

# Road transport of dangerous substances in Poland, their classification and labelling of vehicles

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## Summary:

Development of chemistry industry and increasing number of dangerous substances used in various domains of life creates a need for their transportation. Thanks to the evolution of automotive and transport industry frequency and speed of transport in the country raised. It is often performed via highly populated areas, which is caused by the lack of road infrastructure. The document presents binding classification of dangerous substances, labelling method for vehicles transporting dangerous substances and legal regulations defining correct transport methods for such substances.

**Key words:** dangerous substance, transport, labels.

The article 3 of the Natural Environment Protection Act of 27 April 2001 defines definition of dangerous substance. „Is understood as one or more substances or a mixture of substances which due to their chemical, biological and radioactive properties may, in case of improper handling, create a threat to human life or health or to natural environment; raw material, product, semi-product, waste, as well as a substance created in case of a failure can be a dangerous substance” [1].

Increasing road traffic, continuous densification of roads with vehicles and increase of the number of other road users generates higher risk of danger in case of road transport of dangerous goods compared to railroad transport. Moreover, this results from considerably higher variety of transported materials by road. Substances which railroad transport does not want to carry are

performed by road transport. Increasing number of transported dangerous goods, as well as lack of efficient monitoring of transport propel unfair carrier companies. Grey market of dangerous material transport is incredibly difficult to uncover as mapped out and properly signed routes via which transport is executed are missing. Unfair carrier companies do happen to avoid effective control via intentional concealment of hazard resulting from transport of dangerous goods. In such case, prevention against uncontrolled release of dangerous substance is practically impossible. Transport of dangerous substances with the use of road means of transport which are in poor technical condition increases a risk of traffic collision. However, if transport is not made via roads away from towns and cities, ring roads the results of traffic collisions could have much further consequences than damaged means of transport and driving difficulties.

Safety first – although it seems natural we still encounter cases of breaking the international law of the ADR Agreement concerning the International Carriage of Dangerous Goods by Road, despite the fact that Poland has ratified the agreement 35 years ago.

Thereunder, in order to constantly increase awareness of dangerous materials transport users, as well as to reduce the number of and prevent uncontrolled release of these materials, questions of road transport in Poland are regulated by the European Agreement concerning the International Carriage of Dangerous Goods by Road. It is a European agreement on international transport of dangerous substances concluded on 30 September 1957 in Geneva under the auspices of the United Nations Economic Commission for Europe. It came into force on 29 January 1968. The agreement itself is quite short and simple, whereas the key is defined in the second article which states that apart from excessively dangerous goods other dangerous goods can be transported internationally in road vehicles, under condition that it is performed in compliance with:

- conditions defined in the Attachment A on dangerous goods, in particular in reference to packaging and labelling;
- conditions defined in the Attachment B, in particular on the scope of construction, equipments and maintenance of vehicles transporting dangerous goods [2].

From the time the ADR Agreement came into force, the A and B Attachments are regularly supplemented and updated. The latest changes came into force on 1 July 2009. Poland has ratified the agreement in 1975. Nowadays 46 countries has concluded the ADR convention [3].

Polish legislation includes provisions which aim at defining liability for transport, as well as explanation of difficult questions which result in increased awareness and safety of transport users.

The last table includes the list of fines for dangerous goods transport users in case of „road transport violation of provisions on road transport of dangerous goods,”<sup>4</sup> with the division to violation related to: required documents, transport method, vehicles, packaging and other

**Table 1:** Acts and orders regulating road transport of dangerous goods.

No.	Binding since	Description of an act or order	Official Journals of Laws
1.	28.10.2002	Road transport of dangerous goods.	Dz. U. Nr 199, poz. 1671, z późn. zm.
2.	23.12.2002	License for use of vehicles to transport some dangerous goods.	Dz. U. Nr 237, poz. 2011, z późn. zm.
3.	23.12.2002	Remuneration for members of exam commission appointed by the entity running additional training courses for drivers transporting dangerous goods.	Dz. U. Nr 237, poz. 2012
4.	14.08.2003	Parking lots on which vehicles carrying dangerous goods are transferred.	Dz. U. Nr 161, poz. 1567
5.	15.09.2005	Additional training courses for drivers transporting dangerous goods.	Dz. U. Nr 187, poz. 1571
6.	26.09.2005	Obtaining a certificate of advisor for safety in the scope of road transport of dangerous goods.	Dz. U. Nr 200, poz. 1654
7.	29.09.2005	Check list sheet.	Dz. U. Nr 201, poz. 1667
8.	7.10.2005	A template of annual report from activity in the scope of road transport of dangerous goods and filling in instructions.	Dz. U. Nr 207, poz. 1733
9.	4.06.2007	Dangerous goods which must be reported if transported by road.	Dz. U. Nr 107, poz. 742
10.	19.12.2002	The scope and use of provisions on road transport of dangerous goods.	Dz. U. Nr 236, poz. 1986
11.	29.07.2005	Amendment of the Act on road transport and other Acts.	Dz. U. Nr 180, poz. 1497

Source: <http://piechocinski.blog.onet.pl/0-przewozach-towarow-niebezpie,2,ID393573965,n;> accessed on 23/03/2010.

violations. Companies transporting dangerous goods must be aware that fines for irregularities during transport are summed up. Therefore, practicing one element is not enough. In order to make transport of dangerous goods efficient and harmless, the companies organising such transport should comprehensively train every aspect affecting safety of transport users, as well as safety of residents in areas via which such transport is performed. Luckily, an increasing number of users being aware of inevitability of fine allows

to reduce negative result of uncontrolled releases of dangerous goods.

### Dangerous goods classification

Polish dictionaries define the notion of class as „systematic division of items, (...) according to some method on classes, sections and divisions”[5]. Dangerous substances, according to the international ADR convention, have been divided to 13 classes (Table 2:

**Table 2:** The classes of dangerous goods.

Class number	Dangerous material type
1	Explosive substances and articles
2	Gases
3	Flammable liquids
4.1	Flammable solids, self-reactive substances and solid desensitized explosives
4.2	Substances liable to spontaneous combustion
4.3	Substances which, in contact with water, emit flammable gases
5.1	Oxidizing gases
5.2	Organic peroxides
6.1	Toxic substances
6.2	Infectious substances
7	Radioactive material
8	Corrosive substances
9	Miscellaneous dangerous substances and articles

Source: S. M. Zielińska, *Klasyfikacja materiałów niebezpiecznych*, in: S. M. Zielińska, S. Zelen: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, p. 14.

Dangerous substances has been assigned to individual classes according to dominant threats. Every dangerous material of all classes received identification UN number. The number can refer to single entries, generic entries, specific entries not otherwise specified (n.o.s.) and general entries n.o.s.. Entries for well defined substances or articles, including substances covering several isomers e.g. UN 1090 ACETONE.

Four types of entries are recognised: for single entries, generic entries, specific entries not otherwise specified (n.o.s.) and general entries n.o.s..

Single entries for well defined substances or articles including substances covering several isomers e.g. UN 1090 ACETONE, UN 1104 AMYL ACETATES.

Generic entries refer to groups of substances and articles which have been well defined and which do not belong to the not otherwise specified entries e.g. UN 1133 ADHESIVES, UN 1266 UN 1266, UN 3101 UN 1266.

Specific entries n.o.s.: groups of substances and articles which have defined chemical properties or have technical nature n.o.s. e.g. UN 1477 NITRATES, INORGANIC, N.O.S., UN 1987 ALCOHOLS, N.O.S.

The last group of general entries n.o.s. covering a group of substances or articles having one or more dangerous properties, not otherwise specified, e.g.: UN 1325 FLAMABLE SOLID, ORGANIC, N.O.S., UN 1993 FLAMABLE LIQUID, N.O.S. 6.

Dangerous goods from all classes, excluding class 7, are labelled with alphanumeric codes. Classification code for class 1 comprises the number adequate to the subclass and a letter adequate to compliance. In case of other classes the letters

**Table 3:** The symbol of hazard generated by individual dangerous materials.

Symbol	English	Polish
A	Asphyxiant	Duszące
O	Oxidizing	Utleniające
F	Flammable	Palne
F	Toxic	Trujące
C	Corrosive	Żrące
D	Desensitized (explosives)	Odczulone ( materiały wybuchowe)
SR	Self-Reactive	Samoreaktywne
S	Spontaneous Combustion	Samozapalne
W	Water – Reactive	Reagujące z wodą
P	Organic Peroxides	Nadtlenki organiczne
I	Infectious	Zakaźne
M	Miscellaneous	Różne

Source: S. M. Zielińska, *Klasyfikacja materiałów niebezpiecznych*, in: S. M. Zielińska, S. Zelen: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, p. 15.

used refer to relevant hazards (from the first letter of English names):

Letters followed by numbers mean division within the class in the scope of hazards indicated by the same letters e.g. CF1 corrosive material, flammable, liquid, whereas CF2 – corrosive material, flammable, solid” [6].

Utmost care should be paid to remember that every dangerous material which is to be transported must always be classified. „The classification procedure is to assign a relevant entry of the numerical list to the material designed for transport or optional, to state that the material is not dangerous and does not correspond to any entry from the list” [6].

Bodies responsible for classification of dangerous goods in Poland: National Atomic Energy Agency – radioactive materials and Institute of Industrial Organic Chemistry – other classes. Classification procedure is performed on the application of an interested party e.g. the owner of a manufacturing plant.

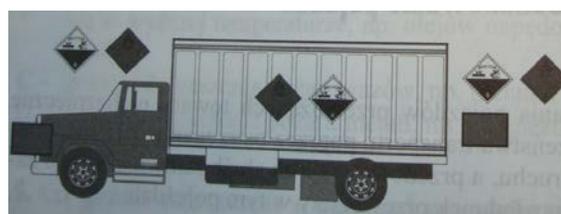
## Labelling of vehicles

Correct labelling of vehicles transporting dangerous materials is a must if we want to increase the level of safety via informing, as well as warning for traffic users, including emergency services such as fire brigades, which then can efficiently help in case of dangerous substance release.

Every vehicle transporting dangerous goods should be equipped with two orange plates. Plates should be visible, one on the front and one at the back of the vehicle. Some transporting vehicles should also have warning labels attached.

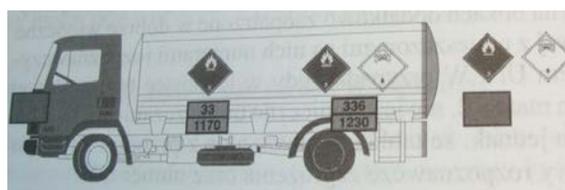
If a vehicle carries pieces of a dispatch then it should only be labelled with orange plates without hazard identification numbers; additional warning labels are not required on the vehicle. However, if a piece of a dispatch is transported in containers, the carrier company must label the container with warning labels. The container should be labelled on the front and at the back with orange plates and warning labels on sides.

Transport units with a tank or tankers which are used for transport of dangerous materials should



**Figure 1:** Example of correctly labelled vehicle with container which contains pieces of a dispatch with dangerous materials.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 66.



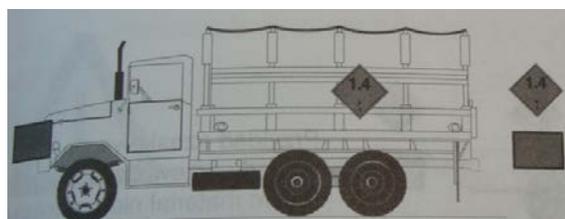
**Figure 2:** Example of correctly labelled tanker.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 66.



**Figure 3:** Example of correctly labelled tanker carrying only one dangerous substance.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 66.



**Figure 4:** Example of correctly labelled vehicle carrying explosive substances.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 69.

be labelled with warning plates which would not have hazard identification numbers on the front and at the back.

If a tanker carries only one dangerous good then the vehicle should be labelled with orange plates including hazard identification numbers – front

and back. In such case there is no need to place labels on sides of a vehicle.

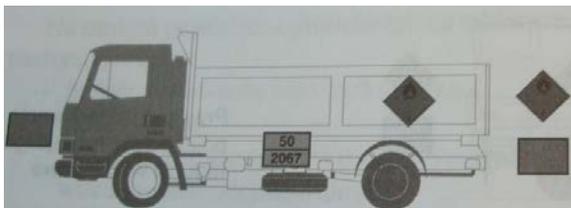
Every tanker should be equipped with a metal plate permanently affixed to the vehicle in place accessible for inspection. The plate should include permanently inscribed data on: type approval number, manufacturer name or trademark, manufacture number, year of manufacture, etc. [6].

Every vehicle carrying explosive substances from class 1 should be labelled with warning plates and labels which correspond to labels previously placed on pieces of the dispatch(s) including explosive substances. Labels should be placed at the back and on sides of the vehicle.



**Figure 5:** Example of correctly labelled vehicle carrying radioactive materials.

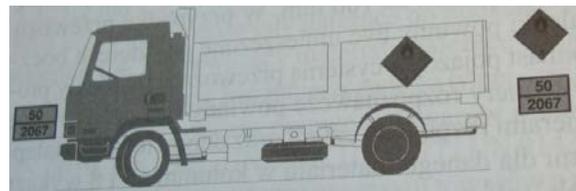
Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 69.



**Figure 6:** Example of properly labelled vehicle carrying unfixed dangerous material.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 70.

Every transporting unit carrying radioactive materials from class 7 should be labelled with orange warning plates and labels number 7D placed on both sides and at the back of the vehicle. If radioactive material is transported in a container, every side of it should be relevantly labelled. However, in case of transport of such materials with the use of a unit with a tank, the vehicle should be labelled with plates with hazard identification number and warning labels. The labels should be placed at the back and on sides of the tank, whereas in case of transport in a container-tank labels should be placed on all sides of the container.



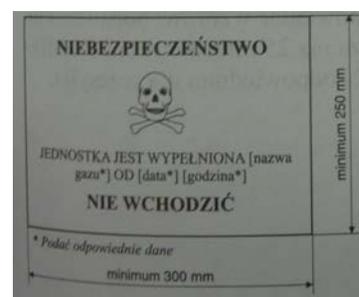
**Figure 7:** Example of correctly labelled vehicle carrying unfixed dangerous material.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 70..



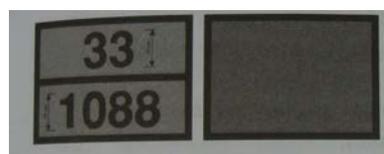
**Figure 8:** Example of correctly labelled vehicle carrying dangerous material of increased temperature.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 71



**Figure 9:** Example of a warning sign placed on a vehicle or a container which was filled with gas.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 71.



**Figure 10:** Warning plates.

Source: S. M. Zielińska, Oznakowania pojazdu, w: S. M. Zielińska, S. Zelent: ADR 2009, Ośrodek doradztwa i doskonalenia kadr Sp. z o. o., Gdańsk 2008, page 73.

Vehicles or containers carrying unfixed dangerous materials should be equipped with orange plates without hazard identification number placed on the front and at the back of the vehicle. Moreover, such vehicles should have orange plates with relevant hazard identification number on sides.

Side labelling of a vehicle is not required if the vehicle carries only one dangerous material. In

such case orange plates with hazard identification numbers should be affixed on the front and at the back of the vehicle.

Vehicles carrying unfixed dangerous materials should be additionally equipped with relevant labels placed on sides of the vehicle.

Tankers, portable tanks, containers, container-tanks and other vehicles transporting dangerous materials of increased temperature class 9 should be equipped, apart from reflective plates and warning labels, with relevant signs in the shape of a triangle. Such sign should be placed on sides and at the back of the vehicle. Container-tank vehicles and portable tanks are special as they should also have the sign placed on the front.

Every vehicle and container which was previously filled with gas should be visibly labelled with a warning sign. Usually, information on the sign are in English or other language of a sender.

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All orange plates should have dimensions of 40 cm on 50 cm; shall have black 15 mm wide contours and be visible. Hazard identification numbers and UN numbers should be black. The top part of the plate should have a hazard identification number, the bottom part – UN number; numbers should be separated with a black horizontal line.

Transporting units carrying unfixed dangerous materials or in tanks should be equipped with orange plate including identification numbers. Identification number comprises UN number on the bottom of the plate and hazard identification number. Hazard identification number can comprise two or three digits. Digits indicate the danger.

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