

## IVHHN RECOMMENDED DUST MASKS FOR PROTECTION FROM VOLCANIC ASH

### Introduction

Following an eruption, volcanic ash can cause irritation of the airways and lungs and, if breathed in over many years, could cause lung disease. Whilst volcanic ash is suspended in the air, it is vital that the population exposed protects themselves by wearing masks. For the public, use of masks is only necessary whilst the levels of suspended dust are above background levels. For those involved in clean-up operations, garden maintenance or even people who are cleaning houses and property, masks should be worn at all times whilst the ash is mobile in the atmosphere.

### Mask types and standards

For protection against volcanic ash, high-efficiency, light-weight disposable masks/respirators are appropriate. The mask must provide protection at the highest concentration the person will experience. Suitable disposable masks are 'CE' marked to show that the design has been tested to a recognised standard. They will also be marked with the standard (e.g. EN 149:2001 in the EU or N95 in the US) and an additional code such as FFP1 (low efficiency), FFP2 (medium efficiency) or FFP3 (high efficiency) (FFP = Filtering Face Piece) is shown on EU masks. The US N95 standard is roughly equivalent to FFP2 or 3 as it is efficient up to 10 x the local occupational exposure limit (see Table 2). The higher the FFP number, the more protection the respirator can provide if it is used properly. Pre-2001 masks may also distinguish between those suitable for solids and liquids e.g. FFP2S. Disposable masks cover the nose, mouth and part of the chin. Some of them contain exhaling valves. An elastic band around the head and neck keeps them in place.



Figures 1 & 2. Masks may either be fitted with or without valves.

Valve masks are more comfortable, especially for those wearing spectacles which might otherwise mist up. They are appropriate for hot and humid climates.

### Recommended masks

The following tables give examples of appropriate respirators provided by the company 3M. There are many other manufacturers (e.g. Willson, Moldex, Uline, Pyramex, see web addresses in References section) who make similar masks.

Table 1. Maintenance-free respirators from 3M, UK and EU models. All conform to EN149 standard. LOEL = Local Occupational Exposure Limit.

UK 3M Product No.	Mask shape	Efficiency	Occ. Limit	Valve present	Information
8011	Hard cup	FFP1	4 x LOEL	No	Basic mask
8812	Soft cup	FFP1	4 x LOEL	Yes	
8710E	Soft cup	FFP1	4 x LOEL	No	
9312	Folded	FFP1	4 x LOEL	Yes	
9310	Folded	FFP1	4 x LOEL	No	
8822	Soft cup	FFP2	10 x LOEL	Yes	Good in humid
8825	Soft cup	FFP2D	10 x LOEL	Yes	Good in humid
8810	Soft cup	FFP2	10 x LOEL	No	
9322	Folded	FFP2	10 x LOEL	Yes	Good in humid
9320	Folded	FFP2	10 x LOEL	No	
8835	Soft cup	FFP3D	20 x LOEL	Yes	Good in humid
9332	Folded	FFP3	20 x LOEL	Yes	Good in humid

Table 2. Maintenance-free respirators from 3M, US/Canada models. All conform to NIOSH 42 CFR84 N95 or N100 standards. LOEL = Local Occupational Exposure Limit.

US 3M Product No.	Mask shape	Efficiency	Occ. Limit	Valve present	Information
8000	Hard cup	N95	-	No	Short duration
8210 & 8110S	Soft cup	N95	10 x LOEL	No	
8511 & 8211	Soft cup	N95	10 x LOEL	Yes	Good in humid
9210	Folded	N95	10 x LOEL	No	Good for comfort
9211	Folded	N95	10 x LOEL	Yes	Good for humid
8233	Soft cup	N100	10 x LOEL	Yes	99.97 % filter efficiency

Table 3. Maintenance-free respirators from 3M, Japan models. All conform to the industrial safety and health law (Law No. 57 of 1972). Efficiency: D = disposable; S = solid; L = liquid. 1,2,3 roughly equivalent to FFP1,2,3.

Japan 3M Product No.	Mask shape	Efficiency	Time Limit for use	Valve present	Information
8511	Soft cup	DS2	27 hours	Yes	
8812	Soft cup	DS1	12 hours	Yes	
8233	Soft cup	DS3	38 hours	Yes	
8577	Soft cup	DL2	23 hours	Yes	Good in humid
8210J	Soft cup	DS2	13 hours	No	
8710	Soft cup	DS1	14 hours	No	
9913	Soft cup	DS1	11 hours	No	
8000J	Hard cup	DS1	3 hours	No	
9322	Folded	DS2	18 hours	Yes	
9312	Folded	DS1	19 hours	Yes	

The UK/EU respirators are tested for penetration of particles > 0.5 µm diameter and the US respirators are tested to > 0.3 µm diameter. We recommend that valved respirators are used in hot or humid climates although they will aid comfort in all environments. The respirators distributed to a population should be chosen with the occupation of the people and the airborne dust concentration in mind. For example, for the general population exposed to suspended volcanic dust, the FFP1 mask might be appropriate if the dust levels do not exceed 4 x the local occupational exposure limit. For workers involved in clean-up operations, gardening or other high-exposure jobs, FFP2 or FFP3 are recommended. We recommend folded masks as

they are individually packed, allowing clean storage, and easy and hygienic distribution. However, the folded masks can fit less well on people with small faces or chins.

### **Finding a good mask**

A respirator must pass three tests:

- It must be capable of providing adequate protection
- It must fit you properly and it must be compatible with any other personal protective equipment that you wear at the same time.
- In addition, you must always use it correctly for it to be fully effective.

Respirators only protect you if they fit properly without any leakage around the nose or chin. Even expensive respirators are unsuitable if they do not give a good seal with the face. A good fit relies on close contact between the respirator and smooth skin without hair in the region of the seal. Consequently a beard or beard stubble can affect the fit and reduce protection. Many manufacturers make respirators in different sizes to allow for variations in the shape and size of faces. You should not expect one respirator to fit everyone. **If you are responsible for providing masks for a community, you should order them in several different sizes and types.** It will not be possible to individually fit masks to every person in a population, however. If resources allow, special effort should be taken to fit masks for occupationally-exposed individuals and other high-exposure groups.

### **A good fit**

To check if a respirator fits properly, ensure that the straps and any strip for moulding the respirator around the bridge of your nose are correctly adjusted. Then hold the respirator in place and breathe in or out sharply. If you detect any leakage around your face you should readjust the respirator and retest. See bottom of document for further instructions.

### **Children**

Unfortunately respirators are not made to fit children's faces. For this reason, children must be kept indoors and stopped from playing in dusty environments whilst ash is present.

### **Occupational exposure**

For continuous labour in dusty conditions, full-face non-disposable respirators with changeable filters will be more appropriate and are also more comfortable to wear in hot, humid conditions. For extreme conditions see: [http://www.3m.com/intl/za/ohes\\_airstream.html](http://www.3m.com/intl/za/ohes_airstream.html) for Airstream Powered Helmets.

### **Storage**

Although the masks are disposable, if supplies are limited they can be stored for re-use in a clean bag or box to ensure that dust from the outside does not contaminate them. They should not be hung in a dusty environment. They must be replaced at the first sign of breathing difficulty.

### **Warning**

It is possible to buy cheap masks called 'nuisance dust masks', 'comfort masks' or 'hygiene masks'. They may look similar to lightweight disposable masks but they are not intended for use in dusty environments and are not marked 'CE' or 'EN149/N95'. Instead, the package may say something like 'This product does not provide respiratory protection'. Unless the product clearly states that it conforms to a recognised standard, do not use these masks for protection from volcanic ash.

## **Web references**

Dust mask manufacturers:

3M Worldwide. <http://www.mmm.com/> with links to pages for the US, Canada, UK, Europe, Japan, China, Korea, Brazil.

Moldex. <http://www.moldex.com/applications/dusty.htm>

Willson. <http://www.safetyinfo.com/equipment/wilson-respirator-images-pages/wilson-disposable.htm>

Uline. [http://www.uline.com/Group\\_230.asp](http://www.uline.com/Group_230.asp)

Pyramex.

<http://www.pyramexsafety.com/html/modules.php?name=Product&sel=prod&product=Respiratory>

Vilene. <http://www.vicre.co.jp/mask/0101.html>

Koken. <http://www.koken-ltd.co.jp/boujin.htm>

Mask fitting instructions:

<http://multimedia.mmm.com/mws/mediawebserver.dyn?SSSSSSAzK12S4vTSevTSSScTScNtyt&9->

<http://www.moldex.com/fittinginstructionsexamples/adjustablestrap.htm>

Health & safety guidelines:

Japanese Standards: <http://www.jicosh.gr.jp/english/law/DustMask/index.html>

European Standards: <http://www.bsi-global.com/Health/PPE/bsen149.xalter>

US Standards: <http://www.cdc.gov/niosh/pt84abs2.html>

## **Acknowledgements**

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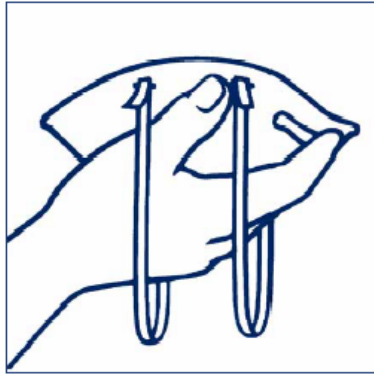
Yasuhiro Ishimine, National Research Institute for Earth Science and Disaster Prevention, Bosai, Japan for researching Japanese health and safety guidelines.

Jim Chisholm, UK Health & Safety Executive, for reviewing the document.

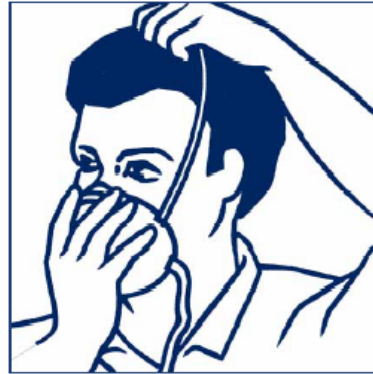
The following diagram of fitting instructions is courtesy of 3M (see next page).

<http://multimedia.mmm.com/mws/mediawebserver.dyn?SSSSSSAzK12S4vTSevTSSScTScNtyt&9->

## Fitting Instructions



1. Cup the respirator in your hand with the nosepiece at your fingertips allowing the headbands to hang freely below your hand.



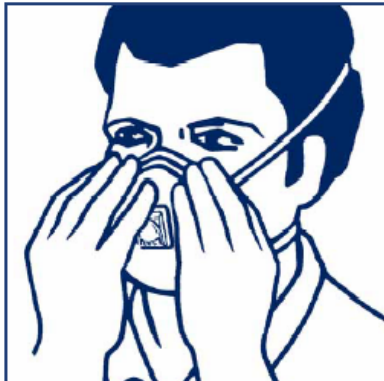
2. Position the respirator under your chin with the nosepiece up.



3. Pull the top strap over your head resting it high at the top back of your head. Pull the bottom strap over your head and position it around the neck below the ears.



4. Place the fingertips of both hands at the top of the metal nosepiece. Mould the nosepiece to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece. Pinching the nosepiece using one hand may result in less effective respirator performance.



5. The seal of the respirator on the face should be fit-checked prior to wearing in the work area.

- Cover the front of the respirator with both hands, being careful not to disturb the position of respirator.
- Inhale sharply. A negative pressure should be felt inside the respirator. If any leakage is detected, adjust position of respirator and/or tension of strap. Retest the seal. Repeat the procedure until the respirator is sealed properly.