

3M™ Select Software – Australia / New Zealand

Introduction to Select and Service Life Software

3M™ Select Software is designed to help you choose the appropriate 3M respirator for your work environment. This guidance information is for the 3M Select Software.

3M™ Service Life Software is designed to help you estimate the service life of 3M gas/vapour respirators and filters. Help guidance for Service Life software is available from within the Service Life Software program.

By using the links in the on-line version of the software, you may also do any of the following:

- use 3M Select or Service Life Software
- download 3M Select and Service Life Software
- go to the 3M Occupational Health and Environmental Safety Division website
- select a different location
- contact 3M OH&ESD

Select Software

This program uses respirator protection factors from Australian / New Zealand Standard AS/NZS 1715 “Selection, Use and Maintenance of Respiratory Protective Equipment”.

WARNING! Misuse of respirators may adversely affect the wearer’s health, lead to severe or life threatening illness or permanent disability.

This information is intended only as a guide. Selection of the most appropriate respirator will depend on the particular situation. It should be made only by a person familiar with the working conditions and the benefits and limitations of respiratory protection products. Respirators must be used in conjunction with a respiratory protection programme. This generally includes, but is not limited to, proper respirator selection, medical evaluation, fit testing, training, respirator maintenance, programme evaluation, etc. Before selecting respiratory protective equipment, a full risk assessment must be performed. If the risk assessment concludes that other control measures are inadequate, then respiratory protective equipment should be chosen as the last resort. Once the workplace contaminants and their concentrations have been identified, this software can then be used.

If a chemical can be absorbed through the skin, skin protection may be required in addition to respiratory protection. Eye protection may also be necessary if not provided by the respirator. Failure to provide adequate skin and eye protection can lead to adverse health effects regardless of respirator use.

If you have any questions related to proper selection and use of 3M respirators, contact your local 3M representative or contact the 3M Tech Assist Helpline on 1800 024 464 (Australia) or 0800 364 357 (New Zealand) for assistance.

The general process to make a respirator selection using this software tool is as follows:

- confirm that there is no potential for oxygen deficiency,
- enter one or more contaminants,
- enter the exposure levels for the contaminants,
- answer other questions depending on the contaminants which you have selected,
- choose from among the possible solutions.

You can navigate through the software by answering the questions and selecting “Continue”. You may also navigate backwards using the links in the left margin. For the online version of the software, **do not use the Back or Forward options on your browser**. The remainder of this help document explains each successive screen.

Contaminant Page

OXYGEN DEFICIENCY

Answer the question about whether you may have an oxygen deficient or potentially oxygen deficient atmosphere. 3M defines oxygen deficient environments as atmospheres containing less than 19.5% oxygen. Individual countries may apply their own limits on oxygen deficiency. Seek advice if in doubt.

SELECTING A CONTAMINANT

The software contains a database of chemical names, Chemical Abstract Service registry numbers (CAS #s), Immediately Dangerous to Life or Health (IDLH) levels and Workplace Exposure Standards (WESs). The CAS numbers harmonize chemical identification regardless of the synonym used or differences in spelling.

IDLH specifically refers to acute respiratory exposure that poses an immediate threat to loss of life, immediate or delayed irreversible adverse effects on health, or acute eye exposure that would prevent escape from a hazardous atmosphere. These values have been developed for selection of respiratory protection only. This software uses the IDLH concentrations published in the National Institute for Occupational Safety and Health (NIOSH) Publication No. 90-117 (1990). NIOSH also published IDLH values in NIOSH Publication No. 94-116 (1994). The 1994 values are not used in the software because OSHA considers them as interim values and is still using the values from the 1990 publication for enforcement (OSHA memorandum August 3, 1998). When no IDLH exists, the lower explosive limits (LELs) from the NIOSH Pocket Guide, Publication No. 2005-149, and the Workplace Environmental Exposure Level Guides were used.

The WESs used in this software are the maximum airborne contaminant concentration allowed in the breathing zone of the worker. There are different types of WESs depending on the duration of the exposure: 8 hour time weighted average (TWA) exposure limits, 15 minute short term exposure limits (STEL) and/or ceiling (instantaneous) exposure limits. One or more type of WES is shown next to each contaminant. The WES units are either parts of contaminant per

million parts of air (ppm), milligrams per cubic meter of air (mg/m³), or fibres per cubic centimeter (f/cc).

The Workplace Exposure Standards are quoted from the Safe Work Australia Hazardous Substances Information System (HSIS) Exposure Standards List online (<http://hsis.ascc.gov.au>). If the chemical is not listed in HSIS, then the exposure standard used in this system is the lowest value of either the ACGIH® Threshold Limit Values (TLVs®), OSHA Permissible Exposure Limits (PELs), or American Industrial Hygiene Association Workplace Environmental Exposure Levels (AIHAWHEELs). TLVs are from ACGIH®, 2011 TLVs® and BEIs® Book. Copyright 2011. Reprinted with permission.

You may select one or more contaminants for respirator selection. To select a contaminant, click in the "Search" box and then begin to type either the name or CAS number. The list of contaminants matching your search will be updated as you type. Click on the "+" button next to the contaminant to add it to your list of "selected contaminants" in the bottom half of the screen. To restore the complete list of contaminants in the top half of the screen, click the "Clear" button. Chemicals without established occupational exposure limits and chemicals that are mainly used as pesticides are not included. If required, contact the 3M Tech Assist Helpline on 1800 024 464 (Australia) or 0800 364 357 (New Zealand) for assistance on these chemicals.

REMOVING A CONTAMINANT

To remove a contaminant from the list of "selected contaminants" in the bottom half of the screen, click on the "-" button next to the contaminant.

ENTERING EXPOSURE LEVELS

The exposure level is the contaminant concentration in air measured or estimated in the breathing zone of the worker. It is NOT the concentration (e.g. % by weight) listed on a material safety data sheet. For more information on sampling worker exposure levels, please contact the 3M Tech Assist Helpline on 1800 024 464 (Australia) or 0800 364 357 (New Zealand) for assistance, or contact an occupational hygienist.

Next to each of the selected contaminants is a box for the 8 hour TWA exposure, short term (15 minute) exposure, and ceiling exposure. If the contaminant has an 8 hour TWA exposure standard, the 8 hour exposure box will be active (white in colour). If the contaminant does not have an 8 hour exposure standard, the 8 hour exposure box will be inactive (grey in colour). The same is true for the short term and ceiling exposure boxes.

You must enter at least one type of exposure concentration (8 hour, short term or ceiling) for each of the contaminants that you have selected. For chemicals with more than one type of exposure standard, you may enter an exposure concentration in each active box. To enter an exposure, click on the box next to the contaminant and enter the exposure concentration.

The units for exposure levels are either parts of contaminant per million parts of air (ppm), milligrams per cubic meter of air (mg/m³), or fibres per cubic centimeter (f/cc). In some cases,

you may also change the units used for the exposure. To change units, select the desired unit of measure from the units drop-down list. If your concentration units are not one of the options, you must convert your exposure value to one of the options available.

When you have entered all exposure concentrations click the "Continue" button.

Other Selection Factors Page

Depending on the contaminants and exposure levels you have entered, you may be asked additional questions or receive comments to consider.

MIXTURES

If you enter more than one contaminant, a warning message will appear. You will be asked to consider health effects from mixtures and possibly adjust the exposure levels you have entered.

Health effects from mixtures are complex as contaminants may have additive, synergistic, or antagonistic (combination is less than individual) interaction in the human body. For more information about contaminant health effects, please see exposure standard documentation, or contact a toxicologist, occupational hygienist or other occupational health professional.

The additive approach to mixtures is that the sum of contaminant exposure divided by exposure limit shall not exceed unity (1). Mathematically this is: $E1/WES1 + E2/WES2 + \dots + En/WESn < 1$. However, the additive model is often only applied to substances with both the same target organ and similar toxicological effect.

Given the varied opinions regarding health effects from contaminant mixtures, this software does not automatically group contaminants by health effects. However, if you feel that some of the contaminants you entered have a combined health effect, you may manually adjust the exposure levels that you previously entered. Following is an example of two contaminants with additive health effects, and one contaminant with no additive health effect:

Scenario

Contaminant A: exposure = 5 ppm, exposure standard = 10 ppm, central nervous system effects

Contaminant B: exposure = 16 ppm, exposure standard = 20 ppm, central nervous system effects

Contaminant C: exposure = 2 ppm, exposure standard = 30 ppm, upper respiratory tract irritation

1) Calculating the summed hazard ratio using the additive model

Contaminants A and B are substances with known additive effects on the same body organ or system. The summed hazard ratio for contaminants A and B is: $5 / 10 + 16 / 20 = 1.3$. In other words, considered together, the exposure for contaminants A and B is 1.3 times the exposure limit.

2) Modifying the exposure levels

Contaminant A (modified): exposure = 1.3 x exposure standard = 1.3 x 10 ppm = 13 ppm

Contaminant B (modified): exposure = 1.3 x exposure standard = 1.3 x 20 ppm = 26 ppm

Contaminant C (not modified): exposure = 2 ppm

3) Using the links in the left margin, you may return to the contaminant page and enter these modified exposure levels.

This process may be repeated separately for full shift, short term exposure and ceiling exposure. The software will then select the appropriate respirator(s).

Note: At the end of the Select Software, there is an option to use the contaminants and exposure levels you have entered to estimate cartridge service life. Health effects are not used when estimating cartridge service life. Therefore, if you have modified the exposure levels in the Select Software, the original exposure levels should instead be used in the Service Life Software.

PARTICULATES ONLY

If all of the contaminants entered are particles (none are gases or vapors), then you will be asked if you also need relief from odors that are noticeable, but not above the workplace exposure standard. If “yes,” then on the solution page only particulate respirators that also have nuisance level organic vapor or nuisance level acid gas relief will be displayed. If “no,” then all particulate respirators will be considered. Note: If a respirator is required for gases or vapors in your environment, then these gases or vapors must be entered on the contaminant page.

GAS OR VAPORS ONLY

If all of the contaminants entered are gases or vapors (none are particulates), then you will be asked if there are also any particles present in the environment (e.g., mist from spray painting). If you wish the software to include particle filters in the solution, use the link in the left margin to return to the contaminant page and enter any particulate contaminants (e.g., "nuisance particles").

EXPOSURE LESS THAN EXPOSURE STANDARD

You will be notified if you have entered exposure levels less than the workplace exposure standards used in this software.

Solution Page

The Solution Page will contain respirators that may be used to help reduce exposure to all of the contaminants entered, even if the exposure entered is less than the workplace exposure standard. For example, if you enter an exposure of 0.01 ppm and the workplace exposure standard is 100 ppm, the software will still recommend a respirator that may be used to reduce exposure. This is done because workplace exposure standards are not fine lines between safe and unsafe conditions, and some individuals may wish to reduce their exposure to concentrations much less than the workplace exposure standard.

SELF CONTAINED BREATHING APPARATUS (SCBA)

A warning message will be displayed for oxygen deficient environments or for contaminant concentrations that are Immediately Dangerous to Life or Health (IDLH). A summed gas/vapour concentration of >70,000 ppm would cause an oxygen deficiency, and is thus also considered

IDLH. A self-contained breathing apparatus (SCBA) or combination airline with auxiliary SCBA is recommended for oxygen deficient, IDLH or unknown environments. 3M does not offer these types of respirators.

SUPPLIED AIR RESPIRATORS

Supplied air respirators are recommended if it is required by regulatory guidance; if there is no appropriate filter for any single contaminant; or if there is no filter for all of the selected contaminants together. Supplied air solutions may be recommended where a contaminant has a WES above its odour threshold, as for these contaminants, a wearer would not be able to detect contaminate breakthrough. If a supplied air respirator is required, you will be directed to either a website or pdf file featuring powered and supplied air respirators and contact information for your local 3M representative.

HALF MASK OR FULL FACEPIECE RESPIRATORS

Respirators help reduce the wearer's inhalation exposure according to the respirator's protection factor. A respirator with a higher protection factor is expected to provide greater reduction in exposure (more protection) than a respirator with a lower protection factor. This software uses protection factors (PFs) from AS/NZS 1715:2009. However, in order to achieve the expected protection factor, respirators must be used in conjunction with a respiratory protection programme. This generally includes but is not limited to proper respirator selection, medical evaluation, fit testing, training, respirator maintenance, programme evaluation, etc. If you have entered more than one contaminant, the contaminant with the highest hazard ratio (exposure concentration / WES) is used to determine what protection factor level is required.

Half mask or full facepiece negative pressure air purifying respirators that filter all of the contaminants selected and reduce exposures to below the WESs will be displayed. If you enter an exposure concentration that is less than the WES, a respirator will still be recommended. For example, if you enter an exposure of 0.01 ppm and the workplace exposure standard is 100 ppm, the software will still recommend a respirator with an appropriate filter for that contaminant. This is done because workplace exposure standards are not fine lines between safe and unsafe conditions, and some individuals wish to reduce their exposure to concentrations much less than the workplace exposure standard.

If any of the selected contaminants cause eye irritation in the concentration range of 1- 10 times the WES, then a warning message is displayed.

DISPOSABLE vs. REUSABLE RESPIRATORS

Depending on the information you have entered, there may be many different respirators that could be recommended. If both disposable respirators (filtering facepieces) and reusable respirators (elastomeric or silicone rubber style facepieces with appropriate filters) are appropriate, you will be asked which you prefer in order to reduce the number of respirators shown.

SIMPLEST SOLUTION

The software automatically shows only a limited number of solutions. For example, if all of the selected contaminants are particles, it will display respirators that are nominally only for particles (and not respirators that are for both particles and gases/vapours). If all of the selected contaminants are gases or vapours, it will display respirators that are nominally only for gases/vapours (and not respirators that are for both particles and gases/vapours). If the required filter is only available as a combination particulate/gas/vapour filter, then it will be recommended even if the selected contaminant was only a particle or only a gas/vapour.

To further reduce the number of possible respirators, you may select “show only simplest respirator.” Simplest is defined in this software as:

- Half masks preferred over full facepieces
- Fewest number of parts in addition to the facepiece
- Fewest number of gas/vapour and particulate classes
- Lowest class of gas/vapour and particulate filters
- Respirators or filters without certain “extra” features

You may also deselect the “show only simplest respirator” to see the original list.

DISPOSABLE RESPIRATORS

For disposable respirators (filtering facepieces), you must select a respirator on the left side of the screen. Your selection is now complete—no additional filters are required.

REUSABLE RESPIRATORS

For reusable respirators, you must first select a facepiece on the left side of the screen. If the facepiece includes filters that are permanently attached, your selection is complete-

If you select a facepiece without pre-attached filters, then depending on your contaminants you must select a filter from the list on the right side of the screen.

OTHER CONSIDERATIONS

While the software provides a list of possible half mask and/or full facepiece respirator solutions, you must consider any other safety equipment required for the job. The respirator selected must be compatible with hard hats, goggles, glasses, welding faceshields, etc. In addition, the worker must be able to communicate and perform required job duties without removing the respirator.

Worker comfort must also be considered. If a respirator does not have good worker acceptance and is not worn during all times of exposure, it will not provide the protection needed. Removal of the respirator, even for short periods of time, dramatically reduces the protection afforded by the respirator. If strenuous work is to be performed, or if the respirator is to be worn for an extended period of time, it may be desirable to select a lightweight respirator with low breathing resistance. For example, a disposable respirator with an exhalation valve may be easier to breathe through than the same type of disposable respirator without an exhalation valve.

In some workplaces, a powered air purifying respirator (PAPR) or supplied air respirator may be preferred instead of a negative pressure half mask or full facepiece respirator. Certain types of headgear used with powered or supplied air respirators provide head and/or eye protection, can be used with facial hair, or may be used by those who cannot be properly fitted with a half mask or full facepiece. Some of the supplied air respirators heat or cool the air to provide comfort in cold or hot working environments. For those who have difficulty breathing through a negative pressure air purifying respirator, a powered or supplied air respirator may be more comfortable as it provides air to the worker's breathing zone. Powered and supplied air respirators are often complex. Please see the website link or pdf file at the bottom of the Solution Page, or contact for your local 3M representative for more information.

LONG DESCRIPTION AND CREATING A REPORT

After selecting a respirator, facepiece, or filter, a picture and description will be shown at the bottom of the screen.

You may also generate a report for your records. When you select the "generate report" button, a new window will open up to allow you to enter comments such as employee, task, location, etc. The report will contain the choices you have made including the selected contaminants, exposure concentrations, respirator chosen, etc.

SERVICE LIFE SOFTWARE

If you have selected a gas/vapour filter, you may wish to click on the button at the bottom of the screen or the link at the left of the screen to calculate estimated filter service life. The service life software is not for particle filters. Instead, these are changed according to physical damage, increased breathing resistance or your company's policy. Please see respirator or filter user instructions for more information.

QUESTIONS?

If you have any further questions regarding this software or 3M respirators, please contact your local 3M representative or contact the 3M Tech Assist Helpline on 1800 024 464 (Australia) or 0800 364 357 (New Zealand) for assistance.

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