safe work australia

# Health monitoring

*Guide for isocyanates*

safe work australia

# Contents

# Introduction

This guide is intended to be read by a registered medical practitioner with experience in health monitoring who is engaged by person conducting a business or undertaking (PCBU) to carry out or supervise health monitoring. It provides practical guidance to registered medical practitioners about requirements under the work health and safety (WHS) laws for health monitoring.

This guide applies to all workplaces covered by the WHS Regulations where health monitoring is required.

## How to use this guide

This guide includes references to the legal requirements under the WHS Act and WHS Regulations. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or WHS Regulations.

The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with. The word ‘should’ is used in this guide to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

This guide provides information for those registered medical practitioners engaged by a PCBU to carry out or supervise health monitoring for workers. This guidance should be read in conjunction with the following:

- *Health monitoring guide for registered medical practitioners*
- *Health monitoring guides for hazardous chemicals*
- *Health monitoring guide for workers*
- *Health monitoring guide for persons conducting business or undertakings (PCBUs).*

## Health monitoring under the WHS Regulations

In certain circumstances, the model WHS Regulations place duties on a PCBU to provide health monitoring to workers. These requirements arise if the worker is carrying out work with hazardous chemicals including lead and asbestos. In addition, the work being carried out must be the kind of work specified in the WHS Regulations. A PCBU has the duty to determine if health monitoring is required.

The WHS Regulations prescribe that health monitoring is carried out by or supervised by a registered medical practitioner with experience in health monitoring.

# Isocyanates

Isocyanates are a family of highly reactive organic compounds that contain the isocyanate functional group of the formula R-N=C=O.

Isocyanates include isocyanates and poly-isocyanates, which contain two or more isocyanate functional groups.

**Work activities that may represent a high risk exposure**

Spray painters using two-pack polyurethane paints are the group at highest risk of exposure to isocyanates. The repair and refinishing of cars entails the sprayed on application of isocyanate-containing coatings on almost every vehicle.

The largest volume use of isocyanates is in the production of polyurethane foams.

Examples of work activities involving isocyanates that require special attention when assessing exposure include:

- all stages of manufacture and use where free isocyanates are released as vapours, aerosols and mists:
    - spray painting, using two-pack paints with an isocyanate hardener, like in vehicle paints
    - use of rigid foams for thermal insulation in refrigerators, storage tanks, packaging and furniture
    - use of flexible foams for bedding and upholstery
    - use of hard wearing coatings for furniture and floors
    - manufacture of sporting goods such as skis, surfboards and footwear, and
    - spray on polyurethane products used as protective coatings for truck beds, trailers, boats, foundations and decks
- processes where heat decomposition of polyurethane products occurs, such as welding, heat removal of electrical insulating varnishes and hot wire cutting of foam, and
- foundry operations, in particular core making, where resins used to bind the sand may contain isocyanates (for example the ‘Iso-Cure process’).

Special attention should also be given to acute exposures that may occur in the above processes.

**Sources of non-occupational exposure**

The increased use of isocyanates in consumer products has increased non-occupational exposure to these chemicals. However, there is minimal research into the impact of non-occupational exposures.

## 1. Health monitoring required for isocyanates under the Work Health and Safety (WHS) Regulations

Collection of demographic, medical and occupational history

Physical examination of the respiratory system and skin

Completion of standardised respiratory questionnaire

Standardised respiratory function tests, $FEV_1$, FVC and $FEV_1$/FVC ([1])

Urinary isocyanate metabolites

[1] *$FEV_1$: Forced expiratory volume in one second; FVC: Forced vital capacity; $FEV_1$/FVC: Tiffeneau index*

## Health monitoring before starting work in an isocyanate process

Health monitoring for isocyanates may be required before the worker starts work so that changes to the worker's health can be detected.

Initial discussions about a health monitoring program should include:

- possible health effects from exposure to isocyanates
- how to recognise and report symptoms, and
- what is involved in the health monitoring program, for example the frequency of testing and the tests that may be needed.

An initial physical examination by the registered medical practitioner should place emphasis on the respiratory system, including baseline spirometry, and skin if work and medical history indicates this is necessary, for example through the presence of symptoms.

Isocyanates may be skin or respiratory sensitisers and previous work history with isocyanates and symptoms of sensitisation should be investigated. While evidence is unclear, workers with a history of the following conditions should be warned that they may be at greater risk of adverse health effects from exposure to isocyanates:

- asthma
- hay fever
- recurrent acute bronchitis
- interstitial pulmonary fibrosis
- pulmonary tuberculosis
- occupational chest disease, or
- impaired lung function.

Exposure to isocyanates may cause respiratory irritation and may aggravate pre-existing asthma. Smoking may be a risk factor for sensitisation to isocyanates.

## During exposure to an isocyanate process

### 2. Monitoring exposure to isocyanates

Where workers are exposed, suspected of being exposed or are concerned about exposure to isocyanates, the person conducting the business or undertaking (PCBU) has a duty to arrange a health monitoring appointment for the worker(s) with the registered medical practitioner. For example, an appointment should be arranged following spills or loss of containment of isocyanates resulting in excessive exposure to workers, when workers develop symptoms of isocyanate exposure or for those who use isocyanate products in their work.

Workers should undergo a medical examination at six weeks from the start of the health monitoring program and then at six monthly intervals during continued exposure. Where monitoring after 12 months shows no adverse health effects the registered medical practitioner may choose to carry out annual monitoring. For spray painters using isocyanate paints in motor vehicle repair who are new workers, lung function testing and a questionnaire are recommended at the beginning of work, after six weeks, twelve weeks and then yearly.

The medical examination should include:

- completion of a standardised respiratory questionnaire
- physical examination for work-related dermatitis, and
- standardised respiratory function tests.

There is no existing evidence pre- and post-shift changes in lung function are either sensitive or specific for the validation or exclusion of work-related asthma. Comparison with earlier results may assist in identifying the development of occupational asthma.

Biological monitoring is recommended at least yearly and for new workers during the first few months as well as a check on control measures and work practices.

The registered medical practitioner may choose to assess isocyanate exposure by a urinary isocyanate metabolite (isocyanate-derived diamine) test.

Absorbed isocyanates are metabolised and excreted in urine as the corresponding diamine and conjugates. Half-lives are usually short (two to four hours) and samples only reflect recent exposure. Urine samples should be collected immediately post-shift or, if exposure is sporadic, immediately post-exposure.

The following test should be used to test the worker's isocyanate exposure levels:

- urinary isocyanate-derived diamine.

Where urinalysis is performed, the following values should be used as a guide for assessing exposure to isocyanates:

**Biological exposure standard for isocyanates[2]**

*Urinary isocyanate-derived diamine:*

1 µmol/mol creatinine

The biological exposure standard is a guidance value only. Urine test results above this level do not necessarily mean that the individual will experience adverse health effects, but it may indicate a review of control measures is required.

### Workplace exposure standard

The workplace exposure standard for isocyanates (all; as –NCO) is:

- eight hour time weighted average (TWA) of 0.02 mg/m$^3$, and
- short term (15 minute time weighted average) exposure limit (STEL) of 0.07 mg/m$^3$.

Individual isocyanates may also have their own specific workplace exposure standard.

A physical examination, lung function testing and urinary testing may be indicated if the results of air monitoring indicate frequent or potentially high exposure (half of the TWA or above).

### Removal from work

Where a medical examination indicates the worker is displaying symptoms of exposure to isocyanates or where results of biological monitoring indicate exposure that may cause adverse health effects, the registered medical practitioner should consider recommending the worker be removed from isocyanate-related work.

The development of respiratory sensitisation is an idiosyncratic response that may affect some individuals at a specific exposure level while others remain unaffected. However, symptoms do indicate that the controls in the workplace may be inadequate.

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[2] *See Chemical analysis branch handbook, 9th Edition, Workplace and biological monitoring exposure analysis, WorkCover NSW (PDF 3.39MB) for more details*

Removal from the workplace should be considered if the registered medical practitioner finds evidence of the development of occupational asthma on examination or urinary isocyanate-derived diamine levels exceed the biological exposure standard.

When removal from isocyanate-related work is indicated the registered medical practitioner must provide the PCBU with the following recommendations:

- the worker should be removed from work with isocyanates, and
- the PCBU should review control measures and carry out recommended remedial action.

The worker must be informed of the results of health monitoring.

**Return to work**

Should a worker be removed from isocyanate-related work, they must not return until the registered medical practitioner has:

- assessed them as medically fit, and
- made a recommendation to the PCBU that the worker can return to remediated isocyanate-related work.

This assessment should take into consideration the clinical condition of the worker, the resolution of symptoms, the worker's urinary isocyanate-derived diamine levels and remediation of the circumstances that led to the symptoms if possible

## At termination of work in an isocyanate process

### 3. Final medical examination

A final medical examination should be carried out by the registered medical practitioner and should include:

- physical examination for work-related dermatitis
- standardised respiratory function tests, and
- analysis of urinary isocyanate levels.

Workers sensitised to isocyanates should be strongly advised against further exposure.

Workers with health conditions or continuing symptoms due to exposure to isocyanates should be advised to seek continuing medical examinations as organised by the registered medical practitioner supervising the health monitoring program.

A health monitoring report from the registered medical practitioner should be provided to the PCBU as soon as practicable after the completion of the monitoring program, and at regular intervals for longer term or ongoing health monitoring processes. The report must include:

- the name and date of birth of the worker
- the name and registration number of the registered medical practitioner
- the name and address of the PCBU or undertaking who commissioned the health monitoring
- the date of the health monitoring
- any test results that indicate whether or not the worker has been exposed to a hazardous chemical
- any advice that test results indicate that the worker may have contracted an injury, illness or disease as a result of carrying out the work that triggered the requirement for health monitoring

- any recommendation that the PCBU take remedial measures, including whether the worker can continue to carry out the type of work that triggered the requirement for health monitoring, and
- whether medical counselling is required for the worker in relation to the work that triggered the requirement for health monitoring.

## Potential health effects following exposure to isocyanates

### 4. Route of occupational exposure

The primary route of isocyanate exposure is via inhalation. However, skin absorption can also be an important route of exposure.

The risk of exposure depends on the volatility of the compound and the application process. The most commonly used isocyanates are:

- toluene diisocyanate (TDI)
- methylene diphenyl diisocyanate (MDI), and
- hexamethylene diisocyanate (HDI).

The most volatile of the isocyanates are those with low molecular weight like HDI and TDI used in spray painting and polyurethane foam manufacturing.

More recently isocyanates like HDI have been partially polymerised into the form of pre-polymers so they are less volatile. However, the spray painting process itself creates a mist of easily inhaled fine particles.

### 5. Target organ/effect

The target organs and potential effects of isocyanate exposure include:

**Table 1** Target organs and potential effects of isocyanate exposure

| Target organ | Effect |
|---|---|
| **Respiratory system** | • Irritation<br>• Sensitisation with work-related asthma |
| **Skin and mucous membranes** | • Irritation<br>• Sensitisation |
| **Eyes** | • Irritation |
| **Central nervous system** | • Headache<br>• Loss of consciousness<br>• Coma |

### 6. Acute effects

HDI and TDI and other volatile isocyanates are acute irritants of the eyes, mucous membranes, respiratory tract and skin.

Isocyanate contact with the eyes can cause severe chemical conjunctivitis.

In mild cases there may be slight irritation of the nose and throat. Headaches may occur from inhalation of low concentrations of isocyanates. With higher levels of exposure there may be:

- acute bronchial irritation with coughing

- shortness of breath and bronchospasm
- abdominal distress, nausea and vomiting
- chemical pneumonitis, and
- pulmonary oedema.

Reactive airways dysfunction syndrome (RADS) is an onset asthma-like syndrome that begins within hours following a single exposure to inhaled irritants at very high concentrations and continues to be symptomatic for three months or longer. Evidence is emerging that RADS can be seen as one end of a spectrum of irritant effects on the airways. It may be necessary to distinguish this syndrome from occupational asthma caused by isocyanate exposure.

Acute dermatitis results from either massive skin contamination or a hyper-responsiveness of the skin.

The oral toxicity of isocyanates appears to be low.

## 7. Chronic effects

Chronic exposure to isocyanates can cause contact dermatitis, immune sensitisation and asthma and less commonly hypersensitivity pneumonitis.

Isocyanates generally appear to be weak human skin irritants and sensitisers.

Sensitisation of the skin is not common and if this occurs it is usually due to inadequate work hygiene giving rise to extensive skin contamination with diisocyanates, solvents and additives. Sensitised people react with symptoms of skin irritation including blistering and swelling.

4,4’-diisocyanate dicyclohexylmethane, however, is a potent skin sensitiser.

There is growing evidence skin exposure can induce isocyanate respiratory sensitisation though this is still under debate. Skin exposure may be especially important with less volatile diisocyanates like poly-isocyanates and MDI where skin exposure may be the main route of exposure.

The estimated prevalence of work-related asthma in the isocyanate exposed workforce has most commonly been reported in the range five to 10 per cent. There is no evidence atopy influences susceptibility. Smoking may be a risk factor for sensitisation to isocyanates.

The latent (sensitising) period of exposure is highly variable, from several weeks (and often less than two years) to up to 10 years or longer in 20 per cent of cases. Exposure to higher concentrations from spills may increase the risk of sensitisation. Once sensitisation has occurred, subsequent exposure to airborne concentrations well below the exposure standard increases the background level of airway responsiveness and can cause reactions like chest tightness, wheezing and shortness of breath. Exposure of sensitised workers may initiate a reduction in respiratory capacity immediately on exposure, some hours later or both. Some workers become extremely sensitive to isocyanates and the high likelihood of chronicity of work-related asthma (depends on duration of symptoms prior to cessation of exposure) places a high priority on primary prevention of sensitisation.

A rare consequence of chronic isocyanate exposure is hypersensitivity pneumonitis, a granulomatous inflammatory reaction in terminal airways, alveoli and surrounding interstitium. Symptoms include dyspnoea, malaise and fever occurring several hours after work with isocyanates. There is a restrictive pattern on spirometry. Chest X-ray demonstrates a reticular or nodular lung pattern.

Other health effects of chronic exposure to isocyanates may include liver and kidney dysfunction.

Interstitial pulmonary fibrosis has been reported as a long term health outcome.

Adverse health effects resulting from exposure to isocyanates normally arise during the ordinary working period, soon after contact occurs. Occasionally, as with hypersensitivity pneumonitis, symptoms may not appear for several hours following exposure. Therefore, a correlation of symptoms with workplace exposure may not be obvious. It is important workers are informed of the potential for the delayed onset of adverse health effects and they should report adverse health effects that they think may be related to isocyanate exposure so the root-cause can be investigated.

## 8. Carcinogenicity

Some isocyanate compounds have been classified as Category 2 carcinogens according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as they are suspected of causing cancer in humans.

There is sufficient evidence TDI is carcinogenic in experimental animals and there is limited evidence for a carcinogenic effect of MDI in animals.

## 9. GHS classification

Different isocyanate compounds may have different health hazard classifications. The specific isocyanate compound to which a worker is exposed will need to be reviewed to ensure appropriate identification of the health hazards. For the GHS classification of a specific isocyanate, refer to Safe Work Australia's Hazardous Chemical Information System or the relevant safety data sheet for detailed information.

## Source documents

Allport, D., Gilbert, D. and Outterside, S. (2003) *MDI and TDI: Safety, Health and the Environment: A Source Book and Practical Guide*, John Wiley and Sons, New York.

American Conference of Governmental Industrial Hygienists (ACGIH), Documentation of the Threshold Limit Values for Chemical Substances, 7th Ed, Cincinnati, 2011.

Bello, D., Woskie, S.R., Streicher, R.P., Liu, Y., Stowe, M.H., Eisen, E.A., Ellenbecker, M.J., Sparer, J., Youngs, F., Cullen, M.R. and Redlich, C.A. (2004) Polyisocyanates in Occupational Environments: A Critical Review of Exposure Limits and Metrics. *Am. J. Ind. Med.* 46: 480-491.

Bello, D., Herrick, C.A., Smith, T.J., Woskie, S.R., Streicher, R.P., Cullen, M.R., Liu, Y. and Redlich, C.A. (2007) Skin exposure to isocyanates: reasons for concern. *Environ. Health Perspect.* 115(3): 328-335.

Bernstein, D.I. and Jolly, A. (1999) Current Diagnostic Methods for Diisocyanate Induced Occupational Asthma. *Am. J. Ind. Med.* 36: 459-468.

BOHRF (2010) *Occupational Asthma: Evidence Review*, British Occupational Health Research Foundation, London (PDF 721KB).

Burge, S. (1997) Respiratory Symptoms. *Occup. Med. (Lond).* 47: 55-56.

Cartier, A. (2016) Occupational asthma: Definitions, epidemiology, causes and risk factors. In: Up-to-date, Barnes PJ (Ed), Up-to-date, Waltham, MA.

*Chemical analysis branch handbook, 9th Edition, Workplace and biological monitoring exposure analysis*, WorkCover NSW (PDF 3.39MB).

Health and Safety Laboratory. Isocyanates; www.hsl.gov.uk

Health and Safety Executive (UK) (2009) *Safety in Motor Vehicle Repair, Working with Isocyanate Paints*, Leaflet INDG388(rev.1), Health and Safety Executive, London.

Health and Safety Executive (UK), *COSHH Essentials: General Guidance, G408, Urine sampling for isocyanate exposure measurement*, Health and Safety Executive, London (PDF 61KB).

Lauwerys, R.R. and Hoet, P. (2001) Industrial Chemical Exposure Guidelines for Biological Monitoring, 3rd Ed, Lewis Publishers, Boca Raton.

Medical Research Council Committee on Research into Chronic Bronchitis (1986) *MRC Questionnaire on Respiratory Symptoms*, Medical Research Council.

Mikoczy, Z., Welinder, H., Tinnerberg, H. and Hagmar, L. (2004) Cancer Incidence and Mortality of Isocyanate Exposed Workers from the Swedish Polyurethane Foam Industry: Updated Findings 1959-98. *Occup. Environ.Med.* 61: 432-437.

Occupational asthma in Australia, Australian Institute of Health and Welfare Bulletin 59, April 2008.

Respiratory Disease Committee of the International Union Against Tuberculosis (1986) *IUAT Bronchial Symptoms Questionnaire*, International Union Against Tuberculosis.

Safe Work Australia (2015); *Guide to Handling Isocyanates* (PDF 302KB).

Safe Work Australia (2013); *Workplace Exposure Standards for Airborne Contaminants* (PDF 873KB).

Safe Work Australia; Hazardous Chemicals Information System.

Shakeri, M.S., Dick, F.D. and Ayres, J.G. (2008) Which agents cause reactive airways dysfunction syndrome (RADS); A systematic review. *Occ. Med.* 58: 205-211.

Verschoor, L. and Verschoor, A.H. (2014) Non-occupational and occupational exposure to isocyanates. *Curr. Opin. Pulm. Med.* 20(2): 199-204.

WorkCover NSW, *Chemical Analysis Branch Handbook*, 8th edition. Available at www.testsafe.com.au

# Health monitoring report

*Isocyanates*

**This form contains confidential information and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with consent of the worker**

# Health monitoring report – Isocyanates

**This health monitoring report is a confidential health record and must not be disclosed to another person except in accordance with the Work Health and Safety (WHS) Regulations or with the consent of the worker.**

There are two sections. Complete both sections and all questions as applicable.

**Section 1** A copy of this section should be forwarded to the person conducting the business or undertaking (PCBU) who has engaged your services.

**Section 2** may contain confidential health information. Information that is required to be given to the PCBU should be summarised in Section 1.

## Section 1 – A copy of this section to be provided to the PCBU

### Person conducting a business or undertaking

**Company/organisation name:** Click here to enter text.

**Site address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

**Site Tel:** Click here to enter text. **Site Fax:** Click here to enter text.

**Contact Name:** Click here to enter text.

### Other businesses or undertakings engaging the worker ☐ N/A
(include a separate section for each PCBU)

**Company/organisation name:** Click here to enter text.

**Site address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

**Site Tel:** Click here to enter text. **Site Fax:** Click here to enter text.

**Contact Name:** Click here to enter text.

### Worker details (tick all relevant boxes)

**Surname:** Click here to enter text. **Given names:** Click here to enter text.

**Date of birth:** Click here to enter a date. **Sex:** ☐ Male ☐ Female

**Address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

**Current job:** Click here to enter text.

**Tel (H):** Click here to enter text. **Mob:** Click here to enter text.

**Date started employment:** Click here to enter a date.

### Employment in isocyanate risk work (tick all relevant boxes)
(information provided by the PCBU)

**Type of isocyanate used (if known please specify):** Click here to enter text.

☐ New to isocyanate work

☐ New worker but not new to isocyanate work

☐ Current worker continuing in isocyanate work

**Worked with isocyanates since:** Click here to enter a date.

**Risk assessment completed:** ☐ Yes ☐ No

## Work environment assessment (tick all relevant boxes) (information provided by the PCBU)

**Date of assessment:** Click here to enter a date.

**Isocyanate industry/process**

☐ Isocyanate manufacture and use

☐ Foam manufacture

☐ Spray painting

☐ Welding/fabrication

☐ Automotive industry

☐ Furniture industry

☐ Flooring industry

☐ Foundries - core making

☐ Heat decomposition of polyurethane products while welding

☐ Heat removal of electrical insulating varnishes

☐ Hot wire cutting of foam

☐ Other (specify):

**Other chemicals the worker may be exposed to:** Click here to enter text.

| **Controls** | | |
|---|---|---|
| Eye protection | ☐ Yes | ☐ No |
| Wear gloves | ☐ Yes | ☐ No |
| Respirator use | ☐ Yes | ☐ No |
| Respirator type | Click here to enter text. | |
| Local exhaust ventilation | ☐ Yes | ☐ No |
| Overalls/work clothing | ☐ Yes | ☐ No |
| Laundering by employer | ☐ Yes | ☐ No |
| Wash basins and showers (with hot and cold water) | ☐ Yes | ☐ No |
| Other please specify | | |

## Health monitoring results

### Biological monitoring results

Include/attach test results that indicate whether or not the worker has been exposed

| **Date** | **Tests performed** | **Recommended action or comment** |
|---|---|---|
| Click here to enter text. | Click here to enter text. | Click here to enter text. |
| Click here to enter text. | Click here to enter text. | Click here to enter text. |

**This form contains confidential information and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with consent of the worker**

| Date | Tests performed | | Recommended action or comment |
|---|---|---|---|
| Click here to enter text. | Click here to enter text. | | Click here to enter text. |
| | **Yes** | **No** | |
| Spirometry quality acceptable | ☐ | ☐ | Click here to enter text. |
| Spirometry normal | ☐ | ☐ | Click here to enter text. |

**Comments about health monitoring results (for example any early indications or diagnosis of injury, illness or disease):** Click here to enter text.

## **Recommendations** (by registered medical practitioner) (tick all relevant boxes)

**Further/additional health monitoring for worker**

☐ This is the final health monitoring report

☐ Repeat health assessment in Click here to enter text. month(s) / Click here to enter text. week(s)

☐ Counselling required

☐ Medical examination by registered medical practitioner. On Click here to enter a date.

☐ Referred to Medical Specialist (respiratory/dermatology/other). On Click here to enter a date.

**Recommendations to PCBU**

☐ The worker is suitable for work with isocyanates

☐ Review workplace controls

☐ The worker should be removed from work with isocyanates. On Click here to enter a date.

☐ The worker is fit to resume work. On Click here to enter a date.

☐ Biological monitoring results indicate unacceptably high exposure levels

**Specialist's name:** Click here to enter text.

**Additional comments or recommendations:** Click here to enter text.

## **Registered medical practitioner** (responsible for supervising health monitoring)

**Name:** Click here to enter text.

**Signature:**

**Date:** Click here to enter a date.

**Tel:** Click here to enter text. **Fax:** Click here to enter text.

**Registration Number:** Click here to enter text.

**Medical Practice:** Click here to enter text.

**Address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

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# Section 2 – This section to be retained by the registered medical practitioner

## Person conducting a business or undertaking

**Company/organisation name:** Click here to enter text.

**Site address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

**Site Tel:** Click here to enter text. **Site Fax:** Click here to enter text.

**Contact Name:** Click here to enter text.

## Other businesses or undertakings engaging the worker ☐ N/A

**Company/organisation name:** Click here to enter text.

**Site address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

**Site Tel:** Click here to enter text. **Site Fax:** Click here to enter text.

**Contact Name:** Click here to enter text.

## Worker details (tick all relevant boxes)

**Surname:** Click here to enter text. **Given names:** Click here to enter text.

**Date of birth:** Click here to enter a date.

**Sex:** ☐ Male ☐ Female ☐ Pregnant/breastfeeding

**Address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.

**Current job:** Click here to enter text.

**Tel (H):** Click here to enter text. **Mob:** Click here to enter text.

**Date started employment:** Click here to enter a date.

**Type of isocyanate used (if known please specify):** Click here to enter text.

## Past employment and exposure details (tick all relevant boxes)

**Have you ever worked in any of the following jobs?**

If you answered 'yes' to any of the questions, please advise if you experienced any symptoms such as cough or wheeze or asthma when working.

| | | | **Comments** (all 'yes' answers) |
|---|---|---|---|
| Spray painting, including of motor vehicles | ☐ No | ☐ Yes | Click here to enter text. |
| Manufacture of motor vehicle interior parts | ☐ No | ☐ Yes | Click here to enter text. |

**This form contains confidential information and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with consent of the worker**

| | | | **Comments** (all 'yes' answers) |
|---|---|---|---|
| Manufacture of rigid foam for thermal insulation or flexible foams for upholstery | ☐ No | ☐ Yes | Click here to enter text. |
| Use of spray on polyurethane products | ☐ No | ☐ Yes | Click here to enter text. |
| Manufacture and use of isocyanates | ☐ No | ☐ Yes | Click here to enter text. |
| Spray painting, using two-pack paints with an isocyanate hardener, e.g. vehicle paints | ☐ No | ☐ Yes | Click here to enter text. |
| Processes where heat decomposition of polyurethane products occurs, such as welding, heat removal of electrical insulating varnishes and hot wire cutting of foam | ☐ No | ☐ Yes | Click here to enter text. |
| Foundry operations, in particular core making, where resins used to bind the sand may contain isocyanates (for example the 'Iso-Cure process') | ☐ No | ☐ Yes | Click here to enter text. |
| Other (please specify) | ☐ No | ☐ Yes | Click here to enter text. |

**In any workplace were you exposed to:**

| | | | |
|---|---|---|---|
| Benzene | ☐ No | ☐ Yes | Click here to enter text. |
| Degreasers | ☐ No | ☐ Yes | Click here to enter text. |
| Dyes | ☐ No | ☐ Yes | Click here to enter text. |
| Formaldehyde | ☐ No | ☐ Yes | Click here to enter text. |
| Paint removers | ☐ No | ☐ Yes | Click here to enter text. |
| Solvents | ☐ No | ☐ Yes | Click here to enter text. |
| Cleaning fluids | ☐ No | ☐ Yes | Click here to enter text. |

## **General health questionnaire** (tick all relevant boxes)

| | | | |
|---|---|---|---|
| Did you suffer any incapacity lasting two weeks or longer in the last two years | ☐ No | ☐ Yes | Click here to enter text. |
| Have you ever had any operations or accidents or been hospitalised for any reason | ☐ No | ☐ Yes | Click here to enter text. |
| Are you currently receiving any medical treatment or taking any medications. Please detail. | ☐ No | ☐ Yes | Click here to enter text. |

| | | |
|---|---|---|
| Do you practice personal hygiene at work, for example nail biting, frequency of hand washing, eating or smoking, clean shaven, shower and change into clean clothes at end of shift | ☐ No | ☐ Yes |

## **Specific health questions** (tick all relevant boxes)

**Do you have or have you ever had:**

| | | | **Comments** (all 'yes' answers) |
|---|---|---|---|
| Blurred vision or other vision problems | ☐ No | ☐ Yes | Click here to enter text. |
| Itchy eyes, runny or congested nose | ☐ No | ☐ Yes | Click here to enter text. |
| Chest pains or irregular heartbeats or suffered from rheumatic fever | ☐ No | ☐ Yes | Click here to enter text. |
| Shortness of breath on exertion | ☐ No | ☐ Yes | Click here to enter text. |
| Wheezing, bronchitis or asthma now or in the past | ☐ No | ☐ Yes | Click here to enter text. |
| Any other lung or respiratory conditions (emphysema, pneumonia or sinusitis) | ☐ No | ☐ Yes | Click here to enter text. |
| Allergies, hay fever, or allergic bronchitis | ☐ No | ☐ Yes | Click here to enter text. |
| Liver disease (including alcohol related or other hepatitis) | ☐ No | ☐ Yes | Click here to enter text. |
| Severe stomach pain or peptic ulcers | ☐ No | ☐ Yes | Click here to enter text. |

**Registered medical practitioner to provide comments for any 'Yes' responses (reference Question number):**

Click here to enter text.

## **Respiratory questionnaire** (tick all relevant boxes)

| | | **Yes** | **No** | **Details** |
|---|---|---|---|---|
| | **Cough and Phlegm** | | | |
| 1 | Do you usually cough first thing in the morning | ☐ | ☐ | Click here to enter text. |
| 2 | Do you usually cough during the day or at night | ☐ | ☐ | Click here to enter text. |
| | **If no go to Q9** | | | |
| 3 | Do you cough like this on most days for as much as three months of the year | ☐ | ☐ | Click here to enter text. |

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| | | Yes | No | Details |
|---|---|---|---|---|
| 4 | Do you usually bring up phlegm from your chest first thing in the morning | ☐ | ☐ | Click here to enter text. |
| 5 | Do you usually bring up phlegm from your chest at any other rime of the day or night | ☐ | ☐ | Click here to enter text. |
| | **If no go to Q9** | | | |
| 6 | Do you bring up phlegm like this on most days for as much as three months each year | ☐ | ☐ | Click here to enter text. |
| 7 | In the past three years have you had a period of increased cough and phlegm lasting for three weeks or more | ☐ | ☐ | Click here to enter text. |
| 8 | If Yes, have you had more than one such period | ☐ | ☐ | Click here to enter text. |
| | **Breathlessness** | | | |
| 9 | Do you get short of breath when hurrying on level ground or walking up a slight hill | ☐ | ☐ | Click here to enter text. |
| | **If no go to Q13** | | | |
| 10 | Do you get short of breath walking with other people of your own age on level ground | ☐ | ☐ | Click here to enter text. |
| 11 | Do you have to stop for breath when walking at your own pace on level ground | ☐ | ☐ | Click here to enter text. |
| 12 | Have you at any time in the last 12 months been woken at night by an attack of shortness of breath | ☐ | ☐ | Click here to enter text. |
| | **Wheezing and chest tightness** | | | |
| 13 | Have you had attacks of wheezing or whistling in your chest at any time in the last 12 months | ☐ | ☐ | Click here to enter text. |
| 14 | Have you ever had attacks of shortness of breath with wheezing | ☐ | ☐ | Click here to enter text. |
| 15 | If Yes, was your breathing absolutely normal between attacks | ☐ | ☐ | Click here to enter text. |
| | **Smoking** | | | |

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| | | Yes | No | Details |
|---|---|---|---|---|
| 16 | Do you or did you smoke more than one cigarette/day; a cigar/week; two oz. pipe tobacco/month) | ☐ | ☐ | Click here to enter text. |
| | **If no proceed to *General health assessment*** | | | |
| 17 | Do (did) you inhale smoke | ☐ | ☐ | If yes, indicate:<br>☐ Slightly ☐ Moderately ☐ Deeply |
| 18 | How old were you when you started smoking regularly | | | Click here to enter text. |
| 19 | Do (did) you smoke manufactured cigarettes | ☐ | ☐ | Click here to enter text. |
| | **If no go to Q24** | | | |
| 20 | How many cigarettes do (did) you smoke per day on weekdays | | | Click here to enter text. |
| 21 | How many per day on weekends | | | Click here to enter text. |
| 22 | Do (did) you smoke plain or filtered cigarettes | | | Click here to enter text. |
| 23 | What brands do (did) you usually smoke | | | Click here to enter text. |
| 24 | Do (did) you smoke hand rolled cigarettes | ☐ | ☐ | Click here to enter text. |
| | **If no go to Q27** | | | |
| 25 | How much tobacco do (did) you usually smoke per week in this way | | | Click here to enter text. |
| 26 | Do (did) you put filters in these cigarettes | ☐ | ☐ | |
| 27 | Do (did) you smoke a pipe | ☐ | ☐ | |
| | **If no go to Q29** | | | |
| 28 | How much tobacco do (did) you usually smoke per week in this way | | | Click here to enter text. |
| 29 | Do (did) you smoke cigars | ☐ | ☐ | |
| | **If no go to Q31** | | | |
| 30 | How many of these do (did) you usually smoke per week in this way | | | Click here to enter text. |
| 31 | If you are a present smoker have you been cutting down in the past year | ☐ | ☐ | |
| 32 | If you are a past smoker when did you give up smoking altogether | | | Click here to enter text. |

**Registered medical practitioner to provide comments for any 'Yes' responses (reference Question number):**

Click here to enter text.

## General health assessment (if applicable)

**Height:** Click here to enter text. cm **Weight:** Click here to enter text. kg

**BP:** Click here to enter text. / Click here to enter text. mmHg

**Urinalysis**

**Blood:** ☐ Normal ☐ Abnormal

**Protein:** Click here to enter text. **Referred for further testing**

**Sugar:** Click here to enter text. ☐ No ☐ Yes

| **Cardiovascular system** | | | **Medical comments** (for all yes/abnormal) |
|---|---|---|---|
| Blood pressure | ☐ Normal | ☐ Abnormal | Click here to enter text. |
| Heart rate | ☐ Normal | ☐ Abnormal | Click here to enter text. |
| Heart sounds | ☐ Normal | ☐ Abnormal | Click here to enter text. |
| Murmurs present | ☐ No | ☐ Yes | Click here to enter text. |
| Evidence of cardiac failure/oedema | ☐ No | ☐ Yes | Click here to enter text. |
| **Respiratory system** | | | |
| Breathing normal and regular in character | ☐ Yes | ☐ No | Click here to enter text. |
| Auscultation normal | ☐ Yes | ☐ No | Click here to enter text. |
| Signs of past/present respiratory disease | ☐ No | ☐ Yes | Click here to enter text. |

**Spirometry**

At least three technically acceptable manoeuvres should be obtained with the highest and second highest $FEV_1$ and FVC within 0.15 L (within 0.100 L for those with an FVC of equal to or less than 1.0 L)[3]. Use best result for $FEV_1$ and FVC, even if from different tests.

| | **Actual** | **Predicted** | **% Predicted** | |
|---|---|---|---|---|
| **$FEV_1$** | Click here to enter text. L/min | Click here to enter text. L/min | Click here to enter text. % | Click here to enter text. |
| **FVC** | Click here to enter text. L/min | Click here to enter text. L/min | Click here to enter text. % | Click here to enter text. |
| **$FEV_1$/FVC** | Click here to enter text. L/min | Click here to enter text. L/min | Click here to enter text. % | Click here to enter text. |
| | **Yes** | **No** | | |
| Spirometry quality acceptable | ☐ | ☐ | Click here to enter text. | |

[3] *Miller MR, Hankinson J, et al, 'Standardisation of spirometry', Series 'ATS/ERS Task Force: Standardisation of Lung Function Testing', Brusasco V, Crapo R, Viegi G (eds), Number 2 in this series, Eur Respir J, vol. 26, pp 319-338, 2005.* http://www.thoracic.org/statements/resources/pfet/PFT2.pdf.

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| Actual | Predicted | | % Predicted |
|---|---|---|---|
| Spirometry normal | ☐ | ☐ | Click here to enter text. |
| **Skin** | | | **Medical comments** (for all abnormal) |
| Eczema, dermatitis or allergy | ☐ No | ☐ Yes | Click here to enter text. |
| Skin cancer or other abnormality | ☐ No | ☐ Yes | Click here to enter text. |
| Evidence of nail biting | ☐ No | ☐ Yes | Click here to enter text. |
| Other | ☐ No | ☐ Yes | Click here to enter text. |

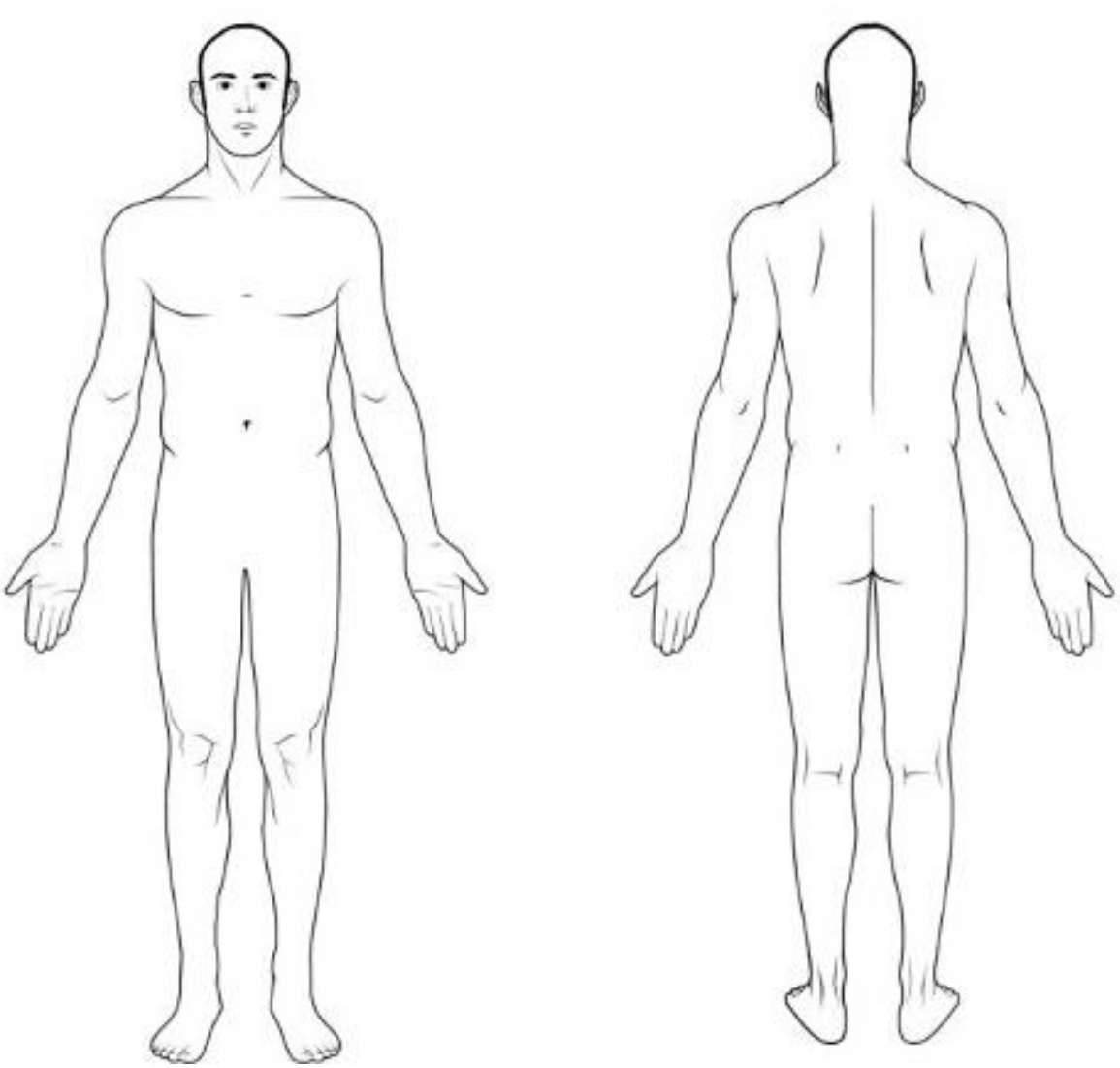

**Figure 1** Template of the human body to indicate the location of abnormalities

| **Eye** | | | **Medical comments** (for all abnormal) |
|---|---|---|---|
| Evidence of eye irritation | ☐ No | ☐ Yes | Click here to enter text. |

## Biological monitoring results

Include/attach at least the previous two test results (if available)

| **Date** | **Tests performed** | **Recommended action or comment** |
|---|---|---|
| Click here to enter a date. | Click here to enter text. | Click here to enter text. |
| Click here to enter a date. | Click here to enter text. | Click here to enter text. |
| Click here to enter a date. | Click here to enter text. | Click here to enter text. |
| Click here to enter a date. | Click here to enter text. | Click here to enter text. |

## Other medical history, family medical history, current medication, comments, tests or recommendations (use separate sheet if necessary)

Click here to enter text.

## Registered medical practitioner (responsible for supervising health monitoring)

**Name:** Click here to enter text.

**Signature:**

**Date:** Click here to enter a date.

**Tel:** Click here to enter text. **Fax:** Click here to enter text.

**Registration Number:** Click here to enter text.

**Medical Practice:** Click here to enter text.

**Address:** Click here to enter text.

**Suburb:** Click here to enter text. **Postcode:** Click here to enter text.