Healthy Workplaces MANAGE DANGEROUS SUBSTANCES

European Agency for Safety and Health at Work

Healthy Workplaces

Substitution of dangerous substances in the workplace

Key Points

- Exposure to dangerous substances in the workplace continues to be a major safety and health issue. The health effects can be life changing and even fatal.
- The best way to reduce the risks is elimination or substitution — removing the substance by changing the process or product in which it is used or replacing it with a less dangerous one.
- Substitution is a stepwise process — a complete risk assessment is a key step in the process.
- By working together, management and workers can build a strong risk prevention culture in which substitution is part of prevention and protection routines.

All info sheets and other campaign materials are available to download from EU-OSHA's Healthy Workplaces Campaign website *(https://healthy-workplaces.eu)*.

Healthy Workplaces Manage Dangerous Substances

The European Agency for Safety and Health at Work (EU-OSHA) is running a Europe-wide campaign from 2018 to 2019 to promote the prevention of risks from dangerous substances in workplaces. The aim is to reduce the presence of and exposure to dangerous substances in workplaces by raising awareness of the risks and of effective ways of preventing them.

The issue

Despite comprehensive EU legislation having been designed to control and reduce occupational exposure to dangerous substances, they continue to be a major safety and health issue.

The effects of exposure to dangerous substances range from temporary and mild health impairments, such as skin irritation, to severe acute and chronic diseases, such as lung obstructions, and potentially fatal diseases, such as asbestosis and cancer. A number of dangerous substances are also inflammable or explosive, posing additional safety risks. Furthermore, some substances have acute toxic and fatal effects, e.g. gases that develop from waste water or gases that leak from cooling systems.

Taking action

Risk assessment is the key to managing the hazards posed by dangerous substances. Working together and sharing responsibility will create a good culture of risk prevention in the workplace.

The benefits

Everyone benefits from preventing the risks of exposure to dangerous substances — workers benefit from improved safety and health, and management from easier compliance with legislation, reduced costs of sickness absence and control measures, and the improved reputation of the organisation. Other benefits include:

- improved immediate and long-term health of the workers exposed to the dangerous substance. This can significantly lower sickness absence;
- less dangerous substances cause, in general, reduced costs for waste disposal, effluents into the sewage system or emissions into the air;
- spending less on control measures, personal protective equipment and/or health surveillance;
- easier compliance with legislation;
- saving costs on fire and explosion protection;
- often lower consumption of the chemicals, which generates more cost savings;
- better reputation, internally and externally, to customers and consumers.

EXAMPLE

Elimination of welding by pipe pressing

Welding and soldering of pipes releases fumes containing a number of dangerous substances. Welders are also exposed to intense heat and light, considerable noise and risk of fire. However, welding and soldering of pipes can be partly avoided by joining the pipes under high pressure (above). This eliminates the dangerous substances caused by welding. The technique is also quick and easy to apply, which is a key success factor.

Useful links for hazard identification

- **ECHA** (European Chemicals Agency) provides information on hazardous properties, classification and labelling, and safe use of chemicals: ***https://echa.europa.eu/information-on-chemicals***
- **RISCTOX** is a database on the health and environmental risks posed by chemicals: ***http://www.etui.org/Topics/Health-Safety/Chemicals-and- REACH/RISCTOX-database***
- **Haz-Map** is a US database on the health effects of exposure to chemical and biological agents for different work tasks and occupations: ***https://hazmap.nlm.nih.gov/***

Elimination and substitution in principle: STOP

The Chemical Agents Directive (CAD) of the EU recommends following a hierarchy or 'order of priority' of control measures to prevent or reduce exposure to dangerous substances. A complete elimination is at the top, followed by the rest of the hierarchy:

- **S = Substitution** = complete elimination of the dangerous substance or substitution with a safer alternative
- **T = Technological measures** = minimising the concentration of dangerous substance in the exposure zone
- **O = Organisational measures** = minimising the number of exposed workers and/or the duration and intensity of exposure
- **P = Personal protective equipment** = wearing protective clothing or equipment such as goggles and gloves as a barrier to exposure.

For more details, see the info sheet on legislation covering dangerous substances in the workplace.

Useful links for risk assessment tools

- **SEIRICH** (in French): *http://www.inrs.fr/publications/outils/seirich.html*
- **EMKG** (in English and German): *https://www.baua.de/EN/Service/Publications/Guidance/EMKG-2.html*
- **COSSH Essentials** (in English): *http://www.hse.gov.uk/coshh/essentials/coshh-tool.htm*
- **Stoffenmanager** (in Dutch, English, Finnish, German, Polish, Swedish): *https://stoffenmanager.nl/*
- **OiRA** (many languages): *https://oiraproject.eu/oira-tools*

Elimination and substitution in practice

Changing from a dangerous substance to another, less hazardous one or to an alternative process free from dangerous substances is a stepwise process. Guidance on substitution processes is available (see reference EC, 2012 below). It puts special emphasis on the needs of small enterprises. The web portal SUBSPORT also provides a lot of substitution-related information from enterprises.

1. Identify the hazards and risks

To do this, you will need an inventory of dangerous substances. The inventory will allow you to compare the safety data on the substances and prioritise substances for elimination and substitution.

For chemical products and substances that your company purchases, the safety and health data come from the safety data sheets delivered by the enterprise that sell these products. For process-generated substances (e.g. dust, fumes) and naturally occurring materials (e.g. grain or flour dust, marble or heavy metals), safety information, such as technical documents and instructions for handling and use, will be available from product suppliers.

2. Look for restrictions on substances

Legislation and international or sector-specific agreements place restrictions on the use of certain substances. Many may not be used at all because they have been banned. The use of others may be restricted by large organisations or associations in a supply chain, for example in the electronic, car and textile industries.

Voluntary labelling also supports the identification of the hazards and offers alternatives. Two good examples in the construction sector are the Danish MAL-KODE system and the German GISBAU system.

3. Prepare a comprehensive risk assessment

According to the basic OSH legislation, a comprehensive risk assessment has to be prepared. In the area of risks from dangerous substances, you have to identify and describe the intrinsic hazards and the conditions of use. This involves factors such as:

- the number of workers exposed;
- the level of exposure of workers;
- the place of use — an open or a confined space;
- the risk of skin contact;
- the risk of dispersion or spread into the air, for example as a result of spraying.

Checklists for legal or voluntary restrictions

- **REACH:** *https://echa.europa.eu/addressing-chemicals-of-concern*
- **SUBSPORT:** *http://www.subsport.eu/list-of-lists-database*
- **Automobile industry:** *http://www.mdsystem.com/index.jsp*
- **Textile industry:** *http://www.roadmaptozero.com/*
- **ETUI: Carcinogens and Reprotoxins:** *https://www.etui.org*
- **SIN-List:** *http://chemsec.org/business-tool/sin-list/*

4. Find alternatives and compare

Identify the alternatives: search the internet, ask authorities, professional associations, trade unions. Ask your suppliers to formulate a safer alternative.

Look for alternative processes that remove the need to use a substance altogether and potentially use replacement substances (if elimination is not possible).

Use the same method to assess all alternatives. Consider the hazard criteria and weigh up the costs and benefits.

An all-risk reduction solution is the ideal alternative. However, most solutions will reduce some of the risks but not all of them, and you can select the alternative that is safest and will work best in your circumstances.

5. Try a pilot study

Reduce the risks of an unsuccessful substitution by trying it on a smaller pilot scale first. Technological and organisational changes need to be considered, particularly potential changes in risks and control measures. Involving workers is essential to get the full picture of the changes involved.

6. Implement and improve

The full-scale introduction of a substitute may require some changes in working procedures or in materials and equipment. Feedback from workers and clients can be key to making a successful substitution.

7. Introduce a chemical management system

To make substitution part of everyday working practice, you need to have a chemical management system in place that continually challenges the use of substances and requires substitution.

Useful sources of methods for alternative assessment

- **OECD (Organisation for Economic Co-operation and Development):** *http://www.oecdsaatoolbox.org/*
- **ECHA authorisations:** *https://echa.europa.eu/addressing-chemicals-of-concern/authorisation/applications-for-authorisation-previous-consultations*
- **COLUMN Model** (in English): *http://www.dguv.de/medien/ifa/en/pra/ghs_spaltenmodell/spaltenmodell_2017_en.pdf* (in German) *http://publikationen.dguv.de/dguv/pdf/10002/spaltenmodell_2017.pdf*

Useful sources of solutions and best practice

- **Alternativas** (in Spanish): *http://www.istas.net/web/index.asp?idpagina=3468*
- **PIUS** (in English):*http://www.dguv.de/medien/ifa/en/pra/ghs_spaltenmodell/spaltenmodell_2017_en.pdf* (in German) *http://publikationen.dguv.de/dguv/pdf/10002/spaltenmodell_2017.pdf*
- **Safer Choice:** *epa.gov/dfe*
- **SOLUB** (in French): *irsst.qc.ca/solub*
- **SUBSPORT:** *http://www.subsport.eu*
- **Substitution of CMR-Substances** (in French): *https://www.substitution-cmr.fr/index.php?id=112*
- **TURI (Toxics Use Reduction Institute of Massachusetts):** various sectors *sustainableproduction.org*, *turi.org* and hospitals *sustainablehospitals.org*

References

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