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or adequate control of exposure;
- have the ability and the authority of the employer to collate all the necessary, relevant information.

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Suitable and sufficient risk assessment

55 The risk assessment should take into account the properties of the hazardous substance or biological agent, how and when they can give rise to risks to health, and the degree to which those risks need to be taken into account.

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56 Regulation 6(2)(a)–(l) requires the risk assessment to consider:

- the potential for the substance to cause harm from exposure by inhalation, ingestion, absorption, skin contact and infection (for a biological agent);
- the physical attributes of the substance, eg liquid, gas, mist, fume, dust or infective state, its ability to become airborne, and the means by which it could come into contact with the skin or other body membranes;
- the details of when and how exposure can occur and who may be affected, including workers and others;
- the effectiveness of existing controls and the options for improving control where prevention is not an option.

57 The risk assessment should consider *the work activity*, including:

- all the substances hazardous to health (including biological agents and simple asphyxiants) arising from the work (used, produced, synthesised, created as waste or by-products, or released from processes or during accidents, incidents and emergencies);
- work done by sub-contractors, at the workplace, that may expose employees to substances hazardous to health.

58 The risk assessment should consider *the hazards*, including:

- the physical, chemical and biological properties of the substances and the effects they could have on the body;
- where those substances are likely to be present and in what form, eg dust, vapour, mist, fume etc, and whether they are used or produced, and in what amounts and how often;
- the additional requirement regarding substances known, or suspected, to be carcinogens, mutagens or asthmagens, where there is a more compelling reason for the employer to substitute a less toxic alternative. Where this is not reasonably practicable, adequate procedures, training, instruction and supervision should ensure that the exposure level is reduced to as low a level as is reasonably practicable (ALARP).

59 The risk assessment should consider *the people exposed*, including:

- the ways in which, and the extent to which, any group of people (office staff, night cleaners, security guards, members of the public such as visitors, patients etc) could be exposed. For maintenance workers, where exposure may be foreseeably higher than normal, the type of work and process should be taken into account and any reasonably foreseeable deterioration, or failure, of any control measure provided;
- the need to protect particular groups of employees who may be at increased risk, eg inexperienced trainees and young people under 18; pregnant workers; disabled workers; and any employees known to be

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susceptible to certain illnesses such as dermatitis, asthma or other diseases which may be caused or made worse by exposure to substances hazardous to health.

60 The risk assessment should consider *types and extent of exposure*, including:

- an estimate of exposure, taking into account any information available about:
  - the concentration in air likely to be produced by the work concerned;
  - the likelihood of skin contact;
  - the effort needed to do the work and how this may affect the rate and volume of air employees breathe (for some work activities, employees might breathe three or four times the volume of air that they would breathe at rest);
  - the effect of any engineering measures and systems of work currently used for controlling potential exposure;
- a comparison between the estimate of exposure and any existing, valid standards which help to assess the adequacy of control, eg a WEL or 'biological monitoring guidance value';
- the key points used to recognise and evaluate exposure in regulation 6(2)(a)–(l). Exposure through all routes must be considered (inhalation, skin contact, absorption through the skin and other body membranes, ingestion and puncture).

61 The risk assessment should consider *the potential health effects*, including:

- the likelihood of a foreseeable risk of ill health (eg whether the risk is probable, possible, remote or nil/negligible);
- the severity of ill health, if it occurs. This may be explained by the following three descriptors:
  - serious health effects – permanent, progressive, irreversible, or permanently disabling conditions that result in lifelong disability or restriction to work, eg diseases such as silicosis, cancer, persistent occupational irritant contact dermatitis, sensitisation, asthma and serious chemical burns. These also include effects that would lead to loss of consciousness, eg from exposure to simple asphyxiants;
  - significant health effects – non-permanent, reversible and non-progressive conditions that result in temporary disability, eg diseases such as salmonella, non-persistent occupational irritant contact dermatitis, farmers' lung and minor chemical burns to the skin;
  - minor health effects – examples include temporary skin and respiratory irritation;
- for potentially serious health effects, the risk assessment will need to be more comprehensive and the control measures more stringent to reduce exposure. For example, very toxic substances such as carcinogens require a more comprehensive assessment and a higher standard of control than low-toxicity substances such as mild irritants.

62 The risk assessment should consider *control measures*, including:

- firstly, preventing exposure by substituting the hazardous substances or by using process design controls, if this is reasonably practicable;
- if preventing exposure is not reasonably practicable, employers should consider controlling exposure adequately by using a less hazardous substance or a less hazardous form of the substance;

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- the measures necessary to control exposure adequately could involve three approaches, to be used as appropriate and in accordance with the findings of the assessment, namely:
  - controls in the exposure pathway between the source and the worker, such as containment with integrated local exhaust ventilation (LEV) or using closed-loop transfer and sampling, fixed and portable LEV, or keeping a safe working distance;
  - worker-specific controls such as PPE and limiting the time exposed through worker rotation;
  - administrative controls, such as supervision and training;
- applying the principles of good practice in controlling exposure outlined in Schedule 2A and regulation 7;
- human factors. Human factors are critical because they can affect the use of controls and lead to unnecessary exposures. The issues include awareness, work rate and interaction with controls, including how easy they are to use. Employers should consider the way workers use the controls when making decisions about the design, installation and use of controls;
- the reasons for the chosen methods of avoiding or minimising the foreseeable risks, eg why substitution is not practicable when a carcinogen is used, or why PPE is used rather than engineering controls like LEV.

63 The risk assessment should also consider *other requirements*, including:

- correct use and efficient maintenance, examination and testing of control measures;
- exposure monitoring, where required;
- health surveillance, where required;
- provision of information, instruction and training;
- the ability to deal with accidents, incidents and emergencies;
- ensuring employees or their representatives are informed about the outcome of the assessment.

Assessing the risk from biological agents

64 Infection is dependent on a number of variable factors and not necessarily the amount of agent that is present. It is important to consider whether the work activity can provide a route by which the employee may be exposed to the biological agent. For exposure to biological agents, the employer should also consider:

- the hazard groups of any biological agents that may be present and what form they may be in, eg infectious stages or hardy spores;
- how and where they are present, how they are transmitted and the diseases they cause;
- the likelihood of exposure and consequent disease (including the identification of workers and non-workers, such as hospital patients, who may be particularly susceptible because, for example, they are immunocompromised), drawing on evidence of the prevalence of infection or other ill effect as experienced within a particular industry sector or workplace.

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65 The level of risk should be the employer's main consideration and, even where the exposure is incidental to the activity, if the risk is sufficiently high and some of the measures listed in regulation 7(6) can reduce it, then the employer should apply those measures.