GHS hazard pictograms

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) is an internationally agreed-upon standard managed by the United Nations that was set up to replace the assortment of hazardous material classification and labeling schemes previously used around the world. Core elements of the GHS include standardized hazard testing criteria, universal warning pictograms, and harmonized safety data sheets which provide users of dangerous goods with a host of information. The system acts as a complement to the UN Numbered system of regulated hazardous material transport. Implementation is managed through the UN Secretariat. Although adoption has taken time, as of 2017, the system has been enacted to significant extents in most major countries of the world. This includes the European Union, which has implemented the United Nations' GHS into EU law as the CLP Regulation, and United States Occupational Safety and Health Administration standards.

The key elements for the labeling of containers under the GHS includes:

- an identification of the product
- one or more hazard pictograms (where necessary)
- a signal word – either Danger or Warning – where necessary
- hazard statements, indicating the nature and degree of the risks posed by the product
- precautionary statements, indicating how the product should be handled to minimize risks to the user (as well as to other people and the general environment)
- the identity of the supplier (who might be a manufacturer or importer)

Hazard pictograms form part of the international Globally Harmonized System of Classification and Labeling of Chemicals (GHS). Two sets of pictograms are included within the GHS: one for the labeling of containers and for workplace hazard warnings, and a second for use during the transport of dangerous goods. Either one or the other is chosen, depending on the target audience, but the two are not used together. The two sets of pictograms use the same symbols for the same hazards, although certain symbols are not required for transport pictograms. Transport pictograms come in wider variety of colors and may contain additional information such as a subcategory number.

The GHS chemical hazard pictograms are intended to provide the basis for or to replace national systems of hazard pictograms.

The GHS transport pictograms are the same as those recommended in the UN Recommendations on the Transport of Dangerous Goods, widely implemented in national regulations such as the U.S. Federal Hazardous Materials Transportation Act (49 U.S.C. 5101–5128) and D.O.T. regulations at 49 C.F.R. 100–185.

Physical hazards pictograms

Pictogram	Usage
 **GHS01: Explosive**	• Unstable explosives • Explosives, divisions 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 • Self-reactive substances and mixtures, types A, B • Organic peroxides, types A, B Further information: Explosive material e.g. azidoazide azide, TNT, chromyl chloride, nitroglycerin
 **GHS02: Flammable**	• Flammable gases, category 1 • Flammable aerosols, categories 1, 2 • Flammable liquids, categories 1, 2, 3, 4 • Flammable solids, categories 1, 2 • Self-reactive substances and mixtures, types B, C, D, E, F • Pyrophoric liquids, category 1 • Pyrophoric solids, category 1 • Combustible solids, category 3 • Combustible liquids, category 3 • Self-heating substances and mixtures, categories 1, 2 • Substances and mixtures, which in contact with water, emit flammable gases, categories 1, 2, 3 • Organic peroxides, types B, C, D, E, F Further information: Flammability e.g. acetone, methanol, generally most solvents.
 **GHS03: Oxidizing**	• Oxidizing gases, category 1 • Oxidizing liquids, categories 1, 2, 3 • Oxidizing solids, categories 1, 2, 3 Further information: Oxidizing agent e.g. sulfur dioxide, most halogens, potassium permanganate, nitric acid

GHS04: Compressed Gas

- Compressed gases
- Liquefied gases
- Refrigerated liquefied gases
- Dissolved gases
- e.g. liquid nitrogen, liquid oxygen, liquid helium

GHS05: Corrosive

- Corrosive to metals, category 1

Further information: Corrosive substance
Strong acids/bases (nitric acid, sodium hydroxide), calcium oxide, anhydrous zinc chloride **can** be corrosive

no pictogram required

- Explosives, divisions 1.5, 1.6
- Flammable gases, category 2
- Self-reactive substances and mixtures, type G (see HAZMAT Class 4 Flammable solids)
- Organic peroxides, type G

Health hazards pictograms

Pictogram

Usage

GHS06: Toxic

- Acute toxicity (oral, dermal, inhalation), categories 1, 2, 3
- e.g. Manganese heptoxide (fire diamond rating at health hazard is 4)

- Acute toxicity (oral, dermal, inhalation), category 4
- Skin irritation, categories 2, 3
- Eye irritation, category 2A
- Skin sensitization, category 1
- Specific target organ toxicity following single exposure, category 3
    - Respiratory tract irritation
    - Narcotic effects

Not used

GHS07: Harmful

- with the "skull and crossbones" pictogram
- for skin or eye irritation if:
    - the "corrosion" pictogram also appears
    - the "health hazard" pictogram is used to indicate respiratory sensitization

GHS08: Health hazard

- Respiratory sensitization, category 1
- Germ cell mutagenicity, categories 1A, 1B, 2
- Carcinogenicity, categories 1A, 1B, 2
- Reproductive toxicity, categories 1A, 1B, 2
- Specific target organ toxicity following single exposure, categories 1, 2
- Specific target organ toxicity following repeated exposure, categories 1, 2
- Aspiration hazard, categories 1, 2
- e.g. Chromium

no pictogram required

- Acute toxicity (oral, dermal, inhalation), category 5
- Eye irritation, category 2B
- Reproductive toxicity – effects on or via lactation

Physical and health hazard pictograms

Further information: Corrosive substance

Pictogram	Usage
 **GHS05: Corrosive**	• Explosives, divisions 1.5, 1.6 • Flammable gases, category 2 • Self-reactive substances and mixtures, type G (see HAZMAT Class 4 Flammable solids) • Organic peroxides, type G • Skin corrosion, categories 1A, 1B, 1C • Serious eye damage, category 1

Environmental hazards pictograms

Pictogram	Usage
 **GHS09: Environmental hazard**	• Acute hazards to the aquatic environment, category 1 • Chronic hazards to the aquatic environment, categories 1, 2 • Environmental toxicity, categories 1, 2
no pictogram required	• Acute hazards to the aquatic environment, categories 2, 3 • Chronic hazards to the aquatic environment, categories 3, 4

Transport pictograms

Class 1: Explosives

Pictogram	Usage
 **Divisions 1.1–1.3**	Explosives **Division 1.1**: Substances and articles which have a mass explosion hazard **Division 1.2**: Substances and articles which have a projection hazard but not a mass explosion hazard **Division 1.3**: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard *Note*: The asterisks are replaced by the class number and compatibility code
 **Division 1.4**	**Explosives** – Substances and articles which are classified as explosives but which present no significant hazard **Note**: The asterisk is replaced by the compatibility code
 **Division 1.5**	**Explosives** – Very insensitive substances which have a mass explosion hazard **Note**: The asterisk is replaced by the compatibility code
 **Division 1.6**	**Explosives** – No hazard statement **Note**: The asterisk is replaced by the compatibility code

Class 2: Gases

Pictogram	Usage
	**Flammable gases** – Gases which at 20 °C and a standard pressure of 101.3 kPa: • are ignitable when in a mixture of 13 percent or less by volume with air; or • have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.
Division 2.1	 Alternative sign
	**Non-flammable non-toxic gases** – Gases which: • are asphyxiant – gases which dilute or replace the oxygen normally in the atmosphere; or • are oxidizing – gases which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does; or • do not come under the other divisions.
Division 2.2	 Alternative sign
	**Toxic gases** – Gases which: • are known to be so toxic or corrosive to humans as to pose a hazard to health; or • are presumed to be toxic or corrosive to humans because they have an LC_{50} value equal to or less than 5000 ml/m^3 (ppm). e.g. hydrogen cyanide
Division 2.3	

Classes 3 and 4: Flammable liquids and solids

Pictogram	Usage
 **Class 3**	**Flammable liquids** – Liquids which have a flash point of less than 60 °C and which are capable of sustaining combustion  Alternative sign
 **Division 4.1**	**Flammable solids, self-reactive substances and solid desensitized explosives** – Solids which, under conditions encountered in transport, are readily combustible or may cause or contribute to fire through friction; self-reactive substances which are liable to undergo a strongly exothermic reaction; solid desensitized explosives which may explode if not diluted sufficiently
 **Division 4.2**	**Substances liable to spontaneous combustion** – Substances which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire e.g. manganese heptoxide
 **Division 4.3**	**Substances which in contact with water emit flammable gases** – Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities  Alternative sign

Other GHS transport classes

Pictogram	Usage
 **Division 5.1**	**Oxidizing substances** – Substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material
 **Division 5.2**	**Organic peroxides** – Organic substances which contain the bivalent –O–O– structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals  Alternative sign
 **Division 6.1**	**Toxic substances** – Substances with an LD_{50} value ≤ 300 mg/kg (oral) or ≤ 1000 mg/kg (dermal) or an LC_{50} value ≤ 4000 ml/m^3 (inhalation of dusts or mists) e.g. nearly everything that contains cyanide groups
 **Class 8**	**Corrosive substances** – Substances which: • cause full thickness destruction of intact skin tissue on exposure time of less than 4 hours; or • exhibit a corrosion rate of more than 6.25 mm per year on either steel or aluminium surfaces at 55 °C