- Dry cutting during installation
- Slurry management
- Health surveillance not in place

Get informed



Quick reference – Summary RCS hazard management

	Identify workers exposed to RCS Information and training has been provided Health surveillance is provided where there is a risk Risk assessments have been conducted
	Workers or others exposed to RCS during fabrication or installation of stone bench tops have been identified.
	Workers have been provided with information and training on RCS, including potential health effects, the need for health surveillance, appropriate control measures and how to use the control measures.
	Health surveillance is provided to all stone workers and to other workers where there is a risk to health from exposure to RCS.
	Safe operating procedures have been developed and implemented for stone fabrication and installation work.
	Risk assessments have been conducted and recorded for RCS and other hazardous substances in the workplace.
	Safety Data Sheets (SDS) are available at the workplace for all hazardous substances used in the workplace, including those containing silica.
in	 Effective control measures have been implemented, including; No dry cutting, grinding or polishing Wet work methods Wet spray is controlled to prevent it becoming airborne Wet waste is contained so that it does not later dry out and present an inhalation hazard Local extraction ventilation (LEV) is used on cutting and grinding equipment A safe system of work is in place for cleaning and maintenance of LEV, to prevent exposing workers to RCS

Docular thorough housekooping system is in place.

Further information



DMIRS website:

Silica: <u>www.commerce.wa.gov.au/publications/silica</u>

COSH Guidance Note: <u>https://www.commerce.wa.gov.au/publications/guidance-note-safe-stone-product-fabrication-and-installation</u>

Silica Safety and Health Alert: <u>http://www.commerce.wa.gov.au/publications/safety-alert-112018-stone-benchtop-workers-risk-fatal-silicosis</u>

Checklist for stone product fabrication: http://www.commerce.wa.gov.au/publications/stone-benchtop-fabrication-andinstallation-checklist

Safe Work Australia website: <u>www.safeworkaustralia.gov.au/silica</u>

NIOSH (National Institute for Occupational Safety and Health) (USA) website: <u>www.cdc.gov/niosh/topics/silica</u>





Contolling exposures to prevent occupational lung disease in the construction industry

Questions?

www.breathefreelyaustralia.org.au







Silicosis – Health Surveillance

Dr Evelyn Lee Occupational Physician WorkSafe WA





- Silicosis Epidemiology
- Pathogenesis of silicosis
- Types of Silicosis
- Health Surveillance of Silicosis- WorkSafe WA
 perspective

Queensland Alert



QLD Alert Sep/Oct 2018

78 cases of silicosis among stonemasons

- mean age 34 yrs
- Duration of exposure mean 12.9 yrs; range 2-45 yrs
- All cases worked with artificial stone or dry cutting or RPE <50%
- Artificial stone (90%)
- Dry cutting (87%)
- Normal CXR (43%)
- PMF (26%)







Silicosis Epidemiology

United Kingdom

- Between 2006-2017 108 cases reported
- 98% male
- 81% are symptomatic
- 1:6 cases affecting those under age of 46



Silicosis Epidemiology



Engineered stone material available 1986

- 1st case report Italy 2010
- Increasing cases Spain, Israel, USA

Israel

- 2009-2014-193 cases
- 18 have undergone lung transplantation

USA

- 18 severe cases (2 deaths) from California, Colorado, Texas, Washington (MMWR, 2019)
- Estimated 96,000 engineered stone workers
- +++ under diagnosed

Note: Crystalline silica in Eng stone (90%); Granite (25-45%); Marble (1%)





Silicosis Epidemiology



Australia- available early 2000's

- 2011-2016 7 cases from QLD, Vic, NSW (R. Hoy et al, 2017)
- Queensland
 - March 2019 1 death
 - As of 31 Oct 2019 176 silicosis (25 PMF) from 1,000 screened
- WA
 - 7 silicosis confirmed cases
 - 11 probable cases
 - 3 silicosis claims

170 health surveillance completed





Silicosis





Types of Silicosis

Acute Silicosis (acute silicoproteinosis)

- After exposure to very high intensity
- Symptoms within few weeks to 5 years from initial exposure

Accelerated Silicosis

- Within 10 years of exposure to mod to high levels
- Rapid progression (clinical and radiological)
- Confluence of nodules, scarring, progressive massive fibrosis (PMF), lung architecture destruction
- Commonly sandblasters, tunnellers

Chronic Silicosis

- After 10 or more years exposure low to mod levels
- Typically simple silicosis on CXR
- Small % -> Progressive massive fibrosis (PMF)
- PMF nodules >1 cm mainly UZ

Accelerated Silicosis





Accelerated Silicosis



Chronic Silicosis




Chronic Silicosis (2)



Chest X-ray – more obvious nodules Small rounded opacities (<10 mm) p (<1.5) q (1.5-3.0) r (3-<10)

Progressive Massive Fibrosis (PMF)



- Coalescence of nodules to a mass larger than 1 cm
- May be stable for years
- More severe symptoms and reduced lung function



WorkSafe WA Guidance Notes for AMP

Government of Western Australia Department of Mines, Industry Regulation and Safety

Health Surveillance – Silica Dust (respirable crystalline)

Appointed Medical Practitioners (AMP) undertaking health surveillance are expected to have an understanding of the potential adverse health effects of respirable crystalline silica, and to use their clinical knowledge to advise on health surveillance for workers in the workplace.

Adverse health effects

Inhalation of fine respirable crystalline silica dust particles can lead to deposition in the respiratory bronchioles, alveolar ducts and alveoli within the lungs. This results in inflammation, cell damage and ongoing fibrosis with the development of silicosis.

1. **Simple chronic silicosis** may occur after many years of exposure to relatively low levels of silica dust. There may be no symptoms or signs for 10-30 years. Some may have mild symptoms of cough, sputum or breathlessness. Silicosis is a progressive disease. Intense but relatively short exposures or the development of symptoms within 10 years have been reported to be associated with increased risk of progressive massive fibrosis.

Example: foundry work; mining



Risk Assessment

Substance factor

- Particle size
- Crystalline content (%)

Exposure factor

- Time of first exposure
- Duration of dust exposure

Controls

- Personal controls
- Workplace environmental controls dust suppression, dust extraction, respiratory protective equipment

Silica Health Surveillance

- 1. Work history- year of first exposure, nature and extent of silica exposure
- 2. Respiratory questionnaire, medical & smoking history
- 3. Physical examination with emphasis on lung, heart and joints
- 4. Chest Imaging
 - Chest Xray
 - LDCT
- 5. Lung function test
 - Office spirometry consistent with ATS criteria and at least 3 valid blows
 - Laboratory test- including DLCO

WorkSafe WA Health Surveillance Form



WorkSafe Health Surveillance Notification: SILICA (respirable crystalline dust)



Occupational Safety and Health Act 1984

CONFIDENTIAL

Use latest electronic version on website. Incomplete or illegible forms will be returned to sender.

1. EMPLOYEE / WORKER	(X) all relevant boxes
Last name: Give	en names:
Date of birth: Country of birth:	🗌 Male 🗌 Female
Address:	
Tel (H):	Mob:
Current job:	Date started:
Workplace address:	
If not employee Contractor Owner/	Operator Other
2. EMPLOYER (Principal)	
Company:	Employer:
Tel:	Fax:
Address:	
Contact Name: Employ	er email:
3. INDUSTRY	(X) all relevant boxes
 Abrasive blasting Construction Industry Concrete, masonry or building stone Power tool dry cutting, surfacing, angle grinding, chiselling, drilling, surfacing, chasing, jackhammering, etc Concrete spraying (shotcrete) Demolition work Roofing (slate, tiles) Tiling - Wall/floor Tunnelling Foundry casting 	 Stone fabrication & installation Natural stone Artificial stone Stonemasonry – other (specify): Manufacturing Cement, concrete, gypsum, brick or plaster Glass Lead flux Other Assay laboratory sample preparation Other industry (specify):
4. EXPOSURE TO SILICA DUST	(X) all relevant boxes
New to silica work Continuing i Year of 1 st exposure to silica dust (mm/yyyy)	n silica work D Not directly working with silica Total years of exposure





- Understand indicators of silicosis
- Report respiratory symptoms \rightarrow ask for a review
- Stop smoking
- Reinforce safe work practice
 - Respiratory protective equipment
 - Clean shaven
- Hygiene
 - Wash face and hands before eating or drinking
 - Shower and change before going home
- Park away from dust

Do not take dust home

Indicators of Silicosis



- Respiratory symptoms
 - No Symptoms
 - Dry cough, shortness of breath with exertion, chest pain
- Lung function test
 - No change
 - Accelerated annual decline in FEV1
 - 20-30 ml per annum for non-smokers
 - 60 ml per annum for smokers
- Lung Imaging
 - CXR normal
 - CXR changes or progression,
 - LDCT changes

HRCT is the diagnostic test but has higher dose of radiation





- HRCT
- Referral to Respiratory physician
- AMP may remove from exposure until diagnosis determined
- Consider risk of returning to work with ongoing silica exposure



https://www.commerce.wa.gov.au/worksafe/information-appointedmedical-practitioners-health-surveillance-silica-dust-respirable

Silicosis – Preventable, progressive (no cure)

Important factors

- Crystalline Silica (%) content in stone
- Power tools (cutting, grinding, drilling, polishing etc)
- Respirable fraction in dust
- Inadequate respiratory protection
- Inadequate dust suppression & controls
- Dose Cumulative load in lungs and duration
- Long latency (usually) but accelerated in high exposures
- Smoking is an aggravating factor
- Health surveillance is medical monitoring for early detection







Contolling exposures to prevent occupational lung disease in the construction industry

Questions?

www.breathefreelyaustralia.org.au







Dust Control in Silica Workshop

Ryan Winston Managing Director blanc. Architectural Homes

SILICA ON SITE AND IN THE CONSTRUCTION WORKPLACE

CHANGING THE MINDSET OF INDUSTRY – BUILDERS, TRADESMEN AND WOMEN TRADE TRAINING AND APPRENTICES

WHAT IS SILICA AND ITS EFFECTS

- Silicosis is a progressive, irreversible lung disease/ cancer caused by prolonged exposure to respirable crystalline silica or quartz dust.
- Silica can be found in products such as Stone (Natural and Engineered), Porcelain products, Brick & Concrete (& many others).
- These products are common place on every building construction site throughout Western Australia.
- Three types of exposure issues are;
- Acute short term exposure (period of weeks/months) to high levels of silica.
- Accelerated 5 10 years exposure to high levels of exposure
- Chronic long term exposure (over 10 years) to lower levels of silica

HOW ARE THE HEALTH RISKS POSED?

- Health risks associated with silicosis occur when materials are not handled correctly.
- Misunderstanding / unawareness of the seriousness of the health concerns
- Dry cutting and polishing of both natural and engineered stones are large factors in being diagnosed with silicosis.
- Cutting of ceramic tiles, sweeping of concrete and cement dusts without the appropriate PPE protection. It is important to note that disturbing materials that contain crystalline silica can also release particles too small to see and there is a possibility of inhalation.

CRYSTALLINE SILICA CONTROLS -MANUFACTURING

<u>Crystalline Silica Controls - Manufacturing</u>

- Personal Protective Equipment (PPE) (e.g. masks, gloves, aprons, etc...) that complies with standards and regulations. This has always been recommended and now compulsory,
- Plant & Equipment;
 - Ventilation,
 - Water Filtration Systems,
 - Water cutting machines and tools,
 - Residue disposal plant.
- No dry cutting. If dry cutting required and cannot be avoided, ensure all PPE is used and cutting is performed in a controlled and ventilated area (along with use of approved vacuum).
- In order to minimise dust exposure once dry, ensure water methods (e.g. hosing down production floor) are used to clean dry dust.
- Daily & regular cleaning of tools and production areas.
- Daily & regular tool box meetings/training
- Worksafe WA Control Measures



CRYSTALLINE SILICA CONTROLS – SITE & INSTALLATION

- Onsite/template measuring on site to ensure correct measurements are recorded for production. This reduces any need for modification on site (i.e. dry cutting).
- Any minor onsite cutting is performed with PPE (e.g. masks, gloves, aprons, etc...) to minimise on site crystalline silica exposure,
- Daily & regular tool box meetings/training/education
- Enforcement / firm understanding will deliver sound advice and protection
- Empathy / Care for those around you and yourself
- Worksafe WA Control Measures



STAKEHOLDERS AFFECTED

- Both residential and commercial builders
- Tradesmen and women, apprentices numbers are falling
- Families and friends
- Industry suppliers
- Neighbors' adjacent and society who live, walk the streets around the sites
- Our clients
- Ourselves!

SO HOW DO WE AFFECT CHANGE

- We need to be the leaders who drive this each and every one of us to talk about the issues, ensure the correct PPE is worn.
- Push for more education throughout industry from top to bottom.
- Lobby government for support and investment towards,
- Regulation of industry
- Look towards trade registration which can then hold each individual accountable for their actions.
- There is no doubt an onus on all engineered stone suppliers to drill down on all manufacturers to limit distribution to nonconforming manufacturers in respect to genuine SAFE PRACTISE.
- Support the individuals who are leading the way with their examples set

EXAMPLES OF WHO ARE LEADING THE WAY ?

- Bravvo have been assessed by Worksafe WA, and the inspection provided positive feedback including;
- Bravvo in the Worksafe WA Inspectors view was that they were leading the industry in prevention systems. The Worksafe WA Inspector was very impressed by the setup and safe practise across the board.
- Note how clean factory is, no dust no slurry etc....
- All slurry washes into factory floor drains which then run into a water filtration system. The end sludge is compacted into hash bags and binned, resulting in efficient and effective minimisation of dust settlement and slurry.

BRAVVO FINISH FIRST FACTORY SETUP

• See attached pics of our production factory and water filtration system.



WHY DOES THIS MATTER TO ME / US ALL

- We want to build a safe industry, where the opportunities can take you where you really want to go.
- We want to go to work, come home safely and contribute to society.
- We want to see success stories, and enjoy long lasting relationships.
- We want to grow old and enjoy our hard earned retirement.
- We care about the future of our industry
- Because our efforts together can save lives







Respiratory Protection

Marcus Dionisio Respiratory & Hearing Protection Specialist 3M

Respiratory Protection – Airborne Contaminants

Breathe Freely

November 2019





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Introduction to Respirators

- PPE to protect workers against:
 - Airborne dusts
 - Fumes, fibres and other particulates
 - Hazardous chemicals
 - Infectious substances
- Last line of defense...



Where to start?

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Australian/New Zealand Standard™

Respiratory protective devices



Introduction to Respirators

Normally required due to:

- a) Worker exposures approaching or above the regulatory limit (WES/OES).
- b) Excessive exposures for short durations (i.e. task).
- c) Individuals with medical conditions that warrant further protection.
- d) Hazardous substances are stored, spills or a leak may require protection.
- e) Oxygen deficiency.



Image: courtesy of GCG health safety & hygiene

Selection of Respirators

- Two main types of Respirators:
 - 1. Air purifying
 - 2. Air supplying
- Critical factors before choosing a respirator:
 - Is it suitable for what you want to be protected against?
 - Does it deliver the right level of protection?
- Is it required to control the risk? If so, when?
- Screening of workers for medical conditions that impact on the ability to wear respirators.

Respirator Types



Particle Sizes





Image: OHTA W201 Course Manual

What does respirable dust look like?



Image – courtesy of GCG health safety & hygiene

How long can particles stay in the air?

The particle's size makes a big difference

Typical settling rates for different sized particles from a height of 1.5m in still air



Image – courtesy of 3M

P1, P2 or P3 Respirators?

Class	Use	Examples
P1	Mechanically generated particles	Silica, wood dust, nuisance dust and asbestos**. ** Limitations apply.
P2	Mechanically + thermally generated particles	As above + metal fumes, exhaust fumes & smoke.
P3	Mechanically + thermally generated particles	As above + increased protection factor (i.e. for toxic metals).

Protection Factors – Airborne Dusts



AS1715 – Table 4.2

- Use existing exposure monitoring data to confirm the required protection factor.
- If the worker exposure is unknown, estimate the concentration.
 - Consult an Occupational Hygienist, if required.
Does it Fit - Donning

Putting On The Respirator



Position the respirator in your hands with the nose piece at your fingertips.



Cup the respirator in your hand allowing the headbands to hang below your hand. Hold the respirator under your chin with the nosepiece up.



The top strap (on single or double strap respirators) goes over and rests at the top back of your head. The bottom strap is positioned around the neck and below the ears. Do not crisscross straps.



Place your fingertips from both hands at the top of the metal nose clip (if present). Slide fingertips down both sides of the metal strip to mold the nose area to the shape of your nose.

Image: https://www.cdc.gov/niosh/docs/2010-133/pdfs/2010-133.pdf?id=10.26616/NIOSHPUB2010133

Respirator Limitations

Common limitations in protecting against airborne particulates include:

✓ They can leak, wear out, or be the wrong kind.

- They can be hot, uncomfortable and make it hard to see or communicate.
- They can be hard to breathe through.
- They are easily removed in contaminated air.

✓ Other PPE impacts

Unfortunately not as simple as buying a box of respirators.

Respirator Training & Record Keeping

- <u>Supervisors</u> trained in their responsibilities.
- Employees trained in:
 - Identification of the hazard
 - Usage
 - Storage
 - Inspection
 - Demonstrated competency for use
 - Maintenance
 - Limitations
 - NB: example training material in Section 7 of AS1715
- Refresher training frequently
 - Normally every 12 months (consider the risk, use patterns & behaviours).
- Maintain records of training, fit testing, medical screening and audit records as a minimum.

Respirator Maintenance (Mechanical)

• Must be used as designed and as per manufacturer instructions.

Disposable Respirators	Re-usable Respirators
 Single use Change if wet or damaged (i.e. bent out of shape) No cleaning or maintenance 	 Identify filter changeout intervals – varies according to contaminant, concentration, storage etc. Pre-filter change out Clean (non degrading wipes, warm soapy water) Store in a dry location out of direct sunlight Change the head straps (elasticity) and exhaust valve (warped/brittle)

Does it Fit – Fit Check

Simple Check by the Wearer -Each Time it is Worn



Positive pressure fit check

- 1. Block the exhalation valve with the palm of your hand.
- 2. Gently breathe out and hold for about 10 seconds.
- 3. Check to see if the face-piece is bulging slightly.
- 4. If the face-piece remains bulging and there are no more leaks between the face and face-piece, the respirator is properly fitted. If you detect leaks, readjust the straps and check again for a proper fit.



Negative pressure fit check

- 1. Block the cartridges with the palms of your hands.
- 2. Gently inhale and hold for about 10 seconds.
- 3. Check to see if the face-piece is collapsing slightly.
- 4. If the face-piece remains collapsed and there are no more leaks between the face and face-piece, the respirator is properly fitted. If you detect leaks, readjust the straps and check again for a proper fit.

Image: NZ WorkSafe

https://worksafe.govt.nz/topic-and-industry/personal-protective-equipment-ppe/respiratory-protective-equipment/advice-for-businesses/

Does it Fit – Fit Testing

• AS1715 references two methods to confirm a respirator fits an individual:

www.tsi.co



Quantitative

- When to fit test:
 - Before being issued with a respirator (close face fitting)
 - Annually
 - Change in respirator (unique to the model tested)
 - Change in facial characteristics

Does it Fit - Clean Shaven



Comparison between beard stubble and hazardous fibrous materials under a microscope



Image – courtesy of 3M

NB: Workers using a loose fitting PAPR respirator do not need to be clean shaven.



Example Fit Factor Before - Bearded



After – Clean Shaven

Image: courtesy of Allens Industrial

NB: not full test conditions.

Facial Hairstyles and Filtering Facepiece Respirators



Image:

https://www.cdc.gov/niosh/npptl/pd fs/FacialHairWmask11282017-508.pdf

Key Learnings

- Fit testing regularly shows us:
 - No one respirator/mask will fit all face shapes.
 - Some people need a different sized re-usable respirators to achieve a fit.
 - Workers rarely know the basics of fitting a respirator.
 - Being clean shaven is critical to allow a proper fit.
 - Fit Test wherever possible.
- Workers will generally remove a respirator to speak.
- Sweating impacts on the seal.
- Particulate respirators will not protect you against gases and vapours.









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Thank you!

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