

Are you fit enough?

Fit testing Technical Bulletin

Introduction

The Approved Codes of Practice (ACOPs) supporting the Control of Substances Hazardous to Health Regulations (COSHH), the Control of Asbestos at Work Regulations (CAW) and the Control of Lead at Work Regulations (CLAW) require that wearers of tight fitting respirators are fit tested. Fit testing is a means of checking that a respirator facepiece matches a person's facial features and seals adequately to their face. There are several methods available and the Health and Safety Executive's information document HSE 282/28 provides information on how the HSE expect fit testing to be conducted.

This technical bulletin contains information on the types of respirators that require fit testing, who should be fit tested, when fit testing should be conducted and the different methods of fit testing available.

1. Why is fit important?

The performance of tight fitting respirators relies on achieving a good seal between the facepiece of the respirator and the wearer's face. If the seal is inadequate, contaminated air will take the path of least resistance and will travel through leaks in the face seal. Consequently, a poor seal to the face will reduce the level of protection provided to the wearer.

2. What factors affect fit?

Faces vary widely in shape, size and proportions and it is unlikely that one particular model of respirator will fit everyone. Other factors affecting the seal of a respirator to a wearer's face include:

- Facial hair – Wearers of tight fitting respirators must be clean shaven in the area of the face seal.
- Eyewear – Both prescription spectacles and safety eyewear affect fit and if worn, should be worn during a fit test.
- Jewellery – Jewellery in the area of the face seal may need to be removed.

3. What types of Respiratory Protective Equipment (RPE) require fit testing?

Tight fitting respirators should be fit tested, including those incorporated into powered or supplied air systems. Tight fitting respirators include disposable respirators, reusable half masks and reusable full face masks. Loose fitting respirators rely on sufficient airflow through the facepiece and do not require fit testing. Examples of tight and loose fitting respirators are pictured in Figure 1.



Figure 1: Examples of tight and loose fitting respirators

4. Who should be fit tested?

All wearers of tight fitting RPE should receive a fit test on the make(s) and model(s) of respirator that they are required to use. The only exception to this is individuals who are exposed to nuisance levels of substances, i.e. exposure that is genuinely always below the Workplace Exposure Limit and who wear a respirator for comfort only, not for protection. These individuals do not require a fit test.

5. When should fit testing be conducted?

A fit test should ideally be conducted during the initial selection of RPE, before an individual wears the respirator in a hazardous environment. If an untested facepiece is already in use it should be fit tested as soon as possible.

It is good practice to repeat fit testing at regular intervals. This is especially important if RPE is used as the primary means of control e.g. annual testing for workers involved in licensed asbestos removal. In any case fit testing should be repeated if:

- The wearer significantly gains or loses weight, has major dental work or sustains a major facial injury
- A different model or size of RPE is selected
- Specified by company policy

Fit testing is in addition to the requirement to perform a pre-use fit check.

6. Who should conduct fit testing?

Fit testing should be conducted by a competent person. To be considered competent a person should have adequate knowledge of fit testing and should have some practical experience. The expected skills and knowledge of a competent fit tester are listed in HSE 282/28.

A fit tester accreditation scheme, “Fit2Fit RPE Fit Test Providers Accreditation Scheme” also exists. This initiative was developed by the British Safety Industry Federation (BSIF) in conjunction with industry stakeholders, including 3M, and is supported by the HSE. For more information please see www.fit2fit.org.

7. Fit test methods

There are two basic types of fit testing, qualitative and quantitative, and Table 1 provides a summary of each.

The Qualitative Taste Test and the Particle Counting Device (TSI Portacount) are the most common fit testing methods, but the other methods listed in Table 1 are acceptable if preferred. All test methods require a series of exercises to be performed during the fit test. Manufacturer’s instructions and HSE guidance for the equipment used should be followed at all times. A record of the results obtained should be generated and retained for at least 5 years.

	Qualitative Fit Testing	Quantitative Fit Testing
Result	Pass or fail	Numerical – Fit Factor
Available Methods	1. Qualitative Taste Test (see para. 7.1) 2. Odour Fit Test Method	1. Laboratory Test Chamber 2. Portable Particle Counting Device (TSI Portacount) (see para. 7.2) 3. Controlled Negative Pressure Device
Suitable For	Disposable respirators (Taste Test Only) and reusable half masks.	Disposable respirators, reusable half masks and reusable full face masks.

Table 1: Qualitative & Quantitative Fit Testing Summary

7.1 Qualitative Taste Test

The qualitative taste test provides a pass or fail result based upon the wearer detecting a test agent. A controlled aerosol concentration is introduced to a hood fitted over the wearer, as depicted in Figure 3.



Figure 3: Qualitative Taste Test

The test is suitable for all disposable respirators and reusable half masks fitted with particulate or combination gas/vapour and particulate filters. The 3M “Guide to using the 3M Qualitative Fit Test Kit” gives detailed information and tips on how to conduct a qualitative taste test and can be downloaded from www.3m.co.uk/fittestrespirator.

7.2 Portable Particle Counting Device (TSI Portacount)

The most common portable particle counting device used for fit testing is the TSI Portacount, a device which relies on naturally occurring particles circulating in the ambient air. The test involves connecting a probed facepiece, via plastic tubing, to the counting device. Particles of a certain size identified within the facepiece are counted. This number is compared with the number of particles counted outside the respirator in the ambient air. In certain cases, it may be necessary to increase the ambient air particle concentration by means of a particle generator. The result of this test is expressed as a ratio between the particle counts inside and outside of the respirator and is called a fit factor. A fit factor of 100 or more indicates a pass for a disposable respirator or reusable half mask. A fit factor of 2000 or more indicates a pass for a reusable full face mask.



Figure 4: Portable Particle Counting Device

	Advantages	Disadvantages
Qualitative Taste Test	<ul style="list-style-type: none"> ✓ Inexpensive ✓ Simple to use ✓ No calibration of equipment required ✓ Detection makes wearer feel more involved in the test ✓ No modification of facepiece required 	<ul style="list-style-type: none"> ✗ Subjective – relies on wearer’s response ✗ Unable to test full face masks.
Portable Particle Counting Device	<ul style="list-style-type: none"> ✓ Objective numerical result ✓ Wearer cannot influence result ✓ Computer compatible software to allow print-outs of records. 	<ul style="list-style-type: none"> ✗ Expensive equipment ✗ Modification of facepiece required

Table 2: The Advantages and Disadvantages of the Qualitative Taste Test Method and The Portable Particle Counting Device Method.

8. Interpreting fit test results

A fit test pass indicates that an adequate seal can be achieved between the faces of the respirator and the wearer's face. It does not necessarily prove that the wearer will be protected in their workplace. Workplace protection depends upon:

- Accurate and thorough risk assessment
- Correct selection
- Training
- Wear time
- Careful fitting
- Remaining clean shaven
- No changes to face shape and size.

Fit factors generated in a quantitative test can be high and should not be used as a basis to select a respirator; instead the Assigned Protection Factor (APF) should be used.

9. 3M products to support fit testing

3M offer two qualitative taste test kits, FT-10 (sweet) and FT-30 (bitter); FT-10 uses a solution of sodium saccharin to produce a sweet tasting aerosol and FT-30 uses a denatonium benzoate (Bitrex) solution to produce a very bitter taste. The choice between the two is a personal one but occasionally a test subject will be unable to taste one or both solutions. Each kit contains a hood and collar assembly, two nebulisers, sensitivity solution, test solution and detailed user instructions. Spare solutions are also available.



Figure 5:
3M FT-30 Fit Test Kit

10. 3M fit test services

3M can provide either qualitative or quantitative fit testing conducted by Fit2Fit* accredited personnel and half day



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(up to 8 people) or full day (up to 17 people) sessions are available.

Alternatively, a half-day qualitative fit testing workshop is available which covers:

- How to use 3M fit test kits
- Discussion on why someone may fail
- Fault finding and how to avoid potential issues
- Practical demonstrations and practice session.

For more information on either service please contact our Safety Services Co-ordinator on **0845 6013457** or email us on safetyservices.uk@mmm.com.

*For details of the Fit2Fit scheme please see www.fit2fit.org

11. 3M Safety Services

3M is able to offer a range of services to help you meet your PPE needs. These include:

- Care & Maintenance Packs
- Noise Level Check Service
- Hearing Conservation Programme
- Respiratory Service Life Software
- Fit Testing (Quantitative and Qualitative)
- Fit Testing Training Workshops
- EarFit Validation (HPE)
- Air Quality Testing

For more information please speak to our Safety Services Co-ordinator.

12. More information from 3M

For more information on 3M products or services please visit the 3M Safety Solutions website, www.3m.co.uk/ohes or call the 3M Health and Safety Helpline on 0870 60 800 60 (UK) or 1 800 320 500 (Ireland).

13. Further reading

- HSE 282/28 (Free download from www.hse.gov.uk)
- www.3m.co.uk/fittestrespirator
- Guide to using the 3M Qualitative Fit Test Kit

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