EPOXY FOLDER –
Chemical safety in construction coating

Finnish Institute of Occupational Health

Työsuojelurahasto
Arbetarskyddsfonden
The Finnish Work Environment Fund

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Chemical safety in construction coating work

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Contents

Welcome to a lesson on chemical safety in epoxy coating work!

Construction coating work includes a great deal of work with chemicals. Uncured coatings, like any other chemicals, may affect a person's health, which is why they should be treated with respect; they should be handled carefully and with sufficient personal protection.

The materials in this safety folder focus on the prevention of chemical risks in coating work. One of the key chemical hazards comes from epoxy products which have long been a significant cause for allergic contact eczema. Some other coating chemicals are also addressed briefly in this folder.

The folder contains condensed instructions for risk assessment, protection, the orientation of new employees, etc. It is intended to be read by employees, supervisors as well as occupational health services.

This material can be found in electronic format at www.ttl.fi/epoxyfolder. The materials can be freely downloaded, copied and, for instance, laminated for the workplace wall. It can also be used in training events.

We hope the information in this folder contributes to safe work with coating chemicals!

The safety folder was drafted on the basis of the "Occupational skin diseases caused by epoxy compounds and their prevention in the construction industry" project of the Finnish Institute of Occupational Health. The name of the research report is "Epoksit rakennusalalla – ammatti-ihotautien ehkäisy" and it can be found in Julkari at: http://urn.fi/URN:ISBN 978-952-261-661-6 (PDF, in Finnish).

In co-operation with the Finnish Work Environment Fund, the Finnish Construction Trade Union, Pintaurakoitsijat ry, the Regional State Administrative Agency of Southern Finland, Pohjola insurance company, Consti Oy, Teopinn Oy, E Voutilainen Oy, Terveystalo Porvoo/Occupational Health Services.

Health hazards of epoxy coatings

Epoxy resins (plastic part of coatings)

- The epoxy compounds in the resin part cause allergic contact dermatitis (allergic contact eczema). A contact allergy to epoxy compounds may even develop as a result of only one chemical splash.
- The eczema appears as an itchy, stinging or blistering eczema on the skin area which was in contact with the chemical. The skin symptoms usually manifest themselves some hours or several days after the skin contact. If left untreated, the eczema may last several days or even weeks.
- If the contact allergy is of high grade, even small amounts of epoxy compounds on the skin or in the workplace air may cause eczema. A person allergic to epoxy resin is usually no longer able to handle epoxy coatings due to the skin symptoms.
- Epoxy resins may also cause respiratory symptoms.

Curing agents of epoxy coatings

- The amine compounds in epoxy hardeners also cause allergic contact dermatitis. A person allergic to epoxy hardeners is usually no longer able to handle epoxy curing agents due to the skin symptoms.
- The amine hardeners in epoxy coatings are strongly alkaline, which is why they irritate and corrode skin and eyes.
- The larger the splash and the longer the substance is in contact with the tissue, the more severe the burn created by the splash.
- Minor skin contact causes irritation of the skin and, if prolonged or repeated, irritant contact dermatitis. It looks like allergic contact dermatitis but is not due to contact allergy. Irritant contact dermatitis cannot be diagnosed with any skin test.
- The amine compounds in epoxy hardeners have a strong odour and are alkaline, which is why they irritate the respiratory tract.

Epoxy dust

- The dust of a recently cured epoxy may still contain ingredients of resins and curing agents, thus causing allergic contact eczema, irritation of the respiratory tract and odour problems. The longer the epoxy mixture has been cured, the less harmful parent substances remain in it.

Solvents included in coatings, solvent-based thinners and washing solvents

- Many organic solvents, such as xylene and petroleum ether, affect the nervous system. They enter the body through the respiratory tract or the skin.
- Some solvents have short-term, intoxicating effects. Long-term (usually several years) and abundant exposure can result in permanent impacts to the nervous system, such as changes to the memory or to the ability to concentrate or learn.

Health hazards of other coating chemicals

Polyurethane coatings

Polyurethane coatings (usually the hardener part) contain isocyanates that can cause asthma or allergic contact dermatitis.

- The development of asthma requires that the isocyanates enter the respiratory tract, i.e. that they evaporate or pulverize in the workplace air. Asthma is usually developed as a result of constant exposure and its symptoms include shortness of breath, wheeziness and a cough. The symptoms can manifest themselves as soon as during the same work shift or several hours after the exposure, for instance on the evening after the working day. A person with asthma caused by isocyanates can have symptoms over a very small concentration of isocyanates in the air and cannot therefore continue in the same work. The symptoms of asthma caused by isocyanates often continue even if the employee stops working with isocyanates. The prognosis is improved by detecting the disease early and stopping the exposure.
- Allergic contact dermatitis appears on the skin area which was in contact with the chemical. The dermatitis (eczema) usually manifests itself some hours or several days after the skin contact. A person allergic to isocyanates is usually no longer able to handle coatings containing isocyanate due to the skin symptoms.

Two-component acrylate coatings

Two-component acrylate coatings cause allergic and irritant contact dermatitis. Recurring contact with skin may also cause dysfunction of the peripheral nervous system on the contact area, such as weakening of the sense of touch in arms or hands. Many acrylate compounds evaporate easily, have a strong odour and may cause irritation of the respiratory tract, nausea and headache and, in some cases, asthma. If the exposure is recurring and the concentrations are high, acrylates may also affect the central nervous system. Peroxides irritate the respiratory tract, eyes and skin and are used as curing agents..

Polyester and vinyl ester

Polyester and vinyl ester (epoxy acrylate) coatings contain strongly odorous styrene or corresponding compounds. They irritate the skin and respiratory tract and may influence the central nervous system if the exposure is abundant or long-term. Vinyl ester coatings may also cause allergic contact dermatitis. Peroxides used as hardeners irritate the respiratory tract, eyes and skin.

Organic solvents, thinners and washing solvents

Many organic solvents, thinners and washing solvents contained by plastic coatings, such as xylene, petroleum ether and acetone affect the nervous system. They enter the body through the respiratory tract and the skin.

- Some solvents have short-term, neurologicaleffects such as dizziness. Long-term and abundant exposure can result in permanent impacts to the nervous system, such as changes to the memory or to the ability to learn.
- Solvents dry the skin and cause a rash.
- Solvents are flammable and, therefore, cause a fire hazard.

More information

For more information on the health hazards of plastic coating chemicals, please refer to, for instance, the safety data sheet which is provided as separate instructions in chapter 5 of this safety folder. Occupational health services act as an expert in matters related to work and health.

What you should know about chemicals causing allergic dermatitis

- Substances that may cause allergic contact dermatitis are marked in the chemical's package label and the safety data sheet as follows:
  "May cause an allergic skin reaction" (hazard statement H317)
  "May cause sensitization by skin contact" (R43 risk phrase, older marking)
- Even a small amount of sensitizing chemical on the skin may cause contact allergy if the skin contact is recurring.
- It is impossible to predict who will have a contact allergy and who will not.
- The development of a contact allergy usually requires a direct skin contact with the sensitizing substance. The contact may come from
  - spatter
  - immersing hands in the chemical
  - spreading the substance by hand
  - dirty tools
  - surfaces and gloves
  - penetration of chemicals through gloves or clothing.
- A chemical often comes in contact with skin or the surface of a protective glove when
  - opening or closing chemical containers
  - pouring chemical
  - mixing chemicals
  - spreading the chemical by hand.
- Chemicals are easily transferred to the surrounding surfaces and tools via dirty hands or gloves.
- Allergic contact dermatitis usually heals gradually when the contact with the sensitizing substance ends.
- When the skin contact allergy has developed, a very small amount of the substance on the skin may cause difficult eczema. That is why those who have developed work-related allergic contact dermatitis are rarely able to continue in the same work.

Central statutory obligations related to occupational safety

The Occupational Health and Safety Act (738/2002), the Government Decree on Chemical Agents at Work (715/2001), the Government Decree on the Safety of Construction Work (205/2009), the Occupational Health Care Act (1383/2001), Act on Occupational Safety and Health Enforcement and Cooperation on Occupational Safety and Health at Workplaces (44/2006), the Government Decree on the Selection and Use of Personal Protective Equipment at Work (1407/1993).

Employer

- The employer must ensure the health and safety of the employees at work.
- The employer is obligated to investigate and assess the occupational risks (for example, accident and chemical risks, noise impacts) and reduce them, if necessary. Expert help may be needed to assess the chemical exposure of the employees.
- On the basis of the risk assessment, the employer must provide the employee with information on the harmful and risk factors of the workplace and ensure that the employee receives orientation and work instructions. Work instructions must be made for the use of hazardous chemicals. Before the work is started, the employer must make sure the employee has understood the provided instructions.
- The employer must keep an up-to-date list of all the chemicals used at the workplace. The safety data sheets must be available to the employees whenever necessary. A chemical of which there is no safety data sheet or corresponding information available must not be used at the workplace.
- The work environment and tools must be appropriate for the work and enable safe work.
- The employer must procure and provide for the use of the employee personal protective equipment that meets the requirements, is practical and suited for the employee if the hazard cannot be avoided or sufficiently limited by other means. The employer must monitor that the protective equipment is used according to instructions.
- The employer must organize for the employees occupational health care which, among other things, examines and assesses the health or the working conditions and monitors the employees' health and work ability.

Employee

- The employee must follow the instructions provided by the employer and work with sufficient care and caution. The employee must also use and service the personal protective equipment with care and according to instructions.
- The employee must use whatever means available to ensure their own safety and that of the other employees.
- The employee must report any potential deficiencies and problems to the employer.

Employer and employee

- Occupational safety at the workplace must be maintained and improved in co-operation between the employer and the employees.

Obligations at common workplace with several employers

- At a common construction site, the employer in the position of main contractor, the head developer of the project or other appointed person or the safety co-ordinator must ensure overall safety. The developer leads the occupational safety co-operation and specifies the operating principles.
- At a common workplace, the employer with primary authority or the employer in the position of main contractor will tend to the duties of an occupational safety officer unless the employers have appointed a common occupational safety officer.
- The subcontractors will provide their employees with instructions and orientation, take part in the safety co-operation and manage and supervise the work.
- Employees working for different employers at a common construction site have the right to elect a common occupational safety representative and deputy representatives.
- The responsibility for providing safety-related information and the flow of information at a common construction site falls on each party for their part and on the main executor, employer and independent operator in co-operation.

How to utilize the safety data sheets of chemicals

- A safety data sheet is the primary source of information describing the hazardous properties and safe use of a chemical. A supplier of chemicals must deliver to their client safety data sheets on all the chemicals that contain harmful ingredients and are used at work.
- The classifications and markings describing the hazardous properties of a chemical are stated in section 2 of the safety data sheet. Hazards are reported with red-white-black warning symbols and hazard statements (H or R statements). Precautionary statements (P or S statements) provide instructions for safe use. The same information must be found in the package label–make sure to read at least this information!
- The employer is responsible for ensuring that the up-to-date safety data sheets are available to the employees in either electronic format or on paper. It is recommended to mutually agree at the workplace where and how to store the sheets and make sure everyone can find them when needed.
- In addition, the employer must keep an up-to-date, trade name-specific list of all the chemicals used at the workplace. (Government Decree 715/2001, section 5)
- The safety data sheets and list of chemicals must be delivered to occupational health services upon request. The occupational health services must read them thoroughly in order to assess the health hazards of the work as well as the need for monitoring the exposure and health of the employees, among other things.
- Safety data sheets are used, for instance, as an aid for risk assessment and in the drafting of work instructions. They can also be used to make a summary in the work instructions, indicating the name and/or other reliable identification of the chemical, the essential hazard markings and instructions for safe working practice, information on suitable protective equipment and what to do in case of an accident.
- If you detect any symptoms related to the handling of chemicals or there is a chemical accident at the workplace, inform your employer about the problem and see a doctor. Bring the safety data sheets or at least the label of the chemical.

Example of safety data sheet of an epoxy coating curing agent, section 2:

2. HAZARDS IDENTIFICATION
2.1 Classification of the substance or mixture
1272/2008 (CLP)
Acute Tox. 4, H302
Skin Corr. 1B, H314
Eye Dam. 1, H318
Skin Sens. 1, H317
Aquatic Chronic 3, H412
67/548/EEC
C; R35
R43
R52/53

A good praxis would be to include in job instructions hazard symbols, hazard statements and precautionary statements of products in use as well as information on protective devices (risk management sections 4 and 8), safe use and storing (sections 7 and 10).

2.2 Label elements
1272/2008 (CLP)
GHS05
Signal Word **Danger**

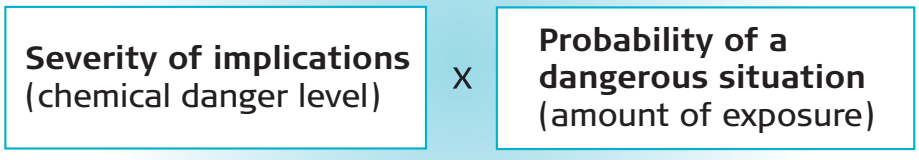
Hazard statements
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H317 May cause an allergic skin reaction.

Precautionary statements
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P309 IF exposed or if you feel unwell:
P310 Immediately call a POISON CENTER or doctor/physician -
P305 IF IN EYES:
P351 Rinse cautiously with water for several minutes.

Risk assessment at the workplace

- Risk assessment refers to the identification of harmful and risk factors caused by the work, work facilities and working conditions as well as the assessment of any health or safety hazards resulting from them. Risk control brings all the risks at the workplace to an acceptable level.
- The promotion of safety at the workplace is based on the results of the risk assessment. The control and prevention measures of risks are implemented in the order of importance dictated by the risk assessment, starting with the most substantial risks.
- If there is an easy solution to a risk, employ it right away.
- Risk assessment is a team effort. Assessment should be carried out in co-operation with the employer, employees, their representatives and the occupational health services. At a common construction site, a risk assessment is executed in co-operation with the client and the operators of the work site.
- Make sure the workplace has an up-to-date list of all the chemicals in use and their safety data sheets for the purposes of chemical risk assessment.
- Different tools have been developed for chemical risk assessment. For example, according to the British standard BS8800, the consequences created by the use of the chemicals and their likelihood are combined in the risk classification with the use of a table matrix.
- In a company using coating chemicals, it is important to assess the potential of skin exposure (substances in contact with skin) by observing the work and interviewing the employees (likelihood, duration, recurrence and contact area of chemical spatter/getting wet, possibility of chemical accident).

Chapter 7 of this folder contains instructions for coating business for assessing skin and respiratory risks caused by chemicals.



Assessment of chemical risks

1. Start the chemical risk assessment

- Print out a model example at www.ttl.fi/epoxyfolder.
- Then, open the Excel spreadsheet template on the same page; the template complies with the model example. Save it on your computer.
- Take out all the chemical safety data sheets.

2. Fill the chemical information in the Excel spreadsheet template according to these instructions

- Work and work tasks can be described in a number of ways, for instance by grouping the chemicals according to purpose or use or product group such as in column 1 of the example. This facilitates risk assessment and increases readability. Remember to also mark other exposure agents in addition to coatings, such as grinding dust or welding fumes.
- Record the date of the chemical safety data sheet in column 2 of the spreadsheet.
- Check the hazard statements (H or R) and the warning symbols of the product in section 2 of the safety data sheet. Copy the warning symbols to column 3 and add them for each chemical from page 15 of this folder (image 2).
- If several product or chemicals have the same hazardous properties and usage methods (e.g. several 2-component epoxy coatings), it may suffice to only make a risk assessment for the most used product.
- Select the assessment target according to the greatest daily amount of use. In column 5, enter the amount of use in either liters or kilograms per typical work task or target.
- In column 4, use job titles instead of individual names.
- In column 5, briefly describe the methods of exposure by using words such as spatter, skin contact, evaporating liquid, mist, dust.

3. Assess the level of risk

Classification of skin hazards (I):

- Take out the chemical risk assessment matrix (image 1 on page 15).
- On the basis of the H or R hazard statements of the chemical, decide the severity group (column) of consequences in which the chemical belongs: “minor”, “harmful” or “severe”. Select the group on the basis of the most severe hazard statement even if only one statement belongs in that group. Coatings that sensitize, corrode or irritate the skin usually belong in the severity group “harmful”.
- Select the likelihood of exposure (row) instead of the amount of use as follows:
  - “potential”, when there is, for instance, a chance of being exposed to spatter or when it concerns random or short-term contact with the skin.
  - “likely”, when it concerns long-term or often repeated contact with the chemical (such as washing or spreading) or cleaning after a chemical accident.
- The risk level is at the intersection of the selected points (row and column).
- Enter the risk level in question (negligible, minor, moderate, substantial or excessive) after the letter I in column 7 on the spreadsheet.

Classification of respiratory hazards (H):

- Take out the chemical risk assessment matrix (image 1 on page 15).
- On the basis of the H or R hazard statements, decide the severity group (column) of consequences in which the chemical belongs: “minor”, “harmful” or “severe”. Select the group on the basis of the most severe hazard statement even if only one statement belongs in that group.
- Select the likelihood of exposure (row) according to the amount of use of the chemical.
- The risk level is at the intersection of the selected points (row and column).
- Enter the risk level after the letter H in column 7.

CONGRATULATIONS!

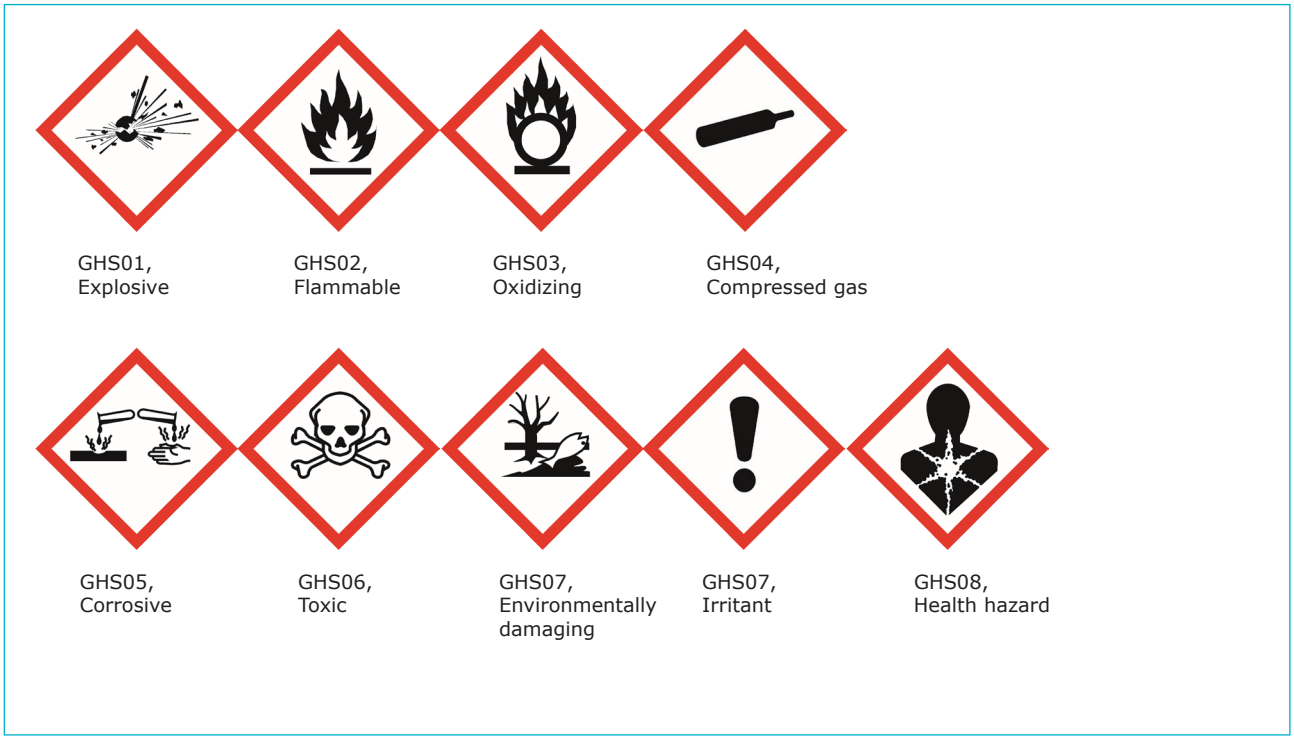
You have made
your first risk assessment.

How to control chemical risks

1. Have a common chemical safety meeting.
2. Record the already executed protective measures in the Excel spreadsheet template (column 6).
3. Together, assess their sufficiency when taking into account the level/colour depicting the risk and the procedural requirements. (Note that the result of a risk assessment is always a risk without protective measures.)
4. You may, for instance, need the special expertise of occupational health services or occupational hygienist when assessing the sufficiency of the risk control measures.
5. Suggest improvements (e.g. better protective clothing, working practice or tools) in order to bring the risk to an acceptable level. Utilize the safety data sheet and the information in this epoxy folder.
6. If necessary, agree on additional measures and their execution, schedule and the individuals responsible for them. Enter the conclusions in spreadsheet column 8.
7. When the measures have become the norm, assess their effect.
8. Update the risk assessment in specific intervals or when the chemicals or work methods change.
9. Always repeat the risk assessment if the chemicals cause illnesses.

Consequences for health (severity of harm) → Probability of exposure ↓	**Slightly harmful** Discomfort, irritation, slight temporary illness, e.g. redness of skin EUH066, H302, H312, H315, H319, H332, H335, H336 R20, 21, 22, 36, 37, 38, 66, 67	**Harmful** Long-time severe effects, permanent minor damage, burns, eczema H301, H311, H314, H317, H331, H341, H351, H361d, H361f, H362, H371, H372, H373 R23, 24, 25, 33, 34, 40, 43, 48, 62, 63, 64, 68	**Severe** Poisoning, cancer, asthma, permanent severe effect, life shortening effect H300, H304, H310, H314, H318, H330, H334, H340, H350, H350i, H360D, H360F, H370 R26, 27, 28, 35, 39, 41, 42, 45, 46, 49, 60, 61, (65)
Improbable Occasional exposure , chemicals are seldom handled or small amounts (less-than 100 ml/g day)	Trivial risk No action	Tolerable risk The situation must be observed	Moderate risk Actions required
Possible Chemicals are often or daily handled (less-than 100 L/kg day)	Tolerable risk The situation must be observed	Moderate risk Actions required	Substantial risk Action necessary
Probable Chemicals are handled daily many times or in large amounts (greater-than 100 L/kg day)	Moderate risk Actions required	Substantial risk Action necessary	Intolerable risk Immediate action

Picture 1. Risk assessment matrix tool based on British Standard BS 8800:2004



Picture 2. Hazard pictograms

Chemical safety orientation for new employees

- Chemical risks in construction coating work may be substantial, which is why the safe handling of chemicals is a part of the required competence.
- The employer is responsible for training each employee to know about safe working practices and the hazards related to the work.
- The orientation regarding the safe handling of chemicals (as well as the rest of the occupational safety measures) is based on the company's risk assessment where the risk factors of the work are identified.
- The subjects that must be told and shown to a new employee include:
  - Which chemical hazards are present at the work and what the potential health hazards or other consequences are
  - Where the essential information on chemical hazards (such as safety data sheets or condensed fact sheets, work and safety instructions) can be found
  - Where and how the chemicals are stored and how to move them safely
  - How the chemical packages are opened, how and where the substances are handled, mixed, etc.
  - How to avoid spreading the chemicals in the work environment by correct working practices and by working in a clean, careful manner
  - How to prevent the chemicals from coming into contact with the skin, eyes and the respiratory tract
  - Where to find the personal protective equipment and work clothing; how to make sure they are suited for you and the work
  - How to put on, take off, service and dispose of the personal protective equipment
  - What the safe replacement interval of the personal protective equipment is
  - How and where to safely clean and service the tools
  - Which safety-related tools should always be available and how the employee should verify their availability
  - What to do in case of an emergency or accident
  - Whom the employee should contact to ask for additional information or report deficiencies or problems

- The company physician or occupational health nurse should discuss the work-related hazard of disease during, for instance, the pre-employment examination.
- Even the most experienced employees need chemical safety training to revise their knowledge. This is particularly important in the event of changed job description, errors detected in the operations or the implementation of new methods, chemicals or protective equipment.

The materials in this folder, intended for coating businesses, can be used for the orientation.

In the orientation, go through the following topics:

- Work environment
- Most common risk factors (chemicals, risks of accident)
- Occupational safety in the company
- Safe working practices
- Work instructions
- Personal protective equipment
- Occupational safety and health organization
- Occupational health services

Three steps for the prevention of contact eczema

1. Avoid contact

- Make sure the workplace, chemicals and tools are clean and in order.
- Reserve a specific place and tools for mixing the chemicals, as well as sufficiently large mixing pots.
- Add distance to the chemical; for instance, when spreading the substance, use a roller or a spatula with a long shaft.
- Take care not to soil your surroundings with the chemicals; do not touch tools, surfaces, hearing protectors or mobile phones with dirty gloves.
- When a piece of work clothing gets soiled, go wash yourself immediately and change into clean clothes. If your skin has been stained, immediately use the skin cleansing wipes intended for removing epoxy stains and go wash yourself.
- When a piece of work clothing gets soiled, wash yourself immediately and change into clean clothes. If your skin has been stained, immediately use the skin cleansing wipes intended for removing epoxy stains and go wash yourself.
- Do not wear a wristwatch or jewellery.
- Clean the tools, worktops and other surfaces every day.
- Immediately dispose of any cloths used for cleaning as well as dirty, used gloves.
- Dispose of any chemical containers appropriately.
- Get dressed and wash yourself in separate dressing and washing facilities. Wash your hands before entering the restroom. Do not go home after work in dirty work clothes.

2. Protect your skin

- The protective gloves must cover the entire area of bare skin, which means that they must be sufficiently long. The material must be suitable for the chemicals you will be using. For instance, chemical protective gloves made of nitrile or butyl rubber are suited for coating work with epoxy and urethane.
- Several layers of gloves can be used in extremely soiling work (see chapters 10 and 11 in this folder).
- Gloves' safe service life must be agreed upon at the workplace.
- Always use your own personal protective equipment. Do not lend them to a workmate.
- Put on your gloves before starting to handle chemicals and remove them without soiling your skin. Dispose of them by placing them in a lidded trash bin. You can practice the removal of gloves with the help of a video you can find at www.ttl.fi/epoxyfolder.
- Use respiratory protection when necessary. Eye protectors or safety masks must always be used in construction work.
- Pay special attention to protection when working in confined spaces or above the shoulder line.

3. Take care of your skin

- Healthy skin can endure chemicals better than skin that is in poor condition.
- It is recommendable to use unscented lotions after cleaning your hands, during your breaks and after the working day. You may also use lotion at bedtime.
- Regularly inspecting your skin will help you detect any upcoming rash; dry skin is usually the first sign.
- Monitoring the condition of your skin may help identify any deficiencies in your preventive measures.

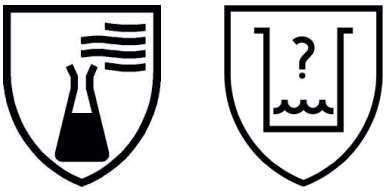
Selecting gloves for coating work

What does the law say about personal protective equipment?

- The protective must be practical in preventing work-related hazards and suited for the employee and the working conditions.
- Ergonomic requirements and the employee's state of health must be taken into account when selecting protective equipment.
- Instructions must be provided regarding the use of personal protective equipment and safe usage time must be specified. The employer must ensure that the protective equipment works.
- The employee must use the protective equipment and report any deficiencies detected in it.

What type of gloves are required for coating work and how to use them?

- A chemical protective glove must have one of the markings shown in the attached image.
- The glove material must protect the wearer from the handled chemicals (more information in the safety data sheet or these instructions).
- The gloves should be long enough to cover the entire exposed area of skin.
- The safe service life/frequency of replacement of chemical protection gloves must be known at the workplace. If a glove is broken or its insides are soiled, it must be immediately replaced.



NOTE!

Leather/textile gloves ARE NOT SUITED for coating work: they let through and absorb chemicals, thus increasing skin contact with the chemical.

Guide for selecting chemical protection gloves

In this chart, epoxy refers to epoxy resins, curing agents and mixtures thereof as well as benzoic alcohol and other agents contained by the mixtures. The safety data sheet may contain more detailed information on the chemicals than this chart. MDI and HDI urethane refer to urethane coatings, isocyanate curing agents and mixtures thereof.

Usage time of gloves from first contact with chemical as colour code.

	Glove material						
Coating material	4H/ Silver-shield, Barrier	Butyl	Neo-prene >0,3 mm	PVC >0,3 mm	Nitrile >0,3 mm	Dis-posable nitrile gloves	Natural rubber
Epoxy without solvents							
Epoxy and acetone							
Epoxy and ethyl or butyl acetate							
Epoxy and xylene							
MDI-uretane, no solvents							
HDI-uretane, solvents							
Acrylate coatings							
Polyester- and Vinyl ester coatings: styrene and acetone							

1–5 drops are not taken into account when determining the start point of service life.

4 h | 1 h | 10 min | Not suited

TIP: Several disposable gloves can be used on top of thick (>0.3 mm) chemical protection gloves if they are taken off layer by layer in short intervals. This increases the service life of the thick gloves and prevents spreading of chemicals in the surroundings through dirty gloves.

Example of a glove solution

Several gloves can be worn in layers in extremely soiling work to prevent the surroundings from getting dirty. The series of images depict the coating of a bathroom floor drain.

1. To coat the floor drain, long chemical protection gloves are put on first, followed by 2–4 thin vinyl gloves on top of them.

2. The coating is spread by hand onto the surface of the floor drain.

3. When the coating is completed, the topmost vinyl gloves are removed.

4. The glove is removed by grasping the wrist of the glove.

5. The glove is pulled off with one hand and placed in the coating residue.

6. The other glove is removed in the same manner as the first.

7. The coating residue is left to harden in the bucket and is appropriately disposed of.

8. The employee is left with gloves with which to continue their work.

The thick chemical protection gloves in the lowest layer are replaced at least once a day.

Occupational health services and epoxy work

Identifying exposed employees

Occupational health services should be aware of and identify the companies under their responsibility where epoxy chemicals are processed. In the construction industry, epoxy chemicals occur in, for instance:

- painting
- floor coating
- sewer pipe renovations
- tiling
- facade work
- glueing.

Workplace investigation

- In the workplace investigation, special attention is paid to skin hazards, protection and the safe use of chemicals.
- The risks of skin exposure are identified by, for instance, interviewing the employees and monitoring the work, spatter, wetting of the skin, surface contamination i.e. soiling, handling of tools, cleaning methods of the skin as well as the use, suitability and replacement rate of protective gloves.
- The workplace investigation utilizes the company's own risk assessment which should be available to the occupational health services staff. Both risk assessment and workplace investigations must be repeated in regular intervals to monitor mutually agreed measures, identify changing conditions, etc.
- In a workplace investigation, it is ensured that the occupational health services have an up-to-date list of the used chemicals and their safety data sheets that are a vital source of information when assessing the risk of illness.
- The occupational health services must take part in organizing first aid and ensure that the workplace and occupational health services are prepared for accidental exposure and chemical accidents with instructions and equipment (e.g. protective clothing, an eyewash bottle, respirators, absorption agents, first aid instructions).

Medical examinations

Epoxy coatings are strongly sensitizing to the skin, which means that epoxy coating is considered work that causes a particular risk of illness. Epoxy chemicals may also cause respiratory symptoms, rhinitis or asthma. This means that a comprehensive initial examination towards chemical hazards and inspections in regular intervals are required.

The occupational health physician must ensure that the employee understands the risks of handling epoxy products as well as the effects of skin sensitization on their ability to work. In the initial examination, it must be explained that coating work has to do with vital protective measures such as protecting the skin carefully, isolating epoxy work from other processes if possible and preventing surfaces from getting dirty.

In the examination, it is ensured that the employee has been given appropriate orientation and protection instructions and that the workplace has chemical protection gloves suited for epoxy work. In the initial examination, the condi-

tion of the skin is checked and recorded and it is taken into account that employees with previous dermatitis are ill-suited to carry out work which strains the skin.

Those suffering from chronic respiratory diseases such as asthma or long-term rhinitis are ill-suited for work exposing the employee to substances that significantly irritate or sensitize the respiratory tract, such as compounds evaporating from coating chemicals and construction dust. The initial examination includes a spirometry with a bronchodilator test.

In the periodic health inspections, attention is paid to respiratory and skin symptoms with the use of, for instance, a questionnaire. The employees who have symptoms are called in for a clinical examination. If asthma is suspected, a spirometry with a bronchodilator test and a PEF workplace monitoring are carried out. If necessary, occupational disease examinations are initiated. A directed workplace investigation to the coating work target is recommended in connection with suspicion of occupational disease or the discovery of substantial symptoms in order to better assess the risk of illness and protection methods and, if necessary, recommend preventive measures to avoid further illnesses.

First aid in accidents

If the eye comes into contact with epoxy or other coating chemical, it is rinsed under running water for 15 minutes. After this, the employee must be taken to a doctor while continuing rinsing the eye.

If clothes come into contact with epoxy, they must be immediately removed and the skin underneath must be cleaned with a skin cleaning wipe intended for removing stains. After this, the skin is washed with water and soap. After thorough cleansing, the area is rinsed with plenty of water. Contact a physician if the exposed area of skin is large or if the skin is red, irritated or itchy.

Pregnant employees

The ability to carry out construction coating work must be assessed individually for each pregnant employee. Pregnant women must not be exposed to carcinogenic substances. The content of solvents in the air must not exceed 10% of the TLV TWA value.

Workplace counselling

The occupational health services must provide epoxy workplaces with information on the health hazards present at the work, protection against them, safe working practices, occupational diseases, occupational accidents, other work-related illnesses and their prevention.

The employer and employees must be provided with counselling, feedback and procedural suggestions on the basis of background information related to the field, workplace investigations and patient work.

The occupational health services take part in the occupational safety culture of the company and the development of the work environment with their own expertise.

Further information:

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Government Decree on the principles of good occupational health care practice, the content of occupational health care and the qualifications of professionals and experts 708/2013

PEF workplace monitoring instructions: www.ttl.fi/PEF

Stay healthy in epoxy coating work!
Epoxy coatings are used, for example, in floor and facade work as well as sewer renovations carried out with new coating methods. Allergy to epoxy compounds may develop as a result of just one chemical splash.

This folder contains information on sensitizing coating chemicals and instructions for safe work, risk assessment, prevention of contact eczema, selection of protective gloves and the orientation of new employees.

The information package is intended for the supervisors, employees and occupational health services of businesses carrying out construction coating work. The materials can be freely downloaded, copied and, for instance, laminated for the workplace wall. It can also be used in training events.

Image: StocPhotos

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