Key for Mixed Loadings of Dangerous Goods

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ABSTRACT

In complying with European international regulations for the land transportation of hazardous materials, there are many complicated rules. Some of them concern the prohibitions on mixed loading of certain types of hazardous materials on the same vehicle. The compliance of these rules is based on the labeling of the goods and, because of that, it has been possible to make a special chart by which working people who are dealing with such operations can decide whether or not certain types of hazardous materials are compatible. This key is frequently used by many companies in the freight forwarding business and the trucking industry in Sweden and other Scandinavian countries. To some extent, it is even used by Swedish enforcement personnel. For short-term storage at terminals and in warehouses, the chart advises how to segregate different types of goods depending on the labeling. It also provides additional information such as a quick reference chart on hazard warning labels. The purpose of this paper is to provide an example of a simplified method for complying with important safety regulations.

There are many complicated safety regulations to comply with in the transportation of hazardous materials. In addition, it is necessary for those dealing with such operations to have guides, loading charts, and other similar aids to make the compliance easier and safer. Among many of the safety regulations, the prohibitions on mixed loading of certain types of hazardous materials on the same vehicle are of a specific importance. To avoid incompatible substances being involved in and reacting dangerously and thereby causing incidents or accidents, the regulations outline the specific requirements by providing descriptions of the goods (i.e., proper shipping name or hazard class entries) in loading charts. Such regulations can sometimes be constructed and based on the labeling (hazard warning labels, affixed to packagings) of the goods. It is always evident, however, that the more detailed such regulations are, they will be considered more complicated and difficult to comply with. More stringent rules (i.e., fewer variations in a chart system of rules) are easier to understand and, by this, safety is also promoted.

EUROPEAN REGULATIONS

The implementation of regulations concerning the transportation of "dangerous goods" was started in Europe approximately 100 years ago with some special regulations for the carriage of dangerous goods by rail. The International Convention Concerning the Carriage of Goods by Rail came into force in 1893 and, since that time, international transportation of hazardous materials has been implemented by Annex 1 of the convention on the International Regulations Concerning Carriage of Dangerous Goods by Rail (RID). For highway transportation of hazardous materials, the European international regulations have been in force for a little more than 15 years. These regulations are practiced in 19 of the European nations and are entitled: Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). The regulations were built on the rail RID regulations. Many parts of these regulations are similar to each other, such as the regulations for:

- Classification,
- Packagings,
- Marking and labeling,
- Descriptions of the goods (declarations in shipping papers), and
- Prohibitions on mixed loadings.

The ADR-RID regulations have been gradually adjusted to the United Nations recommendations, although so far, only partially. However, the hazard warning labels and, in the main, the classification and some rules for packaging are in conformity with the UN standards.

ADR REGULATIONS

The ADR system for the identification of hazardous materials consists of (a) description in shipping papers, and (b) marking and labeling of packagings.

In the shipping papers, the shipper should declare (a) the name of the hazardous substance (not always proper shipping name), (b) the hazard class number, and (c) the item number followed by the initials ADR (see Figure 1).

If more than 3000 L are carried in one container, the shipping papers must also include the UN number ("1789"), which must appear on hazard warning panels affixed to the container or on the vehicle (see Figure 2).

Packages are marked and labeled according to a different system in the ADR regulations. The hazard warning labels are in conformity with the UN recommendations except for gases and infectious substances. Explanatory text and digits in the lower part on the label are not mandatory. When appropriate, packages must be marked with the name of the hazardous substance, complete with the class number (especially for class 2, gases). The primary hazard and, when appropriate, the secondary hazard(s) must

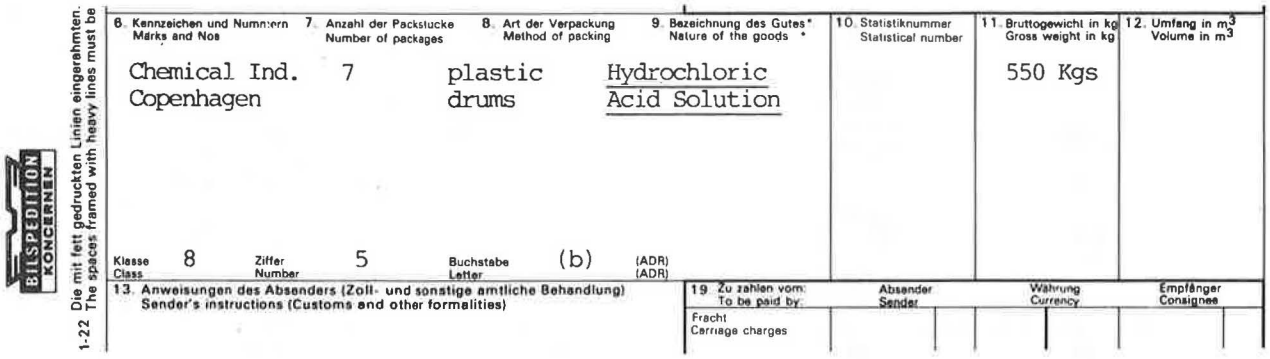

FIGURE 1 Sample declaration form used in shipping hazardous materials.

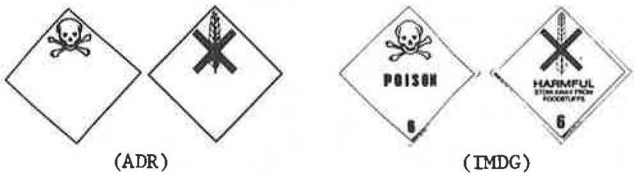

FIGURE 2 Sample labels used in the transportation of hazardous materials.

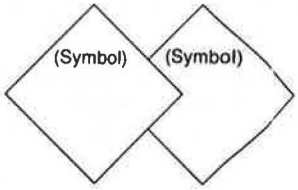

FIGURE 3 Double labels of the same type.

be shown on warning labels affixed to the packages or the containers (see Figure 3).

For special reasons, the ADR regulations include a system of double labels (i.e., two labels of the same type). Such double labeling means increased risks and more stringent prohibitions on mixed loading. It is used for composite containers, fragile packages and for certain types of hazardous materials by means of segregation.

PROHIBITION OF MIXED LOADING ON ONE VEHICLE

In the ADR regulations, the rules concerning the prohibitions on mixed loading on the same vehicle are expressed as in the following example for class 6.1.

(1) Substances of Class 6.1 contained in packages bearing a label or two labels conforming to model No. 6.1 or 6.1A shall not be loaded together on one vehicle with sub-

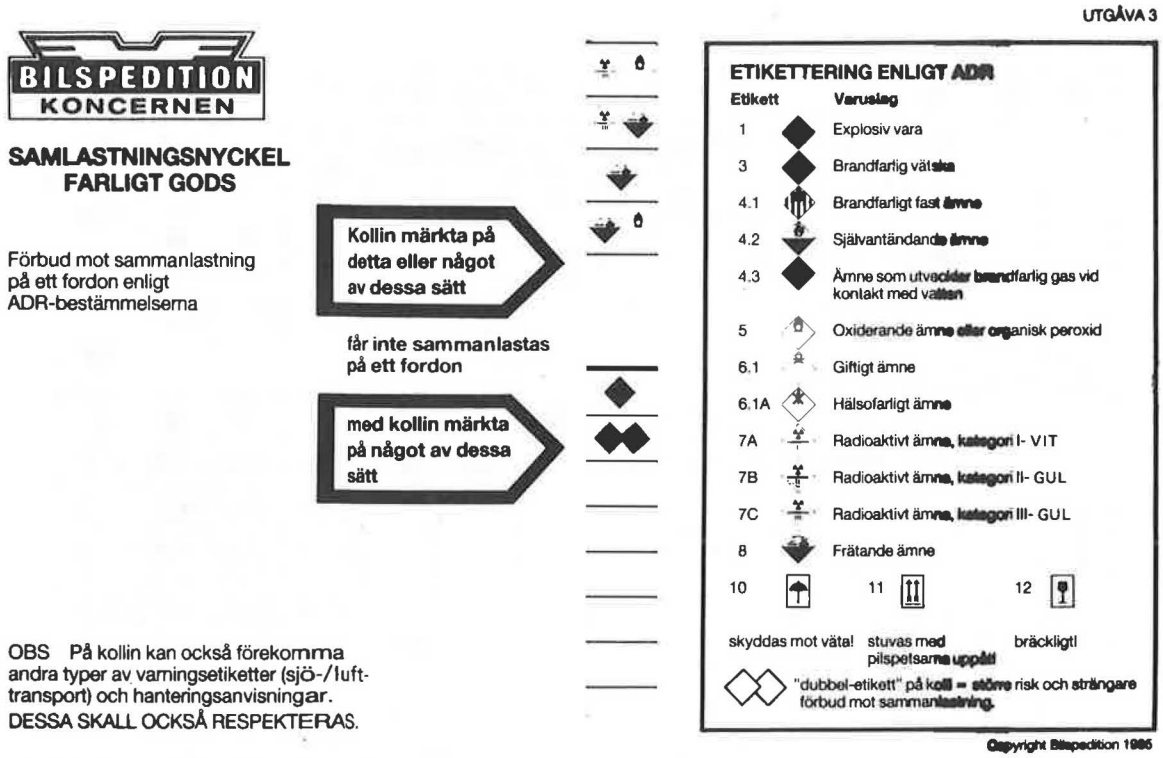

FIGURE 4 Front side of the Bilspedition key.

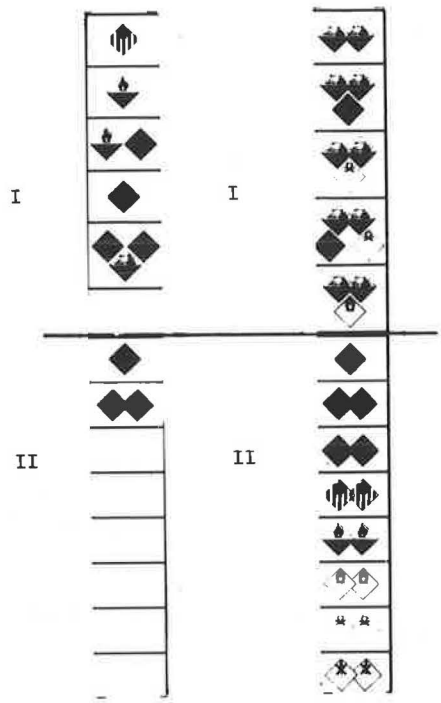

FIGURE 5 Bilspedition key—mixed loading chart.

stances or articles of Classes 1a, 1b, or 1c contained in packages bearing one or two labels conforming to model No. 1.

(2) Substances of Class 6.1 contained in packages bearing two labels conforming to model No. 6.1 or 6.1A shall not be loaded together on one vehicle with:

(a) Substances of Classes 3, 4.1 or 4.2 contained in packages bearing two labels conforming to model No. 3, 4.1 or 4.2;

(b) Substances of Classes 5.1 or 5.2 contained in packages bearing two labels conforming to model No. 5;

(c) Substances of Class 8 contained in packages bearing two labels conforming to model No. 8. (ADR Regulations, Section 6.1, paragraph 403.)

(Some explanations: the labels are not named by the symbols for meanings, but are given "numbers" corresponding to the class numbers.)

One can realize how difficult it would be for the working people to comply with such regulations. It is important to keep in mind (a) the hazard class number and the classification, and (b) one or two (or more) labels of certain types classified by number and appearance. There are no less than 14 different hazard classes in the ADR regulations, each with its own respective rules for those prohibitions. It is absolutely necessary to have guides such as the Bilspedition key for mixed loadings of dangerous goods (see Figure 4).

THE BILSPEDITION KEY

The Bilspedition key has been used since 1975 and is reviewed in conformity with the development of the regulations. Usage of it is helpful in all domestic and international road transport movements and even rail transport. Through a special agreement signed on October 1980 by the authorities of Denmark, Finland, Sweden, and even Germany concerning so-called short voyages in the Baltic Sea, the land transport regulations may be used for transporting dangerous goods during the short ferry crossings as an alternative to the IMDG code. This means that the ADR regulations for mixed loadings of hazardous materials

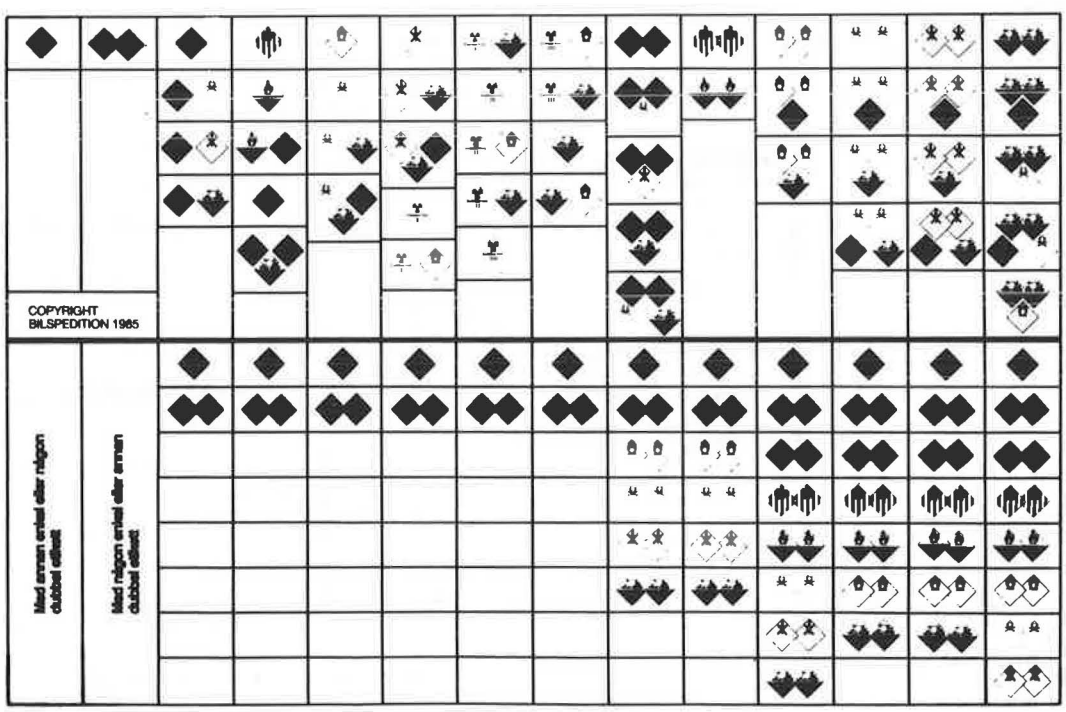

FIGURE 6 Bilspedition key—prohibition chart.

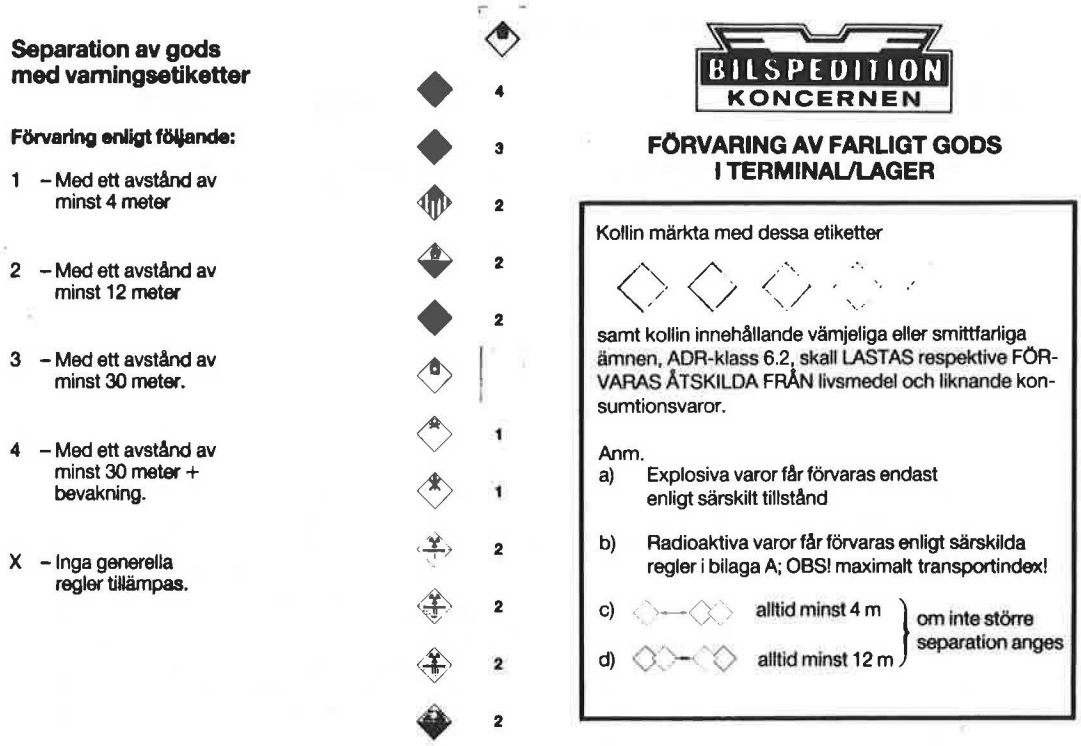

FIGURE 7 Bilspedition key—segregation chart.

apply and that the Bilspedition key can be used for the purposes of mixed loadings on vehicles and containers (see Figure 5). (Note that hazardous materials labels like those shown in Group I must not be loaded together on the same vehicle with hazardous materials labels like those shown in group II.) For stowage and segregation on board vessels, special regulations apply.

Compliance with the prohibitions on mixed loading should be based on the hazard warning labels (i.e., the kind of and combinations of labels affixed to packages). The whole system of prohibitions can be explained through this chart in the key shown in Figure 6. If there is no requirement for labeling of a certain type of hazardous material, there is no prohibition on mixed loading.

The key also contains a quick reference chart in which are shown the numbers and labels as well as the entries to hazardous materials (see Figure 7) classes. [Note that class 2 in the ADR System has no specific label, but label 3 (Inflammable Liquids) is prescribed for labeling of packages that contain inflammable gases.] The opposite side of the key (the back side) has another function applicable to short-term storage of dangerous goods at terminals and warehouses. This chart is not subject to some Swedish (domestic) legislation, but can be used as a guideline system for segregation based on the general segregation table. (IMDG Code, page 0112).

By using the segregation key in considering the labeling of the goods, the degree of horizontal segregation is given by a digit representing a specific minimum distance. Of course the primary hazard of the hazardous materials must be respected in the first line. Additional information such as segregation of foodstuffs and segregation that concerns single and double labels is also given.

The purpose of this information on the key is to show how some complicated regulations can be made easier to understand and to obey by this guidance system. A similar key may be useful for the U.S. transportation of hazardous materials on the highway although the conditions are different because of varying federal, state, and local regulations. Starting from the federal regulations (CFR 49), the author feels this could be possible.

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