

M5-EN.4. HAZARDOUS SUBSTANCES

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Short description of the section:

In this section examples of typical **hazardous substances** **##G16##** that a driver of a land transportation company is subject to are presented and analyzed.

The **goal** of this section is:

- Present classification of hazardous substances;
- Distinguish factors that may have effect on human health;
- Distinguish the most specific types of hazardous substances that a driver of a land transportation company is subject to;
- Present examples and descriptions of these risk factors;
- Give recommendations for work safety measures.

Material of this section will assist the employee, the employer and the company owner in adjusting recommendations for determining hazardous substances, selecting ways of prevention and safety measures for himself and his company.

M5.4.1.jpg

M5-EN.4.1. Classification of hazardous substances

Hazardous chemical substances and preparations are classified on the basis of physical and chemical features and fall into one of the following categories:

- Explosive;




- Oxidizing ;
- Highly flammable;
- Flammable;
- Combustible.





Hazardous chemical substances may also be classified by harm to human health and to environment:

- Very toxic;
- Toxic;
- Harmful;
- Corrosive;
- Irritant;
- Sensitizing;
- Carcinogenic;
- Mutagenic;
- Toxic to reproduction;
- Harmful to environment;
- Harmful to ozone layer.

M5-EN.4.2. Labelling of hazardous substances

Containers of hazardous substances carry the following labels:

		Very toxic or toxic
		Corrosive (mordant)
		Harmful to environment

		Explosive
		Flammable or highly flammable
		Irritating or harmful
		Oxidizing

M5-EN.4.3. Major risk factors having influence on employee health

The following factors related with chemical substances can have an adverse effect on employee health

- **Harmfulness** of chemical substances identified by chemical characteristics;
- **Amount** of hazardous substances in ambient air which may be inhaled or get onto the skin or into the eyes;
- **Dustiness and volatility** of hazardous chemical substances.

Danger to human beings arises when:

- Hazardous substances are inhaled or get in contact with the skin;
- The skin or mucous is in direct contact with hazardous substance;
- During accidents (fire, explosion) when hazardous substances are released.

Hazardous chemical substances may have different adverse **effect on human beings**. Some of them cause cancer; others have negative effect on reproduction or cause foetus development defects. Other substances may affect brain activity, nervous system, eyesight, lungs, cause asthma and skin illnesses. Both short-time contact and long-time accumulation of hazardous substances in human body may be harmful to health.

M5-EN.4.4. Gas, safety measures

In the assessment of the manifestation of gas as a risk factor the following shall be **inspected and identified**:

- Is inhalation of toxic gas (e.g. CO) prevented?
- Are solids (e.g. diesel scum) suspended?
- Is negative impact of smoking inside the cabin eliminated?
- Are hazardous substances removed from the new vehicle's cabin interior materials?
- Are hazardous substances transported in a safe manner (e.g. reserve containers or gas cylinders)?
- Are rules of driving with the rear door closed (in box-van trucks) always observed?

Impact on human health. Poisoning with carbon black (CO), resulting from incomplete burning of fuel such as gasoline, kerosene, oil, propane, coal, or wood, first of all affect the central nervous system. Initial symptoms of CO poisoning may include headache, fatigue, dizziness, drowsiness, or nausea. During prolonged or high exposures, symptoms may worsen and include vomiting, confusion, and collapse in addition to loss of consciousness and muscle weakness, the face becomes pink and the person loses consciousness and suffocates.

The following **safety measures** are recommended to avoid negative effect of gas:

- Give instructions;
- Prevent penetration of toxic gas (e.g. sensor operated valve);
- Install active carbon filters, mechanical blocking and switches in circulating air input;
- Regulate smoking inside the cabin;
- Install proper transportation equipment or auxiliary means;
- Supply the driver with hauling documents;
- Drive with the loading door closed;
- Use **personal protective equipment**.

M5-EN.4.5. Vapour, safety measures

In the assessment of the manifestation of **vapour** as risk factor the following shall be **inspected and identified**:

- Is inhalation of poisonous fume prevented?
- Is formation of vapour from cooling liquids, fuel or washing liquids prevented?
- Are hazardous substances removed from the new vehicle's cabin interior materials?
- Are hazardous substances transported in a safe manner?
- Are rules of driving with the rear door closed (in box-van trucks) always observed?

Impact on human health. Small concentrations of petrol vapour irritate eyes and respiratory system, cause drowsiness and dizziness.

The following **safety measures** are recommended to avoid negative effect of vapour on human health:

- Identify hazardous substances;
- Suck the vapour in the place where it is generated;
- Prepare working instruction;
- Install active carbon filters, mechanical blocking and switches in circulating air input;
- Supply the driver with hauling documents;
- Install proper transportation equipment or auxiliary means;
- Drive with the rear loading door closed;
- Protect respiratory system and skin with **personal protective equipment**:

M5-EN.4.6. Aerosols, liquids, safety measures

In the assessment of the manifestation of **aerosols and liquids** as risk factors the following shall be **inspected and identified**:

- Is inhalation of poisonous aerosols prevented?
- Is exhaust gas emission prevented?
- Are acids and alkali kept in crushproof containers?
- Is safe charging of batteries ensured?
- Is skin contact with fuel, washing liquid or battery acid prevented
- Are hazardous substances transported in a safe manner?
- Are rules of driving with the rear door closed (in box-van trucks) always observed

Impact on human health. Acids and alkali may cause chemical burns. Contact with liquid fuel irritates skin and eyes.

The following **safety measures** are recommended to avoid negative effect of aerosols and liquids on human health:

- Prepare working instruction;
- Install solid substances' filters in the vehicle's ventilation/air conditioning system;
- Install proper transportation equipment or auxiliary means;
- Supply the driver with hauling documents;
- Keep the loading door closed;
- Use appropriate **personal protective equipment** and eye washers;

M5-EN.4.7. Personal protective equipment

M5-EN.4.7.1. Types of personal protective equipment

Personal protective equipment (PPE) is the last barrier between the hazardous substance and the employee. PPE is used in the following cases:

- When collective and organizational preventive and safety measures are not sufficient or technically inefficient.
- When appropriate collective and organizational preventive and safety measures cannot be implemented immediately, then PPE serve as a temporary solution.
- In single cases or in such cases when the installation of permanent safety measures is not feasible, provided that the use of PPE guarantee the same level of safety as permanent safety measure would provide.
- In emergency, rescue or saving situations.

Types of personal protective equipment:

- Equipment protecting respiratory system (filtering visor, half-mask, full face-piece, self-contained breathing apparatus) ;
- Eye protecting equipment (face-shield, goggles, safety glasses);
- Skin protecting equipment (gloves, chemical-resistant suits or coveralls)

M5-EN.4.7.2. Protective clothing

Hazardous substances pose spontaneous inflaming or explosion hazard, therefore protective clothing should be worn to prevent the risk of inflaming of explosive mixture present in the ambient air caused by sparkles generated by electric arc, static discharge or impact. In such cases special Electro Static Discharge (ESD) protection clothing is required. Such clothing prevents from generating ESD sparkles which may cause spontaneous inflaming or explosion.

However, it should be noted that ESD protection clothing will not give full protection if regular clothes, such as coats, vests etc. are worn on top. The type of clothes worn under ESD protection clothing is not very important, however the mandatory requirement is that ESD protection clothing shall have full contact with the skin in the neck and wrists area. Flame retardant clothing (resistant to short-term contact with flame) is required while working in the environment with potential exposure to hazardous substances.

However, it should be noted that not only the fabrics but also the models is important for this type of clothing. If the model of your apparel does not meet the requirements for this category of protective clothing, such clothes will not give full protection against potential hazards.



Anti-static clothing shall carry a CE sign and an icon with respective EN numbering: LST EN 1149-1
Flame retardant clothing shall carry a CE sign and an icon with respective EN

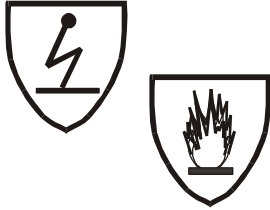


numbering:

LST EN 531 A or at least one of the three: B1, C1, D1, E1

LST EN 470-1

Anti-static and flame retardant clothing shall carry a CE sign and an icon with respective



EN numbering: LST EN 1149-1, LST EN 531 A and at least one of the three: B1, C1, D1, E1 LST EN 470-1

M5-EN.4.8. Delivery of hazardous cargo

Carriage of dangerous goods by road is regulated by the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) signed in Geneva in 1957. At present 40 countries are parties of this Agreement.

In general meaning dangerous goods are dangerous articles and substances that may cause harm to people, the environment or property.

The carrier shall ensure that the drivers delivering dangerous goods hold a certificate confirming that they have the required qualifications and skills to carry dangerous goods as per ADR requirements, shall be liable for the suitability of the vehicle and equipment necessary to carry dangerous goods, shall provide the driver with information on routes along which carrying of dangerous goods is forbidden or recommended. The driver shall check if the consignor of dangerous goods has submitted all documents, namely shipping documents, sender's declaration, written instruction (or instructions in case of international carriage). The carrier is also responsible for vehicle labelling, safety of equipment in the vehicle and for the construction and testing of packaging.

M5-EN.4.9. Labelling of vehicles carrying hazardous goods

Vehicles are marked with:

- orange-coloured plates
- orange-coloured plates with numbers
- big hazard warning diamonds
- other hazard warning signs

Orange-coloured plate and affixing of the plate:

- orange-coloured
- reflective
- dimensions at least 40x30 cm (may be reduced down to 30x12 cm)
- black-bordered, rim width up to 15 mm
- affixed on at the front and the other at the rear of a transport unit

Orange-coloured plate with numbers:

- orange-coloured



- reflective
- dimensions at least 40x30 cm
- black-bordered, rim width up to 15 mm
- black figures, 10 cm-high
- hazard identification number inscribed at the top of the plate
- prescribed UN number inscribed at the bottom of the plate
- After 15-minute engulfment in fire hazard identification number and UN number shall remain legible.
- affixed on both sides of the tank vehicles, battery vehicles or transport units having one or more tanks carrying dangerous goods; on both sides of each tank containing dangerous solid bulk substances; they may also be affixed one at the front and the other at the rear of a transport unit.

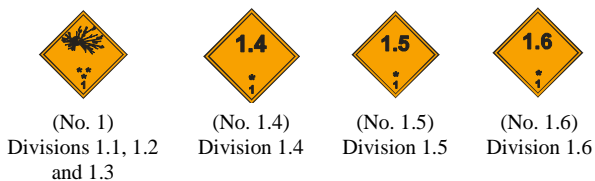
The hazard identification number consists of two or three figures. In general, the figures indicate the following hazards:

- 2 Emission of gas due to pressure or to chemical reaction
- 3 Flammability of liquids (vapours) and gases or self-heating liquid
- 4 Flammability of solids or self-heating solid
- 5 Oxidizing (fire-intensifying) effect
- 6 Toxicity or risk of infection
- 7 Radioactivity
- 8 Corrosivity
- 9 Risk of spontaneous violent reaction (including the potential risk following from the nature of a substance of a risk of explosion, disintegration and polymerization reaction following the release of considerable heat or flammable and/or toxic gases).

Doubling of a figure indicates an intensification of that particular hazard. Where the hazard associated with a substance can be adequately indicated by a single figure, this is followed by a zero. If a hazard identification number is prefixed by the letter "X", this indicates that the substance will react dangerously with water. For such substances, water may only be used by approval of experts.

Specimen labels:

CLASS 1 HAZARD Explosive substances or articles



CLASS 2 HAZARD Gas



(No. 2.1)
Flammable gases

(No. 2.2)
Non-flammable,
non-toxic gases

(No. 2.3)
Toxic gases

CLASS 3 HAZARD
Flammable liquids



(No. 3)

CLASS 4.1 HAZARD
**Flammable solids, self-reactive
substances and desensitized explosives**



(No. 4.1)

CLASS 4.2 HAZARD
**Substances liable to
spontaneous combustion**



(No. 4.2)

CLASS 4.3 HAZARD
**Substances which, in contact with
water, emit flammable gases**



(No. 4.3)

CLASS 5.1 HAZARD
Oxidizing substances



(No. 5.1)

CLASS 5.2 HAZARD
Organic peroxides



(No. 5.2)

CLASS 6.1 HAZARD
Toxic substances



(Nr. 6.1)

CLASS 6.1 HAZARD
Infectious substances



(Nr. 6.2)

CLASS 7 HAZARD
Radioactive material



(Nr. 7A)

Category I-White



(Nr. 7B)

Category II-Yellow

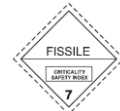


(Nr. 7C)

Category III-Yellow



(Nr. 7D)



(Nr. 7E)

Class 7 fissile material

CLASS 8 HAZARD
Corrosive substances



(Nr. 8)

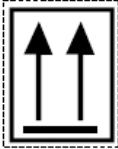
CLASS 9 HAZARD
Miscellaneous dangerous substances and articles



(Nr. 9)

Other hazard or warning signs:

Sign No. 11



Sign No. 11 shall be fixed on both opposite sides of the following packaging except for packaging of class 1 and class 7 substances:

- liquids in containers with lids invisible from outside;
- containers with ventilation vents or containers with ventilation vents without packaging;
- quenched liquefied gas.

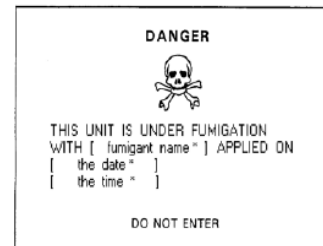
Substances carried under elevated temperature



Sign pursuant to IMDG code

Sea polluting substance

Fumigation warning sign



M5-EN.4.10. Self-study assignment

On the basis of information presented in this section draw a list of **hazardous substances** present in a typical driver's job in your company.

If the risk factor is defined by standard parameters, name the **regulations** related with the risk factor and **instructions** that have to be complied with.

Choose appropriate **measures (technical, organizational, personal) for elimination of risk factors** and determine whether **additional consultation of specialists** is required. If statutory acts provide for such (e.g., pursuant to legal acts on accident prevention), point that out.

Specify **who is responsible** for implementation of selected measures and when they must be implemented.

Fill in Table 5. You may use the template **##D5##**.

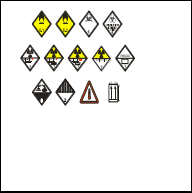


Table 5

Company:

_____ **Person in charge:**

Job:

Date:

Type of work, work equipment, workplace	Risk factors/ shortcomings/ loads (factor)	Factor related explanations and references	Regulations and working instructions	Measures: Technical, Organizational, Personal	Implementation (who) (when)