

THE FACTS OCCUPATIONAL EXPOSURE TO CARCINOGENS

CARCINOGENS ARE DANGEROUS IN MANY WAYS 2

REDUCE EXPOSURE WITH WORKPLACE HYGIENE 3

STOP PRINCIPLE: 4

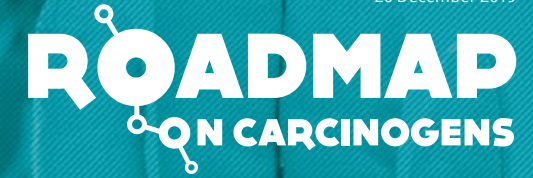
S = SUBSTITUTION 5

T = TECHNICAL MEASURES 6

O = ORGANISATIONAL MEASURES 7

P = PERSONAL PROTECTION 8

CARCINOGENS ARE DANGEROUS IN MANY WAYS



Exposure threatens workers' overall health and quality of life, as well as participation in work and productivity levels. Not only does cancer result in individual suffering, the societal impact is large as well. The direct costs of carcinogen exposure at work across Europe are estimated at 2.4 billion Euros per year. Taking health care expenditure and productivity losses into account, this number is estimated as 4 to 7 billion Euros annually (RIVM, 2016).

53% of the work-related deaths in the EU are associated with exposure to carcinogens at work (OSHwiki)

That translates to nearly 80.000 people in the EU dying from cancer caused by working with carcinogens. In addition to those deaths, every year over 120.000 people are diagnosed with work-related cancer. The diagnosis often comes years after exposure, as cancer has a very long latency period. This means that workers may very well be retired before the disease appears.

Compared to other health risks

To put these numbers in perspective, the leading cause of death in the EU, cardiovascular diseases, is responsible for 1.8 million deaths. Smoking and other tobacco use is responsible for 700.000 deaths. About 25.600 people die in traffic accidents ever year, with over 1.4 million injured. In the Netherlands, unhealthy working conditions are responsible for 5% of the total disease burden, as high as obesity and an unhealthy environment (RIVM, 2016).

Prevention is key!

While everyone can be exposed to carcinogens from time to time in their daily lives, work-related exposures often occur daily for many years of employment and usually at higher concentrations. Prevention is therefore very important. We could even eliminate all work-related deaths caused by exposure to carcinogens by eliminating and substituting all carcinogens at the workplace.

More information on substitution can be found in our Substitution factsheet on [EU-OSHA](#) and on the [EU website](#). Substitution is part of the larger STOP strategy. More on the strategy can also be found here on the EU-OSHA [in this factsheet](#) and [this infosheet](#).

The Roadmap on Carcinogens website contains a [Good Practices Overview](#) with examples of all parts of the STOP strategy, including Substitution.

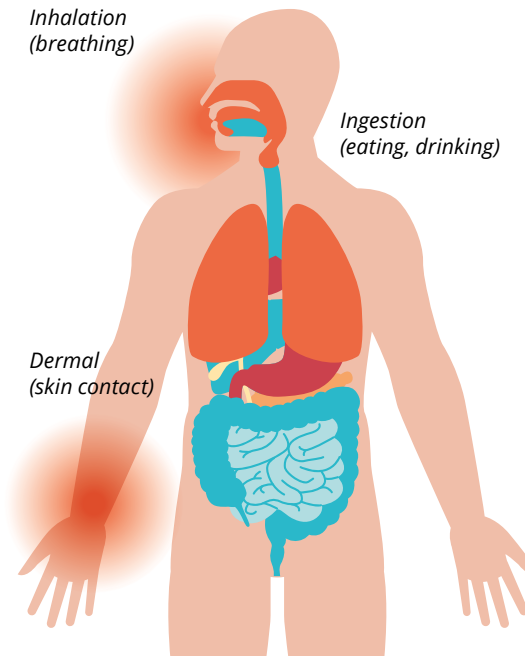
REDUCE EXPOSURE WITH WORKPLACE HYGIENE



Proper personal hygiene is an effective way to protect your health. When it comes to the workplace, hygiene is just as important, especially when working with carcinogens. You can reduce exposure to carcinogens by following good hygiene practices to ensure a healthy and safe working environment. Together you can keep your workplace clean!

How can you be exposed?

Three routes of exposure are breathing, swallowing (eating or drinking), or contact with your skin. Breathing contaminated air is the most common way of workplace carcinogens entering your body. But don't forget about the other routes! When you're eating your lunch in the same areas as where carcinogens are handled for example, they might end up on your food and subsequently in your body. Similarly, you might transfer carcinogens to your food if you don't wash your hands before eating or drinking. When using gloves to handle carcinogens and touching your clothing or even your face with the gloves might contaminate them. There can always be ways of being exposed to carcinogens without us noticing. With proper workplace hygiene you can reduce these risks.



Proper workplace hygiene

These are some important pointers that will help you ensure a proper workplace hygiene:

- Limit the quantities of carcinogens used
- Keep the number of workers exposed as low as possible
- Only workers with sufficient knowledge and skills to do so should work with carcinogens
- Take the utmost care when working with carcinogens, work orderly and with common sense Know how to use the technical measures implemented to prevent exposure
- Always use the appropriate tools provided
- Always follow the proper instructions and organisational measures implemented to prevent exposure
- No food or drinks in the areas where carcinogens are handled or stored
- Store your work clothing separately from your personal clothing
- Prevent eye and skin contact by wearing targeted personal protective equipment (PPE)
- Don't touch your face or other parts of your body while wearing protective gloves
- Clean reusable PPEs after every use

References: EU-OSHA

EXPOSURE TO CARCINOGENS

STOP PRINCIPLE



When carcinogens are involved at the workplace, employers have to do everything in their power to prevent workers coming into contact with these substances.

As you might imagine, the best way to achieve this is complete elimination or substitution of the carcinogen with a less dangerous alternative: taking away the source. When substitution is (not yet) technically possible, other measures can be taken.

These measures follow a hierarchy of control, detailed in the STOP strategy. **Each letter stands for a different level of measures.** It's easy to remember – STOP keeps you safe!

Stepping down in the hierarchy is only allowed for carcinogens when there is a technical limitation: economical reasons are not valid. When a carcinogen is not substituted, exposure should be lowered as much as technically possible: not just below the occupational safety limits, but as low as possible. Below is a generic explanation of STOP. Be sure to read out the next pages providing more details and implementation tips for each level of measures.

S

S = Substitution

Substitute carcinogens by substances that are not carcinogenic. When doing so, ensure that the substitute is less dangerous overall. Substitution is always the first measure to consider.

T

T = Technical measures

From closed systems to equipment with built-in vacuum systems to local exhaust ventilation, many techniques help to control the source and therefore reduce the exposure to carcinogens dramatically. And, as they keep everyone in your surroundings safe, they are a first step to reduce exposure towards carcinogens.

O

O = Organisational measures

Did you close that door and keep that lid shut? Are you using dedicated areas for certain chemicals or processes? Do you ensure that as few people as possible are exposed? Is your workplace tidy and cleaned on a regular basis? Does everyone wash their hands and face before eating, drinking and smoking? These are organisational measures which help a lot to reduce the exposure towards carcinogenic substances.

P

P = Personal protection

Sometimes substitution is not possible and technical and organisational measures are not enough. Then you need to use personal protection. Personal protection helps to keep carcinogens away from lungs and skin. Examples include gloves and safety glasses.

STOP PRINCIPLE: S = SUBSTITUTION

STOP follows a hierarchy of control. For carcinogens, a step down in the hierarchy is only allowed when technical limitations prevent you from eliminating exposure entirely. This factsheet focuses on the highest and most desirable level, S for substitution.

Substitution is always the first measure to consider

Substitute dangerous substances with less dangerous ones, eliminating a carcinogenic substance altogether, or replacing it with a less dangerous one, is a multi-step process:

EU-OSHA provides an excellent explanation of substitution on their info sheet [Substitution of dangerous substances in the workplace](#).

When no suitable substitutes can be found, well-founded reasoning is required

For carcinogens, the steps are similar, but stricter. As an employer you need to actively look for substitutes. When no suitable substitutes can be found, well-founded reasoning is required.

Various websites with substitution suggestions are available, including www.subsportplus.eu and marketplace.chemsec.org.

1. Identify carcinogenic substances
2. Find alternatives and compare
3. Try a pilot study
4. Implement and improve
5. Introduce a chemical management system

The benefits of substitution

Eliminating and substituting carcinogens from the workplace provides benefits for both workers (improved safety and health) and employers (reduced costs of control measures, healthy workforce, compliance with legislation). Other benefits include improved long-term health, reduced hazardous waste disposal, and a better company reputation.

More information

- In-depth information is available in the EC report: [‘Minimising chemical risk to workers’ health and safety through substitution’](#).
- EU-OSHA: [How to manage dangerous substances?](#)
- EU-OSHA: [Info sheet legislative framework dangerous substances workplaces](#)

References: EC, EU-OSHA

STOP PRINCIPLE: T = TECHNICAL MEASURES

STOP follows a hierarchy of control. For carcinogens, a step down in the hierarchy is only allowed when technical limitations prevent you from eliminating exposure entirely. This factsheet focuses on the second level, T for technical measures.

Technical measures can reduce the emission rate from the source

From closed systems to equipment with built-in vacuum systems (e.g. welding, sanding, grinding, sawing) to local exhaust ventilation, many techniques help to control the source and therefore reduce the exposure towards carcinogens. And, as techniques keep everyone in your surroundings safe, they are an important step to reduce exposure towards carcinogens. Technical measures can reduce the emission rate from the source by either:

1. Non-ventilation controls

There are various ways to contain emissions at the source. Using well-fitting lids for containers containing volatile liquids for example. Proper sealing of substances to prevent leakage into the workspace air. Handling aids to minimize the time a carcinogen spends outside its container, or pumping rather than pouring liquids to reduce splashing. Depending on the substance and process used, non-ventilation controls can be effective.

2. Ventilation controls

Local exhaust ventilation (LEV) is designed to extract polluted air at the source before it can reach the workers. Fixed and/or integrated local exhaust ventilation systems are considered to extract the hazardous substances most effectively, while flexible/movable LEV systems are considered less effective as they require constant adjustment by the workers using them.

3. Combining containment and ventilation

A third option are ventilated enclosures such as fume hoods or laminar air flow cabinets, where the source is placed in an enclosure with active air extraction. Air is drawn in from the front (open) side preventing emissions from entering the work area. Based on the workplace settings and exposure situation, the correct technical measure should be selected and installed.

Maintenance and use

Technical measures can only be and remain effective with proper maintenance, cleaning and worker training. The effectiveness of technical measures gradually degrades and eventually fails altogether without this. Sometimes systems appear to be working while in fact poor maintenance prevents effective containment.

Technical measures in practice

Local exhaust ventilation is not always easy, especially so when welding large workpieces such as tanks and silos. The challenge is to place the LEV system as close to the source as possible and to minimize the influence of worker behaviour. Extracted welding torches extract the welding fumes directly at the source before emission in the breathing zone of the worker.

More information

- EU-OSHA: [Engineering controls](#)
- TNO: [werkgerelateerde kanker uitbannen kleine investering groot effect \(Dutch only\)](#)

STOP PRINCIPLE: O = ORGANISATIONAL MEASURES



STOP follows a hierarchy of control. For carcinogens, a step down in the hierarchy is only allowed when technical limitations prevent you from eliminating exposure entirely. This factsheet focuses on the third level, O for organisational measures.

Measures which help a lot to reduce the exposure towards carcinogenic substances

Did you close that door and keep that lid shut? Are you using dedicated areas for certain chemicals or processes? Do you ensure that as few people as possible are exposed? Is your workplace tidy and cleaned on a regular basis? Does everyone wash their hands and face before eating, drinking and smoking? These are organisational measures which help a lot to reduce the exposure towards carcinogenic substances.

There is a wide variety of organisational measures

From proper labelling to having readily available workplace instruction cards. All measures are aimed at minimizing the exposure of workers to carcinogens in addition to the already implemented technical measures. Examples include:

- Having readily available workplace instruction cards
- Proper labelling including warnings and hazard indicators
- Shift rotation to limit the time spent handling carcinogens
- Regular Toolbox meetings to keep safety measures on paper alive.
- Dedicated workspaces for certain chemicals and processes.
- Nudging techniques like colour coded routes in workspaces.

Organisational measures in practice

A tool was developed which visually shows dust levels in real-time. Employers use it to effectively identify problem areas and workers gain a better understanding of dust propagation at the work place.

An adhesives manufacturer has implemented multiple measures aimed at reducing exposure during adhesive manufacturing. One of the organizational measures consists of extensive training for workers with the requirement that all workers must possess a Finnish Occupational Safety Card.

More information

- Roadmap on Carcinogens: [Good Practices overview](#)
- EU-OSHA: [Hierarchy of prevention and control measures](#)
- EU-OSHA: [Organisational measures of accident prevention](#)

References: EU-OSHA

STOP PRINCIPLE: P = PERSONAL PROTECTION

STOP follows a hierarchy of control. For carcinogens, a step down in the hierarchy is only allowed when technical limitations prevent you from eliminating exposure entirely. This factsheet focuses on the lowest and least preferred level, P for personal protection.

The last resort to control carcinogens

Sometimes substitution is not possible and technical and organisational measures are not sufficient to reduce exposure levels. Then you need to use personal protection. Personal protective equipment (PPE) helps to keep carcinogens away from lungs, skin and eyes. PPEs can only be used as supplemental to measures higher up in the hierarchy and considered to be a last resort.

Selecting the right PPE

Using the right PPE for the substances used is essential. A risk assessment of what could cause harm in the workplace will help identify the right type and grade of PPE. Substances should be accompanied by a safety data sheet (SDS), in which you can find the appropriate PPEs to use. For process generated emissions, such as silica dusts however, SDS are not available and PPE to use should follow from the risk assessment and evaluation. Common PPEs for protection against hazardous substances are gloves, safety glasses, protective clothing, and (filtered) face masks.

Often more than one PPE is required. Following these basic guidelines will help you selecting the right PPEs:

- Are they suitable to reduce the occupational risks involved? Take the nature, frequency, and duration of exposure into account here
- Is the assigned protection factor adequate?
- Will using them increase other occupational risks?
- Do they properly fit the intended user? Be aware that facial hair may obstruct a proper fit
- Are ergonomics taken into account?
- Under which conditions should they be used?
- Are the product CE marked to indicate that they are in accordance with regulations?
- Are workers trained on how to use PPE?
- Are PPE regularly cleaned and/or exchanged?

Maintenance and use

Personal protective equipment will only work with proper maintenance and use. Every worker should know when and how to use PPEs. Standardized signs can indicate which PPEs are required before entering a room, and regular safety training helps ensuring proper use. Not only should you know when to use PPEs, but also their limitations.

Like technical measures, PPEs require regular maintenance. Are all filters still in order, are glasses cracked? PPEs should be replaced before they are damaged. It is therefore important to routinely check for effectiveness and to carry out preventive maintenance and replacement. Never work with defective PPEs.

More information

- European Commission: [Legal content \(EU 2016/425\)](#)
- EU-OSHA: [Toolbox personal protection](#)

References: EC, EU-OSHA