EPOXY
Tomorrow's technology, today

SAFE HANDLING OF EPOXY SYSTEMS

Guideline for the safe handling of epoxy resin systems in the construction and related industries

WHAT IS THIS BROCHURE ABOUT?

This guideline is designed to support people who use epoxy resin systems. Epoxy resin systems provide many unique technical advantages, which are unequalled by other materials. Therefore, they are used widely in various applications including the composite, building and construction industries.

Before curing, the components of epoxy resin systems may show hazardous properties, the main risk being via skin contact. However, they are safe to handle, provided that basic precautions are taken.

Epoxy resins are typically mixed with a hardener component before application. After application, a chemical reaction takes place producing an inert final material. The finished, hardened epoxy resin does not pose any health risk and offers superior performance.

This guideline describes common situations and possibilities of contact with epoxy systems, and offers information for the safe handling of these products. The information is designed to support craftsmen, business managers, safety and education managers in the selection and provision of suitable organisational, technical and personal safety tools and procedures. The brochure also provides helpful information for workers using the products. However, the guideline cannot replace the specific safety instructions given for each product on its safety data sheet (SDS), which must always be respected in full.

This brochure is provided by the Epoxy Resins Committee of PlasticsEurope. Institutes for safety at work, professional craft associations, the construction industry, regional and national authorities and experts from the chemical industry have been consulted in its development. The common goal is to prevent incidents of health problems and to support the continued safe use of epoxy systems in all applications.

Epoxy resin systems are perfectly safe to handle, provided that basic precautions are taken.

CHARACTERISTICS OF EPOXY RESINS

WHICH PRODUCTS ARE USED?

This brochure mainly covers situations where the materials are handled at ambient temperature. This includes applications in the construction industry where two-component systems are used. Most products consist of an epoxy resin and a hardener.

Before use, both components have to be mixed in a defined ratio. Both the individual components, as well as the uncured mixture, may show hazardous properties and can produce irritating or sensitising effects. However, taking the right precautions they can be handled safely and easily.

Modern two-component systems provide the correct ratio of component and enable easy use.

WHAT ARE THEIR PROPERTIES?

While uncured epoxy resins show certain hazardous properties (described frequently in this document), cured epoxy resins are not a health risk and provide outstanding properties. They show excellent adhesion and mechanical properties, as well as corrosion protection and chemical resistance.

WHERE ARE THEY USED?

The main areas for application of epoxy resins in the construction industry are coatings, adhesives, flooring (e.g. industrial floors and multi-level car parks), concrete restoration, crack repair and as joint material for tiles. In addition, they are widely used in electrical, electronics, aerospace, automotive, sports goods and other high performance applications.

BEFORE WORKING WITH EPOXY SYSTEMS

READ SAFE HANDLING INSTRUCTIONS AND UNDERSTAND THE CHEMICAL PROPERTIES

For both the resin component and the hardener component individual safe handling instructions exist, making the user aware of potential health problems in case of unsuitable exposure.

The classification and labelling points out to the user that the components of the uncured system contain substances which may have irritating or sensitising effects, especially in direct contact with skin or mucous membranes.

In addition, many components are classified with the symbol "Environmental Hazard".

WHICH CONTACT SITUATIONS CAN OCCUR?

Potentially hazardous everyday situations in the use of the components of uncured epoxy resins include transport and storage of containers, metering and mixing of components, spreading, scraping, rolling, spraying and injecting the epoxy resin system, cleaning the tools and disposal of empty containers and waste materials. Unintended contact situations with epoxy resin components occur mainly when the user is inappropriately protected, when he is not attentive or works with unsuitable tools. The following situations should be avoided:

- skin or eye contact through spray or spilling
- dirty/soaked clothes, shoes, gloves
- contaminated handles of tools
- unintended chemical reaction through wrong metering or using the wrong components
- inhaling fumes

After curing the epoxy resins are inert plastics. Direct contact of skin to properly cured epoxy resins does not constitute any health risk.

WHICH KINDS OF EFFECTS CAN APPEAR?

People don't react equally. Some users are less susceptible to sensitising properties, for others a few short contacts are sufficient to produce an allergic reaction.

Typical symptoms for such an allergic reaction include reddened or swollen skin areas or eyes, skin damage or allergic contact eczemas.

In general direct contact with the individual components or uncured mixtures must be avoided. This guideline and the safety instructions provided with each product explain how to avoid exposure.

When taking off used gloves, the skin must not come into contact with the dirty glove: with this "inside-out technique" the dirty side remains inside and the gloves can be safely disposed of.

BEFORE WORKING WITH EPOXY SYSTEMS

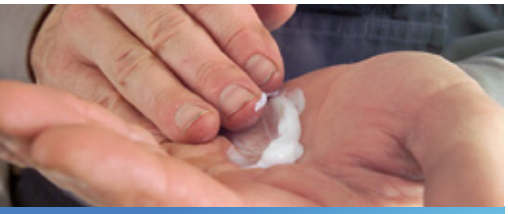
MANAGER'S RESPONSIBILITIES

When potentially hazardous chemicals such as epoxy systems are used, one of the tasks of management is to inform and train its employees regarding the safe handling of these products. Appropriate personal protective equipment must be used. Regular participation of employees in education and safety training is an essential element. The potential hazards, as outlined in the Safety Data Sheets, must be communicated and understood by all workers who may come into contact with the materials. Management´s responsibilities include e.g.:

- the development and display of appropriate operating instructions
- the provision of First-Aid-Kits
- the installation of safety equipment such as eye showers
- ensuring the availability of adequate washing
- and changing facilities

USER'S RESPONSIBILITY: SKIN PROTECTION, SKIN CARE

Before starting work with epoxy systems, exposed areas of the skin, which are not covered by other pro-tective means, e. g. gloves, should be protected with a protective skin cream. Such areas include e. g. face, lower arms and legs. Products without any abrasive ingredients or solvents should be used to clean the skin. After work, the skin should be treated with a cream to support moisturising and regeneration.



Suitable creams provide skin protection and skin care.

PERSONAL SAFETY PROTECTION

In addition to all appropriate organisational and technical measures, the use of personal protective equipment, which must be cleaned and replaced regularly, is essential. Shoes and gloves must be suitable and in good condition. All parts of the body potentially exposed to epoxy systems must be protected with adequate clothing or safety equipment. A comprehensive personal safety protection kit for working with epoxy systems contains:

- **suitable protective gloves** made from nitrile or butyl rubber with fully coated back; note: leather and latex gloves are generally not suitable as they are permeable for the substances and become easily soaked
- **eye and face protection,** e.g. safety glasses, protective goggles, face visor
- **single-use disposable safety overall/trousers/ spats**
- **protective apron,** e.g. for mixing
- **knee protection**
- **breathing protection** where necessary, e.g. when spraying in enclosed areas (please consult also the SDS for more specific information)

If products containing solvents are used, a mask with an appropriate filter, e. g. A-type filter, should be used. With spray applications a combination filter, e. g. an A1-P2 type, is required.

The personal safety protection equipment is the most important basis for safe work with epoxy resin systems.

SAFE HANDLING OF EPOXY SYSTEMS

TRANSPORT AND STORAGE

Guidelines for the transport of epoxy system components are provided by the supplier and must be followed. The components should be stored in sealed containers in a cool and dry place, which is designated as a material storage area. The containers must not be stored in unsuitable places, such as restrooms, or temporary accommodation on the building site.

METERING

Optimal dosages of the components are provided by ready-to-use combi-packages, where the correct resin/hardener ratio is already delivered. Where the application of such systems is not possible, the use of technical metering and mixing systems is advisable, e.g. the use of drum pumps with flow meters, large containers with taps and flow meters or a drum tipper. It is of critical importance, that separate metering devices are being used for each component of the uncured resin system to avoid unintended starting of the curing reaction. While for the sake of easy management, producers define mixing ratio by volume, occasionally metering by weight still needs to be done. Again, components need to be weighted separately before having them mixed.

MIXING

The main goal is to prevent such splash or spillage from spreading to the surrounding areas. Specially designed equipment can substantially reduce the potential exposure to unintended splashing or spilling upon mixing. The following equipment should be used to minimise any risk:

- mixers with variable speed control
- suitable mixing tools (according to the information of the manufacturers)
- protective lid with a hole for the mixer
- mixing stations (for larger amounts of material)
- forced action mixer
- static mixer especially for crack injection

Legs and feet should always be covered properly to prevent any potential splashes getting onto the skin.

SPREADING THE MATERIAL

In all areas of application, suitable pail carriers should be used to pour the uncured liquid epoxy system onto the floor and spread it safely.

SAFE HANDLING OF EPOXY SYSTEMS

SCRAPING, ROLLING, BRUSHING, SPRAYING

The processing of epoxy systems can be made safer by following a few simple measures. For example, using a scraper instead of a palette knife substantially increases the safety distance against splashes. When using a roller, it should be equipped with a splash protector. For spray applications good air circulation must be provided.

When applying the liquid system, always protect armsand legs, work calmly, use asplash protector...

CLEANING OF THE TOOLS

For one´s own safety and for the safety of colleagues, tools, and especially their handles, must be cleaned after use. The cleaning can be carried out by scraping off residual material and/or by using cleaning detergents that are recommended by the producer. Cleaning detergents for tools must never be used on the skin.

...and have ample distance between the liquid and the skin.

WASTE DISPOSAL

Uncured epoxy resins shouldn't be disposed or – if necessary – disposed in compliance the local laws (please consult also the SDS for more specific information). Cured epoxy resins can usually be disposed of as normal building waste, but expert advice should always be sought to ensure compliance with local regulations. Single-use containers should be emptied and disposed of properly, bearing in mind that they may still contain residue.

INJECTION

Careful and exact handling and management of the equipment is of particular importance with this application. This means e.g.:

- preferably, use of two-component metering and mixing equipment
- use of suitable high pressure joints and connections
- permeability check with compressed air careful placement of the injection head
- vent placement at the sealer
- do not squeeze, bend or drive over hoses

PREVENT RELEASE TO THE ENVIRONMENT

Uncontrolled disposal of uncured resins does not only leave the workplace in awful appearance, but also causes harm to our environment. Liquid epoxy resins and some reactive diluents are not readily biodegradable, although its epoxy functional groups are hydrolysed in contact with water, they have the potential to bio-accumulate and are moderately toxic to aquatic organisms.

FIRST AID

Please refer to the manufacturer´s safety data sheets.
General recommendations normally include:

In case of eye contact: turn the head to the side of the contaminated eye and wash immediately for some time with clean running water (eye shower, 10-15 min), seek medical attention.

In case of skin contact: immediately remove contaminated clothes, wash the affected areas carefully under running water, possibly use a suitable skin cleanser; cover potential lesions with sterile material (First Aid Kit), in case of severe contamination seek medical attention.

Inhalation: move the person immediately into fresh air, provide air circulation, seek medical attention.

Ingestion: drink plenty of water, do not induce vomiting, seek medical attention.

BASICALLY IN ALL CASES, IN ADDITION TO THE FIRST AID MEASURES INFORM YOUR SAFETY ADVISOR AND/OR A DOCTOR

HELPFUL LINKS

www.epoxy-europe.eu

LEGAL DISCLAIMER

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