

ECONOMIC COMMISSION FOR EUROPE  
INLAND TRANSPORT COMMITTEE

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**European Agreement**  
**concerning the international carriage**  
**of dangerous goods by road (ADR)**  
**and protocol of signature**

done at Geneva on 30 September 1957

*VOLUME I*

*(Agreement, Protocol of signature and Annex A)*

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## FOREWORD

The text below comprises, in addition to the Agreement itself and the Protocol of signature, the annexes in the form in which they entered into force on 29 July 1968 as well as the amendments thereto up to 1 October 1978.

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EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE  
OF DANGEROUS GOODS BY ROAD (ADR)

THE CONTRACTING PARTIES,  
DESIRING to increase the safety of international transport by road,  
HAVE AGREED as follows:

Article 1

For the purpose of this Agreement,

- (a) the term "vehicle" shall mean motor vehicles, articulated vehicles, trailers and semi-trailers, as defined in article 4 of the Convention on Road Traffic of 19 September 1949, other than vehicles belonging to or under the orders of the armed forces of a Contracting Party;
- (b) the term "dangerous goods" shall mean those substances and articles the international carriage by road of which is prohibited by, or authorized only on certain conditions by, Annexes A and B;
- (c) the term "international transport" shall mean any transport operation performed on the territory of at least two Contracting Parties by vehicles defined in (a) above.

Article 2

- 1. Subject to the provisions of article 4, paragraph 3, dangerous goods barred from carriage by Annex A shall not be accepted for international transport.
- 2. International transport of other dangerous goods shall be authorized subject to compliance with:

- (a) the conditions laid down in Annex A for the goods in question, in particular as regards their packaging and labelling, and
- (b) the conditions laid down in Annex B, in particular as regards the construction, equipment and operation of the vehicle carrying the goods in question, subject to the provisions of article 4, paragraph 2.

Article 3

The Annexes to this Agreement shall form an integral part thereof.

Article 4

- 1. Each Contracting Party shall retain the right to regulate or prohibit, for reasons other than safety during carriage, the entry of dangerous goods into its territory.
- 2. Vehicles in service on the territory of a Contracting Party at the time of entry into force of this Agreement or brought into service on such territory within two months after its entry into force shall be allowed, for a period of three years

from such entry into force, to perform the international transport of dangerous goods even if their construction and equipment do not entirely conform to the requirements laid down in Annex B for the transport operation in question. Under special clauses of Annex B, however, this period may be reduced.

3. The Contracting Parties shall retain the right to arrange, by special bilateral or multilateral agreements, that certain of the dangerous goods which under this Agreement are barred from all international transport may, subject to certain conditions, be accepted for international transport on their territories, or that dangerous goods which under this Agreement are acceptable for international transport only on specified conditions may be accepted for international transport on their territories under conditions less stringent than those laid down in the Annexes to this Agreement. The special bilateral or multilateral agreements referred to in this paragraph shall be communicated to the Secretary-General of the United Nations, who shall communicate them to the Contracting Parties which are not signatories to the said agreements.

#### Article 5

The transport operations to which this Agreement applies shall remain subject to national or international regulations applicable in general to road traffic, international road transport and international trade.

#### Article 6

1. Countries members of the Economic Commission for Europe and countries admitted to the Commission in a consultative capacity under paragraph 8 of the Commission's terms of reference may become Contracting Parties to this Agreement

- (a) by signing it;
- (b) by ratifying it after signing it subject to ratification;
- (c) by acceding to it.

2. Such countries as may participate in certain activities of the Economic Commission for Europe in accordance with paragraph 11 of the Commission's terms of reference may become Contracting Parties to this Agreement by acceding to it after its entry into force.

3. The Agreement shall be open for signature until 15 December 1957. Thereafter, it shall be open for accession.

4. Ratification or accession shall be effected by the depositing of an instrument with the Secretary-General of the United Nations.

#### Article 7

1. This Agreement shall enter into force one month after the date on which the number of countries mentioned in article 6, paragraph 1, which have signed it

without reservation of ratification or have deposited their instruments of ratification or accession has reached a total of five. However, the Annexes thereto shall not apply until six months after the entry into force of the Agreement itself.

2. For any country ratifying or acceding to this Agreement after five of the countries referred to in article 6, paragraph 1, have signed it without reservation of ratification or have deposited their instruments of ratification or accession, this Agreement shall enter into force one month after the said country has deposited its instrument of ratification or accession and the Annexes thereto shall apply for the said country either on the same date, if they are already in force by that date, or, if they are not in force by that date, on the date on which they apply under the provisions of paragraph 1 of this article.

#### Article 8

1. Any Contracting Party may denounce this Agreement by so notifying the Secretary-General of the United Nations.

2. Denunciation shall take effect twelve months after the date of receipt by the Secretary-General of the notification of denunciation.

#### Article 9

1. This Agreement shall cease to have effect if, after its entry into force, the number of Contracting Parties is less than five during twelve consecutive months.

2. In the event of the conclusion of a worldwide agreement for the regulation of the transport of dangerous goods, any provision of this Agreement which is contrary to any provision of the said worldwide agreement shall, from the date on which the latter enters into force, automatically cease to apply to relations between the Parties to this Agreement which become parties to the worldwide agreement, and shall automatically be replaced by the relevant provision of the said worldwide agreement.

#### Article 10

1. Any country may, at the time of signing this Agreement without reservation of ratification or of depositing its instrument of ratification or accession or at any time thereafter, declare by notification addressed to the Secretary-General of the United Nations that this Agreement shall extend to all or any of the territories for the international relations of which it is responsible. The Agreement and the annexes thereto shall extend to the territory or territories named in the notification one month after it is received by the Secretary-General.

2. Any country which has made a declaration under paragraph 1 of this article extending this Agreement to any territory for whose international relations it is responsible may denounce the Agreement separately in respect of the said territory in accordance with the provisions of article 8.

#### Article 11

1. Any dispute between two or more Contracting Parties concerning the interpretation or application of this Agreement shall so far as possible be settled by negotiation between them.
2. Any dispute which is not settled by negotiation shall be submitted to arbitration if any one of the Contracting Parties in dispute so requests and shall be referred accordingly to one or more arbitrators selected by agreement between the Parties in dispute. If within three months from the date of the request for arbitration the Parties in dispute are unable to agree on the selection of an arbitrator or arbitrators, any of those Parties may request the Secretary-General of the United Nations to nominate a single arbitrator to whom the dispute shall be referred for decision.
3. The decision of the arbitrator or arbitrators appointed under paragraph 2 of this article shall be binding on the Contracting Parties in dispute.

#### Article 12

1. Each Contracting Party may, at the time of signing, ratifying, or acceding to, this Agreement, declare that it does not consider itself bound by article 11. Other Contracting Parties shall not be bound by article 11 in respect of any Contracting Party which has entered such a reservation.
2. Any Contracting Party having entered a reservation as provided for in paragraph 1 of this article may at any time withdraw such reservation by notifying the Secretary-General of the United Nations.

#### Article 13

1. After this Agreement has been in force for three years, any Contracting Party may, by notification to the Secretary-General of the United Nations, request that a conference be convened for the purpose of reviewing the text of the Agreement. The Secretary-General shall notify all Contracting Parties of the request and a review conference shall be convened by the Secretary-General if, within a period of four months following the date of notification by the Secretary-General, not less than one-fourth of the Contracting Parties notify him of their concurrence with the request.
2. If a conference is convened in accordance with paragraph 1 of this article, the Secretary-General shall notify all the Contracting Parties and invite them to submit within a period of three months such proposals as they may wish the Conference to consider. The Secretary-General shall circulate to all Contracting Parties the provisional agenda for the conference, together with the texts of such proposals at least three months before the date on which the conference is to meet.
3. The Secretary-General shall invite to any conference convened in accordance with this article all countries referred to in article 6, paragraph 1, and countries which have become Contracting Parties under article 6, paragraph 2.

#### Article 14

1. Independently of the revision procedure provided for in article 13, any Contracting Party may propose one or more amendments to the Annexes to this Agreement. To that end it shall transmit the text thereof to the Secretary-General of the United Nations. The Secretary-General may also propose amendments to the Annexes to this Agreement for the purpose of ensuring concordance between those Annexes and other international agreements concerning the carriage of dangerous goods.
2. The Secretary-General shall transmit any proposal made under paragraph 1 of this article to all Contracting Parties and inform thereof the other countries referred to in article 6, paragraph 1.
3. Any proposed amendment to the Annexes shall be deemed to be accepted unless, within three months from the date on which the Secretary-General circulates it, at least one-third of the Contracting Parties, or five of them if one-third exceeds that figure, have given the Secretary-General written notification of their objection to the proposed amendment. If the amendment is deemed to be accepted, it shall enter into force for all the Contracting Parties, either on the expiry of a further period of three months or, in cases where similar amendments have been or are likely to be made to the other international agreements referred to in paragraph 1 of this article, on the expiry of a period the duration of which shall be determined by the Secretary-General in such a way as to allow, wherever possible, the simultaneous entry into force of the amendment and those that have been or are likely to be made to such other agreements; such period shall not, however, be of less than one month's duration.
4. The Secretary-General shall, as soon as possible, notify all Contracting Parties and all the countries referred to in article 6, paragraph 1, of any objection which may be received from the Contracting Parties to a proposed amendment.
5. If the proposed amendment to the Annexes is not deemed to be accepted, but if at least one Contracting Party other than the Contracting Party which proposed the amendment has given the Secretary-General written notification of its agreement to the proposal, a meeting of all the Contracting Parties and all the countries referred to in article 6, paragraph 1, shall be convened by the Secretary-General within three months after the expiry of the period of three months within which, under paragraph 3 of this article, notification must be given of objection to the amendment. The Secretary-General may also invite to such meeting representatives of:
  - (a) intergovernmental organizations which are concerned with transport matters;
  - (b) international non-governmental organizations whose activities are directly related to the transport of dangerous goods in the territories of the Contracting Parties.
6. Any amendment adopted by more than half the total number of Contracting Parties at a meeting convened in accordance with paragraph 5 of this article shall enter into force for all Contracting Parties in accordance with the procedure agreed at such meeting by the majority of the Contracting Parties attending it.

#### Article 15

In addition to the notifications provided for in articles 13 and 14, the Secretary-General of the United Nations shall notify the countries referred to in article 6, paragraph 1, and the countries which have become Contracting Parties under article 6, paragraph 2, of

- (a) signatures, ratifications and accessions in accordance with article 6;
- (b) the dates on which this Agreement and the Annexes thereto enter into force in accordance with article 7;
- (c) denunciations in accordance with article 8;
- (d) the termination of the Agreement in accordance with article 9;
- (e) notifications and denunciations received in accordance with article 10;
- (f) declarations and notifications received in accordance with article 12, paragraphs 1 and 2;
- (g) the acceptance and date of entry into force of amendments in accordance with article 14, paragraphs 3 and 6.

#### Article 16

1. The Protocol of Signature of this Agreement shall have the same force, effect and duration as the Agreement itself, of which it shall be considered to be an integral part.

2. No reservation to this Agreement, other than those entered in the Protocol of Signature and those made in accordance with article 12, shall be permitted.

#### Article 17

After 15 December 1957, the original of this Agreement shall be deposited with the Secretary-General of the United Nations, who shall transmit certified true copies thereof to each of the countries referred to in article 6, paragraph 1.

IN WITNESS WHEREOF the undersigned, being duly authorized thereto, have signed this Agreement.

DONE at Geneva, this thirtieth day of September one thousand nine hundred and fifty-seven, in a single copy, in the English and French languages for the text of the Agreement proper, and in the French language for the Annexes, each text being equally authentic for the Agreement proper.

The Secretary-General of the United Nations is requested to prepare an authoritative translation of the Annexes in the English language and attach it to the certified true copies referred to in article 17.

PROTOCOL OF SIGNATURE

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## PROTOCOL OF SIGNATURE

### TO THE EUROPEAN AGREEMENT ON THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR)

On proceeding to sign the European Agreement on the International Carriage of Dangerous Goods by Road (ADR) the undersigned, duly authorized,

1. CONSIDERING that the conditions governing the carriage of dangerous goods by sea to or from the United Kingdom differ basically from those set forth in Annex A to ADR and that it is impossible to modify them so as to conform to the latter in the near future;

HAVING REGARD to the undertaking given by the United Kingdom to submit as an amendment to the said Annex A a special appendix containing special provisions for road-sea carriage of dangerous goods between the Continent and the United Kingdom;

HAVE AGREED that, until the entry into force of such special appendix, dangerous goods carried under ADR to or from the United Kingdom shall comply with the provisions of Annex A to ADR and also with the United Kingdom conditions for the carriage of dangerous goods by sea;

2. TAKE NOTE OF a declaration by the representative of France to the effect that the Government of the French Republic reserves the right, notwithstanding the provisions of article 4, paragraph 2, to refuse to allow vehicles in service on the territory of another Contracting Party, whatever the date on which they were put into service, to be used for the carriage of dangerous goods on French territory unless such vehicles comply either with the conditions laid down for such carriage in Annex B or with the conditions laid down for the carriage of the goods in question in the French regulations governing the carriage of dangerous goods by road;
3. RECOMMEND that, before submission in accordance with article 14, paragraph 1, or article 13, paragraph 2, proposed amendments to this Agreement or its Annexes shall as far as possible first be discussed at meetings of experts of the Contracting Parties and, if necessary, of the other countries mentioned in article 6, paragraph 1, of the Agreement and of the international organizations mentioned in article 14, paragraph 5, of the Agreement.

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EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL  
CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR)

ANNEX A

PROVISIONS CONCERNING DANGEROUS  
SUBSTANCES AND ARTICLES

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## Part I

### DEFINITIONS AND GENERAL PROVISIONS

#### DEFINITIONS

1 - 1999

(1) For the purposes of this Annex:

2000

- the term "competent authority" means the authority designated as such in each country and in each specific case by the Government;
- the term "fragile package" means a package containing a fragile receptacle (i.e. a receptacle made of glass, porcelain, stoneware or similar materials) which is not enclosed in a packaging with complete sides protecting it effectively against shock [see also marginal 2001 (5)];
- the term "gas" means a gas or vapour;
- the term "dangerous substances", when used alone, means the substances and articles designated as being substances and articles of ADR;
- the term "carriage in bulk" means the carriage of a solid substance without packaging;
- the term "RID" means the International Regulations concerning the Carriage of Dangerous Goods by Rail [Annex 1 to the International Convention concerning the Carriage of Goods by Rail (CIM)].

(2) For the purposes of this Annex, tanks (see definitions in Annex B) are not placed on the same footing as receptacles, the term "receptacle" being used in a restrictive sense. Provisions concerning receptacles are applicable to fixed tanks, batteries of receptacles, demountable tanks and tank-containers only if this is expressly stipulated.

(3) The term "full load" means any load originating from one sender for which the use of a vehicle or of a large container is exclusively reserved and all operations for the loading and unloading of which are carried out in conformity with the instructions of the sender or of the consignee.

(1) Unless expressly stated otherwise, the sign "%" in this Annex represents:

2001

- (a) in the case of mixtures of solids or of liquids, and also in the case of solutions and of solids wetted by a liquid: a percentage by weight based on the total weight of the mixture, the solution or the wetted solid;
- (b) in the case of gaseous mixtures: a percentage by volume based on the total volume of the gaseous mixture.

### Definitions and general provisions

2001  
(contd)

(2) All weights mentioned for packages in this Annex are, unless otherwise specified, gross weights. The weight of containers or tanks used for the carriage of goods is not included in the gross weight.

(3) Pressures of all kinds relating to receptacles (such as test pressure, internal pressure, safety-valve opening pressure) are always indicated in kg/cm<sup>2</sup> gauge pressure (pressure in excess of atmospheric pressure); however, the vapour pressure of substances is always expressed in kg/cm<sup>2</sup> absolute pressure.

(4) Where this Annex specifies a degree of filling for receptacles or tanks, that degree of filling is always referred to a temperature of the substances of 15°C unless some other temperature is indicated.

(5) Fragile receptacles secured, either singly or in groups, by cushioning materials in a strong receptacle are not regarded as fragile receptacles on condition that the strong receptacle is leak-proof and so designed that in the event of breakage or leakage of the fragile receptacles their contents cannot escape from the strong receptacle and that the mechanical strength of the latter is not impaired by corrosion during carriage.

2002

### GENERAL PROVISIONS

(1) This Annex specifies the dangerous goods to be excluded from international carriage by road and the dangerous goods to be accepted for such carriage under certain conditions. It groups the dangerous goods in restrictive and non-restrictive Classes. Of the dangerous goods covered by the headings of the restrictive Classes (Classes 1a, 1b, 1c, 2, 4.2, 4.3, 5.2, 6.2 and 7), those which are listed in the clauses concerning these Classes (marginals 2101, 2131, 2171, 2201, 2431, 2471, 2551, 2651 and 2701) are to be accepted for carriage only under the conditions specified in these clauses, and others are to be excluded from carriage. Some of the dangerous goods covered by the headings of the non-restrictive Classes (Classes 3, 4.1, 5.1, 6.1, and 8) are, by notes inserted in the clauses concerning the various Classes, excluded from carriage; of the other goods covered by the headings of the non-restrictive Classes, those which are mentioned or defined in the clauses concerning these Classes (marginals 2301, 2401, 2501, 2601 and 2801) are to be accepted for carriage only under the conditions specified in these clauses, and those which are not mentioned or defined therein are not deemed to be dangerous goods for the purposes of this Agreement and are to be accepted for carriage without any special conditions.



Definitions and general provisions

(2) The Classes of this Annex are as follows:

2002  
(contd)

Class 1a	Explosive substances and articles	Restrictive
Class 1b	Articles filled with explosive substances	"
Class 1c	Igniters, fireworks and similar goods	"
Class 2	Gases: compressed, liquefied or dissolved under pressure	"
Class 3	Inflammable liquids	Non-restrictive
Class 4.1	Inflammable solids	"
Class 4.2	Substances liable to spontaneous combustion	Restrictive
Class 4.3	Substances which give off inflammable gases on contact with water	"
Class 5.1	Oxidizing substances	Non-restrictive
Class 5.2	Organic peroxides	Restrictive
Class 6.1	Toxic substances	Non-restrictive
Class 6.2	Repugnant substances and substances liable to cause infection	Restrictive
Class 7	Radioactive substances	"
Class 8	Corrosive substances	Non-restrictive

(3) Any carriage of goods governed by this Annex shall be the subject of a transport document. The sender shall communicate in writing to the carrier the particulars to be included in the transport document as laid down for each class in part II of this annex in sections 2.B. The document may be that already required by other regulations in force. Any goods the carriage of which is so governed shall be described in the transport document in conformity with the indications in section B of the special provisions for each Class. The particulars to be entered in the transport document shall be drafted in an official language of the forwarding country, and also, if that language is not English, or French, or German, in English, French or German, unless international road transport tariffs, if any, or agreements concluded between the countries concerned in the transport operation, provide otherwise. The transport document shall be accompanied, if appropriate, by instructions to be implemented in the event of an accident (see Annex B, marginal 10 185). The transport document shall accompany the dangerous substances carried.

(4) If by reason of the size of the load a consignment cannot be loaded in its entirety on a single transport unit, at least as many separate documents, or copies of the single document, shall be made out as transport units loaded. Furthermore, in all cases, separate transport documents shall be made out for consignments or parts of consignments which may not be loaded together on the same vehicle by reason of the prohibitions set forth in Annex B.

### Definitions and general provisions

2002  
(contd)

(5) Outer packagings additional to those specified in this Annex may be used providing that they do not contravene the spirit of the provisions of this Annex relating to outer packagings. If such additional packagings are used, the prescribed marking and labels shall be applied to them.

(6) If the mixed packing of several dangerous substances with one another or with other goods is allowed by the provisions of section A.3 of the provisions applicable to the various Classes, the inner packagings containing different dangerous substances shall be carefully and effectively separated from one another in the collective packagings if dangerous reactions, such as the production of dangerous heat, combustion, the formation of mixtures sensitive to friction or shock, and the release of inflammable or toxic gases, are liable to occur as a result of damage to or destruction of the inner packagings. In particular, if fragile receptacles are used, and especially if the said receptacles contain liquids, the danger of the formation of dangerous mixtures shall be avoided and to this end all appropriate measures shall be taken, such as the use of suitable cushioning materials in sufficient quantity, securing of the receptacles in a second, strong packaging, and subdivision of the collective packaging into several compartments.

(7) If mixed packing is used, the provisions of this Annex concerning the particulars in the transport document shall apply in respect of each of the different kinds of dangerous substance contained in the collective package, and the collective package shall bear all the inscriptions and all the danger labels prescribed in this Annex for the dangerous substances the collective package contains.

(8) If solutions of substances listed in this Annex are not expressly mentioned in the list of the Class to which the dissolved substances belong, they shall nevertheless be considered as substances of ADR if their concentration is such that they retain the danger inherent in the substances themselves; their packaging shall in such event conform to the requirements of section A of the special provisions applicable to the Class to which the said substances belong, it being understood that packagings which would be unsuitable for the carriage of liquids may not be used.

(9) Mixtures of substances of ADR with other substances shall be considered as substances of ADR if they retain the danger inherent in the substance which is a substance of ADR.

(10) The sender, either in the transport document or in a separate declaration, shall certify that the substance presented may be carried by road in conformity with the provisions of ADR, that its condition, treatment and, as appropriate its packaging and labelling comply with the provisions of ADR. Furthermore, if several dangerous goods are packed together in a collective package or in a single container, the sender is required to declare that this mixed packing is not prohibited.

## Definitions and general provisions

(11) A substance whose specific radioactivity does not exceed 0.002 microcurie per gramme and which is covered by a collective heading of any Class shall be excluded from carriage if, in addition, it is covered by the heading of a restrictive Class in which it is not listed.

2002  
(contd)

(12) A substance whose specific radioactivity does not exceed 0.002 microcurie per gramme and which is not listed by name in a Class, but is covered by two or more collective headings of different Classes, shall be subject to the conditions of carriage laid down:

- (a) in the restrictive Class, if one of the Classes concerned is a restrictive Class;
- (b) in the Class corresponding to the predominant danger exhibited by the substance during carriage, if none of the Classes concerned is a restrictive Class.

(1) This Annex contains for each Class other than Class 7:

2003

- (a) a list of the dangerous substances constituting the Class, and, where applicable, in the form of a marginal having a number ending with the letter "a", the exemptions allowed from the provisions of ADR for some of these substances if they comply with certain conditions;
- (b) provisions sub-divided as follows:
  - A. Packages:
    - 1. General conditions of packing;
    - 2. Packing of a single substance or of articles of the same kind;
    - 3. Mixed packing;
    - 4. Marking and danger labels on packages.
  - B. Particulars in the transport document.
  - C. Empty packagings.
  - D. (where appropriate) Other provisions.

(2) Provisions concerning:

- consignment in bulk, in containers and in tanks;
- method of despatch and restrictions on forwarding;
- prohibitions on mixed loading; and
- transport equipment

## Definitions and general provisions

2003  
(contd)

are to be found in Annex B and its appendices, which also contain all other pertinent provisions applying specifically to carriage by road.

(3) The appendices to this Annex contain:

Appendix A.1: Stability and safety conditions relating to explosive substances, inflammable solids and organic peroxides, together with rules for tests;

Appendix A.2: Provisions relating to the nature of aluminium-alloy receptacles for certain gases of Class 2; provisions relating to the materials and construction of receptacles, intended for the carriage of deeply-refrigerated liquefied gases of Class 2; and provisions relating to tests on aerosol dispensers and non-refillable containers for gases under pressure of Class 2, 10° and 11°;

Appendix A.3: Tests relating to inflammable liquids of Classes 3 and 6.1;

Appendix A.5: Provisions relating to tests on the metal drums referred to in marginals 2303(6) and 2813(1)(c);

Appendix A.6: Regulations relating to radioactive substances of Class 7;

Appendix A.9: Provisions relating to danger labels, and explanation of the symbols.

Appendices A.4, A.7 and A.8 are reserved.

(4) For Class 7, the details concerning conditions of packing, mixed packing, labelling and marking of packages as well as provisions governing storage, despatch and carriage, including in bulk, in containers and in tanks, are specified in the schedules of Annex A listed in marginal 2702. Some of the detailed and technical provisions affecting this Class are elaborated in Appendix A.6 which also includes the complete table of radionuclides and method of testing packagings intended for substances of Class 7.

2004

2005

Where the provisions relating to carriage as a "full load" are applied, the competent authorities may require the vehicle or large container used for the transport operation concerned to be loaded at only one point and unloaded at only one point.

2006

(1) If the vehicle carrying out a transport operation subject to the provisions of ADR is conveyed over a section of the journey otherwise than by road haulage, then any national or international regulations which, on the said section, govern the carriage of dangerous goods by the mode of transport used for conveying the road vehicle shall alone be applicable to the said section of the journey.

(2) In cases where a transport operation subject to the provisions of ADR is likewise subject over the whole or a part of its road journey to the provisions of an international convention which regulates the carriage of dangerous goods by a mode of transport other than road carriage by virtue of clauses extending the applicability of the said convention to certain motor-vehicle services, then the provisions of that international convention shall apply, over the journey in question,

Definitions and general provisions

concurrently with those of ADR which are not incompatible therewith;  
the other clauses of ADR shall not apply over the journey in question.

2006  
(contd)

2007-  
2009

For the purpose of carrying out the trials necessary with a view to amending the provisions of this Annex in order to adapt them to technological and industrial developments, the competent authorities of the Contracting Parties may agree directly among themselves to authorize certain transport operations in their territories by temporary derogation from the provisions of this Annex. The authority which has taken the initiative with respect to the temporary derogation so granted shall notify the competent service of the United Nations Secretariat of the derogation, which service shall bring it to the attention of the Contracting Parties.

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2099

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## Part II

### LIST OF SUBSTANCES AND SPECIAL PROVISIONS FOR THE VARIOUS CLASSES

#### CLASS 1a. EXPLOSIVE SUBSTANCES AND ARTICLES

Note: Substances and articles which cannot explode on contact with a flame and which are not more sensitive to shock or friction than dinitrobenzene are not subject to the provisions of Class 1a

##### 1. List of substances and articles

(1) Among the substance and articles covered by the heading of Class 1a, only those listed in marginal 2101 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex 3. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR. 2100

(2) In the explosives which are to be accepted for carriage, nitroglycerine may be replaced wholly or in part by:

- (a) nitroglycol, or
- (b) dinitrodiethyleneglycol, or
- (c) nitrated sugar (nitrated saccharose), or
- (d) a mixture of the above substances.

1° Highly nitrated nitrocellulose (such as gun-cotton), i.e. with a nitrogen content of more than 12.6 per cent, well stabilized and containing in addition: 2101

when the nitrocellulose is not compressed, not less than  
25 per cent water or alcohol (methyl, ethyl, normal propyl  
or isopropyl, butyl, or amyl alcohol or mixtures thereof),  
including denatured alcohol; or mixtures of water and alcohol;

when the nitrocellulose is compressed, not less than  
15 per cent water, or not less than 12 per cent paraffin  
wax or other similar substances.

See also Appendix A.1, marginal 3101.

Note: 1. Nitrocellulose with a nitrogen content not exceeding 12.6 per cent is a substance of Class 4.1 if it complies with the specifications set out in marginal 2401, 7° (a), (b) or (c).

Class 1a

2101  
(contd)

2. Nitrocellulose in the form of nitrocellulose-film waste, free from gelatine, in reels, sheets or strips, is a substance of Class 4.2(see marginal 2431, 4°).

- 2° Cordite paste, non-gelatinized ("powder cake"), for use in the making of smokeless powders and containing not more than 70 per cent anhydrous substance and not less than 30 per cent water; the anhydrous substance must not contain more than 50 per cent nitroglycerine or similar liquid explosives.
- 3° Gelatinized nitrocellulose powders and gelatinized nitrocellulose powders containing nitroglycerine (nitroglycerine powders):
- (a) non-porous and non-dusty;
  - (b) porous or dusty.

See also Appendix A.1, marginal 3102.

- 4° Plasticized nitrocellulose containing not less than 12 per cent but less than 18 per cent plasticizing substances (such as butyl phthalate or a plasticizer at least equal in effect to butyl phthalate), and whose nitrocellulose has a nitrogen content not exceeding 12.6 per cent, also in the form of chips.

Note: Plasticized nitrocellulose containing not less than 18 per cent butyl phthalate or a plasticizer at least equal in effect is a substance of Class 4.1 [see marginal 2401 7° (b) and (c)].

See also Appendix A.1, marginal 3102, 1.

- 5° Non-gelatinized nitrocellulose powders. See also Appendix A.1, marginal 3102.
- 6° Trinitrotoluene (tolite), also when compressed or cast, trinitrotoluene mixed with aluminium, mixtures termed liquid trinitrotoluene, and trinitroanisole. See also Appendix A.1, marginal 3103.
- 7° (a) Hexyl (hexanitrodiphenylamine) and picric acid;
- (b) pentolites (mixtures of pentaerythritol tetranitrate and trinitrotoluene) and hexolites (mixtures of trimethylene-trinitramine and trinitrotoluene) if their trinitrotoluene content is such that their sensitiveness to shock does not exceed that of tetryl;



Class 1a

- (c) phlegmatized penthrite (pentaerythritol tetranitrate) and phlegmatized hexogen (trimethylene-trinitramine), both phlegmatized by incorporation of wax, paraffin wax or other similarly effective substances in such quantity that the sensitiveness of these substances to shock does not exceed that of tetryl.

2101  
(contd)

For (a), (b) and (c), see also Appendix A.1, marginal 3103.

Note: Substances of 7° (b) and phlegmatized hexogen of 7° (c) may also contain aluminium.

8° Explosive organic nitro-compounds:

- (a) soluble in water, e.g. trinitroresorcinol;  
(b) insoluble in water, e.g. tetryl (trinitrophenylmethylnitramine)  
(c) tetryl gaines without metal covering.

For (a) and (b), see also Appendix A.1, marginal 3103.

Note: Except for liquid trinitrotoluene (6°), explosive organic nitro-compounds in the liquid state are not to be accepted for carriage.

- 9° (a) Moist penthrite (pentaerythritol tetranitrate) and moist hexogen (trimethylene-trinitramine) wetted throughout with not less than 20 per cent water in the case of the former and not less than 15 per cent in the case of the latter;  
(b) moist pentolites (mixtures of penthrite and trinitrotoluene) and moist hexolites (mixtures of hexogen and trinitrotoluene) whose sensitiveness to shock in the dry state exceeds that of tetryl and which are wetted throughout with not less than 15 per cent water;  
(c) moist mixtures of penthrite or of hexogen with wax, paraffin wax or substances similar to wax or paraffin wax, whose sensitiveness to shock in the dry state exceeds that of tetryl and which are wetted throughout with not less than 15 per cent water;  
(d) compressed penthrite gaines without metal covering.

For (a), (b) and (c), see also Appendix A.1, marginal 3103.

10° (a) Denzoyl peroxide:

1. in the dry state or with less than 10 per cent water;

Class 1a

2101  
(contd)

2. with less than 30 per cent phlegmatizer.

Note: 1. Benzoyl peroxide with not less than 10 per cent water or with not less than 30 per cent phlegmatizer is a substance of Class 5.2 [see marginal 2551, 8° (a) and (b)].

2. Benzoyl peroxide with not less than 70 per cent dry and inert solids is not subject to the provisions of ADR.

- (b) Cyclohexanone peroxides [1-hydroxy-1'-hydroperoxy-dicyclohexyl peroxide and bis-(1-hydroxycyclohexyl) peroxide and mixtures of these two compounds]:

1. in the dry state or with less than 5 per cent water;
2. with less than 30 per cent phlegmatizer.

Note: 1. Cyclohexanone peroxides and their mixtures with not less than 5 per cent water or with not less than 30 per cent phlegmatizer are substances of Class 5.2 [see marginal 2551 9° (a) and (b)].

2. Cyclohexanone peroxides and their mixtures with not less than 70 per cent dry and inert solids are not subject to the provisions of ADR.

- (c) Parachlorobenzoyl peroxide:

1. in the dry state or with less than 10 per cent water;
2. with less than 30 per cent phlegmatizer.

Note: 1. Parachlorobenzoyl peroxide with not less than 10 per cent water or with not less than 30 per cent phlegmatizer is a substance of Class 5.2 [see marginal 2551 17° (a) and (b)].

2. Parachlorobenzoyl peroxide with not less than 70 per cent dry and inert solids is not subject to the provisions of ADR.

- 11° (a) Black powder (with a basis of potassium nitrate) in corned or meal form;
- (b) slow mining powders similar to black powder (composed of sodium nitrate, sulphur and wood charcoal, coal or lignite, or composed of potassium nitrate with or without sodium nitrate, sulphur, coal or lignite);
- (c) cartridges of compressed black powder or powder similar to compressed black powder.

Note: The density of the compressed mass must not be less than 1.5 g per cm<sup>3</sup>.

Class 1a

For (a) and (b), see also Appendix A.1, marginal 3104

2101  
(contd)

- 12° (a) Nitrate explosives, in powder form, not covered by 11° or 14° (a) or (c) and consisting essentially of ammonium nitrate or of a mixture of ammonium nitrate and alkali or alkaline-earth nitrates or of a mixture of ammonium nitrate and sodium chloride, or of a mixture of alkali or alkaline-earth nitrates and ammonium chloride, or of a mixture of ammonium nitrate with alkali or alkaline-earth nitrates and of sodium chloride, or of a mixture of ammonium nitrate with alkali or alkaline-earth nitrates and ammonium chloride. They may contain, in addition, combustible substances (such as wood flour, or other vegetable flour or hydrocarbons), sensitizers (for example, fine aluminium powder), aromatic nitro-compounds, nitroglycerine or nitroglycol or a mixture of the two, and inert stabilizing or colouring substances (see also Appendix A.1, marginal 3105).
- (b) explosives not containing inorganic nitrates, in powder form, consisting essentially of a mixture of inert substances (such as alkali chlorides) with nitroglycerine or nitroglycol or a mixture of the two. They may contain, in addition, aromatic nitro-compounds and substances with a phlegmatizing, stabilizing or gelatinizing, or colouring effect. See also Appendix A.1, marginal 3105.

- 13° Chlorate and perchlorate explosives, i.e. mixtures of chlorates or perchlorates of alkali or alkaline-earth metals with compounds rich in carbon.

See also Appendix A.1, marginal 3106.

- 14° (a) Dynamites with an inert absorbent, and explosives similar to dynamite with an inert absorbent;
- (b) blasting gelatine consisting of gun-cotton and not more than 93 per cent nitroglycerine, and gelatinized dynamites with a nitroglycerine content not exceeding 85 per cent;
- (c) gelatinous nitrate explosives, consisting essentially of ammonium nitrate or of a mixture of ammonium nitrate with nitrates of alkali or alkaline-earth metals containing not more than 40 per cent gelatinized nitroglycerine or gelatinized nitroglycol or a mixture of the two. They may contain, in addition, nitro-compounds or combustible substances (such as wood flour or another vegetable flour or hydrocarbons) and, in addition, other inert or colouring substances.

For (a), (b) and (c), see also Appendix A.1, marginal 3107.

- 15° Empty packagings, uncleaned, which have contained dangerous substances of Class 1a.

Class 1a

2. Provisions

A. Packages

1. General conditions of packing

2102

(1) Packagings shall be so closed and leak-proof as to prevent any loss of the contents. The use of metal bands or wires to ensure closure is forbidden unless this procedure is specifically authorized in the special provisions relating to the packing of the substances or articles in question.

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. Solid substances shall be firmly secured in their packagings, and inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance or of articles of the same kind", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The thickness of the walls must not be less than 2 mm.

(5) Cushioning materials shall be suited to the nature of the contents; in particular, they must be absorbent if the contents are liquid or might exude liquid.

2. Packing of a single substance or of articles of the same kind

2103

(1) Substances of 1° and 2° shall be packed:

(a) in wooden receptacles or in drums made of impermeable fibreboard; these receptacles and drums shall in addition be fitted with a lining impermeable to the liquids they contain; their closure must be leak-proof,

or

(b) in impermeable bags (e.g. made of rubber or of a suitable plastics material not readily inflammable) placed in a wooden case, or

(c) in iron drums coated inside with zinc or lead; or

Class 1a

- (d) in receptacles made of tin-plate, zinc sheet or aluminium sheet, which shall be secured by cushioning materials in wooden cases.

2103  
(contd)

(2) Metal receptacles shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than 3 kg/cm<sup>2</sup>; the presence of these closures or safety devices must not impair the strength of the receptacles nor impair its closure.

(3) Nitrocellulose of 1°, if wetted exclusively with water, may be packed in fibreboard drums; the fibreboard must have undergone a special treatment to render it completely impermeable; the closures of the drums must be water-vapour proof.

(4) A package containing substances of 1° must not weigh more than 120 kg or, if it can be rolled, more than 300 kg; however, where fibreboard drums are used, a package must not weigh more than 75 kg.

A package containing substances of 2° must not weigh more than 75 kg.

- (1) Substances of 3° (a) and 4° shall be packed:

2104

- (a) if they are to be carried as a full load:

1. in drums made of impermeable fibreboard; or
2. in packagings made of wood or of metal other than black sheet-iron;

- (b) if they are not to be carried as a full load:

1. in boxes made of fibreboard, tin-plate, zinc sheet or aluminium sheet, or of a suitable plastics material not readily inflammable, or in bags made of closely-woven textile or of stout paper of at least two plies or of stout paper lined with aluminium foil or with a suitable plastics material. These packaging shall be placed in wooden cases; or
2. without preliminary packing in boxes or bags:
  - a. in drums made of impermeable fibreboard or in wooden casks; or
  - b. in wooden packagings lined with zinc sheet or aluminium sheet; or
  - c. in receptacles made of metal other than black sheet-iron.

(2) If the powder is in tubes, sticks, threads, bands or sheets it may also be enclosed, without preliminary packing in boxes or bags, in wooden cases.

Class 1a

2104  
(contd)

(3) Metal receptacles shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than  $3 \text{ kg/cm}^2$ ; the presence of these closures or safety devices must not impair the strength of the receptacle nor impair its closure.

(4) The closure of wooden cases may be ensured by means of bands or wires made of a suitable metal fastened tightly round them. If the bands or wires are made of iron they shall be covered with a material not liable to produce sparks when subjected to impact or friction.

(5) A package must not weigh more than 120 kg; however, where fibreboard drums are used, a package must not weigh more than 75 kg.

2105

(1) Substances of 3° (b) and 5° shall be packed:

(a) if they are to be carried as a full load:

1. in drums made of impermeable fibreboard; or
2. in packagings made of wood or of metal other than black sheet-iron;

(b) if they are not to be carried as a full load:

1. in boxes made of fibreboard, tin-plate or aluminium sheet. A box must not contain more than 1 kg of powder and must be wrapped in paper. These packagings shall be placed in wooden packagings; or
2. in bags made of closely-woven textile or of stout paper of at least two plies or of stout paper lined with aluminium foil or with a suitable plastics material. These bags shall be placed in fibreboard drums or in wooden casks or in other wooden packagings lined with zinc sheet or aluminium sheet, or in receptacles made of zinc sheet or aluminium sheet. Receptacles made of zinc sheet or aluminium sheet shall be completely lined with wood or fibreboard.

(2) Metal receptacles shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than  $3 \text{ kg/cm}^2$ ; the presence of these closures or safety devices must not impair the strength of the receptacle nor impair its closure.

(3) The closure of wooden cases may be ensured by means of bands or wires made of a suitable metal fastened tightly round them. If the bands or wires are made of iron they shall be covered with a material not liable to produce sparks when subjected to impact or friction.

Class 1a

(4) A package under (1) (a) must not weigh more than 100 kg; however, where fibreboard drums are used, a package must not weigh more than 75 kg. A package under (1) (b) must not weigh more than 75 kg. It must not contain more than 30 kg of nitrocellulose powder. 2105 (contd)

(1) Substances of 6° shall be packed in wooden receptacles. Drums made of impermeable fibreboard are likewise to be accepted for solid trinitrotoluene and for trinitroanisole, and iron receptacles for mixtures termed liquid trinitrotoluene. 2106

(2) Metal receptacles shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than 3 kg/cm<sup>2</sup>; the presence of these closures or safety devices must not impair the strength of the receptacle nor impair its closure.

(3) A package must not weigh more than 120 kg or, if it can be rolled, more than 300 kg; however, where fibreboard drums are used, a package must not weigh more than 75 kg.

(1) Substances of 7° shall be packed: 2107

(a) substances of 7° (a): in wooden receptacles or in drums made of impermeable fibreboard. Lead and materials containing lead (alloys or compounds) must not be used in the packaging of hexyl (hexanitrodiphenylamine) and picric acid.

Picric acid may also be packed, not more than 500 g per receptacle, in receptacles made of glass, porcelain, stoneware or similar materials or of a suitable plastics material, secured in a wooden case by cushioning material (e.g. corrugated fibreboard). The receptacles shall be closed by means of a stopper, made of cork or rubber or a suitable plastics material, which shall be held in position by an additional device (such as a cap, crown, seal or binding) capable of preventing any loosening of the closure system during carriage;

(b) substances of 7° (b) and (c): not more than 30 kg per bag, in cloth bags which do not allow the contents to filter through, or in bags made of stout paper or a suitable plastics material, which shall be placed in leak-proof wooden receptacles or in drums made of hardened fibreboard capable of being so closed as to be leak-proof and whose bottoms and lids shall be made of plywood. The lids of cases shall be secured by means of screws and those of drums by means of a collar.

(2) A package containing substances of 7° (a) must not weigh more than 120 kg if it is a wooden receptacle; where fibreboard drums are used, a package must not weigh more than 75 kg. Packages containing picric acid packed in fragile receptacles or in receptacles made of a plastics material must not weigh more than 15 kg. A package containing substances of 7° (b) or (c) must not weigh more than 75 kg; cases which, with their contents, weigh more than 30 kg shall be fitted with means of handling.

Class 1a

2108

(1) Substances and articles of 8° shall be packed:

- (a) substances of 8° (a): in receptacles made of steel not liable to rust, or of any other suitable material (which in particular excludes lead and its alloys). Nitro-compounds shall be uniformly wetted with sufficient water to ensure that they contain not less than 25 per cent water throughout the journey, at every point in the substance. Metal receptacles shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than 3 kg/cm<sup>2</sup>; the presence of these closures or safety devices must not impair the strength of the receptacle nor impair its closure. Receptacles, except those made of steel not liable to rust, shall be secured by cushioning materials in wooden packagings;
- (b) substances of 8° (b): not more than 15 kg per bag, in bags made of cloth or of a suitable plastics material, placed in wooden packagings;
- (c) substances of 8° (a) and (b) may also be packed, not more than 500 g per receptacle, in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, secured by cushioning materials (e.g. corrugated fibreboard) in a wooden case. A package must not contain more than 5 kg of nitro-compounds. The receptacles shall be closed by means of a stopper, made of cork or rubber or a suitable plastics material, which shall be held in position by an additional device (such as a cap, crown, seal or binding) capable of preventing any loosening of the closure system during carriage;
- (d) articles of 8° (c): separately in stout paper and placed, not more than 100 per box, in sheet-metal boxes. Not more than 100 of these boxes shall be packed in a wooden packing case;

(2) A package under paragraph (1) (a) or (b) must not weigh more than 75 kg; it must not contain more than 25 kg of substances of 8° (a) or more than 50 kg of substances of 8° (b). A package under paragraph (1) (c) must not weigh more than 15 kg, or a package under paragraph (1) (d) more than 40 kg.

2109

(1) Substances and articles of 9° shall be packed:

- (a) substances of 9° (a) to (c):
  - 1. not more than 10 kg per bag, in bags made of cloth or of a suitable plastics material, placed in an impermeable fibreboard box or in a box made of tin-plate or aluminium sheet or zinc sheet; or
  - 2. not more than 10 kg per receptacle, in receptacles made of fibreboard of adequate strength, impregnated with paraffin wax or rendered impermeable by some other means.



Class 1a

Boxes made of tin-plate or aluminium sheet or zinc sheet and boxes or receptacles of other kinds shall be placed in a wooden case lined with corrugated fibreboard; metal boxes so placed shall be separated from one another by means of a corrugated-fibreboard wrapping. A case may not contain more than four boxes or receptacles of other kinds. The lids of cases shall be secured by means of screws.

2109  
(contd)

(b) penthrite [9° (a)] may also be packed either:

1. not more than 5 kg per receptacle, in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, closed by means of a stopper made of cork or rubber or a suitable plastics material; each receptacle shall be placed in a metal receptacle hermetically closed by welding or soldering and cushioned with resilient materials so as to wedge the inner receptacle securely without leaving any empty space. Not more than 4 metal receptacles shall be packed in a wooden case lined with corrugated fibreboard and shall be separated from one another by several thicknesses of corrugated fibreboard or of another material capable of performing the same function; or
2. not more than 500 g dry weight per receptacle, in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, closed by means of a stopper made of cork or rubber or a suitable plastics material. These receptacles shall be placed in a wooden case. They shall be separated from one another by means of a corrugated fibreboard wrapping and from the sides of the case by a space of not less than 3 cm filled with cushioning materials;

(c) hexogen [9° (a)] may also be packed as provided under (b) 1. above for penthrite;

(d) articles of 9° (d): first separately in stout paper and placed, not more than 3 kg per case, in fibreboard cases in which they shall be fixed in position by cushioning materials; these cases, not more than 10 per wooden case, shall be so secured by cushioning materials in a wooden case closed by means of screws that there is a space of not less than 3 cm filled with cushioning materials at all points between the fibreboard cases and the packing case.

(2) A package under (1) (a) or (1) (b) 1. must not weigh more than 75 kg; a package under 1 (c) must not weigh more than 10 kg; a package under (1) (b) 2. or (1) (d) must not weigh more than 35 kg. Packages which, with their contents, weigh more than 30 kg shall be fitted with means of handling.

Class 1a

- 2110 (1) Substances of 10° shall be packed, not more than 500 g per bag, in firmly-tied bags made of a suitable pliant material; each bag shall be placed in a box made of metal, fibreboard or paperboard; these boxes, not more than 30 per packing case, shall be secured by cushioning materials in a wooden packing case with complete sides not less than 12 mm thick.
- (2) A package must not weigh more than 25 kg.
- 2111 (1) Substances and articles of 11° shall be packed:
- (a) substances of 11° (a) and (b):
1. not more than 2.5 kg per bag, in bags placed in boxes made of fibreboard, tin-plate or aluminium. The boxes shall be secured by cushioning materials in wooden packagings, or
  2. in bags made of closely-woven fabric, placed in wooden casks or cases;
- (b) articles of 11° (c): rolled in stout paper; each roll must not weigh more than 300 g. The rolls shall be placed in a wooden case lined with stout paper.
- (2) The lids of the wooden cases shall be secured by means of screws; if the screws are made of iron they shall be coated with a material not liable to produce sparks when subjected to shock or friction.
- (3) A package must not weigh more than 75 kg if it is carried as part of a full load, and not more than 35 kg if it is not carried as part of a full load.
- 2112 (1) Substances of 12° shall be cartridge'd in wrappings made of a suitable plastics material or of paper. The cartridges may be dipped in paraffin wax, ceresine or resin, or be wrapped in a suitable plastics material, so as to be protected from damp. Explosives containing more than 6 per cent liquid nitric esters shall be cartridge'd in paper coated with paraffin wax or ceresine or in an impermeable plastics material such as polyethylene. The cartridges shall be placed in wooden packagings.
- (2) Cartridges not coated with paraffin wax or ceresine, or cartridges in permeable wrappings, shall be made up into packets weighing not more than 2.5 kg each. Packets so made up, whose wrapping must consist at least of stout paper, shall be dipped in paraffin wax, ceresine or resin or wrapped in a suitable plastics material so as to be protected from damp. The packets shall be placed in wooden packagings.
- (3) The closure of wooden packagings may be ensured by means of metal bands or wires fastened tightly round them.

Class 1a

(4) A package must not weigh more than 75 kg. It must not contain more than 50 kg of explosives.

2112  
(contd)

(5) Instead of the wooden packagings prescribed in paragraph (1) and paragraph (2), it is also permissible to use suitable cases, made of solid fibreboard or corrugated fibreboard, which are of sufficient mechanical strength and whose lid flaps and bottom flaps must be closed by means of adhesive strips of sufficient strength. The design of cases made of solid fibreboard or corrugated fibreboard must be approved by the competent authority of the country of departure. Such a package must not weigh more than 30 kg; it must not contain more than 25 kg of explosives.

(1) Substances of 13° shall be cartridged in paper wrappings. Cartridges not coated with paraffin wax or ceresine shall first be rolled in paper that has been rendered impermeable. They shall be made up by means of a paper wrapping into packets weighing not more than 2.5 kg each, which shall be secured by cushioning materials in wooden packagings whose closure may be ensured by means of metal bands or wires fastened tightly round them.

2113

(2) A package must not weigh more than 35 kg.

(1) Substances of 14° shall be packed:

2114

(a) substances of 14° (a): cartridged in wrappings made of paper that has been rendered impermeable. The cartridges shall be made up into packets by means of a paper wrapping or, if without a paper wrapping, secured by cushioning materials in fibreboard cases. The packets or fibreboard cases shall be secured by inert cushioning materials in wooden packagings whose closure may be ensured by means of metal bands or wires fastened tightly round them;

(b) substances of 14° (b): cartridged in wrappings made of paper that has been rendered impermeable. The cartridges shall be placed in a fibreboard box. The fibreboard boxes, wrapped in paper that has been rendered impermeable, shall be secured, leaving no empty spaces, in wooden packaging whose closure may be ensured by means of metal bands or wires fastened tightly round them;

(c) substances of 14° (c):

1. cartridged in wrappings made of a suitable plastics material or of paper. The cartridges may be dipped in paraffin wax, ceresine or resin or be wrapped in a suitable plastics material, so as to be protected from damp. Explosives containing more than 6 per cent liquid nitric esters shall be cartridged in paper coated with paraffin wax or ceresine or in an impermeable plastics material such as polyethylene. The cartridges shall be placed in wooden packagings;

Class 1a

2114  
(contd)

2. cartridges not coated with paraffin wax or ceresine, or cartridges in permeable wrappings, shall be made up into packets weighing not more than 2.5 kg each. Packets so made up, whose wrapping must consist at least of stout paper, shall be dipped in paraffin wax, ceresine or resin or be wrapped in a suitable plastics material, so as to be protected from damp. The packets shall be placed in wooden packagings;
3. the closure of wooden packagings may be ensured by means of metal bands or wires fastened tightly round them;
4. instead of the wooden packagings prescribed under 1. and 2. above, it is also permissible to use suitable cases, made of solid fibreboard or corrugated fibreboard, which are of sufficient mechanical strength and whose lid flaps and bottom flaps must be closed by means of adhesive strips of sufficient strength. The design of cases made of solid fibreboard or corrugated fibreboard must be approved by the competent authority of the country of departure.

(2) A package containing substances of 14° (a) or (b) must not weigh more than 35 kg. A package containing substances of 14° (c) must not weigh more than 75 kg; it must not contain more than 50 kg of explosives; in the case of a packing conforming to paragraph 1 (c) 4., the package must not weigh more than 30 kg nor contain more than 25 kg of explosives.

3. Mixed packing

2115

Substances listed under an item number of marginal 2101 may not be included in the same package either with substances grouped under the same or another item number of that marginal, or with substances or articles of other Classes, or with other goods.

Note: Packages as referred to in marginal 2108 (1) (c) may contain organic nitro-compounds having different compositions and names.

4. Marking and danger labels on packages (see Appendix A.9)

2116

Packages containing picric acid [7° (a)] shall be marked with the name of the substance in clearly legible and indelible red characters. This marking shall be in an official language of the country of departure and also, if that language is not English, or French, or German, in English, French or German, unless international road transport tariffs, if any, or agreements concluded between the countries concerned in the transport operation, provide otherwise.

Class 1a

(1) Packages containing substances and articles of Class 1a shall bear a label conforming to model No. 1. 2117

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

2118

B. Particulars in the transport document

(1) The description of the goods in the transport document must conform to one of the names underlined in marginal 2101. Where the name of the substance is not indicated in the case of 8° (a) and (b), the trade name must be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 1a 3° (a) ADR]. 2119

(2) The following must be certified in the transport document: "The nature of the goods, and the packaging, are in conformity with the provisions of ADR".

(3) For consignments which, under marginal 11 400 of Annex B, are to be accepted for carriage as a full load only, the transport document shall also show the weight of each package and the number and nature of the packagings.

2120-  
2125

C. Empty packagings

(1) Packagings of 15° must be securely closed and be leak-proof in the same degree as though they were full. 2126

(2) The description in the transport document must be: "Empty packaging, 1a, 15°, ADR (or RID)". This description must be underlined in red.

2127-  
2129

1

1

CLASS 1b. ARTICLES FILLED WITH EXPLOSIVE SUBSTANCES

1. List of articles

(1) Among the articles covered by the heading of Class 1b, only those listed in marginal 2131 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex B. These articles to be accepted for carriage under certain conditions are to be considered as articles of ADR. 2130

(2) If the articles listed under 7°, 10° or 11° of marginal 2131 are composed of, or filled with, explosive substances listed in marginal 2101 those substances must satisfy the stability and safety conditions laid down concerning them in Appendix A.1.

1° Fuses, not primed: 2131

- (a) rapid combustion fuses (fuses consisting of a thick tube with a core of black powder, or with a core of threads impregnated with black powder, or with a core of nitrated cotton threads);
- (b) detonating fuses in the form of small-section metal tubes with thin walls and a core filled with an explosive substance; see also Appendix A.1, marginal 3108;
- (c) flexible detonating fuses wrapped in textile or a plastics material, of small section and with a core filled with an explosive substance; see also Appendix A.1, marginal 3109;
- (d) instantaneous detonating fuses (small-section woven fuses with a core filled with an explosive substance more dangerous than penthrito).

For other fuses, see Class 1c, 3° (marginal 2171).

2° Non-detonating primers (primers which do not produce a disruptive effect either with the aid of detonators or by other means):

- (a) percussion caps;
- (b) 1. primed cases of central-percussion cartridges, not filled with propellant powder, for firearms of all calibres;
- 2. primed cases of rim-fire cartridges, not filled with propellant powder, for Flobert weapons and firearms of similar calibres;

Class 1b

2131  
(contd)

- (c) quick-matches, screw-primers and other similar primers containing a small charge (black powder or other explosives), set in action by friction, percussion or electricity;
- (d) fuses without any device, e.g. detonator, producing a disruptive effect and without a transmission charge.

3° Railway fog signals

4° Small-arms cartridges [with the exception of those containing a bursting charge (see under 11°)]:

- (a) sporting cartridges;
- (b) Flobert cartridges;
- (c) tracer cartridges;
- (d) incendiary cartridges;
- (e) other central-percussion cartridges.

Note: Apart from sporting cartridges with lead pellets, only cartridges whose calibre does not exceed 13.2 mm are to be considered as articles of 4°.

5° Detonating fuses:

- (a) detonators with or without a delayed-action device; delayed-action connecting pieces for detonating fuses;
- (b) electric detonators fitted with fuses with or without a delayed-action device;
- (c) detonators connected firmly to a black-powder fuse;
- (d) detonators with gaines (detonators combined with a transmission charge composed of a compressed explosive); see also Appendix A.1, marginal 3110;
- (e) fuses with detonators (fused detonators) with or without a transmission charge;
- (f) detonators with percussion cap ("bouchons allumeurs") with or without a delayed-action device, with or without a mechanical device for firing, and without a transmission charge.

6° Sounding caps (detonators, with or without primers, contained in sheet-metal tubes).



Class 1b

- 7° Articles with a propellant charge, other than those listed under 8°; articles with a bursting charge; articles with a propellant and a bursting charge, provided that they contain only explosive substances of Class 1a all without a device producing a disruptive effect (e.g. detonator). The charge in these articles may comprise a tracer substance (see also under 8° and 11°). 2131 (contd.)

Note: Non-detonating primers (2°) are allowed in these articles.

- 8° Articles filled with tracer substances or substances intended for signalling, with or without a propellant charge, with or without an ejection charge, and without a bursting charge, in which the propellant or tracer substance is compressed in such a way that the articles cannot explode when ignited.

- 9° Smoke-producing devices containing chlorates or carrying an explosive charge or an explosive ignition charge.

For smoke-producing substances for agricultural and forestry purposes, see Class 1c marginal 2171 27°.

- 10° Boring devices containing a charge of dynamite or of an explosive similar to dynamite, without fuses and without any device producing a disruptive effect (e.g. detonator), hollow-charge devices for industrial purposes, containing not more than 1 kg of explosive secured within the casing, and without a detonator.

- 11° Articles with a bursting charge, articles with a propellant and a bursting charge, all fitted with a device producing a disruptive effect (e.g. detonator), the whole well secured. The weight of each article must not exceed 25 kg.

2. Provisions

A. Packages

1. General conditions of packing

2132

(1) Packagings shall be so closed and leak-proof as to prevent any loss of the contents. The use of metal bands or wires fastened round the packages to ensure their closure is allowed; their use is compulsory with cases having hinged lids if the lids are not fitted with an effective device to obviate any loosening of the closure.

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

Class 1b

2132 (contd) (3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. Articles shall be firmly secured in their packagings, and inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of articles of the same kind", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Cushioning materials shall be suited to the nature of the contents.

2. Packing of articles of the same kind

2133 Articles of 1° shall be packed as follows:

- (a) articles of 1°(a) and (b): in wooden packagings or in drums made of impermeable fibreboard. A package must not weigh more than 120 kg; however, a fibreboard drum must not weigh more than 75 kg;
- (b) articles of 1°(c): rolled in lengths of up to 250 m on reels made of wood or fibreboard. The reels shall be placed in wooden cases in such a manner that they cannot come into contact either with one another or with the sides of the cases. A case must not contain more than 1,000 m of fuse;
- (c) articles of 1°(d): rolled in lengths of up to 125 m on reels made of wood or fibreboard which shall be packed in a wooden case, closed by means of screws and with sides not less than 18 mm thick, in such a manner that the reels cannot come into contact either with one another or with the sides of the case. A case must not contain more than 1,000 m of instantaneous detonating fuse.

2134 (1) Articles of 2° shall be packed as follows:

- (a) articles of 2°(a): caps with an uncovered explosive charge, not more than 500 per box or small case, and caps with a covered explosive charge, not more than 5,000 per box or small case, in sheet-metal boxes, fibreboard boxes or small wooden cases. These packagings shall be placed in a packing case made of wood or sheet-metal;
- (b) articles of 2°(b)1: primed cases of central-percussion cartridges, not filled with propellant powder, for firearms of all calibres, in cases made of wood or fibreboard or in textile bags;

Class 1b

- (c) articles of 2°(b)2: primed cases of rim-fire cartridges, not filled with propellant powder, for Flobert weapons and firearms of similar calibres, not more than 5,000 per box, in boxes made of sheet-metal or fibreboard which shall be placed in a packing case made of wood or sheet-metal; however, these primed cases for rim-fire cartridges may also be packed, not more than 25,000 per bag, in a bag which must be secured by means of corrugated fibreboard in a packing case made of wood or iron;
- (d) articles of 2°(c) and (d): in boxes made of fibreboard, wood or sheet-metal which shall be placed in packagings made of wood or metal.

2134  
(contd)

(2) A package containing articles of 2°(a), (c) or (d) must not weigh more than 100 kg.

(1) Articles of 3° shall be packed in cases made of boards not less than 18 mm thick, tongued and grooved and assembled by means of wood screws. Fog signals shall be secured in cases by cushioning materials in such a manner that they cannot come into contact either with one another or with the sides of the case.

2135

(2) A package must not weigh more than 50 kg.

(1) Articles of 4°(a), (b) and (e) shall be placed tightly in firmly-closing boxes made of sheet-metal, wood or fibreboard; these boxes shall be housed, leaving no empty spaces, in packing cases made of metal, wood, hardboard, solid fibreboard or corrugated fibreboard; the fibreboard must have been rendered impermeable by impregnation and be of sufficient mechanical strength.

2136

Fibreboard cases shall be closed by means of adhesive strips of sufficient strength. The production model of cases made of solid fibreboard or corrugated fibreboard must be approved by the competent authority of the country of departure.

(2) Articles of 4°(c) and (d) shall be placed, not more than 400 per box, in boxes made of sheet-metal, wood or fibreboard; these boxes shall be packed securely in packing cases made of metal or wood.

(3) A package must not weigh more than 100 kg; however, where hardboard or fibreboard cases are used, a package containing articles of 4(a), (b) or (e) must not weigh more than 40 kg.

2137

(1) Articles of 5° shall be packed as follows:

- (a) articles of 5°(a): not more than 100 per receptacle in the case of detonators and not more than 50 per receptacle in the case of connecting pieces, in receptacles, made of sheet-metal or impermeable fibreboard, in which they shall be well protected against ignition and secured by cushioning materials. Sheet-metal receptacles shall be lined with a resilient material. The lids shall be secured all round by adhesive strips. Receptacles shall, not more than 5 per packet or box in the case of detonators and not more than 10 per packet or box in the case of connecting pieces, be enclosed in a packet or placed in a fibreboard box. The packets or boxes shall be packed in a wooden case closed by means of screws and with sides not less than 18 mm thick, or in a sheet-metal packaging, the case or packaging being secured by cushioning materials in a packing case with sides not less than 18 mm thick in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between the wooden case or sheet-metal packaging and the packing case;
- (b) articles of 5°(b): not more than 100 per packet, in packets with alternate detonators lying towards opposite ends of the packet. Not more than 10 of these packets shall be tied together to form a collective packet. Not more than 5 of these collective packets shall be secured by cushioning materials in a wooden packing case with sides not less than 18 mm thick, or in a sheet-metal packaging, in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between the collective packets and the packing case or sheet-metal packaging;
- (c) articles of 5°(c): fuses fitted with detonators, rolled into coils; not more than 10 coils shall be made into a roll which shall be wrapped in paper. Not more than 10 rolls shall be secured by cushioning materials in a small wooden case closed by means of screws and with sides not less than 12 mm thick. Not more than 10 small cases shall be secured by cushioning materials in a packing case with sides not less than 18 mm thick in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between the small cases and the packing case;
- (d) articles of 5°(d):
  - 1. not more than 100 detonators per case, in wooden cases with sides not less than 18 mm thick, in such a manner that the detonators are spaced not less than 1 cm from one another and from the sides of the case. The said sides shall be mortised and the bottom and lid shall be secured by screws. If the case is lined with zinc sheet or aluminium sheet, a side thickness of 16 mm is sufficient. The case shall be secured by cushioning

materials in a packing case with sides not less than 18 mm thick in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between it and the packing case; or

2. not more than 5 detonators per box, in sheet-metal boxes, the detonators being placed therein in slatted wooden frames or in holed pieces of wood. The lid shall be secured all round by adhesive strips. Not more than 20 sheet-metal boxes shall be placed in a packing case with sides not less than 18 mm thick;

(e) articles of 5°(e): not more than 50 per case, in wooden cases with sides not less than 18 mm thick. The articles shall be secured within the cases by a wooden structure in such a manner that they are spaced not less than 1 cm from one another and from the sides of the case. The sides of the case shall be mortised and the bottom and lid shall be secured by screws. Not more than 6 cases shall be secured by cushioning materials in a packing case with sides not less than 18 mm thick in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between the cases and the packing case. The space may be reduced to not less than 1 cm if it is filled with porous wood-fibre slabs. If the articles are individually packed and firmly secured in hermetically-closing boxes made of sheet-metal or a plastics material, they may be placed in a wooden packing case with sides not less than 18 mm thick. The articles must be separated from one another and firmly secured by fibreboard or by wood-fibre slabs;

(f) articles of 5°(f):

1. not more than 50 per case, in wooden or metal cases; in these cases each detonating part of the "bouchon allumeur" shall be so accommodated in a slotted wooden support that the distance between adjacent detonators and between the detonators of the outermost "bouchons allumeurs" and the side of the case is not less than 2 cm; closing the lid of the case shall ensure complete immobility of the whole; not more than 3 cases shall be placed, leaving no empty spaces, in a wooden packing case with sides not less than 18 mm thick; or
2. in boxes made of wood or metal; in these boxes each "bouchon allumeur" shall be so supported by a frame that the distance between two "bouchons allumeurs" and between a "bouchon allumeur" and the side of the box is not less than 2 cm and that the immobility of the whole is ensured; these boxes shall be placed in a packing case with sides not less than 18 mm thick in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between the boxes and between the boxes and the packing case; a package must not contain more than 150 "bouchons allumeurs".

Class 1b

2137 (2) The lid of the packing case shall be closed by means of  
(contd) screws or of hinges and folding bars.

(3) Each package containing articles of 5° shall be provided with a closure protected either by lead or other seals (stamp or mark) applied to two screw-heads at the ends of the major axis of the lid or of the folding bars, or by a strip, bearing the trade mark, gummed on to the lid and on two opposite sides of the case.

(4) A package must not weigh more than 75 kg; packages weighing more than 30 kg shall be fitted with means of handling.

2138 (1) Articles of 6° shall be rolled separately in paper and placed in corrugated fibreboard wrappings. They shall be packed, not more than 25 per box, in boxes made of fibreboard or sheet-metal. The lids shall be secured all round by adhesive strips. Not more than 20 boxes shall be placed in a wooden packing case.

(2) A package must not weigh more than 50 kg. Packages weighing more than 30 kg shall be fitted with means of handling.

2139 (1) Articles of 7° shall be packed in wooden cases closed by means of screws or of hinges and folding bars and with sides not less than 16 mm thick, or in receptacles made of metal or a suitable plastics material of adequate strength. The lids and bottoms of the wooden cases may also be made of highly-compressed paperboard equalling the sides in strength. Articles weighing more than 20 kg may also be despatched in crates or without packing.

(2) A package must not weigh more than 100 kg if it contains articles each of which weighs not more than 1 kg. Cases which, with their contents, weigh more than 30 kg shall be fitted with means of handling.

2140 (1) Articles of 8° shall be packed in wooden cases, in drums made of fibreboard which has been rendered impermeable, or in receptacles made of metal or of a suitable plastics material of adequate strength. The ignition head shall be protected in such a manner as to prevent any scattering of the charge from the article.

(2) A package must not weigh more than 100 kg; however, where fibreboard drums are used a package shall not weigh more than 75 kg. Cases which, with their contents, weigh more than 30 kg shall be fitted with means of handling.

2141 Articles of 9° shall be enclosed in wooden packagings. A package must not weigh more than 75 kg; packages weighing more than 30 kg shall be fitted with means of handling.

Class 1b

Articles of 10° shall be packed in wooden cases. Packages weighing more than 30 kg shall be fitted with means of handling. 2142

Articles of 11° shall be packed as follows: 2143

- (a) articles less than 13.2 mm in diameter: not more than 25 per box, packed tightly in firmly-closing fibreboard boxes or in receptacles made of a suitable plastics material of adequate strength; these boxes or receptacles shall be placed, leaving no empty spaces, in a wooden case, with sides not less than 18 mm thick, which may be lined with tin-plate, zinc or aluminium sheet, or a suitable plastics or similar material of adequate strength.

A package must not weigh more than 60 kg. Packages weighing more than 30 kg shall be fitted with means of handling.

- (b) articles from 13.2 mm to 57 mm in diameter:

1. separately

in a tube made of fibreboard or of a suitable plastics material, strong, close-fitting and closing firmly at both ends; or

in a tube made of fibreboard or of a suitable plastics material, strong, close-fitting, closed at one end and open at the other; or

in a tube made of fibreboard or of a suitable plastics material, open at both ends but with an inner projection or other suitable internal device to prevent the article from moving.

Packed in this manner, not more than:

300 articles not less than 13.2 mm and not more than 21 mm in diameter; or

60 articles more than 21 mm but not more than 37 mm in diameter; or

25 articles more than 37 mm but not more than 57 mm in diameter shall be placed in layers in a wooden case with sides not less than 18 mm thick, the wooden case being lined with tin-plate, zinc sheet, or aluminium sheet.

In the case of articles packed in tubes open at both ends or at one end, the packing case shall be lined on the side or sides adjacent to the open ends of the tubes either with a felt pad not less than 7 mm thick or with a sheet of the same thickness of double-faced corrugated fibreboard or similar material.

Class 1b

2143  
(contd)

A package must not weigh more than 100 kg. Packages weighing more than 30 kg shall be fitted with means of handling;

2. articles 20 mm in diameter may also be packed, not more than 10 per box, in strong, closely-fitting fibreboard boxes coated with paraffin wax and equipped with a honey-combed bottom insert and with partitions made of fibreboard coated with paraffin wax. The boxes shall be closed by a gummed flap. Not more than 30 boxes shall be tightly packed in a wooden case with sides not less than 18 mm thick, the wooden case being lined with zinc sheet, tin-plate or aluminium sheet.

A package must not weigh more than 100 kg. Packages weighing more than 30 kg shall be fitted with means of handling;

3. articles not more than 30 mm in diameter may, in a number not exceeding that indicated under 1., also be put on to strips and packed in a strong steel receptacle. This receptacle may be cylindrical.

These articles put on to strips shall be surrounded by a suitable device so as to constitute a compact unit and as to prevent individual articles from becoming detached. One or more units shall be so fixed in the receptacle that they cannot be displaced.

The ends of articles put on to strips shall rest on shock-absorbing non-metallic supports.

The lid of the receptacle must be so closed as to be leak-proof and be so secured by a locking device capable of being sealed that the articles cannot fall out.

A package must not weigh more than 100 kg. Packages weighing more than 30 kg shall be fitted with means of handling. Receptacles capable of being rolled shall have their lids fitted with a strong handle enabling them to be carried;

4. articles not less than 30 mm and not more than 57 mm in diameter may also be packed separately in a strong, closely-fitting, hermetically-closed cylindrical box made of fibreboard, fibre or a suitable plastics material. Not more than 40 of these boxes shall be placed in layers in a wooden case with sides not less than 18 mm thick.

A package must not weigh more than 100 kg. Packages weighing more than 30 kg shall be fitted with means of handling.



Class 1b

- (c) Other articles of 11°: in conformity with the provisions of marginal 2139(1). A package must not weigh more than 100 kg. Packages weighing more than 30 kg shall be fitted with means of handling. 2143 (contd)

Note: In the case of articles containing both propellant and bursting charges, the diameter referred to is that of the cylindrical portion containing the bursting charge.

3. Mixed packing

- (1) Articles listed under an item number of marginal 2131 may not be included in the same package either with articles of a different kind but of the same item number, or with articles of another item number of that marginal, or with substances or articles belonging to other Classes, or with other goods. 2144

(2) The following may, however, be included in the same package:

- (a) articles of 1° with one another.

When articles of 1°(a) and (b) are included in the same package, they shall be packed in conformity with marginal 2133 (a).

When articles of 1°(c) are included in the same package with articles of 1°(a) or (b) or both, those of 1°(c) shall be made up into packages in conformity with the provisions applicable to them and the outer packaging shall be that prescribed for articles of 1°(a) or (b). A package must not weigh more than 120 kg;

- (b) articles of 2°(a) with those of 2°(b), provided that both are contained in inner packagings consisting of boxes placed in wooden cases. A package must not weigh more than 100 kg;
- (c) articles of 4° with one another, taking into account the provisions for inner packaging, in a wooden outer packaging. A package must not weigh more than 100 kg;
- (d) articles of 7° with those of 5°(a), (d), (e) and (f), on condition that the packaging of these latter prevents the transmission of a possible detonation to the articles of 7°. In one package the number of articles of 5°(a), (d), (e) and (f) must be the same as that of the articles of 7°. A package must not weigh more than 100 kg.

4. Marking and danger labels on packages (see Appendix A.9)

Packages containing articles of Class 1b shall bear a label conforming to model No. 1. However, packages containing articles of 1°(d), 5° and 6° shall bear two labels conforming to model No. 1. 2145

2146

Class 1b

B. Particulars in the transport document

2147 (1) The description of the goods in the transport document must conform to one of the names underlined in marginal 2131; it must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RTD" [e.g. 1b 2°(a), ADR].

(2) The following must be certified in the transport document:

"The nature of the goods, and the packaging, are in conformity with the provisions of ADR".

2148-  
2162

C. Empty packagings

2163 No provisions.

2164-  
2169

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CLASS 1c. IGNITERS, FIREWORKS AND SIMILAR GOODS

1. List of goods

(1) Among the substances and articles covered by the heading of Class 1c, only those listed in marginal 2171 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR. 2170

(2) Articles to be accepted must fulfil the following conditions:

- (a) The explosive charge shall be constituted, arranged and distributed in such a manner that neither friction, shaking, shock nor ignition of the packed articles can lead to an explosion of the whole contents of the package;
- (b) white or yellow phosphorus may not be used except in articles of 2<sup>o</sup> and 20<sup>o</sup>;
- (c) the detonating compound of fireworks (21<sup>o</sup>-24<sup>o</sup>), flash-powders (26<sup>o</sup>), and the smoke-producing compounds of pesticides (27<sup>o</sup>), must not contain chlorates;
- (d) the explosive charge must satisfy the stability conditions of Appendix A.1, marginal 3111.

A. Igniters:

2171

- 1<sup>o</sup> (a) Safety matches (with a potassium chlorate and sulphur base);  
(b) matches with a base of potassium chlorate and of phosphorus sesquisulphide, also friction igniters.
- 2<sup>o</sup> Strips of amorces for safety lamps and strips of paraffin-waxed amorces for safety lamps. 1,000 amorces must not contain more than 7.5 g explosive.

For strips of caps, see under 15<sup>o</sup>.

- 3<sup>o</sup> Slow-combustion fuses (fuses consisting of a thin impermeable tube with a narrow-section core of black powder).

For other fuses, see Class 1b, 1<sup>o</sup> (marginal 2131).

- 4<sup>o</sup> Pyroxlin thread (nitrated cotton thread). See also Appendix A.1, marginal 3101.

Class 1c

- 2171 (contd)
- 5° Tubular igniters ("lances d'allumage") (tubes, made of paper or fibreboard, containing a small quantity of a fuse composition of oxygenated substances and organic substances and, possibly, of nitrated aromatic compounds) and thermite caps with pellet igniters.
- 6° Safety igniters for fuses (paper cartridges containing a primer pierced by a thread intended to cause friction or tearing, or similar devices).
- 7° (a) Electric primers without detonator;  
(b) pellets for electric primers.
- 8° Electric igniters (e.g. igniters intended for igniting photographic magnesium powders). The charge of each must not exceed 30 mg nor contain more than 10 per cent fulminate of mercury.
- Note: Appliances of the electric bulb type producing a sudden light and containing an ignition charge similar to that of electric igniters are not subject to the provisions of ADR.
- B. Pyrotechnic articles and toys: caps and (strips) of caps; detonating articles:
- 9° Indoor pyrotechnic articles (e.g. Boscocylinders, confetti bombs, cotillon fruits). Articles with a nitrated-cotton (collodion-cotton) base must not contain more than 1 g per article.
- 10° Fulminating bonbons, flower crackers, strips of nitrated paper (collodion paper).
- 11° (a) Fulminating peas, fulminating grenades and other similar pyrotechnic toys containing fulminate of silver;  
(b) fulminating matches;  
(c) accessories with fulminate of silver.
- Ad (a), (b) and (c): 1,000 articles must not contain more than 2.5 g fulminate of silver.
- 12° Detonating pebbles, each carrying on the outside a charge of not more than 3 g of an explosive other than fulminate.
- 13° Pyrotechnic matches (e.g. Bengal matches, golden-rain matches or cascade-of-flowers matches).
- 14° Miracle candles without ignition heads.

Class 1c

- 15<sup>c</sup> Caps for children's toys, strips (strings) of caps and rings of caps. 2171  
1,000 caps must not contain more than 7.5 g of an explosive free from (contd)  
fulminate.

For strips of caps for safety lamps, see under 2<sup>o</sup>.

- 16<sup>o</sup> Explosive corks with an explosive charge having a phosphorus and chlorate base or with a charge of fulminate or a similar compound compressed into cardboard cartridges. 1,000 corks must not contain more than 60 g chlorate explosive nor more than 10 g of fulminate of a compound with a fulminate base.
- 17<sup>o</sup> Round petards with an explosive charge having a phosphorus and chlorate base. 1,000 petards must not contain more than 45 g explosive.
- 18<sup>o</sup> Cardboard caps (toy ammunition) with an explosive charge having a phosphorus and chlorate base or with a charge of fulminate or a similar compound. 1,000 caps must not contain more than 25 g explosive.
- 19<sup>o</sup> Cardboard caps exploding under foot, with a protected charge having a phosphorus and chlorate base. 1,000 caps must not contain more than 30 g explosive.
- 20<sup>o</sup> (a) Detonating sheets;
- (b) martinikas (so-called Spanish fireworks).

Both comprise a mixture of white (yellow) and red phosphorus with potassium chlorate and not less than 50 per cent inert substances not taking part in the decomposition of the mixture of phosphorus and chlorate. A sheet must not weigh more than 2.5 g and a martinika not more than 0.1 g.

C. Fireworks

- 21<sup>o</sup> Anti-hail rockets not fitted with a detonator, bombs and firepots. The charge, including the propellant charge, must not weigh more than 14 kg per article, the bomb or firepot not more than 18 kg in all.
- 22<sup>o</sup> Incendiary bombs, rockets, Roman candles, fountains, wheels and similar fireworks, with a charge not weighing more than 1,200 g per article.

Class 1c

- 2171 (contd) 23° Cannon shots each containing not more than 600 g granulated black powder or 220 g of an explosive not more dangerous than aluminium powder with potassium perchlorate, rifle shots (crackers) each containing not more than 20 g granulated black powder, all provided with fuses with covered ends; and similar articles for producing a loud detonation.

For railway fog-signals, see Class 1b, 3° (marginal 2131).

- 24° Small fireworks (e.g. jumping-crackers, serpents, golden rain, silver rain, if they contain not more than 1,000 g granulated black powder per 144 articles; volcanoes and hand comets, if they contain not more than 30 g each of granulated black powder).
- 25° Bengal fires without ignition heads (e.g. Bengal torches, lights, flames).
- 26° Magnesium flash-powders, not more than 5 g per bag or tube, in paper bags or in small glass tubes.
- D. Pesticides (substances and articles):
- 27° Smoke-producing substances for agricultural and forestry purposes, and smoke-producing cartridges for use as pesticides.

For smoke-producing devices containing chlorates or carrying an explosive charge or an explosive ignition charge, see Class 1b, 9° (marginal 2131).

2. Provisions

A. Packages

1. General conditions of packing

- 2172 (1) Packagings shall be so closed and leak-proof as to prevent any loss of the contents.

(2) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. Articles shall be firmly secured in their packagings, and inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance or of articles of the same kind", inner packagings may be enclosed in outer packagings, either singly or in groups.

(3) Cushioning materials shall be suited to the nature of the contents.

2. Packing of a single substance or of articles of the same kind

2173

(1) Articles of 1<sup>o</sup> (a) shall be packed in boxes or in books. These boxes or books shall be wrapped in stout paper to form a collective packet all the folds of which shall be glued. The books may also be placed in boxes made of thin fibreboard or of a material not readily inflammable (e.g. cellulose acetate). The fibreboard boxes or the collective packets shall be placed in a strong case made of wood, metal, compressed-wood hardboard, strong solid fibreboard or double-faced corrugated fibreboard.

All joints of metal cases shall be closed by soft soldering or by double-seaming.

Fibreboard cases shall be closed by means of joined flaps. The edges of the outer flaps, and all joints, must be either glued or firmly closed by some other suitable means.

If the fibreboard boxes or collective packets are packed in fibreboard cases, the weight of a package may not exceed 20 kg.

(2) Articles of 1<sup>o</sup> (b) shall be so packed in boxes as to prevent any movement. Not more than 12 of these boxes shall be enclosed in a packet all the folds of which shall be glued.

Not more than 12 of these packets shall be wrapped in stout paper to form a collective packet all the folds of which shall be glued. The collective packets shall be placed in a strong case made of wood, metal, compressed-wood hardboard, strong solid fibreboard or double-faced corrugated fibreboard.

All joints of metal cases shall be secured by soft soldering or double-seaming.

Fibreboard cases shall be closed by means of joined flaps. The edges of the outer flaps, and all joints, must be either glued or firmly closed by some other suitable means.

If the collective packets are packed in fibreboard cases, the weight of a package must not exceed 20 kg.

2174

(1) Articles of 2<sup>o</sup> shall be packed in boxes made of sheet-metal or fibreboard. Not more than 30 sheet-metal or 144 fibreboard boxes shall be enclosed in a packet which must not contain more than 90 g explosive. These packets shall be placed in a packing case, with well-jointed sides not less than 18 mm thick, lined with stout paper or with thin zinc or aluminium sheet or with a sheet of a plastics material not readily

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2174 inflammable. A side thickness of 11 mm is sufficient for a package  
(contd) weighing not more than 35 kg if the case is encircled with an iron band.

(2) A package must not weigh more than 100 kg.

2175 (1) Articles of 3° shall be packed in wooden cases lined with stout paper or thin zinc or aluminium sheet, or in drums of impermeable fibreboard.

Small consignments weighing not more than 20 kg, wrapped in corrugated fibreboard, may also be made up into packets in stout two-ply packing paper securely tied with string.

(2) Where fibreboard drums are used, a package must not weigh more than 75 kg.

2176 (1) Pyroxylin thread (4°) shall be rolled, in lengths not exceeding 30 m per strip, on fibreboard strips. Each roll shall be wrapped in paper. Not more than 10 of these rolls shall be wrapped in packing paper to form packets which shall be secured by cushioning materials in small wooden cases. The cases shall be placed in a wooden packing case.

(2) A package must not contain more than 6,000 m of proxylin thread.

2177 (1) Articles of 5° shall be packed, not more than 25 per box, in boxes made of tin-plate or fibreboard; however, thermite caps may be packed, not more than 100 per box, in fibreboard boxes. Not more than 40 of these boxes shall be secured by cushioning materials in a wooden case in such a manner that they cannot come into contact either with one another or with the sides of the case.

(2) A package must not weigh more than 100 kg.

2178 (1) Articles of 6° - 8° shall be packed:

(a) articles of 6°: in wooden cases;

(b) articles of 7°(a): in wooden cases or in wooden casks or in drums made of impermeable fibreboard;

(c) articles of 7°(b): not more than 1,000 per box, secured by sawdust cushioning in fibreboard boxes divided into not less than three compartments each containing approximately the same number of articles and separated by interposed fibreboard sheets. The lids of boxes shall be secured by gummed strips applied all round. Not more than 100 of these fibreboard boxes shall be placed in a



Class 1c

perforated sheet-iron receptacle. This receptacle shall be secured by cushioning materials in a wooden packing case closed by means of screws and with sides not less than 18 mm thick, in such a manner that there is a space of not less than 3 cm filled with cushioning materials at all points between the sheet-iron receptacle and the packing case;

2178  
(contd)

- (d) articles of 8°: in fibreboard boxes. The boxes shall be made up into a packet containing not more than 1,000 electric igniters. The packet shall be placed in a wooden packing case.

(2) In the case of fibreboard drums, a package containing articles of 7°(a) must not weigh more than 75 kg. A package containing articles of 7°(b) must not weigh more than 50 kg; if it weighs more than 30 kg it shall be fitted with means of handling.

(1) Articles of 9° - 26° shall be enclosed (inner packaging):

2179

- (a) articles of 9° and 10°: in paper packagings or in boxes;
- (b) articles of 11°(a): not more than 500 per fibreboard box or per small wooden case, secured by sawdust cushioning:
1. in fibreboard boxes which shall be wrapped in paper; or
  2. in small wooden cases;
- (c) articles of 11°(b): not more than 10 per book, in books; not more than 100 books together shall be packed in a fibreboard box or wrapped in stout paper;
- (d) articles of 11°(c): not more than 10 per bag, in bags made of paper or of a suitable plastics material; not more than 100 bags together shall be packed in a fibreboard box;
- (e) articles of 12°: not more than 25 per box, in fibreboard boxes;
- (f) articles of 13°: in boxes wrapped in paper to form packets each containing not more than 12 boxes;
- (g) articles of 14°: in boxes or in bags made of paper or of a suitable plastics material. These packagings shall be wrapped in paper to form packets each containing not more than 144 of these articles;
- (h) articles of 15°: in fibreboard boxes each containing:
- not more than 100 caps each charged with not more than 5 mg explosive;
- or
- not more than 50 caps each charged with not more than 7.5 mg explosive.

Class 1c

2179  
(contd)

Not more than 12 of these boxes shall be made up in paper into a roll and not more than 12 of these rolls shall be wrapped in packing paper to form a packet.

Strips (strings) of 50 caps, each cap being charged with not more than 5 mg explosive, may be packed in the following manner: 5 strips (strings) per box, in fibreboard boxes wrapped 6 together in paper equivalent in strength to Kraft paper of a minimum weight of 40 mg/m<sup>2</sup>; 12 small packets so made up shall be wrapped together in paper of the same quality to form a large packet;

- (i) articles of 16°: secured by cushioning materials, not more than 50 per box, in fibreboard boxes. The corks shall be glued to the bottom of the boxes or fixed in position there by some equivalent method. Each box shall be wrapped in paper and not more than 10 of these boxes shall be wrapped in packing paper to form a packet;
- (k) articles of 17°: not more than 5 per box, in fibreboard boxes. Not more than 200 boxes, arranged in rolls, shall be placed together in a collective fibreboard box;
- (l) articles of 18°: secured by cushioning materials, not more than 10 per box, in fibreboard boxes. Not more than 100 boxes, arranged in rolls, shall be wrapped in paper to form a packet;
- (m) articles of 19°: secured by cushioning materials, not more than 15 per box, in fibreboard boxes. Not more than 144 boxes, arranged in rolls, shall be packed in a second fibreboard box;
- (n) articles of 20°(a): secured by cushioning materials, not more than 144 per case, in fibreboard cases;
- (o) articles of 20°(b): not more than 75 per box, in fibreboard boxes; not more than 72 boxes shall be wrapped in fibreboard to form a packet;
- (p) articles of 21°: in fibreboard boxes or in stout paper. If the ignition point of the articles is not covered by a protective cap, each article must first be wrapped separately in paper. The propellant charge of bombs weighing more than 5 kg shall be protected by a paper case covering the lower part of the bomb;
- (q) articles of 22°: in fibreboard boxes or in stout paper. However, large fireworks need not have an inner packaging if their ignition point is covered by a protective cap;
- (r) articles of 23°: secured by cushioning materials in boxes made of wood or fibreboard. The ignition heads shall be protected by a protective cap;

Class 1c

- (s) articles of 24°: in fibreboard boxes or in stout paper; 2179  
(contd)
- (t) articles of 25°: in fibreboard boxes or in stout paper. However, large fireworks need not have an inner packaging if their ignition point is covered by a protective cap;
- (u) articles of 26°: in fibreboard boxes. A box must not contain more than 3 glass tubes.

(2) The inner packagings mentioned under (1) shall be placed:

- (a) packagings containing articles of 10°, 13° and 14°, in wooden packing cases;
- (b) packagings containing substances or articles of 9°, 11°, 12° and 15° - 26°, in wooden packing cases with well-jointed sides not less than 18 mm thick, lined with stout paper or thin zinc or aluminium sheet. A side thickness of 11 mm is sufficient for a package weighing not more than 35 kg if the case is encircled with an iron band.

The contents of a packing case are to be limited as follows:

in the case of articles of 17°, to 50 outer fibreboard boxes;  
in the case of articles of 18°, to 25 packets;  
in the case of articles of 20°(a), to 50 fibreboard cases;  
in the case of articles of 20°(b), to 50 packets, each of 72 fibreboard boxes; and

in the case of articles of 21°, to a number of articles such that the weight of their total charge does not exceed 56 kg;

- (c) packaging containing magnesium flash-powders (26°), either in conformity with (b) above, or in wooden packing cases each weighing not more than 5 kg, or, in the case of packagings in the form of paper bags, in strong fibreboard cases each weighing not more than 5 kg.

(3) Wooden cases containing articles with an explosive charge with a phosphorus and chlorate base must be closed by means of screws.

(4) A package containing articles of 9°, 11°, 12°, 15° - 22° or 24° - 26° must not weigh more than 100 kg; it must not weigh more than 50 kg if it contains articles of 23° or more than 35 kg if the sides of the case are only 11 mm thick and the case is encircled with an iron band.

(1) Substances of articles of 27° shall be packed in wooden cases 2180 lined with packing paper, oiled paper or corrugated fibreboard. No lining is necessary if these substances and articles are wrapped in paper or fibreboard.

Class 1c

2180  
(contd)

(2) A package must not weigh more than 100 kg.

(3) Smoke-producing cartridges for use as pesticides may, if wrapped in paper or fibreboard, likewise be packed:

- (a) in corrugated-fibreboard boxes or in strong fibreboard cases; such a package must not weigh more than 20 kg; or
- (b) in ordinary-fibreboard cases; such a package must not weigh more than 5 kg.

Mixed packing

2181

(1) Substances and articles grouped under the same item number may be included in the same package. The inner packagings shall conform to what is laid down for each dangerous substance, and the outer packaging shall be that laid down for the dangerous substances of the item number in question. In this connexion a fibreboard case containing articles of 20° (a) shall be deemed equivalent to a packet containing articles of 20° (b).

(2) If smaller quantities are not prescribed in the section entitled "Packing of a single substance or of articles of the same kind", dangerous substances of this Class, in quantities not exceeding 6 kg for all of the dangerous substances listed under the same item number or the same letter, may be enclosed in the same package either with dangerous substances of another item number or of another letter of the same Class, or with dangerous substances belonging to other Classes (if mixed packing is likewise permitted in the case of such substances), or with other goods, subject to the following special conditions.

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions contained in marginals 2001(5) and 2002(6) and (7) must be observed.

A package must not weigh more than 100 kg, or more than 50 kg if it contains articles of 23°.

## Class 1c

Special conditions:

2181  
(contd)

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
1°	Matches	5 kg	5 kg	Must not be packed together with substances of Classes 3, 4.1 and 4.2.
2° and 3°	Strips of amorces and slow-combustion fuses	Mixed packing not allowed		
4°	Pyroxylin thread		1,500 m of pyroxylin thread	
5° - 8°	All articles	Mixed packing not allowed		
9° - 20°	All articles			Mixed packing allowed only with small wares or non-pyrotechnic toys, from which they must be kept separate. The collective case must meet the requirements laid down for those articles contained therein in respect of which marginal 2179 (2) and (3) imposes the most stringent conditions.
21° - 25°	All articles			Mixed packing allowed only with one another. The collective case must meet the requirements laid down for those articles contained therein in respect of which marginal 2179 (2) and (3) imposes the most stringent conditions.
26° and 27°	All articles and substances	Mixed packing not allowed		

Class 1c

4. Marking and danger labels on packages (see Appendix A.9)

2182 (1) Packages containing articles of Class 1c, 16° or 21° to 23°, shall bear a label conforming to model No. 1.

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9.

2183 B. Particulars in the transport document

2184 (1) The description of the goods in the transport document must conform to one of the names underlined in marginal 2171; it must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 1c, 1°(a), ADR]. The wording "Fireworks of ADR, 1c, item number .....", with particulars of the item numbers under which the substances or articles to be carried are listed, is also allowed in the transport document.

(2) In the case of substances or articles of 2°, 4°, 5°, 8°, 9°, 11°, 12° and 15° - 27°, the following must be certified in the transport document: "The nature of the goods, and the packaging, are in conformity with the provisions of ADR".

2185-  
2189

C. Empty packagings

2190 No provisions.

2191-  
2199

## CLASS 2. GASES: COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE

### 1. List of substances

(1) Among the substances and articles covered by the heading of Class 2, 2200 only those listed in marginal 2201 are to be accepted for carriage, and then only subject to the requirements of this Annex and to the provisions of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR.

(2) Substances having a critical temperature lower than 50°C or, at 50°C, a vapour pressure greater than 3 kg/cm<sup>2</sup> are deemed to be substances of Class 2.

(3) The substances and articles of Class 2 are classified as follows:

- A: Compressed gases having a critical temperature below -10°C;
- B: Liquefied gases having a critical temperature of -10°C or above:
  - (a) Liquefied gases having a critical temperature of 70°C or above;
  - (b) Liquefied gases having a critical temperature of -10°C or above, but below 70°C;
- C: Deeply-refrigerated liquefied gases;
- D: Gases dissolved under pressure;
- E: Aerosol dispensers and non-refillable containers of gas under pressure;
- F: Gases subject to special requirements; and
- G: Empty receptacles and empty tanks.

The substances and articles of Class 2 are subdivided according to their chemical properties, as follows:

- (a) non-inflammable;
- (a t) non-inflammable, toxic;
- (b) inflammable;
- (b t) inflammable, toxic;
- (c) chemically unstable;
- (c t) chemically unstable, toxic.

Unless otherwise specified, chemically unstable substances shall be considered to be inflammable.

Class 2

2200 The names of corrosive gases and of articles containing such gases shall  
(contd) be followed by the word "corrosive" in brackets.

(4) Substances of Class 2 which are listed among the chemically unstable gases are to be accepted for carriage only if the necessary steps have been taken to prevent their dangerous decomposition, dismutation or polymerization during carriage.

To this end, care should in particular be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

2201 A. Compressed gases [see also marginal 2201a under (a). For gases of 1<sup>o</sup>(a) and (b) and 2<sup>o</sup>(a) in aerosol dispensers or in non-refillable containers for gases under pressure, see under 10<sup>o</sup> and 11<sup>o</sup>]:

Gases having a critical temperature below -10<sup>o</sup>C are considered to be compressed gases for the purposes of ADR.

1<sup>o</sup> Pure gases and technically-pure gases

(a) Non-inflammable

Argon; helium; krypton; neon; nitrogen; oxygen;  
tetrafluoromethane (R 14).

(a t) Non-inflammable, toxic

Boron trifluoride; fluorine (corrosive); silicon tetrafluoride  
(corrosive).

(b) Inflammable

Deuterium; hydrogen; methane.

(b t) Inflammable, toxic

Carbon monoxide.

(c t) Chemically unstable, toxic

Nitric oxide (nitrogen monoxide) NO (non-inflammable).

2<sup>o</sup> Mixtures of gases

(a) Non-inflammable

Mixtures of two or more of the following gases: rare gases (containing not more than 10 per cent xenon by volume), nitrogen, oxygen, carbon dioxide (not more than 30 per cent by volume); non-inflammable mixtures of two or more of the following gases: hydrogen, methane, nitrogen, rare gases (containing not more than 10 per cent xenon by volume), not more than 30 per cent carbon dioxide by volume; nitrogen containing not more than 6 per cent ethylene by volume; air.

(b) Inflammable

Mixtures of not less than 90 per cent methane by volume with hydrocarbons of 3<sup>o</sup>(b) and 5<sup>o</sup>(b); inflammable mixtures of two or more of the following gases: hydrogen, methane, nitrogen, rare gases



(containing not more than 10 per cent xenon by volume), not more than 30 per cent carbon dioxide by volume; natural gas.

2201  
(contd)

(b t) Inflammable, toxic

Town gas; mixtures of hydrogen with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume; water gas; synthesis gas (e.g. from the Fischer-Tropsch process); mixtures of carbon monoxide with hydrogen or with methane.

(c t) Chemically unstable, toxic

Mixtures of hydrogen with not more than 10 per cent diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent diborane by volume.

B. Liquefied gases [see also marginal 2201a under (b) and (e). For gases of 3° to 6° in aerosol dispensers or in non-refillable containers for gases under pressure, see under 10° and 11°]:

Gases having a critical temperature of -10°C or above are considered to be liquefied gases for the purposes of ADR.

(a) Liquefied gases having a critical temperature of 70°C or above:

3° Pure gases and technically-pure gases

(a) Non-inflammable

Bromochlorodifluoromethane (R 12 B 1); chlorodifluoromethane (R 22); chloropentafluoroethane (R 115); 1-chloro-2,2,2-trifluoroethane (R 133a); dichlorodifluoromethane (R 12); dichlorofluoromethane (R 21); 1,2-dichloro-1,1,2,2-tetrafluoroethane (R 114); octofluorocyclobutane (RC 318).

(a t) Non-inflammable, toxic

Ammonia; boron chloride (corrosive); chlorine (corrosive); chlorine trifluoride (corrosive); hexafluoropropylene (R 216); hydrogen bromide (corrosive); methyl bromide; nitrosyl chloride (corrosive); nitrogen dioxide NO<sub>2</sub> (nitrogen peroxide, nitrogen tetroxide N<sub>2</sub>O<sub>4</sub>) (corrosive); phosgene (corrosive); sulphur dioxide; sulphuryl fluoride; tungsten hexafluoride.

(b) Inflammable

Butane; 1-butylene (1-butene); 1-chloro-1,1-difluoroethane (R 142b); cis-2-butylene (cis-2-butene); cyclopropane; 1,1-difluoroethane (R 152a); isobutane; isobutylene (isobutene); methylsilane; propane; propylene; trans-2-butylene (trans-2-butene); 1,1,1-trifluoroethane.

Class 2

2201  
(contd)

(b t) Inflammable, toxic

Arsine; dichlorosilane; dimethylamine; dimethyl ether; dimethylsilane; ethylamine; ethyl chloride; hydrogen selenide; hydrogen sulphide; methylamine; methyl chloride; methyl mercaptan; trimethylamine; trimethylsilane.

(c) Chemically unstable

1,3-butadiene; vinyl chloride.

(c t) Chemically unstable, toxic

Cyanogen; cyanogen chloride (non-inflammable) (corrosive); ethylene oxide; methyl vinyl ether; trifluorochloroethylene (R 1113); vinyl bromide.

Note: In the case of halogenated hydrocarbons, the use of names customary in the trade, such as the following, is also permitted: Algofrene, Arcton, Edifren, Flugene, Forane, Freon, Fresane, Frigen, Isceon, Kaltron, followed by the substance identification number without the letter R.

4<sup>o</sup> Mixtures of gases

(a) Non-inflammable

Mixtures of substances listed under 3<sup>o</sup>(a) with or without hexafluoropropylene of 3<sup>o</sup>(a t), which as:

mixture F 1 have a vapour pressure at 70°C not exceeding 13 kg/cm<sup>2</sup> and a density at 50°C not lower than that of dichlorofluoromethane (1.30);

mixture F 2 have a vapour pressure at 70°C not exceeding 19 kg/cm<sup>2</sup> and a density at 50°C not lower than that of dichlorodifluoromethane (1.21);

mixture F 3 have a vapour pressure at 70°C not exceeding 30 kg/cm<sup>2</sup> and a density at 50°C not lower than that of chlorodifluoromethane (1.09);

Note: 1. Trichlorofluoromethane (R 11), trichlorotrifluoroethane (R 113) and chlorotrifluoroethane (R 133) are not liquefied gases within the meaning of ADR and thus are not subject to the requirements of ADR. They may however enter into the composition of mixtures F 1 to F 3.

2. See Note under 3<sup>o</sup>.

The azeotropic mixture of dichlorodifluoromethane (R 12) and 1,1-difluoroethane (R 152a), known as R 500;

The azeotropic mixture of chloropentafluoroethane (R 115) and chlorodifluoromethane (R 22), known as R 502;

The mixture of 19 to 21 per cent by weight dichlorodifluoromethane (R 12) and 79 to 81 per cent by weight bromochlorodifluoromethane (R 12 B1).

Class 2

(a t) Non-inflammable, toxic

2201  
(contd)

Mixtures of methyl bromide and chloropicrin having a vapour pressure above 3 kg/cm<sup>2</sup> at 50°C.

(b) Inflammable

Mixtures of hydrocarbons listed under 3°(b) and of ethane and ethylene of 5°(b), which as:

mixture A have a vapour pressure at 70°C not exceeding 11 kg/cm<sup>2</sup> and a density at 50°C not lower than 0.525;

mixture A 0 have a vapour pressure at 70°C not exceeding 16 kg/cm<sup>2</sup> and a density at 50°C not lower than 0.495;

mixture A 1 have a vapour pressure at 70°C not exceeding 21 kg/cm<sup>2</sup> and a density at 50°C not lower than 0.485;

mixture B have a vapour pressure at 70°C not exceeding 26 kg/cm<sup>2</sup> and a density at 50°C not lower than 0.450;

mixture C have a vapour pressure at 70°C not exceeding 31 kg/cm<sup>2</sup> and a density at 50°C not lower than 0.440.

Note: In the case of the foregoing mixtures the use of the following names customary in the trade is permitted for describing these substances:

<u>Name given under 4°(b)</u>	<u>Name customary in the trade</u>
Mixture A, mixture A 0	<u>butane</u>
Mixture C	<u>propane</u>

Mixtures of hydrocarbons of 3°(b) and 5°(b) containing methane.

(b t) Inflammable, toxic

Mixtures of two or more of the following gases: methylsilane, dimethylsilane, trimethylsilane; methyl chloride and methylene chloride in mixtures having a vapour pressure above 3 kg/cm<sup>2</sup> at 50°C; mixtures of methyl chloride and chloropicrin and mixtures of methyl bromide and ethylene bromide having in either case a vapour pressure above 3 kg/cm<sup>2</sup> at 50°C.

(c) Chemically unstable

Mixtures of methylacetylene and propadiene with the hydrocarbons of 3°(b), which as:

mixture P 1 contain not more than 63 per cent methylacetylene and propadiene by volume and not more than 24 per cent propane and propylene by volume, the percentage of C<sub>4</sub>-saturated hydrocarbons being not less than 14 per cent by volume; and as

Class 2

2201  
(contd)

mixture P2 contain not more than 48 per cent methylacetylene and propadiene by volume and not more than 50 per cent propane and propylene by volume, the percentage of  $C_4$ -saturated hydrocarbons being not less than 5 per cent by volume.

(c t) Chemically unstable, toxic

Ethylene oxide containing not more than 10 per cent carbon dioxide by weight; ethylene oxide containing not more than 50 per cent methyl formate by weight, with nitrogen up to a total pressure not exceeding 10 kg/cm<sup>2</sup> at 50°C; ethylene oxide with nitrogen up to a total pressure of 10 kg/cm<sup>2</sup> at 50°C; dichlorodifluoromethane containing 12 per cent ethylene oxide by weight.

(b) Liquefied gases having a critical temperature of -10°C or above, but below 70°C:

5° Pure gases and technically-pure gases

(a) Non-inflammable

Bromotrifluoromethane (R 13 B 1); carbon dioxide; chlorotrifluoromethane (R 13); hexafluoroethane (R 116); nitrous oxide N<sub>2</sub>O; sulphur hexafluoride; trifluoromethane (R 23); xenon.

With regard to carbon dioxide, see also marginal 2201a under (c .

Note: 1. Nitrous oxide is to be accepted for carriage only if it is not less than 99 per cent pure.

2. See Note under 3°.

(a t) Non-inflammable, toxic

Hydrogen chloride (corrosive).

(b) Inflammable

Ethane; ethylene; silane.

(b t) Inflammable, toxic

Germane; phosphine.

(c) Chemically unstable

1,1-difluoroethylene; vinyl fluoride.

(c t) Chemically unstable, toxic

Diborane.

6° Mixtures of gases(a) Non-inflammable

Carbon dioxide containing not less than 1 per cent and not more than 10 per cent nitrogen, oxygen, air or rare gases by weight; the azeotropic mixture of chlorotrifluoromethane (R 13) and trifluoromethane (R 23) known as R 503.

Note: Carbon dioxide containing less than 1 per cent nitrogen, oxygen, air or rare gases by weight is a substance of 5°(a).

(c) Chemically unstable

Carbon dioxide containing not more than 35 per cent ethylene oxide by weight.

(c t) Chemically unstable, toxic

Ethylene oxide containing more than 10 per cent but not more than 50 per cent carbon dioxide by weight.

C. Deeply-refrigerated liquefied gases7° Pure gases and technically-pure gases(a) Non-inflammable

Argon; carbon dioxide; helium; krypton; neon; nitrogen; nitrous oxide  $N_2O$ ; oxygen; xenon.

(b) Inflammable

Ethane; ethylene; hydrogen; methane.

8° Mixtures of gases(a) Non-inflammable

Air; mixtures of substances of 7°(a)

(b) Inflammable

Mixtures of substances of 7°(b); natural gas.

D. Gases dissolved under pressure9° Pure gases and technically-pure gases(a t) Non-inflammable, toxic

Ammonia dissolved in water with more than 35 per cent but not more than 40 per cent ammonia by weight; ammonia dissolved in water with more than 40 per cent but not more than 50 per cent ammonia by weight.

Note: Ammonia solution with an ammonia content not exceeding 35 per cent by weight is not subject to the requirements of ADR.

2201  
(contd)

(c) Chemically unstable

Acetylene dissolved in a solvent (e.g. acetone) absorbed by porous substances.

E. Aerosol dispensers and non-refillable containers of gas under pressure  
[see also marginal 2201a under (d)]:

Note: 1. Aerosol dispensers are receptacles which can be used only once, are equipped with a release valve or dispersal device, and contain, under pressure, a gas or mixture of gases listed in marginal 2208 (2) or contain an active substance (insecticide, cosmetic, etc.) together with such a gas or mixture of gases as a propellant.

2. Non-refillable containers of gas under pressure are receptacles which can be used only once and contain a gas or a mixture of gases listed in marginal 2208 (2) and (3) (e.g. butane for camp-cookers, refrigerant gases; etc.), but are not equipped with a release valve.

3. The term "inflammable substances" means:

- (i) gases (propellant in aerosol dispensers; contents of non-refillable containers of gas under pressure) whose mixtures with air can be ignited and have a lower and an upper inflammability limit;
- (ii) liquids (active substances in aerosol dispensers) of Class 3.

4. The term "chemically unstable" is applied to contents which in the absence of special precautions undergo dangerous decomposition or self-polymerization at a temperature of not more than 70°C.

10<sup>0</sup> Aerosol dispensers

(a) Non-inflammable

With non-inflammable contents.

(a t) Non-inflammable, toxic

With non-inflammable toxic contents.

(b) Inflammable

- 1. With not more than 45 per cent of inflammable contents by weight.
- 2. With more than 45 per cent of inflammable contents by weight.

(b t) Inflammable, toxic

- 1. With toxic contents and not more than 45 per cent of inflammable contents by weight.
- 2. With toxic contents and more than 45 per cent of inflammable contents by weight.

Class 2

2201  
(contd)

(c) Chemically unstable

With chemically-unstable contents.

(c t) Chemically unstable, toxic

With chemically-unstable toxic contents.

11° Non-refillable containers of gas under pressure

(a) Non-inflammable

With non-inflammable contents.

(a t) Non-inflammable, toxic

With non-inflammable toxic contents.

(b) Inflammable

With inflammable contents.

(b t) Inflammable, toxic

With inflammable toxic contents.

(c) Chemically unstable

With chemically-unstable contents.

(c t) Chemically unstable, toxic

With chemically-unstable toxic contents.

F. Gases subject to special requirements

12° Various mixtures of gases

Mixtures containing gases listed under other item numbers of this Class, and mixtures of one or more gases listed under other item numbers of this Class with one or more vapours of substances not excluded from carriage under ADR, on condition that during carriage:

1. the mixture remains entirely gaseous; and
2. all possibility of a dangerous reaction is excluded.

13° Test gases

Gases and mixtures of gases not listed under other item numbers of this Class and used only in laboratory tests, on condition that during carriage:

- (a) the gas or mixture of gases remains entirely gaseous; and
- (b) all possibility of a dangerous reaction is excluded.

Class 2

2201  
(contd)

G. Empty receptacles and empty tanks

14<sup>o</sup> Empty receptacles and empty tanks, uncleaned, which have contained tetrafluoromethane of 1<sup>o</sup>(a), substances of 1<sup>o</sup>, (a t) - (c t); 2<sup>o</sup>, (b) - (c t); 3<sup>o</sup> - 6<sup>o</sup>; carbon dioxide and nitrous oxide of 7<sup>o</sup>(a); or substances of 7<sup>o</sup>(b), 8<sup>o</sup>(b), 9<sup>o</sup>, 12<sup>o</sup> or 13<sup>o</sup>.

Note: 1. Receptacles and tanks which after being emptied of substances listed under 14<sup>o</sup> still contain small residual amounts are regarded as empty receptacles or empty tanks, uncleaned.

2. Empty receptacles or empty tanks, uncleaned, which have contained gases of 1<sup>o</sup>(a) other than tetrafluoromethane (R 14), or gases of 2<sup>o</sup>(a), 7<sup>o</sup>(a) other than carbon dioxide and nitrous oxide, or 8<sup>o</sup>(a), are not subject to the requirements of ADR.

2201a

Gases and articles handed over for carriage in conformity with the following provisions are not subject to the requirements or provisions relating to this Class set out elsewhere in this Annex or in Annex B:

- (a) compressed gases which are neither inflammable nor toxic nor corrosive and whose pressure in the receptacle, referred to a temperature of 15<sup>o</sup>C, does not exceed 2 kg/cm<sup>2</sup>; the same rule applies to mixtures of gases containing not more than 2 per cent inflammable components;
- (b) liquefied gases contained, in quantities not exceeding 60 l, or in quantities of less than 5 l with not more than 25 g hydrogen, in freezing appliances (refrigerators, ice machines, etc.) and necessary for their operation;
- (c) carbon dioxide [5<sup>o</sup>(a)] in metal capsules (sodors, sparklets) if the carbon dioxide in the gaseous state does not contain more than 0.5 per cent air and the capsules contain not more than 25 g carbon dioxide and not more than 0.75 g per cm<sup>3</sup> of capacity;
- (d) articles of 10<sup>o</sup> and 11<sup>o</sup> of a capacity not exceeding 50 cm<sup>3</sup>. A package of such articles shall not weigh more than 10 kg;
- (e) liquefied petroleum gases contained in motor-vehicle tanks firmly secured to the vehicles; the fuel cock between tank and engine must be closed and the electrical contact open.

2. Provisions

A. Packages

1. General conditions of packing

2202

(1) The materials of which the receptacles and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

Note: Care must be taken not to allow any moisture to enter receptacles when they are being filled, and to dry receptacles completely after hydraulic pressure tests (see marginal 2216) carried out with water or with aqueous solutions.



## Class 2

(2) Packagings, including their closures, shall be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. When outer packagings are prescribed, the receptacles shall be firmly secured therein. Unless otherwise specified in the section entitled "Packing of a single substance or of articles of the same kind", inner packagings may be enclosed in outer packagings, either singly or in groups. 2202 (contd)

(3) Metal receptacles intended for the carriage of gases of 1° to 6° and 9° shall contain only the gas for which they have been tested and whose name is inscribed on the receptacle [see marginal 2218 (1)(a)].

Derogations are allowed:

1. for metal receptacles tested for one of the substances of 3°(a) or 4°(a) or for bromotrifluoromethane, chlorotrifluoromethane or trifluoromethane of 5°(a). These receptacles may also be filled with some other substance of the aforesaid items on condition that the minimum test pressure prescribed for that substance does not exceed the test pressure of the receptacle and that the name of the substance and its permissible maximum filling weight are inscribed on the receptacle;
2. for metal receptacles tested for hydrocarbons of 3°(b) or 4°(b). These receptacles may also be filled with some other hydrocarbon on condition that the minimum test pressure prescribed for that substance does not exceed the test pressure of the receptacle and that the name of the substance and its permissible maximum filling weight are inscribed on the receptacle.

For 1 and 2, see also marginals 2215, 2218 (1)(a) and 2220, (1) to (3).

(4) A change in the use to which a receptacle is assigned is allowed in principle if it does not conflict with national regulations; it requires however the approval of the competent authority and replacement of the former markings by markings relating to the new use.

### 2. Packing of a single substance or of articles of the same kind

Note: Carbon dioxide and nitrous oxide [7°(a)] and mixtures of these two gases [8°(a)] may not be carried otherwise than in specially-equipped tanks (see Annex B, marginal 21 400).

#### a. Nature of receptacles

(1) Receptacles intended for the carriage of gases of 1° to 6°, 9°, 12° and 13° shall be so closed and leak-proof as to prevent any escape of the gases. 2203

(2) These receptacles shall be made of carbon steel or of alloy steel (special steels).

The following may however be used:

#### (a) copper receptacles for:

1. compressed gases of 1°, (a), (b) and (b t), and 2°, (a) and (b), whose filling pressure referred to a temperature of 15°C does not exceed 20 kg/cm<sup>2</sup>; and

Class 2

2203  
(contd)

2. liquefied gases of 3<sup>o</sup>(a); sulphur dioxide of 3<sup>o</sup>(a t); dimethyl ether, ethyl chloride and methyl chloride of 3<sup>o</sup>(b t); vinyl chloride of 3<sup>o</sup>(c); vinyl bromide of 3<sup>o</sup>(c t); mixtures F 1, F 2 and F 3 of 4<sup>o</sup>(a); and ethylene oxide containing not more than 10 per cent carbon dioxide by weight, of 4<sup>o</sup>(c t);

(b) aluminium-alloy receptacles (see Appendix A.2) for:

1. compressed gases of 1<sup>o</sup>, (a), (b) and (b t); nitric oxide (nitrogen monoxide) NO of 1<sup>o</sup>(c t); and compressed gases of 2<sup>o</sup>, (a), (b) and (b t);
2. liquefied gases of 3<sup>o</sup>(a); sulphur dioxide of 3<sup>o</sup>(a t); liquefied gases of 3<sup>o</sup>(b) other than methylsilane; dimethyl ether, hydrogen selenide, and methyl mercaptan of 3<sup>o</sup>(b t); ethylene oxide of 3<sup>o</sup>(c t); liquefied gases of 4<sup>o</sup>, (a) and (b); ethylene oxide containing not more than 10 per cent carbon dioxide by weight, of 4<sup>o</sup>(c t); and liquefied gases of 5<sup>o</sup>, (a) and (b), and 6<sup>o</sup>, (a) and (c). Sulphur dioxide of 3<sup>o</sup>(a t) and substances of 3<sup>o</sup>(a) and 4<sup>o</sup>(a) shall be dry; and
3. dissolved acetylene of 9<sup>o</sup>(c).

All gases which are to be carried in aluminium-alloy receptacles shall be free from alkaline impurities.

2204

(1) Receptacles for dissolved acetylene [9<sup>o</sup>(c)] shall be entirely filled with a porous material, uniformly distributed, of a type approved by the competent authority and which

- (a) does not attack the receptacles or form harmful or dangerous compounds either with acetylene or with the solvent;
- (b) does not shake down, even after prolonged use or through jolting, at temperatures up to 60°C;
- (c) is capable of preventing the spread of decomposition of the acetylene in the mass.

(2) The solvent must not attack the receptacles.

2205

(1) The following liquefied gases may, in addition, be carried in thick-walled glass tubes on condition that the quantity of substance in each tube and the degree of filling of the tubes do not exceed the figures indicated below:

<u>Names of gases</u>	<u>Quantity of substance</u>	<u>Degree of filling of tube</u>
Carbon dioxide, nitrous oxide N <sub>2</sub> O [5 <sup>o</sup> (a)], ethane, ethylene [5 <sup>o</sup> (b)]	3 g	one-half of capacity

Class 2

<u>Names of gases</u>	<u>Quantity of substance</u>	<u>Degree of filling of tube</u>	2205 (contd)
Ammonia, chlorine, methyl bromide [3°(a t)], cyclopropane [3°(b)], ethyl chloride [3°(b t)]	20 g	two-thirds of capacity	
Phosgene, sulphur dioxide [3°(a t)]	100 g	three-quarters of capacity	

(2) The glass tubes shall be flame-sealed and secured separately by infusorial-earth cushioning in closed sheet-metal capsules which shall be placed in a wooden case or in some other outer packaging of sufficient strength (see also marginal 2222).

(3) For sulphur dioxide of 3°(a t) stout glass siphons containing not more than 1.5 kg of substance and filled to not more than 88 per cent of their capacity are also allowed. The siphons shall be secured by infusorial earth, sawdust or powdered carbonate of lime, or by a mixture of the two latter, in strong wooden cases or in some other outer packaging of sufficient strength. A package shall not weigh more than 100 kg. If it weighs more than 30 kg it shall be fitted with means of handling.

(1) Gases of 3°(a); 3°(b) other than methylsilane; 3°(b t) other than arsine, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane; 3°(c); 3°(c t) other than cyanogen chloride; and mixtures of 4°(a) and 4°(b), may also, on condition that the weight of liquid per litre of capacity does not exceed either the maximum weight of contents indicated in marginal 2220 or 150 g per tube, be contained in thick-walled glass tubes, or in thick-walled metal tubes made of a metal allowed by marginal 2203 (2). The tubes shall be free from faults liable to impair their strength; in particular, internal stresses in glass tubes shall have been suitably relieved and the thickness of the tube walls shall not be less than 2 mm. The leakproofness of the closure system shall be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage. The tubes shall be secured by cushioning material in small boxes made of wood or fibreboard, the number of tubes per box being such that the weight of the liquid contained in a box does not exceed 600 g. These small boxes shall be placed in wooden cases or in some other outer packaging of sufficient strength; if the liquid contents of a case weigh more than 5 kg the case shall be lined with soft-soldered sheet-metal.

2206

(2) A package shall not weigh more than 75 kg.

(1) Gases of 7°(a) other than carbon dioxide and nitrous oxide, and of 8°(a) other than mixtures containing carbon dioxide and nitrous oxide, shall be enclosed in closed, double-walled metal receptacles which are so insulated that they cannot become coated with dew or hoar-frost and which are fitted with safety valves.

2207

(2) Gases of 7°(a) other than carbon dioxide and nitrous oxide, and of 8°(a) other than mixtures containing carbon dioxide and nitrous oxide, may also be enclosed in receptacles which are not hermetically closed and which are:

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2207  
(contd)

- (a) double-walled vacuum-jacketed glass receptacles surrounded by an absorbent insulating material; these receptacles shall be protected by iron-wire baskets and placed in metal cases; or
- (b) metal receptacles protected against heat transmission in such a way that they cannot become coated with dew or hoar-frost; the capacity of these receptacles shall not exceed 100 litres.

(3) The metal cases referred to in subparagraph (2)(a) and the receptacles referred to in subparagraph (2)(b) above shall be fitted with means of handling. The openings of the receptacles referred to in subparagraphs (2)(a) and (b) shall be fitted with devices allowing gases to escape, preventing any splashing out of the liquid, and so fixed that they cannot fall out. In the case of oxygen of 7<sup>o</sup>(a) and mixtures containing oxygen of 8<sup>o</sup>(a), the devices referred to above and the absorbent insulating material surrounding the receptacles referred to in subparagraph (2)(a) shall be made of incombustible materials.

2208

(1) Aerosol dispensers (10<sup>o</sup>) and non-refillable containers for gas under pressure (11<sup>o</sup>) shall satisfy the following requirements:

- (a) aerosol dispensers containing only a gas or a mixture of gases, and non-refillable containers for gas under pressure, shall be made of metal. This requirement shall not apply to non-refillable containers for gas under pressure with a maximum capacity of 100 ml for butane. Other aerosol dispensers shall be made of metal, a plastics material or glass. Receptacles made of metal and having an outside diameter of not less than 40 mm shall have a concave bottom;
- (b) receptacles made of materials liable to shatter, such as glass or certain plastics materials, shall be enclosed in a device (close-mesh wire netting, flexible cover made of a plastics material, etc.) affording protection against fragments and their dispersal. Receptacles whose capacity does not exceed 150 cm<sup>3</sup> and whose internal pressure at 20<sup>o</sup>C is below 1.5 kg/cm<sup>2</sup> are exempted from this requirement;
- (c) the capacity of receptacles made of metal shall not exceed 1,000 cm<sup>3</sup>; that of receptacles made of a plastics material or of glass shall not exceed 500 cm<sup>3</sup>;
- (d) each model of receptacle shall, before being put into service, satisfy a hydraulic pressure test carried out in conformity with Appendix A.2, marginal 3291. The internal pressure to be applied (test pressure) shall be 1.5 times the internal pressure at 50<sup>o</sup>C, with a minimum pressure of 10 kg/cm<sup>2</sup>;
- (e) the release valves of aerosol dispensers, and their dispersal devices, shall ensure that the dispensers are so closed as to be leak-proof and shall be protected against accidental opening. Valves and dispersal devices which close only by the action of the internal pressure are not to be accepted.

(2) The following gases shall be accepted as propellants, or as constituents of propellants, or as filler gases, for aerosol dispensers:

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gases of 1°, (a) and (b); 2°, (a) and (b); 3°, (a) and (b) other than methylsilane; ethyl chloride and dimethyl ether of 3°(b t); 1,3-butadiene of 3°(c); trifluorochloroethylene of 3°(c t); gases of 4°, (a) and (b); gases of 5°, (a) and (b) other than silane; gases of 5°(c) and 6°(a) and (c). 2208 (contd)

(3) All the gases listed under (2) and, in addition, the following gases shall be accepted as filling gases for non-refillable containers for gas under pressure; methyl bromide of 3°(a t); dimethylamine, ethylamine, methylamine, methyl mercaptan and trimethylamine of 3°(b t); ethylene oxide, methyl vinyl ether and vinyl bromide of 3°(c t); ethylene oxide containing not more than 10 per cent carbon dioxide by weight, of 4°(c t).

(1) The internal pressure at 50°C of aerosol dispensers and of non-refillable containers of gas under pressure shall exceed neither two-thirds of the test pressure of the receptacle nor 12 kg/cm<sup>2</sup>. 2209

(2) Aerosol dispensers and non-refillable containers of gas under pressure shall be so filled that at 50°C the liquid phase does not exceed 95 per cent of their capacity. The capacity of aerosol dispensers is the available volume in a closed dispenser fitted with the valve support, the valve and the dip tube.

(3) All aerosol dispensers and non-refillable containers for gas under pressure shall satisfy a tightness (leakproofness) test in conformity with Appendix A.2, marginal 3292.

(1) Aerosol dispensers and non-refillable containers of gas under pressure shall be placed in wooden cases or strong fibreboard or metal boxes; aerosol dispensers made of glass or a plastics material and liable to shatter shall be separated from one another by interposed sheets of fibreboard or of another suitable material. 2210

(2) A package shall not weigh more than 50 kg if fibreboard boxes are used or more than 75 kg if other packagings are used.

(3) Where carriage is by full load, each load comprising only aerosol dispensers made of metal, the dispensers may be grouped together and secured on trays with the aid of an appropriate plastics material, by means of a shrinkage and heat-sealing process, on condition that the groups of dispensers are then stacked and suitably secured on pallets.

b. Conditions governing metal receptacles

(These conditions are not applicable to the metal tubes referred to in marginal 2206, to the receptacles referred to in marginal 2207 (2)(b), or to the aerosol dispensers or non-refillable metal containers for gas under pressure referred to in marginal 2208).

1. Construction and fittings (see also marginal 2238). 2211

(1) At the test pressure, the stress in the metal at the most severely stressed point of the receptacle (marginals 2215, 2219 and 2220) shall not exceed three-quarters of the guaranteed minimum yield stress (Re). By "yield stress" is meant the stress at which a permanent elongation of

Class 2

2211  
(contd)

2°/oo (i.e. 0.2 per cent) or, for austenitic steels, 1 per cent of the gauge length on the test-piece, has been produced.

Note: In the case of sheet-metal the axis of the tensile test-piece shall be at right angles to the direction of rolling. The permanent elongation at fracture ( $l = 5d$ ) shall be measured on a test-piece of circular cross-section in which the gauge length  $l$  is equal to five times the diameter  $d$ ; if test-pieces of rectangular cross-section are used, the gauge length shall be calculated by the formula  $l = 5.65\sqrt{F_0}$ , where  $F_0$  indicates the initial cross-sectional area of the test-piece.

(2) (a) Steel receptacles whose test pressure exceeds  $60 \text{ kg/cm}^2$  shall be of seamless construction or welded. For welded receptacles, steels (carbon or alloy) of fully satisfactory weldability shall be used.

(b) Receptacles whose test pressure does not exceed  $60 \text{ kg/cm}^2$  shall either conform to the provisions of subparagraph (a) above, or be riveted or hard-soldered on condition that the manufacturer guarantees the workmanship of the riveting and hard-soldering and that the competent authorities of the country of origin have given their approval.

(3) Aluminium-alloy receptacles shall be seamless or welded.

(4) Welded receptacles are to be accepted only on condition that the manufacturer guarantees the workmanship of the welding and that the competent authorities of the country of origin have given their approval.

2212

(1) A distinction is made between the following types of receptacles:

- (a) cylinders of a capacity not exceeding 150 litres;
- (b) receptacles of a capacity of not less than 100 litres [with the exception of cylinders in conformity with subparagraph (a)] and not more than 1,000 litres (e.g. cylindrical receptacles equipped with rolling hoops, and receptacles on skids);
- (c) tanks (see Annex B);
- (d) assemblies, known as "frames", of cylinders in conformity with subparagraph (1)(a), the cylinders being interconnected by a manifold and held firmly together by a metal fitting;

(2) (a) If under the regulations of the country of departure the cylinders referred to in subparagraph (1)(a) are required to be fitted with a device to prevent rolling, this device shall not be integral with the valve cap (marginal 2213 (2)).

(b) Receptacles in conformity with subparagraph (1)(b) which are capable of being rolled shall be equipped with rolling hoops or be otherwise protected against damage due to rolling (e.g. by corrosion-resistant metal sprayed on to the receptacle's outer surface).

Receptacles in conformity with subparagraphs (1)(b) and (1)(c) which are not capable of being rolled shall be fitted with devices (skids, rings, straps) ensuring that they can be safely handled by mechanical means and so

Class 2

arranged as not to impair the strength of, nor cause undue stresses in, the wall of the receptacle.

2212  
(contd)

(c) Frames of cylinders in conformity with subparagraph (1)(d) shall be fitted with devices ensuring that they can be handled safely. The manifold and the master cock shall be situated within the frame and be so mounted as to be protected against any damage.

(3) (a) With the exceptions of gases of 7° and 8°, gases of Class 2 may be carried in cylinders in conformity with subparagraph (1)(a).

Note: For possible limitations on the capacity of cylinders for certain gases, see marginal 2219.

(b) With the exception of fluorine and silicon tetrafluoride [1°(a t)]; nitric oxide (NO) [1°(c t)]; mixtures of hydrogen with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume [2°(b t)]; mixtures of hydrogen with not more than 10 per cent diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent diborane by volume [2°(c t)]; boron chloride, chlorine trifluoride, nitrosyl chloride, sulphuryl fluoride and tungsten hexafluoride [3°(a t)]; methylsilane [3°(b)] arsine, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane [3°(b t)]; cyanogen chloride, cyanogen and ethylene oxide [3°(c t)]; mixtures of methylsilanes [4°(b t)]; substances of 4°(c) and 4°(c t) other than dichlorodifluoromethane containing 12 per cent ethylene oxide by weight; nitrous oxide [5°(a)]; silane [5°(b)]; and substances of 5°(b t), 5°(c t), 7°, 8°, 12° and 13°, gases of Class 2 may be carried in receptacles in conformity with subparagraph (1) (b).

(c) With the exception of silicon tetrafluoride [1°(a t)]; nitric oxide [1°(c t)]; mixtures of hydrogen with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume [2°(b t)]; mixtures of hydrogen with not more than 10 per cent diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent diborane by volume [2°(c t)]; boron chloride, chlorine trifluoride, nitrosyl chloride, sulphuryl fluoride and tungsten hexafluoride [3°(a t)]; methylsilane [3°(b)]; arsine, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane [3°(b t)]; cyanogen chloride, cyanogen and ethylene oxide [3°(c t)]; mixtures of methylsilanes [4°(b t)]; substances of 4°(c) and 4°(c t) other than dichlorodifluoromethane containing 12 per cent ethylene oxide by weight; nitrous oxide [5°(a)]; silane [5°(b)]; and substances of 5°(b t), 5°(c t), 7°, 8°, 12° and 13°, gases of Class 2 may be carried in frames of cylinders in conformity with subparagraph (1)(d). The individual cylinders in a frame of cylinders shall contain only one and the same compressed gas,

Class 2

2212  
(contd)

liquefied gas or gas dissolved under pressure. Each cylinder in a frame of cylinders for fluorine [1<sup>0</sup>(a t)] or dissolved acetylene [9<sup>0</sup>(c)] shall however be fitted with a cock. The cylinders in a frame of cylinders for acetylene shall all contain the same porous material (marginal 2204).

2213

(1) Openings for filling and emptying receptacles shall be fitted with flap valves or needle-valves. Valves of other types may however be allowed if they present equivalent guarantees of safety and have been approved in the country of origin. Nevertheless, whatever the type of valve adopted, its system of attachment shall be strong and such that its satisfactory condition can be verified easily before each filling.

Apart from a manhole, which if provided shall be closed by an effective closure, and from the necessary orifice for the removal of deposits, receptacles and tanks in conformity with marginal 2212 (1)(b) and (c) shall not be equipped with more than two openings, for filling and discharge respectively. Nevertheless, receptacles of a capacity of not less than 100 l intended for the carriage of dissolved acetylene [9<sup>0</sup>(c)] may have more than two openings for filling and discharge.

Similarly, receptacles and tanks in conformity with marginal 2212 (1), (b) and (c), intended for the carriage of substances of 3<sup>0</sup>(b) and 4<sup>0</sup>(b) may be provided with other openings intended in particular for verifying the level of the liquid and the gauge pressure.

(2) Valves (cocks) shall be effectively protected by caps or fixed flanges. Caps shall possess vent-holes of sufficient cross-sectional area to evacuate gases if leakage occurs at the valves. The caps or flanges shall adequately protect the valve if the cylinder falls and during carriage and stacking. Valves placed inside the neck of the receptacles and protected by a screw-threaded plug, and receptacles carried packed in protective cases, shall not require a cap. Likewise, no protective cap shall be required for valves (cocks) on frames of cylinders.

(3) Receptacles containing fluorine [1<sup>0</sup>(a t)]; chlorine trifluoride [3<sup>0</sup>(a t)]; or cyanogen chloride [3<sup>0</sup>(c t)] shall, whether or not they are carried packed in protective cases, be fitted with steel caps. These caps shall have no openings and shall, throughout carriage, be fitted with a gasket ensuring gas-tightness and made of a material not liable to attack by the contents of the receptacle.

2214

(1) In the case of receptacles containing boron trifluoride or fluorine [1<sup>0</sup>(a t)]; chlorine trifluoride or liquefied ammonia [3<sup>0</sup>(a t)]; ammonia dissolved in water [9<sup>0</sup>(a t)]; nitrosyl chloride [3<sup>0</sup>(a t)]; or dimethylamine, ethylamine, methylamine or trimethylamine [3<sup>0</sup>(b t)], valves made of copper or of any other metal liable to be attacked by these gases are not to be accepted.

(2) The use of substances containing grease or oil for ensuring the leakproofness of joints (seams) or for maintaining the closure devices of receptacles used for oxygen [1<sup>0</sup>(a)]; fluorine [1<sup>0</sup>(a t)]; mixtures with oxygen [2<sup>0</sup>(a)]; nitrogen dioxide, chlorine trifluoride [3<sup>0</sup>(a t)]; nitrous oxide [5<sup>0</sup>(a)]; or mixtures of 12<sup>0</sup> containing more than 10 per cent oxygen by volume is prohibited.

(3) The following requirements shall apply to the construction of the receptacles referred to in marginal 2207 (1):



Class 2

- (a) The materials and construction of the receptacles shall be in conformity with the requirements of Appendix A.2, B, marginals 3250 to 3254. All the mechanical and technological characteristics of the material used shall be established for each receptacle at the first test; with regard to the impact strength and the bending coefficient, see Appendix A.2, B, marginals 3265 to 3285. 2214 (contd)
- (b) Receptacles shall be fitted with a safety valve which shall be capable of opening at the working pressure shown on the receptacle. The valves shall be so constructed as to work perfectly even at their lowest working temperature. Their reliability of functioning at that temperature shall be established and checked by testing each valve or a sample of valves of the same type of construction.
- (c) The vents and safety valves of receptacles shall be so designed as to prevent the liquid from splashing out.
- (d) The closing devices shall be so arranged that they cannot be opened by unqualified persons.
- (e) Receptacles whose filling is measured by volume shall be provided with a level indicator.
- (f) The receptacles shall be thermally insulated. The thermal insulation shall be protected against impact by means of continuous metal sheathing. If the space between the receptacle and the metal sheathing is airless (vacuum insulation), the protective sheathing shall be designed to withstand without deformation an external pressure of at least 1 kg/cm<sup>2</sup>. If the sheathing is so closed as to be gas-tight (e.g. in the case of vacuum insulation), a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the receptacle or its fittings. The device shall prevent moisture from penetrating into the insulation.

(4) In the case of receptacles containing mixtures of 4°(c) or dissolved acetylene [9°(c)], metal parts of closing devices in contact with the contents shall not contain more than 70 per cent copper. Receptacles for dissolved acetylene [9°(c)] may also have stop-valves taking yoke connectors.

(5) Receptacles containing oxygen of 1°(a) or 7°(a) and fitted in fish-tanks are likewise to be accepted if they are provided with appliances enabling the oxygen to escape gradually.

2. Official test of receptacles (for aluminium-alloy receptacles, see also Appendix A.2)

(1) Metal receptacles shall be subjected to initial and periodic tests under the supervision of an expert approved by the competent authority. The nature of these tests is specified in marginals 2216 and 2217. 2215

(2) In order to ensure compliance with the requirements of marginals 2204 and 2221 (2), tests of receptacles intended to contain dissolved acetylene [9°(c)] shall include, in addition, examination of the nature of the porous material and of the quantity of solvent.

Class 2

2216

(1) The initial test of new or unused receptacles shall comprise:

A. On an adequate sample of receptacles:

- (a) testing of the material of construction in respect at least of yield stress, tensile strength, and permanent elongation at fracture; the values yielded by these tests shall comply with national regulations;
- (b) measurement of wall thickness at the thinnest point, and calculation of the stress;
- (c) checking the homogeneity of the material for each manufacturing batch, and inspection of the external and internal condition of the receptacles;

B. For all receptacles:

- (d) a hydraulic pressure test in conformity with the provisions of marginals 2219 to 2221;
- (e) an inspection of the markings on the receptacles (see marginal 2218

C. In addition, for receptacles intended for the carriage of dissolved acetylene [9<sup>o</sup>(c)]:

- (f) an inspection as required by national regulations.

(2) Receptacles shall withstand the test pressure without undergoing permanent deformation or exhibiting cracks.

(3) At the periodic inspections the following shall be repeated:

the hydraulic pressure test; check of the external and internal condition of the receptacle (e.g. by weighing, internal inspection, checks of wall thickness); verification of the equipment and markings and, if necessary, verification of the characteristics of the material by suitable tests.

Periodic inspections shall be carried out:

- (a) every 2 years in the case of receptacles intended for the carriage of gases of 1<sup>o</sup>(a t) and 1<sup>o</sup>(c t); town gas of 2<sup>o</sup>(b t); gases of 3<sup>o</sup>(a t) other than ammonia, hexafluoropropylene and methyl bromide; cyanogen chloride of 3<sup>o</sup>(c t); and substances of 5<sup>o</sup>(a t);
- (b) every 5 years in the case of receptacles intended for the carriage of other compressed and liquefied gases (subject to the provisions of subparagraph (c) below) and of receptacles for the carriage of ammonia dissolved under pressure [9<sup>o</sup>(a t)];
- (c) every 10 years in the case of receptacles intended for the carriage of gases of 1<sup>o</sup>(a) other than oxygen; of mixtures of nitrogen with rare gases, of 2<sup>o</sup>(a); of gases of 3<sup>o</sup>(a) and 3<sup>o</sup>(b) other than 1,1-difluoroethane, 1-chloro-1,1-difluoroethane, methylsilane and 1,1,1-trifluoroethane, and of mixtures of gases of 4<sup>o</sup>(a) and 4<sup>o</sup>(b), if the receptacles have a capacity of not more than 150 litres and the country of origin does not prescribe a shorter interval.

Class 2

- (d) in the case of receptacles intended for the carriage of dissolved acetylene [9°(c)], marginal 2217 (1) shall apply, and in that of receptacles conforming to marginal 2207 (1), marginal 2217 (2) shall apply. 2216 (contd)

(1) The external condition (corrosion, deformation) of, and the condition (loosening, settlement) of the porous material in, receptacles intended for the carriage of dissolved acetylene [9°(c)] shall be examined every 5 years. Sampling shall be performed by cutting up, if considered necessary, a suitable number of receptacles and inspecting them internally for corrosion and for any changes that may have occurred in the constituent materials and in the porous material. 2217

(2) Receptacles conforming to marginal 2207 (1) shall be subjected every 5 years to external inspection and to a tightness (leakproofness) test. The tightness (leakproofness) test shall be carried out with the gas contained in the receptacle or with an inert gas at a pressure of 2 kg/cm<sup>2</sup>. Checking shall be performed by means of a pressure gauge or by vacuum measurement. The thermal insulation shall not be removed. The pressure shall not decline during the 8-hour test period. Changes resulting from the nature of the test gas or from variations in temperature shall be taken into account.

3. Marks on receptacles

(1) Metal receptacles shall bear the following particulars in clearly legible and durable characters: 2218

- (a) one of the names of the gas or of the mixture of gases in full, as given in marginal 2201, 1° to 9°; the name or mark of the maker or owner; and the number of the receptacle [see also marginal 2202 (3)]. In the case of halogenated hydrocarbons of 1°(a), 3°(a), 3°(a t), 3°(b), 3°(c t), 4°(a), 5°(a) and 6°(a), the use of the letter R followed by the substance identification number is also permitted;
- (b) in the case of receptacles intended for liquefied gases, the tare of the receptacle including such fittings and accessories as valves, cocks, metal plugs, etc., but excluding the protective cap;
- (c) in the case of receptacles intended for compressed gases, the tare of the receptacle proper;
- (d) the test pressure (see marginals 2219 to 2221) and the date (month, year) of the last test undergone (see marginals 2216 and 2217);
- (e) the stamp of the expert who carried out the tests and inspections; and in addition:
- (f) in the case of compressed gases or mixtures of compressed gases [1°, 2°, 12° and 13°]: the maximum filling pressure at 15°C allowed for the receptacle in question (see marginal 2219);
- (g) in the case of boron fluoride [1°(a t)], liquefied gases [3° to 6°] and ammonia dissolved in water [9°(a t)]: the maximum filling allowed, and the capacity. In the case of deeply-refrigerated gases of 7° and 8°: the capacity;
- (h) in the case of acetylene dissolved in a solvent [9°(c)]: the permitted filling pressure [see marginal 2221 (2)], and the weight of the empty receptacle including the weight of the fittings and accessories, of the porous material, and of the solvent;

Class 2

2218  
(contd)

- (i) in the case of mixtures of gases of 12<sup>o</sup> and test gases of 13<sup>o</sup>, the words "mixtures of gases" or "test gases", as the case may be, shall be engraved on the receptacle as a general indication of the contents. An exact description of the contents shall be shown in a durable form throughout carriage;
- (k) in the case of metal receptacles which, under marginal 2202 (3), are accepted for the carriage of a number of different gases (multi-purpose receptacles), an exact description of the contents shall be shown in a durable form during carriage.

(2) The marks shall be engraved either on a reinforced part of the receptacle, or on a ring, or on a data plate, immovably affixed to the receptacle. In addition, the name of the substance may be indicated on the receptacle by an adherent and clearly-visible inscription applied by painting or by any other, equivalent, process.

- (c) Test pressure, degree of filling, and limitation of capacity, of receptacles (see also marginals 2238, 211 180 and 212 100)

2219

(1) In the case of receptacles intended for the carriage of compressed gases of 1<sup>o</sup>, 2<sup>o</sup> and 12<sup>o</sup>, the internal pressure (test pressure) to be applied in the hydraulic pressure test shall be at least one and one-half times the filling pressure at 15<sup>o</sup>C indicated on the receptacle, but shall not be less than 10 kg/cm<sup>2</sup>.

(2) In the case of receptacles used for the carriage of substances of 1<sup>o</sup>(a) other than tetrafluoromethane; of deuterium and hydrogen of 1<sup>o</sup>(b); or of gases of 2<sup>o</sup>(a), the filling pressure shall not exceed 300 kg/cm<sup>2</sup> referred to a temperature of 15<sup>o</sup>C. In the case of tanks, the filling pressure shall not exceed 250 kg/cm<sup>2</sup> referred to a temperature of 15<sup>o</sup>C.

In the case of receptacles and tanks intended for the carriage of other gases of 1<sup>o</sup> and 2<sup>o</sup> the filling pressure shall not exceed 200 kg/cm<sup>2</sup> referred to a temperature of 15<sup>o</sup>C.

(3) In the case of receptacles intended for the carriage of fluorine [1<sup>o</sup>(a t)] the internal pressure (test pressure) to be applied in the hydraulic pressure test shall be 200 kg/cm<sup>2</sup> and the filling pressure shall not exceed 28 kg/cm<sup>2</sup> at a temperature of 15<sup>o</sup>C; in addition, no receptacle may contain more than 5 kg fluorine.

In the case of receptacles intended for the carriage of boron trifluoride [1<sup>o</sup>(a t)] the hydraulic pressure to be applied in the test (test pressure) shall be either 300 kg/cm<sup>2</sup>, in which case the maximum weight of the contents per litre of capacity shall not exceed 0.86 kg, or 225 kg/cm<sup>2</sup>, in which case the maximum weight of the contents per litre of capacity shall not exceed 0.715 kg.

(4) In the case of receptacles intended for the carriage of nitric oxide NO [1<sup>o</sup>(c t)], the capacity shall be limited to 50 l; the hydraulic pressure to be applied in the test (test pressure) shall be 200 kg/cm<sup>2</sup>; and the filling pressure shall not exceed 50 kg/cm<sup>2</sup> at a temperature of 15<sup>o</sup>C.

(5) In the case of receptacles intended for the carriage of mixtures of hydrogen with not more than 10 per cent hydrogen selenide or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume; of mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent hydrogen selenide

Class 2

or phosphine or silane or germane by volume or with not more than 15 per cent arsine by volume [2°(b t)]; of mixtures of hydrogen with not more than 10 per cent diborane by volume; or of mixtures of nitrogen or rare gases (containing not more than 10 per cent xenon by volume) with not more than 10 per cent diborane by volume [2°(c t)], the capacity shall be limited to 50 l; the hydraulic pressure to be applied in the test (test pressure) shall be not less than 200 kg/cm<sup>2</sup>; and the filling pressure shall not exceed 50 kg/cm<sup>2</sup> at a temperature of 15°C.

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(contd)

(6) Receptacles in conformity with marginal 2207 (1) shall not, at the filling temperature and at a pressure of 1 kg/cm<sup>2</sup>, be filled beyond 98 per cent of their capacity.

Where oxygen of 7°(a) is carried, steps shall be taken to prevent any spillage of the liquid phase.

(7) Where dissolved acetylene [9°(c)] is carried in receptacles in conformity with marginal 2212 (1) (b), the capacity of the receptacles shall not exceed 150 l.

(8) The capacity of receptacles intended for the carriage of mixtures of gases of 12° shall not exceed 50 l. The pressure of the mixture shall not exceed 150 kg/cm<sup>2</sup> at a temperature of 15°C.

(9) The capacity of receptacles intended for the carriage of test gases of 13° shall not exceed 50 l. The filling pressure at a temperature of 15°C shall not exceed 7 per cent of the test pressure of the receptacle.

(10) In the case of tungsten hexafluoride [3°(a t)] the capacity of the receptacles shall be limited to 60 l.

The capacity of receptacles for silicon tetrafluoride [1°(a t)]; boron chloride, nitrosyl chloride and sulphuryl fluoride [3°(a t)]; methylsilane [3°(b)]; arsine, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane [3°(b t)]; cyanogen chloride and cyanogen [3°(c t)]; mixtures of methylsilanes [4°(b t)]; substances of 4°(c t) other than dichlorodifluoromethane containing 12 per cent ethylene oxide by weight; silane [5°(b)]; and substances of 5°(b t) and (c t), shall be limited to 50.

(11) In the case of receptacles intended for chlorine trifluoride [3°(a t)] the capacity shall be limited to 40 l. After filling, a receptacle containing chlorine trifluoride [3°(a t)] shall, before being handed over for carriage, be held back for not less than seven days in order to verify that it is leak-proof.

(1) In the case of receptacles intended for the carriage of liquefied gases of 3° to 6°, and of receptacles intended for the carriage of gases dissolved under pressure of 9°, the hydraulic pressure to be applied in the test (test pressure) shall be not less than 10 kg/cm<sup>2</sup>.

2220

(2) In the case of liquefied gases of 3° and 4° the following values shall be complied with for the hydraulic pressure to be applied to the receptacles in the test (test pressure) and for the maximum degree of filling allowed: \*/

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\*/ See the end of the table in paragraph (2).

## Class 2

2220  
(contd)

Description of substance	Item number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Bromochlorodifluoromethane (R 12 B 1)	3°(a)	10	1.61
Chlorodifluoromethane (R 22)	3°(a)	29	1.03
Chloropentafluoroethane (R 115)	3°(a)	25	1.06
1-chloro-2,2,2-trifluoroethane (R 133a)	3°(a)	10	1.18
Dichlorodifluoromethane (R 12)	3°(a)	18	1.15
Dichlorofluoromethane (R 21)	3°(a)	10	1.23
1,2-Dichloro-1,1,2,2-tetrafluoroethane (R 114)	3°(a)	10	1.30
Octofluorocyclobutane (RC 318)	3°(a)	11	1.34
Ammonia	3°(at)	33	0.53
Boron chloride	3°(at)	10	1.19
Chlorine	3°(at)	22	1.25
Chlorine trifluoride	3°(at)	30	1.40
Hexafluoropropylene (R 216)	3°(at)	22	1.11
Hydrogen bromide	3°(at)	60	1.20
Methyl bromide	3°(at)	10	1.51
Nitrogen dioxide	3°(at)	10	1.30
Nitrosyl chloride	3°(at)	13	1.10
Phosgene	3°(at)	20	1.23
Sulphur dioxide	3°(at)	14	1.23
Sulphuryl fluoride	3°(at)	50	1.10
Tungsten hexafluoride	3°(at)	10	2.70
Butane	3°(b)	10	0.51
1-Butene	3°(b)	10	0.53
1-Chloro-1,1-difluoroethane (R 142b)	3°(b)	10	0.99
Cis-2-butene	3°(b)	10	0.55
Cyclopropane	3°(b)	20	0.53
1,1-Difluoroethane (R 152a)	3°(b)	18	0.79
Isobutane	3°(b)	10	0.49
Isobutene	3°(b)	10	0.52

## Class 2

2220  
(contd)

Description of substance	Item number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Methylsilane	3°(b)	225	0.39
Propane	3°(b)	25	0.42
Propylene	3°(b)	30	0.43
Trans-2-butene	3°(b)	10	0.54
1,1,1-Trifluoroethane	3°(b)	35	0.75
Arsine	3°(bt)	42	1.10
Dichlorosilane	3°(bt)	10	0.90
Dimethylamine	3°(bt)	10	0.59
Dimethyl ether	3°(bt)	18	0.58
Dimethylsilane	3°(bt)	225	0.39
Ethylamine	3°(bt)	10	0.61
Ethyl chloride	3°(bt)	10	0.80
Hydrogen selenide	3°(bt)	31	1.60
Hydrogen sulphide	3°(bt)	55	0.67
Methylamine	3°(bt)	13	0.58
Methyl chloride	3°(bt)	17	0.81
Methyl mercaptan	3°(bt)	10	0.78
Trimethylamine	3°(bt)	10	0.56
Trimethylsilane	3°(bt)	225	0.39
1,3-Butadiene	3°(c)	10	0.55
Vinyl chloride	3°(c)	12	0.81
Cyanogen	3°(ct)	100	0.70
Cyanogen chloride	3°(ct)	20	1.03
Ethylene oxide	3°(ct)	10	0.78
Methyl vinyl ether	3°(ct)	10	0.67
Trifluorochloroethylene (R 1113)	3°(ct)	19	1.13
Vinyl bromide	3°(ct)	10	1.37
Mixture F 1	4°(a)	12	1.23
Mixture F 2	4°(a)	18	1.15
Mixture F 3	4°(a)	29	1.03

## Class 2

2220  
(contd)

Description of substance	Item number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Mixture of gases R 500	4°(a)	22	1.01
Mixture of gases R 502	4°(a)	31	1.05
Mixture of 19 to 21 per cent by weight dichlorodifluoromethane (R 12) and 79 to 81 per cent by weight bromochlorodifluoromethane (R 12 B1)	4°(a)	12	1.50
Mixtures of methyl bromide and chloropicrin	4°(at)	10	1.51
Mixture A (trade name: butane)	4°(b)	10	0.50
Mixture A 0 (trade name: butane)	4°(b)	15	0.47
Mixture A 1	4°(b)	20	0.46
Mixture B	4°(b)	25	0.43
Mixture C (trade name: propane)	4°(b)	30	0.42
Mixtures of hydrocarbons containing methane	4°(b)	225 300	0.187 0.244
Mixtures of methylsilanes	4°(bt)	225	0.39
Mixtures of methyl chloride and methylene chloride	4°(bt)	17	0.81
Mixtures of methyl chloride and chloropicrin	4°(bt)	17	0.81
Mixtures of methyl bromide and ethylene bromide	4°(bt)	10	1.51
Mixtures of methylacetylene/propadiene and hydrocarbons			
Mixture P 1	4°(c)	30	0.49
Mixture P 2	4°(c)	24	0.47
Ethylene oxide containing not more than 10 per cent carbon dioxide by weight	4°(ct)	28	0.73
Ethylene oxide containing not more than 50 per cent methyl formate by weight with nitrogen up to a maximum total pressure of 10 kg/cm <sup>2</sup> at 50°C	4°(ct)	25	0.80



Description of substance	Item Number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Ethylene oxide with nitrogen up to a total pressure of 10 kg/cm <sup>2</sup> at 50°C	4°(ct)	15	0.78
Dichlorodifluoromethane containing 12 per cent ethylene oxide by weight	4°(ct)	18	1.09

\* / 1. The test pressures prescribed are at least equal to the vapour pressures of the liquids at 70°C, reduced by 1 kg/cm<sup>2</sup>, the minimum test pressure required being however 10 kg/cm<sup>2</sup>.

2. In view of the high degree of toxicity of phosgene (carbonyl chloride) [3°(at)] and of cyanogen chloride [3°(ct)], the minimum test pressure for these gases has been fixed at 20 kg/cm<sup>2</sup>.

3. The maximum values prescribed for the degree of filling in kg/litre have been determined as follows: maximum weight of contents per litre of capacity = 0.95 times the density of the liquid phase at 50°C; in addition, the vapour phase must not disappear below 60°C.

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(contd)

(3) In the case of receptacles intended to contain liquefied gases of 5° and 6° the degree of filling shall be such that the internal pressure at 65°C does not exceed the test pressure of the receptacles. The following values shall be complied with [see also paragraph (4)]:

Description of substance	Item number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Bromotrifluoromethane (R 13 B 1)	5°(a)	42	1.13
		120	1.44
		250	1.60
Carbon dioxide	5°(a)	190	0.66
		250	0.75
Chlorotrifluoromethane (R 13)	5°(a)	100	0.83
		120	0.90
		190	1.04
		250	1.10
Hexafluoroethane (R 116)	5°(a)	200	1.10
Nitrous oxide N <sub>2</sub> O	5°(a)	180	0.68
		225	0.74
		250	0.75
Sulphur hexafluoride	5°(a)	70	1.04
		140	1.37
Trifluoromethane (R 23)	5°(a)	190	0.87
		250	0.95
Xenon	5°(a)	130	1.24
Hydrogen chloride	5°(at)	100	0.30
		120	0.56
		150	0.67
		200	0.74
Ethane	5°(b)	95	0.25
		120	0.29
		300	0.39
Ethylene	5°(b)	225	0.34
		300	0.37
Silane	5°(b)	225	0.32
		250	0.41
Germane	5°(bt)	250	1.02
Phosphine	5°(bt)	225	0.30
		250	0.51
1,1-Difluoroethylene	5°(c)	250	0.77
Vinyl fluoride	5°(c)	250	0.64

Description of substance	Item number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Diborane	5°(ct)	250	0.072
Constituents (weight per cent)			
Carbon dioxide containing 1-10 per cent nitrogen, oxygen, air or rare gases by weight	6°(a)	190	1 0.64
		190	1 - 10 0.48
		250	1 0.73
		250	1 - 10 0.59
Mixture of gases R 503	6°(a)	31	0.11
		42	0.20
		100	0.66
Carbon dioxide containing not more than 35 per cent ethylene oxide by weight	6°(c)	190	0.66
		250	0.75
Ethylene oxide containing more than 10 per cent but not more than 50 per cent carbon dioxide by weight	6°(ct)	190	0.66
		250	0.75

(4) For substances of 5° other than hydrogen chloride [5°(at)]; germane and phosphine [5°(bt)]; and diborane [5°(ct)], and for substances of 6°, the use of receptacles tested at a lower pressure than that indicated in paragraph (3) for the substance in question is allowed, but the quantity of substance per receptacle shall not exceed that which at 65°C would produce inside the receptacle a pressure equal to the test pressure. In such a case the permissible maximum load shall be prescribed by the expert approved by the competent authority.

2221

(1) In the case of gases dissolved under pressure, of 9°, the following values shall be complied with for the hydraulic pressure to be applied to the receptacles in the test (test pressure), and for the maximum degree of filling allowed:

2221  
(contd)

Class 2

Description of substance	Item number	Minimum test pressure kg/cm <sup>2</sup>	Maximum weight of contents per litre of capacity kg
Ammonia dissolved under pressure in water			
with more than 35 per cent but not more than 40 per cent ammonia by weight	9°(at)	10	0.80
with more than 40 per cent but not more than 50 per cent ammonia by weight	9°(at)	12	0.77
Dissolved acetylene	9°(c)	60	see under (2)

(2) In the case of dissolved acetylene [9°(c)], once equilibrium has been achieved at 15°C the cylinder-filling pressure shall not exceed the value prescribed by the competent authority for the porous mass, which value shall be engraved on the cylinder. The quantity of solvent and the quantity of acetylene shall likewise correspond to the figures specified in the approval.

3. Mixed packing

2222 (1) Substances of this Class other than substances of 7° and 8° may be enclosed in the same package with one another if they are contained:

- (a) in metal pressure-receptacles of a volume not exceeding 10 litres;
- (b) in thick-walled glass tubes or glass syphons in accordance with marginals 2205 and 2206, on condition that these fragile receptacles are secured in accordance with the provisions of marginal 2001 (5). The cushioning materials shall be suited to the properties of the contents. Inner packagings shall be placed in an outer packaging in which they shall be effectively kept apart from one another.

(2) Articles of 10° and 11° may be enclosed in the same package with one another under the conditions prescribed in marginal 2210.

(3) In addition, substances packed in accordance with marginals 2205 and 2206 may be enclosed in the same package with one another subject to the following special conditions.

(4) A package which meets the requirements of (1) and (3) shall not weigh more than 100 kg, or more than 75 kg if it contains fragile receptacles.

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2222  
(contd)Special conditions:

Item No. or letter	Description of substance	Maximum quantity per receptacle	per package	Special requirements
	<u>Gases packed in accordance with marginal 2205</u>  All gases listed in this marginal	in the quantities prescribed in marginal 2205	6 kg	Chlorine [3°(at)] shall not be packed together with sulphur dioxide [3°(at)]
(a)	Non-inflammable gases			Shall not be packed together with substances of Classes 1a, 1b, 1c, 3, 4.2, 5.2 or 7
(at)	Non-inflammable toxic gases			
(b)	Inflammable gases			Shall not be packed together with substances of Classes 1a, 1b, 1c, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 7 or 8
	<u>Gases packed in accordance with marginal 2206</u>  All gases listed in the marginal except ammonia and cyclopropane	150 g	6 kg	
(a)	Non-inflammable gases			Shall not be packed together with substances of Classes 1a, 1b, 1c, 3, 4.2, 5.2 or 7
(at)	Non-inflammable toxic gases			
(b)	Inflammable gases			Shall not be packed together with substances of Classes 1a, 1b, 1c, 3, 4.1, 4.2, 4.3, 5.1, 5.2 or 7
(bt)	Inflammable toxic gases			
(c)	Chemically unstable gases			
(ct)	Chemically unstable toxic gases			
3°(at)	Ammonia	20 g	6 kg	
3°(b)	Cyclopropane			

Class 2

4. Markings and labels on packages (see Appendix A.9)

- 2223 (1) Every package containing receptacles holding gases of 1° to 9°, 12° or 13° or non-refillable containers of gas under pressure of 11° shall be marked legibly and indelibly with an indication of its contents, with the addition: "Class 2". This marking shall be in an official language of the country of departure, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

This provision need not be complied with if the receptacles and their markings are clearly visible.

(2) Packages containing aerosol dispensers of 10° shall be marked with the word "AEROSOL" in clearly legible and indelible characters.

(3) Where a consignment constitutes a full load, the markings referred to in paragraph (1) are not mandatory.

- 2224 (1) Packages which contain receptacles made of materials liable to shatter, such as glass or certain plastics materials, shall bear a label conforming to model No. 9.

(2) Every package containing gases of 7°(a) or 8°(a) shall bear, on two opposite sides, labels conforming to model No. 8, and if the substances it contains are enclosed in glass receptacles [marginal 2207 (2)(a)] it shall, in addition, bear a label conforming to model No. 9.

- 2225 Every package containing aerosol dispensers of 10°(b) 2., 10°(bt) 2., 10°(c) or 10°(ct), or non-refillable containers of gas under pressure of 11°(b), 11°(bt), 11°(c) or 11°(ct), shall bear a label conforming to model No. 2A.

B. Particulars in the transport document

- 2226 (1) The description of the goods in the transport document must be:
- (a) in the case of pure and technically-pure gases of 1°, 3°, 5°, 7° or 9°, of aerosol dispensers of 10°, of non-refillable containers of gas under pressure of 11°: one of the names underlined in marginal 2201;
- (b) in the case of mixtures of gases of 2°, 4°, 6°, 8°, 12° or 13°: "mixture of gases". This description must be supplemented by an indication of the composition of the mixture of gases in volume per cent or weight per cent. Constituents below one per cent need not be indicated. In the case of mixtures of gases of 2°(a), 2°(b), 2°(bt), 4°(a), 4°(b), 4°(c), 6°(a), 8°(a) or 8°(b) the descriptions or names customary in the trade which are underlined in marginal 2201 may likewise be used, without indication of the composition.

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These descriptions must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g., 2, 5°(a t), ADR]

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(contd)

(2) In the case of consignments of gases which are listed among the chemically unstable gases the sender shall certify as follows in the transport document: "The necessary steps have been taken to satisfy the requirements of ADR marginal 2200 (4)". In the case of consignments of mixtures of gases of 12° or test gases of 13°, the sender shall certify as follows in the transport document: "The conditions laid down in ADR marginal 2201, 12° or 13°, have been complied with".

(3) In the case of consignments of chlorine trifluoride [3°(a t)] the sender shall certify as follows in the transport document: "After filling with chlorine trifluoride, the receptacle has been kept under observation for not less than seven days and its leakproofness has been verified".

(4) In the case of tanks containing gases of 7°(a) or 8°(a) other than carbon dioxide and nitrous oxide, the transport document shall bear the following entry:

"The tank is in permanent communication with the atmosphere".

2227-  
2236

### C. Empty packagings

(1) Receptacles and tanks of 14° shall be closed in the same manner as though they were full.

2237

(2) The description in the transport document must be: "Empty receptacle or ('Empty tank'), uncleaned, 2, 14°, ADR (or Item 14, RID)". This text must be underlined in red.

### D. Transitional provisions

The following transitional provisions shall apply to receptacles for compressed or liquefied gases or gases dissolved under pressure:

2238

- (a) receptacles already in service shall, subject to the following exceptions, be accepted in international traffic so long as the requirements of the contracting country in which the tests in accordance with marginal 2216 were carried out so permit and as the intervals prescribed in marginals 2216 (3) and 2217 for the periodic inspections are observed;
- (b) in the case of receptacles manufactured under the previous system (permissible stress two-thirds, instead of three-quarters, of the yield stress), no increase in either the test pressure or the filling pressure shall be permitted [see marginal 2211 (1)];
- (c) transitional measures for tanks: see marginal 211 180;
- (d) transitional measures for tank-containers: see marginal 212 180.

2239-  
2299"

1

2



## CLASS 3. INFLAMMABLE LIQUIDS

### 1. List of substances

(1) Among the inflammable liquids and mixtures thereof, whether liquid or still pasty at a temperature not exceeding 15°C, the substances listed in marginal 2301 are subject to the provisions of this Annex and of Annex B. These substances to be accepted for carriage under certain conditions are to be considered as substances of ADR. 2300

(2) Inflammable liquids which at a temperature of 50°C have a vapour pressure not exceeding 3 kg/cm<sup>2</sup>, except those listed in other Classes, are deemed to be inflammable liquids within the meaning of ADR.

(3) Liquids of Class 3 which are liable to form peroxides easily (as happens with ethers or with certain heterocyclic oxygenated substances) are not to be handed over for carriage unless their peroxide content, reckoned as hydrogen peroxide H<sub>2</sub>O<sub>2</sub>, does not exceed 0.3 per cent.

(4) The peroxide content referred to above and the flash-point referred to below shall be determined as shown in Appendix A.3 (marginals 3300 - 3303).

(5) Substances of Class 3 which polymerize easily are to be accepted for carriage only if the necessary precautions have been taken to prevent their polymerization during carriage.

(6) Solid substances soluble in liquids shall be deemed to include driers, fixed oils (boiled or blown linseed oils, etc.) or similar substances (nitrocellulose excepted) whose flash-point is above 100°C.

- 1° (a) Liquids not miscible, or only partially miscible, with water which have a flash-point below 21°C, also when they contain not more than 30 per cent solids (nitrocellulose excepted) either dissolved, or held in suspension in the liquids, or both, e.g. crude petroleums and other crude oils; volatile products from the distillation of petroleum and of other crude oils or of coal, lignite, shale, wood and peat tars, e.g. petroleum ether, pentanes, benzine, benzol and toluene; condensation products of natural gas; ethyl acetate (acetic ester), vinyl acetate, diethyl ether (sulphuric ether), methyl formate and other ethers and esters; carbon disulphide; acrylaldehyde (acrolein); certain chlorinated hydrocarbons [e.g. 1,2-dichloroethane and chloroprene (chlorobutadiene)]; 2301
- (b) mixtures of liquids having a flash-point below 21°C and containing not more than 55 per cent nitrocellulose with a nitrogen content not exceeding 12.6 per cent (collodions, semi-collodions and other nitrocellulose solutions).

### Class 3

2301  
(contd)

For (a), see also marginal 2301a under (a), (b) and (d); for (b), see also marginal 2301a, under (a).

Note: For mixtures of liquids having a flash-point below 21°C and

- containing more than 55 per cent nitrocellulose, whatever its nitrogen content, or
- containing not more than 55 per cent nitrocellulose with a nitrogen content above 12.6 per cent,

see Class 1a, marginal 2101, 1°, and Class 4.1, marginal 2401 7°(a).

- 2° Liquids not miscible, or only partially miscible, with water which have a flash-point below 21°C and contain more than 30 per cent solids (nitrocellulose excepted) either dissolved, or held in suspension in the liquids, or both, e.g.: certain colours for rotogravures and for leathers, certain varnishes, certain enamel paints, and rubber solutions. See also marginal 2301a, under (c).
- 3° Liquids not miscible, or only partially miscible, with water which have a flash-point between 21°C and 55°C inclusive, also when they contain not more than 30 per cent solids either dissolved, or held in suspension in the liquids, or both, e.g.: turpentine; semi-heavy products from the distillation of petroleum and of other crude oils, or of coal, lignite, shale, wood and peat tars, e.g. white spirit (turpentine substitute), heavy benzols, petroleum oils (for lighting, heating or engines), xylene, styrene, cumene, solvent naphtha; butanol; butyl acetate; pentyl acetate (amyl acetate); nitromethane (mononitromethane) and certain mononitro-paraffins; certain chlorinated hydrocarbons (e.g. chlorobenzene). See also marginal 2301a, under (c) and (d).
- 4° Liquids not miscible, or only partially miscible, with water which have a flash-point above 55°C but not exceeding 100°C, also when they contain not more than 30 per cent solids either dissolved, or held in suspension in the liquids, or both, e.g.: certain tars and their distillation products: heating oils, diesel oils, certain gas oils; tetrahydronaphthalene (tetralin); nitrobenzene; certain chlorinated hydrocarbons (e.g. 1-chloro-2-ethylhexane). See also marginal 2301a, under (c) and (d).
- 5° Liquids miscible in all proportions with water which have a flash-point below 21°C, also when they contain not more than 30 per cent solids either dissolved, or held in suspension in the liquids, or both, e.g.: methanol (methyl alcohol, wood spirit), denatured or not;

### Class 3

ethanol (ethyl alcohol, ordinary alcohol), denatured or not;  
acetaldehyde; acetone and acetone mixtures; pyridine. See also  
margincl 2301a, under (a) and (c).

2301  
(contd)

- 6° Empty receptacles, uncleaned, and empty tanks, uncleaned, which have  
contained inflammable liquids of Class 3.

Substances handed over for carriage in conformity with the  
following provisions are subject neither to the provisions for this Class  
contained in this Annex nor to those contained in Annex B:

2301a

- (a) liquids of 1° (except those mentioned under (b) below), and acetone and acetone mixtures (5°): in quantities not exceeding 200 g per receptacle, in receptacles made of sheet-metal, glass, porcelain, stoneware or a suitable plastics material, these receptacles, with a total content not exceeding 1 kg, being placed together in an outer packaging made of sheet-metal, wood or fibreboard and fragile receptacles being suitably secured in the packaging to prevent their breakage;
- (b) carbon disulphide, diethyl ether, petroleum ether, pentanes, methyl formate: 50 g per receptacle and 250 g per package, these substances being packed in the same way as those of (a);
- (c) liquids of 2° - 5°, except acetaldehyde, acetone and acetone mixtures: 1 kg per receptacle and 10 kg per package, these substances being packed in the same way as those of (a);
- (d) the motor-fuel contained in the tanks of motor-driven vehicles or in closed auxiliary tanks firmly fixed to the vehicles. If there is a cock between the tank and the engine it must be closed; the electric circuit must also be disconnected. Motor cycles and motor-assisted pedal cycles whose tanks contain motor-fuel must be loaded upright on their wheels, secured against falling.

## 2. Provisions

### A. Packages

#### 1. General conditions of packing

(1) Receptacles shall be so closed and leak-proof as to prevent  
any loss of the contents, and particularly any evaporation.

2302

(2) The materials of which the receptacles and their closures  
are made must not be liable to attack by the contents nor form harmful or  
dangerous compounds therewith.

2302  
(contd)

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular, receptacles and their closures must, unless the section headed "Packing of a single substance" provides otherwise, be able to withstand any pressure which, the presence of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage (see also marginal 2305). Inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The walls must be not less than 3 mm thick in the case of receptacles weighing, with their contents, more than 35 kg and not less than 2 mm in the case of other receptacles.

The tightness of the closure system must be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage.

(5) Cushioning materials shall be suited to the nature of the contents and, in particular, shall be absorbent. Suitable materials must be used to secure receptacles in the protective packaging; this securing must be carried out with care and be checked periodically (possibly before each fresh filling of the receptacle).

## 2. Packing of a single substance

2303

(1) Substances of 1° - 5° must be packed in suitable receptacles made of metal or of glass, porcelain, stoneware or similar materials. Substances of 4° and corrosive liquids of 1°(a), 3° and 5° may also be packed in receptacles made of a suitable plastics material. [For the special provisions concerning chloroprene and nitromethane, see under (8) and (9), respectively, below.]

(2) Fragile receptacles (glass, porcelain, stoneware or similar materials) may not contain more than the following quantities of substances of 1°:

carbon disulphide .....	1 litre;
diethyl ether, petroleum ether, pentanes .....	2 litres;
other substances of 1° .....	5 litres.

Class 3

2303  
(contd)

(3) Tin-plate receptacles having a capacity not exceeding 10 litres must have a wall thickness of not less than 0.25 mm; those having a capacity exceeding 10 litres but not exceeding 60 litres must have a wall thickness of not less than 0.3 mm and their joints shall be double-seamed by welting, or soldered, or produced by a process ensuring a similar degree of strength and tightness.

(4) Receptacles made of sheet-steel [for tin-plate receptacles having a capacity not exceeding 60 litres, see also (3)] must be welded or hard-soldered, and the quantities of substances of 1° - 5° they may contain, according to the thickness of their walls, are as follows:

if the wall thickness is not less than 0.5 mm: not more than 30 litres;

if the wall thickness is not less than 0.7 mm: not more than 60 litres;

if the wall thickness is not less than 1.5 mm: over 60 litres.

Packages weighing more than 100 kg shall be fitted with rolling hoops.

(5) Receptacles made of sheet-metal other than steel must be designed and manufactured in such a way that they possess the same strength as the sheet-steel receptacles referred to under (4).

(6) Liquids whose vapour pressure at 50°C does not exceed 1.5 kg/cm<sup>2</sup>, with the exception of carbon disulphide, may also be carried in metal drums complying with the following provisions:

The body joints of the drums must be welded and the end joints welded or double-seamed by welting. The drums must be fitted with rolling hoops or strengthening ribs. Every drum must have undergone the leakage test prescribed in marginal 3502 of Appendix A.5. The drums must be of a type of construction which has satisfied the other tests prescribed in the aforesaid Appendix A.5 and must bear the mark assigned at the time of type approval.

(7) For the carriage in non-returnable metal packagings (new packagings intended to be used only once) of inflammable products whose vapour pressure at 50°C does not exceed 1.1 kg/cm<sup>2</sup> it is not necessary, in the case of a package whose unit weight must not exceed 225 kg, for the end of the receptacle to be welded to the body and for the wall thickness to be greater than 1.25 mm, but the receptacle must be able to withstand, without leakage, a hydraulic pressure of 0.3 kg/cm<sup>2</sup> at least, and its body and ends must be equipped with devices (such as ribs or rolling hoops), whether detachable or not, ensuring rigidity.

Class 3

2303  
(contd)

(8) Chloroprene [1° (a)] shall be packed:

- (a) in hermetically-closed metal receptacles, suitably lined if necessary, having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or other outer packaging of adequate strength; or
- (b) in sheet-steel canisters, welded or hard-soldered, having a capacity not exceeding 60 litres, hermetically closed and fitted with means of handling.

(9) Nitromethane (3°) must be contained:

- (a) in fragile receptacles containing not more than 1 litre; or
- (b) in sheet-steel receptacles in conformity with (4) above having a capacity not exceeding 10 litres; or
- (c) in metal drums each having two hermetic closures, one of them screw-threaded, each drum being fitted with rolling hoops and having a capacity not exceeding 200 litres.

2304

(1) Fragile receptacles containing substances of 1° to 5°, receptacles made of a plastics material and containing corrosive liquids of 1°(a), 3° and 5°, tin-plate receptacles containing substances of 1° and 5°, tin-plate receptacles having a wall thickness of less than 0.5 mm and containing substances of 2° - 4°, and sheet-steel receptacles containing nitromethane in conformity with marginal 2303 (9) (b), shall be secured by cushioning materials in protective packagings. If receptacles made of a plastics material are secured separately in protective packagings, cushioning materials are not necessary.

Protective packagings enclosing fragile receptacles containing substances of 1° and 5° and protective packagings enclosing receptacles containing nitromethane (3°) must have complete sides and be made of wood, sheet-metal or a similar material.

The closure of fragile receptacles placed in open protective packagings must be provided with a protective cover shielding them from damage. If the packages are loaded on an open vehicle, the protective cover must be incapable of igniting on contact with a flame.

(2) The following are to be accepted for carriage without protective packaging:

- (a) receptacles made of a plastics material in conformity with marginal 2304 (1), containing substances of 4°;

Class 3

- (b) receptacles made of tin-plate not less than 0.5 mm thick, containing substances of 2° - 4°; 2304 (contd)
- (c) sheet-metal receptacles in conformity with marginal 2303 (4) to (7);
- (d) metal canisters in conformity with marginal 2303 (8) (b) containing chloroprene [1° (a)];
- (e) metal drums in conformity with marginal 2303 (9) (c) containing nitromethane (3°).

(3) The following packages must not exceed the maximum weights indicated below:

- (a) packages of fragile receptacles containing substances of 1° ..... 30 kg;
- (b) packages of fragile receptacles containing substances of 2° - 5° ..... 75 kg;
- (c) packages of receptacles made of a plastics material and containing substances of 1°(a) and 3° - 5°, and of tin-plate receptacles containing substances of 1° - 5° ..... 75 kg;
- (d) packages of receptacles containing chloroprene in conformity with marginal 2303 (8) ..... 75 kg;
- (e) packages of sheet-steel receptacles containing nitromethane in conformity with marginal 2303 (9) (b) ..... 75 kg;
- (f) drums tested in conformity with marginal 2303 (6) ..... 250 kg;
- (g) receptacles in conformity with marginal 2303 (7) ..... 225 kg;
- (h) drums containing nitromethane in conformity with marginal 2303 (9) (c) ..... 275 kg;

(4) Packages other than cases and metal drums shall be fitted with means of handling.

Metal receptacles intended to contain liquids of 1°, nitromethane (3°), or acetaldehyde, acetone, or acetone mixtures (5°), shall not be filled beyond 93 per cent of their capacity. Nevertheless, receptacles containing hydrocarbons other than petroleum ether, pentanes, benzene and toluene may be filled to 95 per cent of their capacity. 2305

### Class 3

#### 3. Mixed packing

2306

(1) Substances grouped under the same item number may be included in the same package. The inner packagings shall conform to what is prescribed for each substance, and the outer packaging shall be that laid down for the substances of the item number in question.

(2) If smaller quantities are not prescribed in the section entitled "Packing of a single substance", substances of this Class may be enclosed in the same package either with dangerous substances of other Classes (if mixed packing is likewise permitted in the case of such substances) or with other goods, as indicated below.

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions contained in marginals 2001 (5) and 2002 (6) and (7) must be observed.

A package must not weigh more than 150 kg, or more than 75 kg if it contains fragile receptacles.

Item No.	Description of substances	Maximum quantity			Special provisions
		per fragile receptacle	per other receptacle	per package	
1°(a)	Carbon disulphide	0.3 litre	1 litre	1 litre	Liquids of Class 3 must not be packed together with substances of Class 4.2, hydrogen peroxide or perchloric acid of Class 5.1, or substances of Class 8, 2°(a), 3°(a), 4°, 7° and 41°.
1°(a) and 1°(b)	All substances except carbon disulphide	1 litre	5 litres	5 litres	
2°	All substances	1 litre	5 litres	10 litres	
3°	All substances	3 litres	5 litres	10 litres	
4°	All substances	5 litres	5 litres	10 litres	
5°	Liquids having a boiling point $\leq 50^{\circ}\text{C}$	1 litre	5 litres	5 litres	
	Other substances	3 litres	5 litres	10 litres	

2307

#### 4. Marking and danger labels on packages (see Appendix A.9)

(1) Packages containing liquids of 1° to 3° and 5° shall bear a label conforming to model No. 2A.



### Class 3

However, if substances of 2°, 3° or 5° are packed in receptacles made of glass, porcelain, stoneware or similar material, of a capacity exceeding 5 litres, the packages shall bear two labels conforming to model No. 2A.

2307  
(contd)

Packages containing acrylaldehyde or chloroprene (chlorobutadiene) [1° (a)] or methanol (methyl alcohol) (5°) shall in addition bear a label conforming to model No. 4.

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

(3) In the case of consignments carried as a full load, labels Nos. 2A and 4, as prescribed under (1), need not be affixed to the packages if the vehicle bears the marking prescribed in Annex B, marginal 10 500.

2308

#### B. Particulars in the transport document

(1) The description of the goods in the transport document must conform to one of the names underlined in marginal 2301. If the latter does not contain the name of the substance, the trade name shall be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 3, 1°(a), ADR].

2309

(2) In the case of all consignments of substances which polymerize easily, the following must be certified in the transport document: "The necessary steps have been taken to prevent polymerization during carriage".

2310-  
2315

Class 3

C. Empty packagings

2316

(1) Receptacles and tanks of 6° must be closed in the same manner and leak-proof in the same degree as though they were full.

(2) The description in the transport document must be:  
"Empty receptacle (or empty tank), 3, 6° ADR (or RID)". This description must be underlined in red.

(3) Empty receptacles, uncleaned, of 6° which have contained substances of 1° to 3° and 5° shall bear a label conforming to model No. 2A. Those which have contained acrylaldehyde or chloroprene (chlorobutadiene) (1° (a)) or methanol (methyl alcohol) (5°) shall in addition bear a label conforming to model No. 4.

2317-  
2399

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CLASS 4.1. INFLAMMABLE SOLIDS

1. List of substances

Among the substances covered by the heading of Class 4.1, those listed in marginal 2401 are subject to the provisions of this Annex and of Annex B. These substances to be accepted for carriage under certain conditions are to be considered as substances of ADR. 2400

- 1° Substances which can easily be ignited by sparks, such as wood flour, sawdust, wood shavings, wood fibre, wood charcoal, wood parings and wood cellulose, old paper and waste paper, paper fibres, cane (except Spanish broom), reeds, hay, straw, also when damp (including maize, rice and flax straw), vegetable textile substances and waste of vegetable textile substances, cork in powder or granular form, expanded or not, with or without an admixture of tar or of other substances not subject to spontaneous oxidation, and cork waste in small lumps. See also Class 4.2, marginal 2431, 8° - 10°, and marginal 2431a, under (b). 2401

Note: 1. These substances are included in the list only for the purposes of the prohibitions on mixed loading. For this purpose the provisions of marginal 2416 (1) apply. No other clause, either of this Annex or of Annex B, is applicable to them.

2. Hay still having a degree of humidity which might lead to fermentation is not to be accepted for carriage.

3. Wrappings and slabs of expanded cork, manufactured under pressure, with or without an admixture of tar or of other substances not subject to spontaneous oxidation, are not subject to any of the provisions of ADR.

4. Cork impregnated with substances still subject to spontaneous oxidation is a substance of Class 4.2 (see marginal 2431, 9°).

- 2° (a) Sulphur (including flowers of sulphur);

(b) sulphur in the melted state.

- 3° Celloidin, produced by incomplete evaporation of the alcohol contained in collodion and consisting mainly of collodion cotton.

- 4° Celluloid in slabs, sheets, rods or tubes, and fabrics coated with nitrocellulose.

Class 4.1

2401  
(contd)

5° Film celluloid, i.e. the raw material for films, without emulsion, in rolls, and developed celluloid films.

6° Celluloid waste and celluloid-film waste.

Note: Nitrocellulose-film waste, free from gelatine, in reels, sheets or strips, is a substance of Class 4.2 (see marginal 2431, 4°).

7° (a) Weakly nitrated nitrocellulose (such as collodion cotton), i.e. with a nitrogen content not exceeding 12.6 per cent, well stabilized and containing in addition not less than 25 per cent water or alcohol (methyl, ethyl, normal propyl or isopropyl, butyl or amyl alcohol, or mixtures thereof), also if denatured, solvent naphtha, benzol, toluene, xylene, mixtures of denatured alcohol and xylene, mixtures of water and alcohol, or alcohol containing camphor in solution;

Note: 1. Nitrocellulose with a nitrogen content exceeding 12.6 per cent is a substance of Class 1a (see marginal 2101, 1°).

2. When the nitrocellulose is wetted with denatured alcohol, the denaturing substance must not have a detrimental effect on the stability of the nitrocellulose.

(b) plasticized nitrocellulose, non-pigmented, containing not less than 18 per cent plasticizer (butyl phthalate or a plasticizer at least equivalent in effect) and in which the nitrocellulose has a nitrogen content not exceeding 12.6 per cent; the nitrocellulose may be in the form of chips;

Note: Plasticized nitrocellulose, non-pigmented, containing not less than 12 per cent and less than 18 per cent butyl phthalate or a plasticizer at least equivalent in effect is a substance of Class 1a (see marginal 2101, 4°).

(c) plasticized nitrocellulose, pigmented, containing not less than 18 per cent plasticizer (butyl phthalate or a plasticizer at least equivalent in effect), in which the nitrocellulose has a nitrogen content not exceeding 12.6 per cent and which contains not less than 40 per cent nitrocellulose; the nitrocellulose may be in the form of chips.

Note: Plasticized nitrocellulose, pigmented, containing less than 40 per cent nitrocellulose is not subject to the provisions of ADR.

For (a), (b) and (c): weakly-nitrated nitrocellulose and plasticized nitrocellulose, pigmented or not, are not to be accepted for carriage unless they satisfy the stability and safety conditions of Appendix A.1 or the conditions set forth above regarding the nature and quantity of the additional substances.

Class 4.1

For (a), see also Appendix A.1, marginal 3101; for (b) and (c), see also Appendix A.1, marginal 3102, 1.

2401  
(contd)

- 8° Red phosphorus (amorphous), phosphorus sesquisulphide and phosphorus pentasulphide.

Note: Phosphorus pentasulphide not free from white or yellow phosphorus is not to be accepted for carriage.

- 9° Ground rubber, rubber dust.

- 10° Dust of coal, lignite, lignite coke and peat, artificially prepared (e.g. by pulverization or other processes), and coke from carbonized lignite rendered inert (i.e. not liable to spontaneous ignition).

Note: 1. Natural dusts obtained as residues in the production of coal, coke, lignite or peat are not subject to the provisions of ADR.

2. Coke from carbonized lignite not rendered completely inert is not to be accepted for carriage.

- 11° (a) Crude naphthalene with a melting point below 75°C;  
(b) pure naphthalene and crude naphthalene with a melting point of 75°C or over;  
(c) Naphthalene in the melted state.

for (a) and (b), see also marginal 2401a.

Naphthalene in balls or flakes [11° (a) and (b)] is subject neither to the provisions for this Class contained in this Annex nor to those contained in Annex B if it is packed, not more than 1 kg per box, in tightly-closed fibreboard or wooden boxes and these boxes are enclosed, not more than 10 per case, in wooden cases.

2401a

2. Provisions

A. Packages

1. General conditions of packing

(1) Packagings shall be so closed and arranged as to prevent any loss of the contents.

2402

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

Class 4.1

2402 (contd) (3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. Solid substances shall be firmly secured in their packagings, and inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Cushioning materials shall be suited to the nature of the contents; in particular, they must be absorbent when the contents are liquid or might exude liquid.

2. Packing of a single substance

2403 (1) Sulphur of 2° (a) shall be packed in stout bags made of paper or of closely-woven jute.

(2) Sulphur in the melted state, of 2° (b), may not be carried otherwise than in tanks.

2404 Celloidin (3°) shall be so packed as to prevent its desiccation.

2405 (1) Celluloid in slabs, sheets, rods or tubes, and fabrics coated with nitrocellulose, (4°), shall be enclosed:

(a) in firmly-closed wooden packagings, or

(b) in strong paper wrappings which shall be placed

1. in crates; or

2. between frames made of boards, the edges of the frames extending beyond the paper wrapping and the frames being bound together with iron bands; or

3. in wrappings of closely-woven fabric.

(2) A package must not weigh more than:

75 kg in the case of celluloid in slabs, sheets or tubes and of fabrics coated with nitrocellulose, if the outer packaging is made of fabric in conformity with (1) (b) 3;

120 kg in all other cases.

2406 Film celluloid in rolls and developed celluloid films (5°) shall be enclosed in wooden packagings or in fibreboard boxes.

Class 4.1

2407

(1) Celluloid waste and celluloid-film waste (6°) shall be enclosed in wooden packagings or in two strong bags made of coarse, closely woven jute canvas, the bags being fireproofed so as not to ignite even on contact with a flame and having strong and continuous seams. These bags shall be placed one inside the other; after filling, their openings shall be separately and several times folded over and closely stitched so as to prevent any escape of the contents. However, celluloid waste may be packed in a single bag if the celluloid waste is first packed in strong packing paper or in a suitable plastics material and it is certified in the transport document that the celluloid waste does not contain any waste in the form of dust.

(2) Packages having a raw-canvas or jute packaging must not weigh more than 40 kg in single packaging nor more than 80 kg in double packaging.

(3) For the particulars in the transport document, see marginal 2416 (2).

(1) Substances of 7° (a) shall be packed:

2408

- (a) in wooden receptacles or in drums made of impermeable fibreboard; these receptacles and drums shall have a lining impermeable to the liquids they contain; their closures must be leak-proof: or
- (b) in bags impermeable to the vapours from the liquids they contain (e.g. bags made of rubber or of a suitable plastics material not readily inflammable), placed in a wooden case or in a metal receptacle; or
- (c) in zinc-lined or lead-lined iron drums; or
- (d) in receptacles made of tin-plate, zinc sheet or aluminium sheet and secured by cushioning materials in wooden cases.

(2) Nitrocellulose of 7° (a), if wetted exclusively with water, may be packed in fibreboard drums; this fibreboard must have undergone a special treatment to render it completely impermeable; the closures of the drums shall be water-vapour proof.

(3) Nitrocellulose of 7° (a), with added xylene, may not be packed otherwise than in metal receptacles.

(4) Substances of 7° (b) and (c) shall be packed:

- (a) in wooden packagings lined with stout paper or zinc sheet or aluminium sheet; or

Class 4.1

2408  
(contd)

- (b) in strong fibreboard drums or, provided that the substances are dust-free and that this is certified in the transport document, in fibreboard cases which have been rendered impermeable; or
- (c) in sheet-metal packagings.

(5) For substances of 7°, metal receptacles must be so constructed that, by reason of the method of assembly of their walls, of their mode of closure, or of the presence of a safety device, they yield when the internal pressure reaches a value not greater than 3 kg/cm<sup>2</sup>; the presence of these closures or safety devices must not impair the strength of the receptacle nor impair its closure.

(6) A package must not weigh more than 75 kg or, if it can be rolled, not more than 300 kg; however, a fibreboard drum must not weigh more than 75 kg and a fibreboard case not more than 35 kg.

(7) For the particulars in the transport document, see marginal 2416 (3).

2409

(1) Red phosphorus and phosphorus pentasulphide (8°) shall be packed:

- (a) in receptacles made of sheet iron or tin-plate, which shall be placed in a strong wooden case; a package must not weigh more than 100 kg; or
- (b) in receptacles made of glass or stoneware not less than 3 mm thick, or of a suitable plastics material, each containing not more than 12.5 kg of substance. These receptacles shall be secured with cushioning materials in a strong wooden case; a package must not weigh more than 100 kg; or
- (c) in metal receptacles which, if with their contents they weigh more than 200 kg, shall be fitted with reinforcing hoops at their ends, and with rolling hoops.

(2) Phosphorus sesquisulphide (8°) shall be packed in leak-proof metal receptacles, which shall be secured by cushioning materials in wooden cases with closely-fitting sides. A package must not weigh more than 75 kg.

2410

Substances of 9° shall be packed in firmly-closing leak-proof receptacles.

2411

(1) Substances of 10° shall be packed in metal or wooden receptacles or in strong bags.

(2) Wooden receptacles and bags are not, however, to be accepted for coal dust, lignite dust or peat dust artificially prepared unless the dust has been completely cooled after drying by heat.



Class 4.1

2416 (3) For the particulars in the transport document, see marginal 2411  
(4). (contd)

(1) Naphthalene of 11° (a) shall be packed in firmly-closed 2412  
wooden or metal receptacles.

(2) Naphthalene of 11° (b) shall be packed in wooden or metal  
receptacles, or in stout fibreboard cases, or in strong bags made of  
textile or of four-ply paper or of a suitable plastics material.

Where fibreboard cases are used, a package must not weigh more  
than 30 kg.

(3) Naphthalene in the melted state [11° (c)] must not be  
carried otherwise than in tanks.

3. Mixed packing

(1) Substances grouped under the same item number may be 2413  
included in the same package. The inner packagings shall conform to what  
is prescribed for each substance, and the outer packaging shall be that  
laid down for the substances of the item number in question. A package  
containing celluloid rods and tubes packed together in a textile wrapping  
must not weigh more than 75 kg.

(2) If smaller quantities are not prescribed in the section  
entitled "Packing of a single substance", substances of this Class, in  
quantities not exceeding 6 kg for all of the substances listed under the  
same item number or the same letter, may be enclosed in the same package  
either with substances of another item number or of another letter of the  
same Class, or with dangerous substances belonging to other Classes (if  
mixed packing is likewise allowed in the case of such substances), or with  
other goods, subject to the following special conditions.

The inner packagings must satisfy the general and special  
conditions of packing. In addition, the general provisions contained in  
marginals 2001 (5) and 2002 (6) and (7) must be observed.

A package must not weigh more than 150 kg, or more than 75 kg if  
it contains fragile receptacles.

## Class 4.1

2413  
(contd)Special conditions

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
2°(a)	Sulphur	5 kg	5 kg	Must not be packed together with chlorates, permanganates, perchlorates, or peroxides (other than solutions of hydrogen peroxide)
7°(a)	Weakly-nitrated nitro-cellulose (such as collodion cotton)	100 g	1 kg	Must not be packed together with substances of Classes 4.2 and 5.1
8°	Red (amorphous) phosphorus	5 kg	5 kg	
8°	Phosphorus sesquisulphide	Mixed packing not allowed		

2414

4. Marking and danger labels on packages (see Appendix A.9)

(1) Packages containing substances of 4° to 8° shall bear a label conforming to model No. 2B.

However, if substances of 4° to 7° are packed in wrappings made of closely woven fabric in accordance with marginal 2405 (1) (b) 3., in fibreboard boxes or cases in accordance with marginals 2406 and 2408 (4) (b), in jute bags in accordance with marginal 2407 (1) or in fibreboard drums in accordance with marginal 2408 (1) (a), (2) and 4 (b), the packages shall bear two labels conforming to model No. 2B.

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

(3) In the case of consignments carried as a full load, label No. 2B need not be affixed to the packages.

2415

Class 4.1

B. Particulars in the transport document

(1) The description of the goods in the transport document must conform to one of the names underlined in marginal 2401. Where the name of the substance is not indicated in the case of 1°, the trade name must be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials 'ADR' or 'RIP' [e.g. 4.1, 7° (a), ADR].

2416

(2) In the case of cellulosid waste (6°) packed in stout packing paper or in a suitable plastics material and placed, so packed, in bags made of closely-woven raw canvas or jute, the following must be certified in the transport document: "Contains no waste in dust form".

(3) In the case of substances of 7° (b) and (c) packed in fibreboard cases, the following must be certified in the transport document: "Substances free from dust".

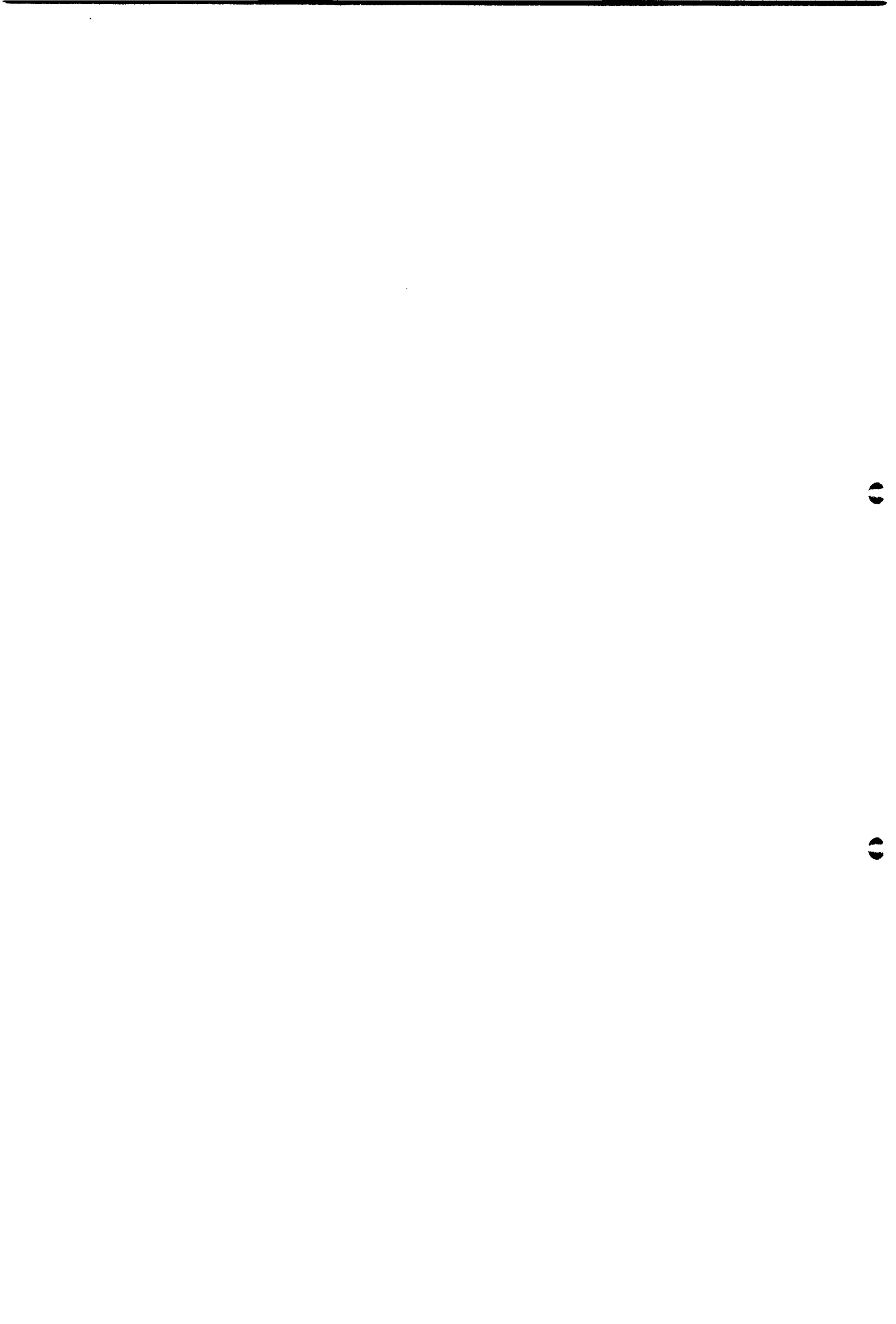
(4) In the case of coal dust, lignite dust or peat dust (10°) artificially prepared and packed in wooden receptacles or in bags [see marginal 2411 (2)], the following must be certified in the transport document: "Substances completely cooled after drying by heat".

2417-  
2423.

C. Empty packagings

No provisions.

2424  
2425-  
2429



## CLASS 4.2 SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION

### 1. List of substances

Among the substances and articles covered by the heading of Class 4.2 only those listed in marginal 2431 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR. 2430

1° White or yellow phosphorus. 2431

2° Compounds of phosphorus with alkali metals or alkaline-earth metals, e.g., sodium phosphide, calcium phosphide, strontium phosphide.

Note: Compounds of phosphorus with the so-called heavy metals, such as iron, copper, tin, etc., but with the exception of zinc (zinc phosphide is a substance of Class 6.1 - see marginal 2601 33°), are not subject to the provisions of ADR.

3° Zinc alkyls, magnesium alkyls, aluminium alkyls and halides and hydrides of aluminium alkyls. See also marginal 2431a under (a).

4° Nitrocellulose-film waste, free from gelatine, in reels, sheets or strips.

Note: Nitrocellulose-film waste free from gelatine is not to be accepted for carriage if it is dusty or includes dusty portions.

5° (a) Used rags and waste;

(b) Greasy or oily fabrics, wicks, cord or thread;

(c) The following greasy or oily substances: wool, hair (and horsehair), artificial wool, reclaimed wool (also called wool shoddy), cotton, recarded cotton, artificial fibres (rayon, etc.), silk, flax, hemp and jute, also in the form of spinning or weaving waste.

For (a), (b) and (c), see also marginal 2431a under (b).

Note: Wetted substances of 5° (b) and (c) are not to be accepted for carriage.

6° (a) Dust and powder of aluminium or zinc and mixtures of dust or powder of aluminium and zinc, also when greasy or oily; powder of zirconium and titanium; dust from blast-furnace filters;

(b) Dust, powder and fine shavings of magnesium and of magnesium alloys with a magnesium content of more than 80 per cent, all free from particles likely to promote ignition;

Class 4.2

2431  
(contd)

(c) The following salts of dithionous (hydrosulphurous) acid ( $\text{H}_2\text{S}_2\text{O}_4$ ): dithionites (hydrosulphites) of sodium, potassium, calcium and zinc;

(d) Metals in a pyrophoric form.

For (a), see also marginal 2431a under (b) and (c); for (b) and (c), see also marginal 2431a under (b).

7° Freshly calcined soot. See also marginal 2431a under (b).

8° Newly-quenched charcoal, powdered, granulated or in lumps.

See also marginal 2431a under (b) and Class 4.1, marginal 2401, 1°.

Note: By "newly-quenched charcoal" is meant:

in the case of charcoal in lumps, charcoal which has been quenched less than four days previously;

in the case of powdered charcoal and of granulated charcoal in a granule size of less than 8 mm, charcoal which has been quenched less than eight days previously and has been air-cooled in thin layers or by a process ensuring an equivalent degree of cooling.

9° Mixtures of granulated or porous combustible substances with constituents still liable to spontaneous oxidation, such as linseed oil or other natural drying oils, boiled or with added drying compounds, resin, resin oil, petroleum residues, etc. (e.g. the substance known as cork waste, lupuline), and oily residues from the bleaching of soya oil.

See also marginal 2431a under (b) and Class 4.1, marginal 2401, 1°.

10° Paper, cardboard and products made of paper or cardboard (e.g. cardboard wrappings and cardboard rings), wood-fibre sheets, skeins of thread, fabrics, string, thread, spinning or weaving wastes, all impregnated with oils, greases, natural drying oils, boiled or with added drying compounds or other impregnating substances liable to spontaneous oxidation. See also marginal 2431a under (b) and Class 4.1, marginal 2401, 1°.

Note: Substances of 10° are not to be accepted for carriage if their humidity exceeds the hygroscopic humidity.

11° The substance with an iron oxide base having been used for purifying lighting gas (spent oxide of iron).

Class 4.2

Note: If the substance which has been used for purifying lighting gas (spent oxide of iron) is, after storage and aeration, no longer liable to spontaneous ignition, and if this is certified in the transport document by the entry: "Substance not liable to spontaneous ignition", it is not subject to the provisions of ADR.

2431  
(contd.)

12° Used yeast bags, uncleaned. See also marginal 2431a under (b).

13° Empty sodium nitrate bags made of a textile fabric.

Note: Textile bags from which all the nitrate impregnating them has been completely removed by washing are not subject to the provisions of ADR.

14° Empty iron drums, uncleaned, and empty tanks, uncleaned, which have contained phosphorus of 1°.

15° Empty receptacles, uncleaned, which have contained substances of 3°.

Note: re 14° and 15°: Empty packagings which have contained other substances of Class 4.2 are not subject to the provisions of ADR.

Dangerous substances handed over for carriage in conformity with the following provisions are subject neither to the provisions for this Class contained in this Annex nor to those contained in Annex B:

2431a

- (a) solutions of substances of 3° in a concentration not exceeding 10 per cent in solvents with a boiling point not lower than 95°C, if their condition is such as to exclude any danger of spontaneous ignition and if this is certified in the transport document by the entry: "Substance not liable to spontaneous ignition"; see, however, Class 3;
- (b) substances of 5° - 10° and 12° (excluding, however, those of 6° (d)), if their condition is such as to exclude any danger of spontaneous ignition and if this is certified in the transport document by the entry: "Substance not liable to spontaneous ignition"; for the substances of 8° and certain substances of 9° and 10°, however, see Class 4.1 marginal 2401, 1°;
- (c) dust and powder of aluminium or zinc [6° (a)], e.g. packed together with varnish for use in the manufacture of colours, if packed with care in quantities not exceeding 1 kg.

## Class 4.2

### 2. Provisions

#### A. Packages

##### 1. General conditions of packing

2432

(1) Packagings shall be so closed and arranged as to prevent any loss of the contents.

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents nor form harmful or dangerous compounds therewith.

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular, in the case of substances in the liquid state or immersed in a liquid or in solution, receptacles and their closures must, unless the section headed "Packing of a single substance or of articles of the same kind" provides otherwise, be able to withstand any pressure which, the pressure of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage. Solid substances shall be firmly secured in their packagings, and inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance or of articles of the same kind", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The thickness of the walls must be not less than 3 mm in the case of receptacles which, with their contents, weigh more than 35 kg, and not less than 2 mm in the case of other receptacles.

The tightness of the closure system must be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage.

(5) When receptacles made of glass, porcelain, stoneware or similar materials are prescribed or allowed, they must be secured by cushioning materials in protective packagings.

Cushioning materials shall be suited to the nature of the contents; in particular, they shall be dry and absorbent when the contents are liquid or might exude liquid.



Class 4.2

2. Packing of a single substance or of articles of the same kind

(1) Phosphorus of 1° shall be packed:

2433

- (a) in leak-proof tin-plate receptacles hermetically closed and placed in wooden cases; or
- (b) in sheet-iron drums closing hermetically. Press-on lids shall not be allowed. The sheet-iron constituting the body, bottom and lid shall not be less than 1.5 mm thick. A package must not weigh more than 500 kg. If it weighs more than 100 kg, it shall be fitted with rolling hoops or strengthening ribs, and shall be welded; or
- (c) not more than 250 g per receptacle, in hermetically-closed glass receptacles secured by cushioning materials in leak-proof tin-plate receptacles closed by soldering and secured, likewise by cushioning materials, in wooden cases.

(2) Receptacles and drums containing phosphorus shall be filled with water.

(1) Substances of 2° shall be packed in leak-proof tin-plate receptacles hermetically closed and placed in wooden cases.

2434

(2) Substances of 2° may also be packed, not more than 2 kg per receptacle, in receptacles made of glass, porcelain, stoneware or similar materials, secured by cushioning materials in wooden cases.

(1) Substances of 3° shall be packed in receptacles made either of metal or of glass, porcelain, stoneware or similar materials, hermetically closed. Receptacles must not be filled beyond 90 per cent of their capacity.

2435

(2) Metal receptacles shall be secured by cushioning materials in protective packagings which, if they are not closed, shall be covered. If the covering consists of readily-inflammable substances, it shall be rendered sufficiently fire-resistant to prevent its catching alight in contact with a flame. If the protective packaging is not closed, the package shall be fitted with means of handling and shall not weigh more than 75 kg.

(3) Receptacles made of glass, porcelain, stoneware or similar materials shall have a capacity of not more than 5 litres and shall be secured by cushioning materials in leak-proof sheet-metal receptacles hermetically closed.

Class 4.2

2435  
(contd)

(4) Substances of 3° may also be packed in hermetically-closed drums made of corrosion-resistant steel and having a capacity of not more than 300 litres and a wall thickness of not less than 3 mm. The drums must withstand a test pressure of 10 kg/cm<sup>2</sup> and satisfy the conditions of marginal 2211 (1) and (2)(b). The closure of the filling and emptying device must be ensured by a protective cap. Receptacles must not be filled beyond 90 per cent of their capacity; however, with the liquid at a mean temperature of 50°C, a free space of 5 per cent must remain for safety purposes. When handed over for carriage, the liquid must be under a layer of inert gas at a pressure not exceeding 0.5 kg/cm<sup>2</sup>. Receptacles shall be tested in conformity with the provisions of marginal 2216 (2) and (3). The tests shall be repeated every 5 years. The receptacles shall bear the following particulars in clearly legible and indelible characters:

1. the name of the substance in full, the name or mark of the maker or owner, and the number of the receptacle;
2. the tare of the receptacle, including fittings and accessories;
3. the test pressure, the date (month, year) of the last test undergone, and the stamp of the expert who carried out the tests and inspections;
4. the capacity of the receptacle and the maximum filling allowed;
5. the wording: "Do not open during carriage; liable to spontaneous ignition".

A package must not weigh more than 400 kg.

2436

(1) Substances of 4° shall be packed in bags placed in drums made of impermeable fibreboard or in receptacles made of zinc sheet or aluminium sheet. The sides of metal receptacles shall be lined with fibreboard. The bottoms and lids of fibreboard drums and metal receptacles shall be lined with wood.

(2) Metal receptacles shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than 3 kg/cm<sup>2</sup>; the presence of these closures or safety devices must not impair the strength of the receptacle nor impair its closure.

(3) A package must not weigh more than 75 kg.

2437

(1) Substances of 5° (a) shall be tightly compressed and be placed in leak-proof metal receptacles.

(2) Substances of 5° (b) and (c) shall be tightly compressed and be packed either in wooden or fibreboard cases or in paper or textile wrappings firmly secured.

Class 4.2

(1) Substances of 6° (a) shall be enclosed in tightly-closing leak-proof receptacles made of wood or metal. However, zirconium shall be enclosed only in metal or glass receptacles, which shall be secured by cushioning materials in strong wooden cases. If the cushioning materials are inflammable, they shall be fireproofed. 2438

(2) Substances of 6° (b) shall be enclosed in tightly-closing leak-proof iron drums or in wooden cases with a sheet-metal lining rendered leak-proof (by soldering, for example) or in boxes made of tin-plate or thin aluminium sheet and so closing as to be leak-proof; these drums, cases or boxes shall be placed in wooden cases. For substances of 6° (b) handed over individually for carriage in boxes made of tin-plate or aluminium sheet, a wrapping of corrugated fibreboard will suffice instead of a wooden case; a package of this nature must not weigh more than 12 kg.

(3) Substances of 6° (c) shall be packed in air-tight sheet-metal receptacles or air-tight iron drums. In the case of sheet-metal receptacles, a package must not weigh more than 50 kg.

(4) Substances of 6° (d) shall be packed in receptacles made of metal, glass or a suitable plastics material and so closing as to be gas-tight. The stoppers used for closure shall be held in position by an additional device (such as a cap, crown, seal or binding) capable of preventing any loosening during carriage. The substances shall be dispatched under a protective liquid (such as methanol) or a protective gas.

Metal receptacles shall be placed in a wooden packing case. A package must not weigh more than 50 kg.

Glass receptacles shall be secured by cushioning materials in fibreboard or metal packagings; the cushioning materials must be incombustible. Receptacles made of a plastics material shall be placed in fibreboard or metal packagings. Packagings containing receptacles made of glass or a plastics material shall be placed in a wooden packing case. A package must not weigh more than 25 kg.

Substances of 7° - 10° and 12° shall be enclosed in tightly-closing packages. Wooden packagings used for substances of 7° and 8° shall be provided with a leak-proof lining. 2439

The substance having been used for purifying lighting gas (spent oxide of iron) (11°) shall be packed in tightly-closing sheet-metal receptacles. 2440

Empty sodium nitrate bags (13°) shall be made up into tightly-packed bundles securely fastened with string and placed either in a wooden case or in a wrapping consisting either of several thicknesses of stout paper or of waterproofed fabric. 2441

## Class 4.2

### 3. Mixed packing

2442

(1) Substances grouped under the same item number may be included in the same package. The inner packagings shall conform to what is prescribed for each substance, and the outer packaging shall be that laid down for the substances of the item number in question.

(2) If smaller quantities are not prescribed in the section entitled "Packing of a single substance or of articles of the same kind", substances of this Class, in quantities not exceeding 6 kg in the case of solids or 3 litres in the case of liquids for all of the substances listed under the same item number or the same letter, may be enclosed in the same package either with substances of another item number or of another letter of the same Class, or with dangerous substances belonging to other Classes (if mixed packing is likewise allowed in the case of such substances), or with other goods, subject to the following special conditions.

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions of marginals 2001 (5) and 2002 (6) and (7) must be observed.

A package must not weigh more than 150 kg, or more than 75 kg if it contains fragile receptacles.

#### Special conditions:

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
1° 2° 3°	White or yellow phosphorus Phosphides Zinc alkyls, etc.	Mixed packing not allowed		
6°(a) (b) and (d)	Dust and powder of aluminium or zinc Dust, powder and fine shavings of magnesium Metals in a pyrophoric form	3 kg	3 kg	Must not be packed together with weakly-nitrated nitrocellulose and red phosphorus of Class 4.1, nor with bifluorides
4°, 5° 6°(c) 7° - 12°	All substances			

## Class 4.2

### 4. Marking and danger labels on packages (See Appendix A.9)

(1) Packages containing substances of 1° to 4° or 6° shall bear a label conforming to model No. 2C. 2443

However, if substances of 4° are packed in drums made of impermeable fibreboard in conformity with marginal 2436 (1), the packages shall bear two labels conforming to model No. 2C.

(2) Drums containing phosphorus of 1° and having a screw-cap lid shall, unless they are fitted with a device maintaining them upright, bear in addition, high up in two diametrically opposite places, two labels conforming to model No. 8.

(3) Packages containing fragile receptacles not visible from the outside shall bear labels conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

(4) In the case of consignments carried as a full load, label No. 2C as prescribed under (1), need not be affixed to the packages if the vehicle bears the marking prescribed in Annex B, marginal 10 500.

### B. Particulars in the transport document

2444  
2445

The description of the goods in the transport document must conform to one of the names underlined in marginal 2431. Where the name of the substance is not indicated in the case of 2°, 3°, 9° and 10°, the trade name must be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 4.2, 5° (a), ADR].

2446-  
2452

### C. Empty packagings

2453

(1) Receptacles and tanks of 14° and receptacles of 15° must be closed in the same manner and leak-proof in the same degree as though they were full.

(2) The description in the transport document must be: "Empty receptacle (or empty tank), 4.2, 14° (or 15°), ADR (or RID)". This description must be underlined in red.

2454-  
2469

1

2

CLASS 4.3 SUBSTANCES WHICH GIVE OFF INFLAMMABLE GASES ON CONTACT WITH WATER

1. List of substances

Among the substances and articles covered by the heading of Class 4.3 only those listed in marginal 2471 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of I.D.R. 2470

1° (a) Alkali and alkaline-earth metals, e.g. sodium, potassium, calcium, as well as alkali metal alloys, alkaline-earth metal alloys and alloys of alkali and alkaline-earth metals; 2471

(b) alkali metal amalgams and alkaline-earth metal amalgams;

(c) alkali metal dispersions.

2° (a) Calcium carbide and aluminium carbide;

(b) alkali metal and alkaline-earth metal hydrides (e.g. lithium hydride, calcium hydride), mixed hydrides, and boron hydrides and aluminium hydrides of alkali metals and alkaline-earth metals;

(c) alkali silicides;

(d) calcium silicide, in powder, grains or lumps, containing more than 50 per cent silicon, manganese calcium silicide (silico-manganese-calcium);

(e) alloys of magnesium with manganese.

3° Amides of alkali metals and alkaline-earth metals, e.g. sodamide (sodium amide). See also marginal 2471a

Note: Calcium cyanamide is not subject to the provisions of I.D.R.

4° Trichlorosilane (silicochloroform).

5° Empty receptacles, uncleaned, and empty tanks, uncleaned, which have contained substances of Class 4.3.

Sodamide (3°) in quantities not exceeding 200 g per package is not subject to the provisions for this Class contained in this Annex or in Annex B if it is packed in receptacles which are so closed as to be leak-proof and which cannot be attacked by the contents, and if these receptacles are packed with care in a strong, leak-proof wooden packaging with a leak-proof closure. 2471a

Class 4.3

2. Provisions

4. Packages

1. General conditions of packing

2472

(1) Packagings shall be so closed and leak-proof as to prevent the ingress of moisture and any loss of the contents.

(2) The materials of which the receptacles and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith. Receptacles must in all cases be free from moisture.

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular, in the case of solids immersed in a liquid, receptacles and their closures must, unless the section headed "Packing of a single substance" provides otherwise, be able to withstand any pressure which, the presence of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage. Solid substances shall be firmly secured in their packagings, and inner packagings shall be firmly secured in outer packagings.

Unless otherwise specified in the section entitled "Packing of a single substance", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The thickness of the walls must in no case be less than 2 mm.

The tightness of the closure system must be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage.

(5) Cushioning materials shall be suited to the nature of the contents.



2. Packing of a single substance

(1) Substances of 1° shall be packed:

2473

- (a) in receptacles made of sheet-iron, lead-lined sheet-iron or tin-plate. For substances of 1°(b), however, receptacles made of lead-lined sheet-iron or of tin-plate are not to be accepted. These receptacles, with the exception of iron drums, must be placed in wooden packing cases or in protective iron hampers; or
- (b) not more than 1 kg per receptacle, in receptacles made of glass or stoneware. Not more than 5 of these receptacles shall be packed in a wooden packing case having a leak-proof lining of ordinary sheet-iron, lead-lined sheet-iron, or tin-plate, assembled by soldering. For glass receptacles containing quantities not exceeding 250 g, the lined wooden case may be replaced by an outer receptacle made of ordinary sheet-iron, lead-lined sheet-iron, or tin-plate. Glass receptacles shall be secured in the outer packagings by incombustible cushioning materials.

(2) If a substance of 1°(a) is not packed in a welded metal receptacle with a lid hermetically closed by soldering, then:

- (a) it must be completely covered by mineral oil whose flash-point is above 50°C, or be sufficiently sprinkled to ensure that the lumps are coated with this oil; or
- (b) the air in the receptacle must be completely replaced by a protective gas (e.g. nitrogen) and the receptacle so closed as to be gas-tight; or
- (c) the substance must be poured into the receptacle, which must be filled to the brim and so closed, after cooling, as to be gas-tight.

(3) Iron receptacles must have sides not less than 1.25 mm thick. If, with their contents, they weigh more than 75 kg, they must be hard-soldered or welded. If they weigh more than 125 kg, they must in addition be fitted with end and rolling hoops or with rolling flanges.

(1) Substances of 2° shall be packed:

2474

- (a) in receptacles made of sheet-iron, lead-lined sheet-iron or tin-plate. For substances of 2°(b) and (c) a receptacle must not contain more than 10 kg. These receptacles, with the exception of iron drums, must be placed in wooden packing cases or in protective iron hampers; or

### Class 4.3

2474  
(contd)

(b) not more than 1 kg per receptacle, in receptacles made of glass or stoneware or of a suitable plastics material. Not more than 5 of these receptacles shall be packed in a wooden packing case with a leak-proof lining of ordinary sheet-iron, lead-lined sheet-iron or tin-plate, assembled by soldering. For glass receptacles containing quantities not exceeding 250 g, the lined wooden case may be replaced by an outer receptacle made of ordinary sheet-iron, lead-lined sheet-iron or tin-plate. Glass receptacles shall be secured in the packing cases by incombustible cushioning materials.

(2) A package must not weigh more than 75 kg if it contains substances of 2°(b) or (c) and not more than 125 kg if it contains substances of 2°(d) or (e).

2475

Amides (3°) shall be packed, not more than 10 kg per box or drum, in hermetically-closed metal boxes or drums, which shall be placed in wooden cases. A package must not weigh more than 75 kg.

2476

(1) Trichlorosilane (4°) must be packed in receptacles made of corrosion-resistant steel and having a capacity not exceeding 500 litres. The receptacles must be hermetically closed; the closing device must be specially protected by a cap. The receptacles must be constructed as pressure vessels for a working pressure of 4 kg/cm<sup>2</sup> and be tested in conformity with the regulations governing pressure vessels in force in the country of departure. Receptacles with a capacity not exceeding 250 litres must have a wall thickness of not less than 2.5 mm, and those with a higher capacity a wall thickness of not less than 3 mm.

(2) If filling is based on weight, the degree of filling must not exceed 1.14 kg/l. If it is carried out by visual check, the degree of filling shall not exceed 84.5 per cent.

### 3. Mixed packing

2477

(1) The substances grouped under the same item number may be included in the same package. The inner packagings shall conform to what is prescribed for each substance, and the outer packaging shall be that laid down for the substances of the item number in question.

(2) If smaller quantities are not prescribed in the section entitled "Packing of a single substance", substances of this Class, in quantities not exceeding 6 kg in the case of solids or 3 litres in the case of liquids for all of the substances listed under the same item number or the same letter, may be enclosed in the same package either with substances of another item number or of another letter of the same Class, or with dangerous substances belonging to other Classes (if mixed packing is likewise permitted in the case of such substances), or with other goods, subject to the following special conditions.

## Class 4.3

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions contained in marginals 2001(5) and 2002(6) and (7) must be observed.

2477  
(contd)

A package must not weigh more than 150 kg, or more than 75 kg if it contains fragile receptacles.

Special conditions:

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
1°(a)	Alkali and alkaline-earth metals (e.g. sodium, potassium, calcium, barium) - in fragile receptacles - in other receptacles	500 g 1 kg	500 g 1 kg	The limits of 500 g or 1 kg apply to alkali metals and alkaline-earth metals of 1°(a), and to alkali metal and alkaline-earth metal hydrides of 2°(b), in respect of the aggregate weight of these substances. Alkali metals and alkaline-earth metals, and substances of 2°(b), may not be packed together with acids, nor with liquids containing water.
2°(a)	Calcium carbide	Mixed packing not allowed		
2°(b)	Alkali metal and alkaline-earth metal hydrides (e.g. lithium hydride, calcium hydride), mixed hydrides, boron hydrides and aluminium hydrides - in fragile receptacles - in other receptacles	500 g 1 kg	500 g 1 kg	
4°	Trichlorosilane	Mixed packing not allowed		

Class 4.3

4. Marking and danger labels on packages (see Appendix 4.9)

2478

(1) Every package containing substances of Class 4.3 shall bear a label of model No. 2D and a label conforming to model No. 7.

(2) Every package containing trichlorosilane of 4° shall bear in addition a label conforming to model No. 2A.

(3) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

2479

B. Particulars in the transport document

2480

The description of the goods in the transport document must conform to one of the names underlined in marginal 2471. Where the name of the substance is not indicated in the case of 1°, the trade name must be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 4.3 2°(a), ADR]

2481-

2497

C. Empty packagings

2498

(1) Receptacles and tanks of 5° must be closed in same manner and be leak-proof in the same degree as though they were full.

(2) The description in the transport document must be: "Empty receptacle (or empty tank), 4.3, 5°, ADR (or RID)". This description must be underlined in red.

2499

## CLASS 5.1 OXIDIZING SUBSTANCES

### 1. List of substances

Among the substances and articles covered by the heading of Class 5.1, those listed in marginal 2501 are subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR.

2500

Note: Unless specifically listed in Class 1a or Class 1c, mixtures of oxidizing substances with combustible substances are not to be accepted for carriage if they are capable of exploding on contact with a flame or are more sensitive to shock and to friction than dinitrobenzene.

- 1° Stabilized, aqueous solutions of hydrogen peroxide containing more than 60 per cent hydrogen peroxide, and stabilized hydrogen peroxide.

2501

Note: 1. For aqueous solutions of hydrogen peroxide containing not more than 60 per cent hydrogen peroxide, see marginal 2801, 41°.

2. Aqueous solutions of hydrogen peroxide containing more than 60 per cent hydrogen peroxide, not stabilized, and hydrogen peroxide, not stabilized, are not to be accepted for carriage.

- 2° Tetranitromethane, free from combustible impurities.

Note: Tetranitromethane not free from combustible impurities is not to be accepted for carriage.

- 3° Perchloric acid in aqueous solutions containing more than 50 per cent but not more than 72.5 per cent perchloric acid ( $\text{HClO}_4$ ).

See also marginal 2501a, under (a).

Note: Perchloric acid in aqueous solutions containing not more than 50 per cent perchloric acid ( $\text{HClO}_4$ ) is a substance of Class 8 (see marginal 2801, 4°). Aqueous solutions of perchloric acid containing more than 72.5 per cent perchloric acid are not to be accepted for carriage; the same applies to mixtures of perchloric acid with any liquid other than water.

- 4° (a) Chlorates; inorganic chlorate weed-killers consisting of mixtures of sodium chlorate, potassium chlorate or calcium chlorate with a hygroscopic chloride (such as magnesium chloride or calcium chloride);

Note: Ammonium chlorate is not to be accepted for carriage.

Class 5.1

2501  
(contd)

- (b) perchlorates (with the exception of ammonium perchlorate, see 5°);
- (c) sodium and potassium chlorites;
- (d) mixtures of chlorates, perchlorates and chlorites of (a), (b) and (c) with one another.

For (a), (b), (c) and (d), see also marginal 2501a, under (b).

5° Ammonium perchlorate. See also marginal 2501a, under (b).

6° (a) Ammonium nitrate not containing combustible substances in a higher proportion than 0.4 per cent;

Note: Ammonium nitrate containing more than 0.4 per cent combustible substances is not to be accepted for carriage unless it is a constituent of an explosive of 12° or 14° of marginal 2101.

- (b) mixtures of ammonium nitrate with ammonium sulphate or ammonium phosphate containing more than 40 per cent nitrate but not more than 0.4 per cent combustible substances;
- (c) mixtures of ammonium nitrate with an inert substance (e.g. infusorial earth, calcium carbonate, potassium chloride) containing more than 65 per cent nitrate but not more than 0.4 per cent combustible substances.

For (a), (b) and (c), see also marginal 2501a, under (b).

Note: 1. Mixtures of ammonium nitrate with ammonium sulphate or ammonium phosphate containing not more than 40 per cent nitrate, and mixtures of ammonium nitrate with an inert inorganic substance containing not more than 65 per cent nitrate, are not subject to the provisions of ADR.

2. In the mixtures referred to under (c), only inorganic substances which are neither combustible nor oxidizing may be considered as inert.

3. Compound fertilizers in which the total content of nitrogen as nitrate and as ammonia does not exceed 14 per cent or in which the nitrogen content as nitrate does not exceed 7 per cent are not subject to the provisions of ADR.

- 7° (a) Sodium nitrate;
- (b) mixtures of ammonium nitrate with nitrates of sodium, potassium, calcium or magnesium;

Class 5.1

(c) barium nitrate, lead nitrate.

2501  
(contd)

For (a), (b) and (c), see also marginal 2501a, under (b).

Note: 1. If they do not contain more than 10 per cent ammonium nitrate, mixtures of ammonium nitrate with calcium nitrate or with magnesium nitrate or with both are not subject to the provisions of ADR.

2. Empty textile bags which have contained sodium nitrate and have not been entirely freed from the nitrate impregnating them are articles of Class 4.3 (see marginal 2431, 13°).

8° Inorganic nitrites. See also marginal 2501a, under (b).

Note: Ammonium nitrite and mixtures of an inorganic nitrite with an ammonium salt are not to be accepted for carriage.

9° (a) Peroxides of alkali metals and mixtures containing peroxides of alkali metals which are not more dangerous than sodium peroxide;

(b) dioxides and other peroxides of alkaline-earth metals, e.g. barium dioxide;

(c) permanganates of sodium, potassium, calcium and barium.

For (a), (b) and (c), see also marginal 2501a, under (b).

Note: Ammonium permanganate, and mixtures of a permanganate with an ammonium salt, are not to be accepted for carriage.

10° Chromium trioxide (chromic anhydride; also called chromic acid).

See also marginal 2501a, under (b).

11° Empty packagings, uncleaned, and empty tanks, uncleaned, which have contained substances of Class 5.1.

Note: Empty packagings and empty tanks which have contained a chlorate, a perchlorate, a chlorite (4° and 5°), an inorganic nitrite (8°) or substances of 9° and 10°, with residues from their previous contents adhering to the outside, are not to be accepted for carriage.

## Class 5.1

2501a

Substances handed over for carriage in conformity with the following provisions are subject neither to the provisions for this Class contained in this Annex nor to those contained in Annex B.

- (a) substances of 3<sup>0</sup>, in quantities not exceeding 200 g per receptacle, on condition that they are packed in receptacles so closed as to be leak-proof and not capable of being attacked by the contents, and that receptacles are packed, not more than 10 per case, in a wooden case with inert absorbent cushioning materials;
- (b) substances of 4<sup>0</sup>-10<sup>0</sup>, in quantities not exceeding 10 kg, packed not more than 2 kg per receptacle in receptacles so closed as to be leak-proof and not capable of being attacked by the contents, these receptacles being enclosed in strong, leak-proof packagings made of wood or sheet-metal and having leak-proof closures.

## 2. Provisions

### A. Packages

#### 1. General conditions of packing

2502

(1) Receptacles shall be so closed and arranged as to prevent any loss of the contents.

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents, or cause the contents to decompose, or form harmful or dangerous compounds therewith.

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular, where substances are in the liquid state, receptacles and their closures must, unless the section headed "Packing of a single substance" provides otherwise, be able to withstand any pressure which, the presence of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage. Unless otherwise specified in the section entitled "Packing of a single substance", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The walls must be not less than 3 mm thick in the case of receptacles weighing, with their contents, more than 35 kg and not less than 2 mm in the case of other receptacles.



## Class 5.1

The tightness of the closure system must be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage.

2502  
(contd)

(5) When receptacles made of glass, porcelain, stoneware or similar materials are prescribed or allowed, they must be secured by cushioning materials in protective packagings. Cushioning materials must be incombustible (asbestos, glass wool, absorbent earth, infusorial earth, etc.) and incapable of forming dangerous compounds with the contents of the receptacles. If the contents are liquid, the cushioning materials shall also be absorbent and proportionate in quantity to the volume of the liquid; this interior absorbent layer must not, however, be less than 4 cm thick at any point.

### Packing of a single substance

(1) Aqueous solutions of hydrogen peroxide, and hydrogen peroxide of 1°, shall be packed in drums or other receptacles made of aluminium of at least 99.5 per cent purity or of special steel not liable to cause the hydrogen peroxide to decompose. These receptacles shall be fitted with means of handling; they must be able to remain upright in a stable fashion and must:

2503

- (a) be fitted in their upper part with a closing device ensuring equality of the internal and the atmospheric pressure; this closing device must in all circumstances prevent any escape of the liquid and any entry of foreign matter into the receptacle and must be protected by a vented cap; or
- (b) be able to withstand an internal pressure of  $2.5 \text{ kg/cm}^2$  and be fitted in the upper part with a safety device yielding when the excess of internal pressure is  $1 \text{ kg/cm}^2$  at most.

(2) Receptacles shall not be filled beyond 90 per cent of their capacity.

(3) A package must not weigh more than 90 kg.

Tetranitromethane (2°) shall be contained in bottles made of glass, porcelain, stoneware or similar materials or of a suitable plastics material, with incombustible stoppers, placed inside a wooden case with complete sides; fragile receptacles shall be secured therein by absorbent-earth cushioning. Receptacles shall not be filled beyond 93 per cent of their capacity.

2504

Class 5.1

2505

Perchloric acid in aqueous solutions (3<sup>o</sup>) shall be contained in glass receptacles, which shall be filled to not more than 93 per cent of their capacity. The receptacles shall be secured by absorbent and incombustible cushioning materials in incombustible protective packagings impermeable to liquids and capable of retaining the contents of the receptacles. The closure of the receptacles shall be protected by caps if the protective packagings are not completely closed.

Glass bottles closed by glass stoppers may also be secured by absorbent and incombustible cushioning materials in wooden cases with complete sides.

Packages containing fragile receptacles and carried otherwise than as a full load must not weigh more than 75 kg and shall be fitted with means of handling.

2506

(1) Substances of 4<sup>o</sup> and 5<sup>o</sup> and solutions of substances of 4<sup>o</sup> shall be packed in receptacles made of glass, of a suitable plastics material, or of metal; solid substances of 4<sup>o</sup> (b) may also be enclosed in hardwood casks.

(2) Fragile receptacles and receptacles made of a plastics material must be secured by cushioning materials in wooden or metal protective packagings. They may also be secured separately by incombustible cushioning materials in non-fragile intermediate receptacles which must in turn be firmly placed or secured by cushioning materials in protective packagings. Each receptacle must contain not more than 5 kg of substance. In the case of receptacles whose contents are liquid, the cushioning materials must be absorbent.

(3) In the case of receptacles made of a plastics material and containing solutions of substances of 4<sup>o</sup>, the protective packagings may be dispensed with if the walls are not less than 4 mm thick at every point, the walls are strengthened by strong reinforcing rims, the ends are strengthened, the upper part is provided with two strong handholds, and the opening is fitted with a screw-threaded closure.

(4) Receptacles for liquids shall not be filled beyond 95 per cent of their capacity.

(5) Packages containing fragile receptacles or receptacles made of a plastics material [see (2) and (3)], if they contain liquids, and packages containing fragile receptacles or receptacles made of a plastics material [see (2)], if they contain only solid substances and are carried otherwise than as a full load, must not weigh more than 75 kg. Packages carried otherwise than as a full load shall be fitted with means of handling.

Class 5.1

(6) Packages which can be rolled must not weigh more than 400 kg; if they weigh more than 275 kg they shall be fitted with rolling hoops.

2506  
(contd)

(7) Receptacles containing solid chlorates other than those referred to under (8) must not contain any combustible material other than a small pad of waxed paper.

(8) If the chlorate is in the form of tablets, with or without a suitable binder, and is packed in bottles containing not more than 200 g, a sufficient quantity of cotton-wool may be used to prevent excessive movement of the tablets in the bottle. The bottles shall be packed in fibreboard boxes placed in an intermediate packaging separate from the outer packaging. An intermediate packaging may not contain more than 1 kg or a package more than 6 kg of chlorate.

(1) Substances of 6<sup>o</sup>, 7<sup>o</sup>, and 8<sup>o</sup> shall be packed:

2507

(a) in drums or cases; or

(b) in strong bags made of closely-woven fabric or of stout paper of at least five plies or, in quantities not exceeding 50 kg, in bags made of a suitable plastics material sufficiently thick and strong to prevent any loss of the contents.

If the substance is more hygroscopic than sodium nitrate, bags made of closely-woven fabric or of stout paper of five plies must be lined with a suitable plastics material or be rendered impermeable by suitable means.

Packages which can be rolled must not weigh more than 400 kg; if they weigh more than 275 kg they shall be fitted with rolling hoops.

(1) Substances of 9<sup>o</sup> (a) shall be packed:

2508

(a) in steel drums; or

(b) in receptacles made of sheet-metal, lead-lined sheet-iron, or tin-plate, secured in wooden packing cases having a metal lining rendered leak-proof, e.g. by soldering.

When carried as a full load, substances of 9<sup>o</sup> (a) may be packed in tin-plate receptacles placed solely in protective iron hampers.

(2) Receptacles containing substances of 9<sup>o</sup> (a) must be so closed and leak-proof as to prevent moisture from entering.

(3) Substances of 9<sup>o</sup> (b) and (c) shall be packed:

Class 5.1

2508  
(contd)

- (a) in incombustible receptacles fitted with an incombustible hermetic closure. If the incombustible receptacles are fragile, each shall be secured separately by cushioning materials in a wooden case lined with stout paper; or
- (b) in hardwood casks with closely-fitting staves, lined with stout paper.

(4) Packages containing fragile receptacles and carried otherwise than as a full load must not weigh more than 75 kg and shall be fitted with means of handling.

Packages capable of rolling must not weigh more than 400 kg; they must be fitted with rolling hoops if they weigh more than 275 kg.

2509

(1) Chromium trioxide ( $10^0$ ) shall be packed:

- (a) in receptacles made of glass, porcelain, stoneware or similar materials, tightly stoppered, and secured in a wooden case by inert and absorbent cushioning materials; or
- (b) in metal drums.

(2) Packages containing fragile receptacles carried otherwise than as a full load must not weigh more than 75 kg and shall be fitted with means of handling.

Packages capable of rolling must not weigh more than 400 kg; they must be fitted with rolling hoops if they weigh more than 275 kg.

3. Mixed packing

2510

(1) Substances grouped under the same letter may be included in the same package. The inner packagings shall conform to what is prescribed for each substance, and the outer packaging shall be that laid down for the substances of the item number in question.

(2) If smaller quantities are not prescribed in the section entitled "Packing of a single substance", substances of this Class, in quantities not exceeding 6 kg in the case of solids or 3 litres in the case of liquids for all of the substances listed under the same item number or the same letter, may be enclosed in the same package either with substances of another item number or of another letter of the same Class, or with dangerous substances belonging to other Classes (if mixed packing is likewise allowed in the case of such substances), or with other goods, subject to the following special conditions.

## Class 5.1

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions of marginals 2001 (5) and 2002 (6) and (7) must be observed.

2510  
(contd)

A package must not weigh more than 150 kg, or more than 75 kg if it contains fragile receptacles.

Special conditions:

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
1°	Hydrogen peroxide and aqueous solutions of hydrogen peroxide containing more than 60% hydrogen peroxide.	Mixed packing not allowed.		Must not be packed together with weakly-nitrated nitrocellulose, red phosphorus, bifluorides, liquid halogenated irritants, hydrochloric acid, sulphuric acid, chlorosulphonic acid, acetic acid, benzoic acid, salicylic acid, formic acid, nitric acid, free sulphonic acids, mixed nitrating acids, sulphur, hydrazine. Must be separated from uncombined carbon
2°	Tetranitromethane			
3°	Perchloric acid			
4°	Solutions of substances of 4°			
4°(a)	Chlorates			
	- in fragile receptacles	1 kg	2.75 kg	
	- in other receptacles	5 kg	5 kg	

## Class 5.1

2510  
(contd)

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
				(in any form), hypophosphites, ammonia and its compounds, triethanolamine, aniline, xylidine, toluidine, or inflammable liquids having a flashpoint below 21°C.
4 <sup>o</sup> (b) and 5 <sup>o</sup>	Perchlorates	5 kg	5 kg	Must not be packed together with weakly-nitrated nitrocellulose, red phosphorus, bifluorides, liquid halogenated irritants, hydrochloric acid, sulphuric acid, chlorosulphonic acid, nitric acid, mixed nitrating acids, aniline, pyridine, xylidine, toluidine, sulphur, hydrazine
4 <sup>o</sup> (c) and (d), 6 <sup>o</sup> , 7 <sup>o</sup> , 8 <sup>o</sup>	All substances			Must not be packed together with weakly-nitrated nitrocellulose or red phosphorus.
9 <sup>o</sup> (a) and (b)	Peroxides - in fragile receptacles - in other receptacles	500 g 5 kg	2.5 kg 5 kg	Same substances prohibited as in the case of perchlorates, and also: aluminium dust, powder or granules, acetic acid; aqueous liquids,

## Class 5.1

2510  
(contd)

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
				inflammable liquids of Classes 3 and 6.1 substances of Class 4.1; metallic peroxides must not be packed in the same package with solutions of hydrogen peroxide. The limitation of 2.5 kg applies to peroxides of 9 <sup>0</sup> (a) and (b) for all of these substances. The use of sawdust or other organic filling materials is prohibited.
9 <sup>0</sup> (c)	Permanganates	5 kg	5 kg	Same substances prohibited as in the case of chlorates, and also: solutions of hydrogen peroxide, glycerine, glycols. Must be separated from the same substances as indicated in the case of chlorates.
10 <sup>0</sup>	Chromic anhydride (chromic acid)	4.5 kg	4.5 kg	The use of sawdust or other organic filling materials is prohibited.

Class 5.1

2511 4. Marking and danger labels on packages (see Appendix A.9)

(1) Packages containing substances of Class 5.1 shall bear a label of model No. 3. However, packages containing substances of 1° to 5° or 8° to 10° shall bear two labels conforming to model No. 3.

Packages containing substances of 3° shall in addition bear a label conforming to model No. 5.

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

(3) In the case of consignments carried as a full load, labels Nos. 3 and 5, as prescribed under (1), need not be affixed to the packages if the vehicle bears the marking prescribed in Annex B, marginal 10 500.

2512 B. Particulars in the transport document

2513 The description of the goods in the transport document must conform to one of the names underlined in marginal 2501; it must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 5.1, 4° (a), ADR]

2514-  
2520

C. Empty packagings

2521 (1) Packagings and tanks of 11° must be closed in the same manner and leak-proof in the same degree as though they were full.

(2) The description in the transport document must be: "Empty packaging, 5.1, 11°, ADR (or RID)". This description must be underlined in red.

(3) Empty textile bags, uncleaned, which have contained sodium nitrate [7°(a)] are subject to the provisions of Class 4.2 (see marginal 2441).

2522-  
2549



## CLASS 5.2 ORGANIC PEROXIDES

### 1. List of substances

Among the substances and articles covered by the heading of Class 5.2, only those listed in marginal 2551 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR.

2550

Note: Organic peroxides which may explode on contact with a flame or which are more sensitive to shock and to friction than dinitrobenzene are not to be accepted for carriage unless they are specifically listed in Class 1a (see marginal 2101, 10° and Appendix A.1, marginal 3112; also marginal 2551, Group E, below).

#### Group A

2551

- 1° Ditertiary butyl peroxide.
- 2° Tertiary butyl hydroperoxide with not less than 20 per cent ditertiary butyl peroxide and not less than 20 per cent phlegmatizer.

Note: Tertiary butyl hydroperoxide with not less than 20 per cent ditertiary butyl peroxide but without phlegmatizer is listed under 31°.

- 3° Tertiary butyl peracetate with not less than 30 per cent phlegmatizer.
- 4° Tertiary butyl perbenzoate.
- 5° Tertiary butyl permaleate with not less than 50 per cent phlegmatizer.
- 6° Ditertiary butyl diperphthalate with not less than 50 per cent phlegmatizer.
- 7° 2,2-bis (tertiary butyl peroxy) butane with not less than 50 per cent phlegmatizer.
- 8° Benzoyl peroxide:
- (a) with not less than 10 per cent water;
- (b) with not less than 30 per cent phlegmatizer.

Class 5.2

2551  
(contd)

Notes: 1. Benzoyl peroxide in the dry state or with less than 10 per cent water or less than 30 per cent phlegmatizer is a substance of Class 1a [see marginal 2101 10° (a)].

2. Benzoyl peroxide containing not less than 70 per cent dry and inert solids is not subject to the provisions of ADR.

9° Cyclohexanone peroxides [1-hydroxy-1'-hydroperoxydicyclohexyl peroxide and bis (1-hydroxycyclohexyl) peroxide and mixtures of these two compounds]:

(a) with not less than 5 per cent water;

(b) with not less than 30 per cent phlegmatizer.

Notes: 1. Cyclohexanone peroxides and their mixtures in the dry state or with less than 5 per cent water or less than 30 per cent phlegmatizer are substances of Class 1a [see marginal 2101, 10° (b)].

2. Cyclohexanone peroxides and their mixtures containing not less than 70 per cent dry and inert solids are not subject to the provisions of ADR.

10°  $\alpha$ ,  $\alpha$  - Dimethylbenzyl hydroperoxide (cumyl hydroperoxide) with a peroxide content not exceeding 95 per cent.

11° Dilauroyl peroxide.

12° 1,2,3,4-Tetrahydro-1-naphthyl hydroperoxide.

13° 2,4-Dichlorobenzoyl peroxide:

(a) with not less than 10 per cent water;

(b) with not less than 30 per cent phlegmatizer.

14° p-Menthanyl hydroperoxide with a peroxide content not exceeding 95 per cent (remainder: alcohols and ketones).

15° 2,6,6-Trimethyl norpinanyle hydroperoxide (pinanyl hydroperoxide; pinane hydroperoxide) with a peroxide content not exceeding 95 per cent (remainder: alcohols and ketones).

16° Di-( $\alpha$ ,  $\alpha$  - dimethylbenzyl) peroxide with a peroxide content not exceeding 95 per cent.

Note: Di-( $\alpha$ ,  $\alpha$  - dimethylbenzyl) Dicumyl peroxide containing 60 per cent or more dry and inert solids is not subject to the provisions of ADR.

Class 5.2

17° Parachlorobenzoyl peroxide:

2551  
(contd)

- (a) with not less than 10 per cent water;
- (b) with not less than 30 per cent phlegmatizer.

Note: 1. Parachlorobenzoyl peroxide in the dry state or with less than 10 per cent water or less than 30 per cent phlegmatizer is a substance of Class 1a [see marginal 2101, 10°(c)].

2. Parachlorobenzoyl peroxide containing 70 per cent or more dry and inert solids is not subject to the provisions of ADR

18° Di-isopropylbenzene hydroperoxide (isopropylcumyl hydroperoxide) with 45 per cent of a mixture of alcohol and ketone.

19° 4-Methylpentan-2-one peroxide (isobutylmethylketone peroxide) with not less than 40 per cent phlegmatizer.

20° Tertiary butyl (~~α~~, ~~α~~-1-dimethylbenzyl) peroxide with not more than 95 per cent peroxide.

21° Diacetyl peroxide with not less than 75 per cent phlegmatizer.

22° Acetyl benzoyl peroxide with not less than 60 per cent phlegmatizer.

Note: re 1° to 22°. Substances which are inert to organic peroxides and have a flash-point not lower than 100°C and a boiling-point not lower than 150°C are deemed to be phlegmatizing substances. Substances of Group A may also be diluted with solvents which are inert to these substances.

Group B

30° Butanone peroxide (ethyl methyl ketone peroxide):

- (a) with not less than 50 per cent phlegmatizer;
- (b) in solutions containing not more than 12 per cent of this peroxide in solvents which are inert to it.

31° Tertiary butyl hydroperoxide:

- (a) with not less than 20 per cent tertiary butyl peroxide, without phlegmatizer;
- (b) in solutions containing not more than 12 per cent of this hydroperoxide in solvents which are inert to it.

Class 5.2

2551  
(contd)

Note: re 30° and 31°. Substances which are inert to organic peroxides and have a flash-point not lower than 100°C and a boiling-point not lower than 150°C are deemed to be phlegmatizing substances.

Group C

- 35° Peracetic acid containing not more than 40 per cent peracetic acid and not less than 45 per cent acetic acid and not less than 10 per cent water.

Note: re Groups A, B and C. Mixtures of products listed in Groups A, B and C are to be accepted for carriage subject to the conditions laid down for Group C if they contain peracetic acid, and in other cases subject to the conditions laid down for Group B.

Group D

- 40° Samples of phlegmatized organic peroxides not listed in Groups A, B or C, or of their solutions, are to be accepted in quantities not exceeding 1 kg per package on condition that their stability in storage is at least equal to that of the substances listed in Groups A and B.

Group E

Note: Group E comprises organic peroxides which decompose easily at normal temperatures and must therefore be carried only under conditions of adequate refrigeration. Although of an explosive nature as defined by the Note on Class 5.2, a few organic peroxides are included in Group E because they can be safely carried in a refrigerated state and in order to avoid any confusion regarding their handling.

- 45° Diocetyl peroxide (dicaprylyl peroxide) of technical purity.

- 46° Acetyl cyclohexane sulphonyl peroxide:

- (a) containing not less than 30 per cent water;
- (b) in solution with not less than 80 per cent solvent;
- (c) in solution with not less than 70 per cent phlegmatizer.

- 47° Diisopropyl peroxydicarbonate:

- (a) of technical purity;
- (b) in solution with not less than 50 per cent phlegmatizer or solvent.

Class 5.2

2551  
(contd)

- 48° Dipropionyl peroxide in solution with not less than 75 per cent solvent.
- 49° Tertiary butyl perpivalate:
- (a) of technical purity;
  - (b) in solution with not less than 25 per cent phlegmatizer or solvent.
- 50° Bis-(3,5,5-trimethylhexanoyl) peroxide in solution with not less than 20 per cent phlegmatizer.
- 51° Dipelargonyl peroxide of technical purity.
- 52° Tertiary butyl per-2-ethylhexanoate of technical purity.
- 53° Di-2-ethylhexyl-peroxydicarbonate in solution with not less than 55 per cent phlegmatizer or solvent.
- 54° Didecancyl peroxide of technical purity.
- 55° Tertiary butyl perisobutyrate in solution with not less than 25 per cent solvent.

Notes: 1. Substances which are inert to organic peroxides and have a flash-point not lower than 100°C and a boiling point not lower than 150°C are deemed to be phlegmatizing substances.

2. The solvents referred to are substances which are inert to organic peroxides and which also satisfy one of the following conditions:

- (a) they are not inflammable and have a boiling point of not less than 85°C; or
- (b) they are not inflammable and have a boiling point of less than 85°C but not less than 60°C, in which case hermetically closed containers must be used; or
- (c) they have a flash-point of not less than 21°C and a boiling point of not less than 85°C; or
- (d) they have a flash-point of less than 21°C but not less than 5°C and a boiling point of not less than 60°C, in which case hermetically closed containers must be used.

Class 5.2

2551  
(contd)

Group F

99° Empty packagings, uncleaned, and empty tanks, uncleaned, which have contained substances of Class 5.2.

2. Provisions

A. Packages

1. General conditions of packing

2552

(1) The materials of which the packagings and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

(2) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. Inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance", inner packagings may be enclosed in outer packagings, either singly or in groups.

(3) Cushioning materials must not be readily inflammable; in addition they shall be suited to the nature of the contents and must not cause the peroxides to decompose.

2. Packing of a single substance

a. Packing of substances of Group A

2553

Receptacles shall be so closed and leak-proof as to prevent any loss of the contents.

2554

(1) Substances of 1° to 7°, 8°(b), 9°(b), 10° to 12°, 13°(b), 14° to 16°, 17°(b) and 18° to 22° and their solutions must be packed:

- (a) in hot-dipped tinned receptacles or in receptacles made of aluminium not less than 99.5 per cent pure; or
- (b) in receptacles, made of a suitable plastics material, which shall be placed in protective packagings; or
- (c) not more than 2 litres per bottle, in tightly-closing glass bottles which shall be secured by cushioning materials in a protective packaging so as to be protected against breakage.

(2) Substances of 1° to 3°, 5° to 7°, 8°(b), 9°(b), 10° to 12°, 13°(b), 16°, 18° and 20° may also be packed in hot-tipped galvanized receptacles.

Class 5.2

(3) Substances of 8°(a), 9°(a), 13°(a) and 17°(a) shall be contained, not more than 5 kg per packaging, in water-tight packagings placed in a wooden case. 2554 (contd)

(4) Pasty and solid peroxides may also be packed in bags, made of a suitable plastics material, placed in suitable protective packagings. The thickness of the packing material shall be sufficient to prevent any loss of the contents from the bags in normal carriage. Solid peroxides may be packed, not more than 1 kg per receptacle, in paraffin-waxed fibreboard receptacles placed in a wooden case; however, in the case of cyclohexanone peroxides of 9°(a) the contents of a receptacle shall be limited to 500 g.

(5) Substances of 10° and of 14° to 18° may also be packed in receptacles made of sheet-steel.

(6) With the exception of bags made of a suitable plastics material, receptacles containing liquid or pasty organic peroxides must not be filled beyond 93 per cent of their capacity.

(7) A package must not weigh more than 50 kg. Packages weighing more than 15 kg shall be fitted with means of handling.

b. Packing of substances of Group B

2555

(1) Receptacles filled with substances of 30°(a) and 31°(a) shall be fitted with a venting device allowing compensation between the internal pressure and the atmospheric pressure and in all circumstances - even in the event of expansion of the liquid through heating - preventing the liquid from splashing out and impurities from entering the receptacle. For substances of 30°(b) and 31°(b), only receptacles so closed and leakproof as to prevent any loss of the contents shall be accepted.

(2) Packages shall be fitted with a base which keeps them securely upright without danger of falling.

(1) Substances of 30°(a) and 31°(a) shall be packed:

2556

- (a) in hot-dipped tinned or hot-dipped galvanized receptacles or in receptacles made of aluminium not less than 99.5 per cent pure; or
- (b) in receptacles, made of a suitable plastics material, placed in protective packagings. The strength of these receptacles shall be sufficient to prevent any loss of the contents in normal carriage; or

Class 5.2

2556  
(contd)

(c) not more than 2 litres per bottle, in glass bottles, which shall be secured by cushioning materials in protective packagings so as to be protected against breakage.

(2) Receptacles containing liquid or pasty organic peroxides must not be filled beyond 90 per cent of their capacity.

(3) A package must not weigh more than 40 kg. Packages weighing more than 15 kg shall be fitted with means of handling.

(4) Substances of 30°(b) and 31°(b) may be forwarded only in quantities not exceeding 5 kg in receptacles as specified in (1) but not equipped with a venting device (in glass bottles, only in quantities not exceeding 1.5 litre). The receptacles must not be filled beyond 75 per cent of their capacity.

c. Packing of substances of Group C

2557

(1) Substances of 35° and mixtures containing peracetic acid shall be packed, not more than 25 kg per receptacle, in thick-walled glass receptacles, or in receptacles made of a suitable plastics material, fitted with a special closure made of a suitable plastics material, capable of being sealed, in communication with the atmosphere through an opening situated above the level of the liquid, and in all circumstances - even in the event of expansion of the liquid through heating - preventing the liquid from splashing out and impurities from entering the receptacle.

(2) Glass receptacles shall be firmly secured, by clean mica powder or glass wool used as cushioning materials, in protective packagings made of sheet-steel or of aluminium, capable of being closed, and fitted with means of handling and with a base which keeps them securely upright without risk of falling; the receptacles shall be secured even if the walls of the protective packagings are not complete. Receptacles made of a suitable plastics material must be placed in close-fitting protective packagings made of sheet-steel and capable of being closed.

d. Packing of substances of Group D

2558

Substances of Group D shall be packed, in quantities not exceeding 1 kg per package, in hot-dipped tinned receptacles, or in receptacles made of aluminium not less than 99.5 per cent pure, or in bottles made of a suitable plastics material injection-moulded or blown and having a sufficient wall thickness, or in glass bottles placed in protective packagings made of sheet-steel, aluminium or wood. The glass bottles shall be firmly secured in the protective packagings by clean mica powder or glass wool used as cushioning materials. Solid compounds may also be packed in bags, made of a suitable plastics material of sufficient thickness, likewise placed in protective packagings made of sheet-steel, aluminium, or wood. If the peroxides give off gases at a temperature lower than 40°C, the receptacles must satisfy the conditions of marginal 2555.



## Class 5.2

### e. Packing of substances of Group E

(1) Packages containing substances of Group E shall be fitted with a venting device allowing compensation between the internal pressure and the atmospheric pressure and in all circumstances -- even in the event of expansion of the liquid through heating -- preventing the liquid from splashing out and impurities from entering the receptacle. 2559

(2) Receptacles containing liquid organic peroxides must not be filled beyond 95 per cent of their capacity.

(1) Substances of 45°, 51° and 54° shall be packed, not more than 50 kg per receptacle or bag, in receptacles or bags, made of a suitable plastics material, which shall be placed in suitable protective packagings in quantities not exceeding 50 kg per packaging. 2560

(2) Substances of 46°(a) shall be packed, not more than 5 kg per bag, in bags made of a suitable plastics material, which shall be placed, not more than 20 kg per packaging and either singly or in groups, in suitable protective packagings.

(3) Substances of 47°(a) shall be packed:

- (a) not more than 1 kg per receptacle, in receptacles, made of a suitable plastics material;
- (b) not more than 3 kg per bowl, in bowls made of aluminium not less than 99.5 per cent pure, with plastics lids.

The protective packaging must not contain more than 10 kg of the substance.

(4) Substances of 46°(b) and (c), 47°(b), 48°, 49°(b), 50°, 52°, 53° and 55° shall be packed, not more than 25 kg per receptacle, in receptacles made of a suitable plastics material, which shall be placed, not more than 50 kg per packaging (but not more than 25 kg per packaging in the case of substances of 52°), in protective packagings.

(5) Substances of 49°(a) shall be packed, not more than 10 kg per receptacles, in receptacles made of a suitable plastics material, which shall be placed, not more than 40 kg per packaging, in protective packagings.

(6) Packages weighing more than 35 kg which contain substances of Group E shall be fitted with means of handling.

### f. Packing of substances in small quantities

Substances of 1° to 22°, 30° and 31°, forwarded in small quantities, may also be packed as follows: 2561

Class 5.2

2561  
(contd)

(a) liquids

not more than 1 kg per package, in bottles, made of aluminium, a suitable plastics material, or glass, with stoppers, made of a suitable plastics material or with yoke or screw closures having, in either case, an elastic gasket. The bottles shall be secured, by clean mica powder or glass wool used as cushioning materials, in fibreboard or wooden boxes. The filling material must be sufficient in quantity to absorb the whole of the liquid. The bottles must not be filled beyond 75 per cent of their capacity;

(b) pasty or powdered substances

not more than 1 kg per package, in aluminium boxes or in fibreboard or wooden boxes (the two latter being lined with aluminium or with a suitable plastics material) with a strong closure. A free space of 10 per cent shall be left in the packagings.

3. Mixed packing

2562

Substances of Class 5.2 may not be included in the same package either with other substances or articles of ADR or with other goods. Substances of Group C must not be included in the same package with substances of Groups A, B or E.

2563

4. Marking and danger labels on packages (see Appendix A.9)

(1) Every package containing substances of Class 5.2 shall bear a label conforming to model No. 3.

Packages containing substances of 46°(a), 47°(a) and 49°(a) shall also bear a label conforming to model No. 1.

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; packages containing substances of 30°, 31°, 35°, 40° and 45° to 55° shall also bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

2564

B. Particulars in the transport document

2565

The description of the goods in the transport document must conform to one of the names underlined in marginal 2551; it must be underlined

Class 5.2

in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 5.2, 8°(a), ADR].

2565  
(contd)

2566-  
2569

C. Empty packagings

(1) Receptacles and tanks of 99° must be closed in the same manner and leak-proof in the same degree as though they were full.

2570

(2) The description in the transport document must be:  
"Empty receptacle, 5.2, 99° ADR (or RID)". This description must be underlined in red.

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2599

1

1

## CLASS 6.1. TOXIC SUBSTANCES

### 1. List of substances

(1) Among the substances and articles covered by the heading of Class 6.1, those which are listed in marginal 2601 or are covered by a collective heading of that marginal are subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR.

2600

(2) Substances of Class 6.1 which polymerize easily are not to be accepted for carriage unless the necessary precautions have been taken to prevent their polymerization during carriage.

(3) The flash-point referred to below shall be determined in the manner described in Appendix A.3.

A. Toxic substances having a flash-point below 21°C and a boiling point below 200°C

2601

1° Hydrocyanic acid and inflammable volatile substances having a similar toxic effect, such as:

- (a) hydrocyanic acid containing not more than 3 per cent water (absorbed by an inert porous substance or in the liquid state), on condition that the filling of the receptacles was carried out less than one year previously;

Note: Hydrocyanic acid not satisfying these conditions is not to be accepted for carriage.

- (b) aqueous solutions of hydrocyanic acid containing not more than 20 per cent hydrocyanic acid (HCN).

Note: Solutions of hydrocyanic acid containing more than 20 per cent hydrocyanic acid (HCN) are not to be accepted for carriage.

2° Nitriles (organic cyanides), such as:

- (a) acrylonitrile,  
(b) acetonitrile (methyl cyanide);  
(c) isobutyronitrile (isobutyric nitrile).

Class 6.1

2601  
(contd)

3° Other nitrogenous organic substances, such as:

ethyleneimine and propyleneimine containing not more than 0.003 per cent total chlorine, and their aqueous solutions; normal butyl isocyanate, tertiary butyl isocyanate, isobutyl isocyanate and isopropyl isocyanate.

Note: Ethyleneimine and propyleneimine of any other nature are not to be accepted for carriage.

4° Halogenated organic substances, such as:

- (a) allyl chloride;
- (b) methyl chloroformate;
- (c) ethyl chloroformate.

5° Metal carbonyls, such as:

- (a) nickel carbonyl (nickel tetracarbonyl);
- (b) iron carbonyl (iron pentacarbonyl).

B. Toxic substances having a flash-point of 21°C or over, and non-inflammable toxic substances, both having a boiling point below 200°C

11° Nitrogenous organic substances, such as:

- (a) 2-cyanopropan-2-ol (acetone cyanohydrin);
- (b) aniline

12° Halogenated organic substances, such as:

- (a) 1-chloro-2,3-epoxypropane (epichlorohydrin);
- (b) glycol chlorohydrin (2-chloroethanol);
- (c) acetylene tetrachloride (1,1,2,2-tetrachloroethane);
- (d) chloropicrin;

Note: Mixtures of chloropicrin with methyl chloride or methyl bromide are substances of Class 2 if the vapour pressure of the mixture at 50°C exceeds 3 kg/cm<sup>2</sup> [see marginal 2201 4° (bt)].

- (e) trichloromethanesulphenyl chloride;
- (f) 2,2-dichlorodiethyl ether, (chloroethyl ether, 2-chloroethyl ether).

- 13° Oxygenated organic substances, such as:
- (a) allyl alcohol;
  - (b) dimethyl sulphate;
  - (c) phenol.
- 14° Lead alkyls, such as tetraethyl lead, tetramethyl lead and mixtures of lead alkyls with halogenated organic compounds, e.g. ethyl fluid.
- C. Toxic organic substances having a boiling point of 200°C or over
- 21° Nitrogenous organic substances, such as:
- (a) 2-bromophenylacetonitrile (bromobenzyl cyanide);
  - (b) phenylcarbylamine chloride;
  - (c) 2,4-diisocyanatotoluene;
  - (d) allyl isothiocyanate;
  - (e) chloroanilines;
  - (f) mononitroanilines and dinitroanilines;
  - (g) naphthylamines;
  - (h) 2,4-diaminotoluene;
  - (i) dinitrobenzenes;
  - (k) chloronitrobenzenes;
  - (l) mononitrotoluenes;
  - (m) dinitrotoluenes;
  - (n) nitroxylenes;
  - (o) toluidines;
  - (p) xylidines
- 22° Oxygenated organic substances not covered by 21° and 23°, such as:
- (a) cresols;
  - (b) xlenols

Class 6.1

2601  
(contd)

23° Halogenated organic substances not covered by 21°, such as:

- (a) xylyl bromide;
- (b) phenacyl chloride (ω-chloroacetophenone);
- (c) phenacyl bromide (ω-bromoacetophenone);
- (d) 4-chloroacetophenone (methyl p-chlorophenylketone);
- (e) symmetrical dichloroacetone.

D. Inorganic substances which may release toxic gases on contact with acids (but see under E for silicon alloys)

31° Inorganic cyanides:

- (a) cyanides and complex cyanides in a solid form;
- (b) solutions of inorganic cyanides;
- (c) preparations of inorganic cyanides.

Note: Ferrocyanides and ferricyanides are not subject to the provisions of ADR.

32° The following azides:

- (a) sodium azide;
- (b) barium azide with not less than 50 per cent water or alcohols, and aqueous solutions of barium azide.

Note: Barium azide in the dry state or with less than 50 per cent water or alcohols is not to be accepted for carriage.

33° Zinc phosphide

Note: Zinc phosphide capable of spontaneous ignition or, under the effect of moisture, of releasing toxic gases is not to be accepted for carriage.

E. Silicon alloys capable of releasing toxic gases

- 41° (a) Ferro-silicon and mangano-silicon with more than 30 per cent and less than 70 per cent silicon;



Class 6.1

2601  
(contd)

- (b) ferro-silicon alloys with aluminium, manganese, calcium or more than one of these metals, with a total content of silicon and of elements other than iron and manganese greater than 30 per cent but less than 70 per cent,

all the substances of 41° having been stored for not less than three days in a dry place open to the air.

Note: 1. Ferro-silicon and mangano-silicon briquettes, whatever their silicon content, are not subject to the provisions of ADR.

2. Substances of 41° are not subject to the provisions of ADR if they are not liable to release dangerous gases under the effect of moisture during carriage and the sender so certifies in the transport document.

3. Substances of 41° which have not been stored for not less than three days in a dry place open to the air are not to be accepted for carriage.

F. Other toxic inorganic substances

51° Beryllium in powder form; beryllium compounds in powder form.

52° Arsenical compounds, such as:

- (a) oxides of arsenic;  
(b) sulphides of arsenic.

Note: With regard to arsenical substances and preparations used as pesticides, see under 81° (i), 82° (i) and 83° (i).

53° Mercury compounds, such as:

Mercuric chloride (corrosive sublimate), except cinnabar and mercurous chloride (calomel).

Note: With regard to mercurial substances and preparations used as pesticides, see under 81° (f), 82° (f) and 83° (f).

54° Thallium compounds

Note: With regard to substances and preparations containing thallium and used as pesticides, see under 81° (h), 82° (h) and 83° (h).

Class 6.1

2601  
(contd)

G. Halogenated organic substances having a harmful or irritant effect

61° Halogenated organic substances, volatile, inflammable or non-inflammable, having a flash-point of 21°C or over and a boiling point below 200°C, such as:

- (a) ethylene dibromide (symmetrical dibromoethane);
- (b) chloroacetone;
- (c) bromoacetone;
- (d) 1,2-dibromobutan-3-one;
- (e) methyl chloroacetate;
- (f) ethyl chloroacetate;
- (g) methyl bromoacetate;
- (h) ethyl bromoacetate;
- (i) 1,1-dichloro-1-nitroethane;
- (k) benzyl chloride;
- (l) 1-chloro-1-nitropropane.

62° Halogenated organic substances of low volatility having a boiling point of 200°C or over and not covered by 23°, such as:

- (a) benzyl iodide;
- (b) acetylene tetrabromide (1,1,2,2-tetrabromoethane).

H. Inorganic substances having a harmful effect

71° Barium compounds, such as barium oxide, barium hydroxide, barium sulphide and other barium salts (except barium sulphate and barium titanate).

Note: Barium chlorate, perchlorate, nitrate, nitrite, dioxide and permanganate are substances of Class 5.1 [see marginal 2501 under 4° (a) and (b), 7° (c), 8° and 9° (b) and (c)].

Class 6.1

2601  
(contd)

- 72° Lead compounds, such as lead oxides, lead salts including lead acetate, lead pigments (e.g. white lead and lead chromate), except lead titanate and lead sulphide (galena).

Note: Lead chlorate, lead perchlorate and lead nitrate are substances of Class 5.1 [see marginal 2501 4° (a) and (b) and 7° (c)].

- 73° Residues and wastes containing compounds of antimony or of lead or of both, e.g. ashes of lead or of antimony or of lead and antimony; lead sludges containing less than 3 per cent free acid.

Note: Lead sludges containing 3 per cent or more free acid are substances of Class 8 [see marginal 2801, 1° (e)].

- 74° Vanadium compounds in powder form, such as vanadium pentoxide and the vandates.

Note: Vanadium chlorate and vanadium perchlorate are substances of Class 5.1 [see marginal 2501, 4° (a) and (b)].

- 75° Antimony compounds, such as antimony oxides and antimony salts, except stibnite.

Note: Antimony chlorate and antimony perchlorate are substances of Class 5.1 [see marginal 2501, 4° (a) and (b)]. Antimony pentachloride, antimony trichloride and antimony pentafluoride are substances of Class 8 [see marginal 2801 11° (a), 12° and 15° (b)].

I. Substances and preparations used as pesticides

- 81° Substances and preparations presenting a risk of very severe poisoning:

- (a) Organo-phosphorus compounds, such as: azinphos-ethyl, azinphos-methyl, demeton-O+S, dimefox, endosulfon, HETP, mecarbam, methylparathion, mevinphos, parathion, phosphamidon, sulfotep and TEPP, and preparations containing more than 10 per cent of these substances.
- (b) Halogenated organic compounds, such as: aldrin, dieldrin, heptachlor, and preparations containing more than 10 per cent of these substances.
- (c) Nitrated organic compounds, such as: 4,6-dinitrophenol, dinoseb, dinitrophenyl acetate, dinitro-o-cresol, and preparations containing more than 50 per cent of these substances.

Class 6.1

2601  
(contd)

- (d) Carbamates and derivatives of urea, such as: ANTU, isolan, and preparations containing more than 25 per cent of these substances.
- (e) Alkaloids, such as: nicotine, brucine, strychnine, or their salts, and preparations containing more than 10 per cent of these substances.
- (f) Organic compounds of metals, such as:
  - 1. organic mercurial compounds, and preparations containing more than 5 per cent of these substances;
  - 2. trialkyl and triaryl compounds of tin, and preparations containing more than 25 per cent of these substances.
- (g) Other organic compounds, such as: cumachlor, sodium fluoracetate, fluoracetamide, pindone, warfarin, and preparations containing more than 5 per cent of these substances.
- (h) Inorganic compounds of metals, such as: thallium compounds, and preparations containing more than 10 per cent of these substances.
- (i) Other inorganic compounds, such as: compounds of arsenic, and preparations containing more than 10 per cent of these substances.

82° Substances and preparations presenting a risk of severe poisoning:

- (a) Organo-phosphorus compounds, such as:
  - 1. demeton-O+S-methyl, dioxathion, ethion, fenthion, phenkapton, thiometon, and preparations containing more than 25 per cent of these substances;
  - 2. preparations of azinphos-ethyl, azinphos-methyl, demeton-O+S, dimefox, endothion, HETP, mecarbam, methylparathion, mevinphos, parathion, phosphamidon, sulfotep and TEPP, containing more than 2.5 per cent but not more than 10 per cent active substance.
- (b) Halogenated organic compounds, such as:
  - 1. toxaphene, pentachlorophenol, and preparations containing more than 20 per cent of these substances;
  - 2. gamma-BHC (gammexane), DDT, and preparations containing more than 50 per cent of these substances.

Class 6.1

- (c) Preparations of nitrated organic compounds, such as: 2601  
(contd)
1. preparations of 4,6-dinitrophenol, dinoseb, dinitrophenyl acetate and dinitro-o-cresol, containing more than 10 per cent but not more than 50 per cent active substance;
  2. preparations of binapacryl, containing more than 50 per cent active substance.
- (d) Carbamates and derivatives of urea, such as:
1. dimethan, urbazid, and preparations containing more than 25 per cent of these substances;
  2. preparations of ANTU and isolan, containing more than 5 per cent but not more than 25 per cent active substance.
- (e) Preparations of alkaloids, such as: preparations of nicotine, brucine, and strychnine, or their salts, containing more than 2.5 per cent but not more than 10 per cent active substance.
- (f) Preparations of organic compounds of metals, such as:
1. organic mercurial preparations, containing more than 1 per cent but not more than 5 per cent active substance;
  2. preparations of trialkyl and triaryl compounds of tin, containing more than 5 per cent but not more than 25 per cent active substance.
- (g) Preparations of other organic compounds, such as:
1. preparations of cumachlor, sodium fluoracetate, pindone and warfarin, containing more than 1 per cent but not more than 5 per cent active substance;
  2. preparations of fluoracetamide, containing not more than 5 per cent active substance.
- (h) Preparations of inorganic compounds of metals, such as: preparations of thallium compounds, containing more than 2.5 per cent but not more than 10 per cent active substance.
- (i) Preparations of other inorganic compounds, such as: preparations of compounds of arsenic, containing more than 2.5 per cent but not more than 10 per cent active substance.

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(contd)

## 83° Harmful substances and preparations:

## (a) Organo-phosphorus compounds, such as:

1. diazinon, dimethoate, trichlorfon, malathion, and preparations containing more than 5 per cent of these substances;
2. preparations of demeton-O+S-methyl, diaoxathion, ethion, fenthion, phenkapton and thiometon, containing more than 2.5 per cent but not more than 25 per cent active substance;
3. preparations of azinphos-ethyl, azinphos-methyl, demeton-O+S, dimefox, endosulfon, HETP, mecarbam, methylparathion, mevinphos, parathion, phosphamidon, sulfotep and TEPP, containing not more than 2.5 per cent active substance.

## (b) Preparations of halogenated organic compounds, such as:

1. preparations of toxaphene and pentachlorophenol, containing more than 5 per cent but not more than 20 per cent active substance;
2. preparations of gamma-BHC (gammexane) and DDT, containing more than 10 per cent but not more than 50 per cent active substance;
3. preparations of aldrin, dieldrin and heptachlor, containing more than 2.5 per cent but not more than 10 per cent active substance.

## (c) Preparations of nitrated organic compounds, such as:

1. preparations of binapacryl, containing more than 10 per cent but not more than 50 per cent active substance;
2. preparations of 4,6-dinitrophenol, dinoseb, dinitrophenyl acetate and dinitro-o-cresol, containing more than 2.5 per cent but not more than 10 per cent active substance.

## (d) Preparations of carbamates and derivatives of urea, such as:

1. preparations of ANTU and isolan, containing more than 1 per cent but not more than 5 per cent active substance;
2. preparations of dimethan and urbazid, containing more than 2.5 per cent but not more than 25 per cent active substance.

(e) Preparations of alkaloids, such as: preparations of nicotine, brucine and strychnine, or their salts, containing not more than 2.5 per cent active substance.

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(f) Preparations of organic compounds of metals, such as:

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(contd)

1. preparations of organic mercurial compounds, containing not more than 1 per cent active substance;
2. preparations of trialkyl and triaryl compounds of tin, containing more than 1 per cent but not more than 5 per cent active substance.

(g) Preparations of other organic compounds, such as:

preparations of cumachlor, sodium fluoracetate, pindone and warfarin, containing not more than 1 per cent active substance.

(h) Preparations of inorganic compounds of metals, such as:

preparations of thallium compounds, containing not more than 2.5 per cent active substance.

(i) Preparations of other inorganic compounds, such as:

preparations of compounds of arsenic, containing not more than 2.5 per cent active substance.

84° (a) cereal grains and seeds impregnated with one or more of the pesticides or other toxic substances of Class 6.1, used as pesticides;

(b) dressed seeds treated with pesticides or with other toxic substances of Class 6.1, but not used as pesticides.

K. Empty packagings:

91° Empty packagings, uncleaned, empty tanks, uncleaned, and empty bags, uncleaned, which have contained substances of 1° - 5°, 11° - 14°, 21° - 23°, 31° - 33°, 41°, 51° - 54°, 81° and 82°.

92° Empty packagings, uncleaned, empty tanks, uncleaned, and empty bags, uncleaned, which have contained substances of 61°, 62°, 71° - 75°, 83° and 84°.

Note: 91° and 92°. Empty packagings with residues from their previous contents adhering to the outside are not to be accepted for carriage.

## Class 6.1

### 2. Provisions

#### 2602 A. Packages

##### 1. General conditions of packing

(1) Packagings shall be so closed and arranged as to prevent any loss of the contents. For the special provision relating to substances of 41° see marginal 2618.

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular, where substances are in the liquid state or in solution, or have been wetted by a liquid, the receptacles and their closures must, unless the section headed "Packing of a single substance" provides otherwise, be able to withstand any pressure which, the presence of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage. Inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance", inner packagings may be enclosed in outer packagings, either singly or in groups.

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The thickness of the walls must be not less than 3 mm in the case of receptacles which, with their contents, weigh more than 35 kg, and not less than 2 mm in the case of other receptacles.

The tightness of the closure system must be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage, unless the said closure comprises two plugs, one placed over the other, one of them being screw-threaded.

(5) When receptacles made of glass, porcelain, stoneware or similar materials are prescribed or allowed, they must be secured by cushioning materials in protective packagings. Cushioning materials shall be suited to the nature of the contents; in particular, they shall be absorbent when the contents are liquid.

(6) When handed over for carriage, packages must not be contaminated on the outside by toxic substances.



2. Packing of a single substance

2603

(1) Hydrocyanic acid and inflammable volatile substances having a similar toxic effect [1°(a)] shall be packed:

- (a) when completely absorbed by an inert porous material: in strong sheet-steel boxes, with a capacity of not more than 7.5 litres, entirely filled with the porous material, which must be of such a nature that it does not shake down or form dangerous spaces, even after prolonged use or under impact, at temperatures up to 50°C. The boxes must be able to withstand a pressure of 6 kg/cm<sup>2</sup> and must, when filled at 15°C, still be leak-proof at 50°C. The date of filling shall be stamped on the lid of each box. The boxes shall be placed in packing cases with sides not less than 18 mm thick in such a manner that they cannot come into contact with one another. The total capacity of the boxes in one packing case must not exceed 120 litres and the package must not weigh more than 120 kg;
- (b) when liquid but not absorbed by a porous material: in carbon-steel receptacles. These shall conform to the spirit of the provisions relating to such receptacles in Class 2, marginals 2211, 2212(1), 2213, 2215 and 2218, with the following derogations and special requirements:

The internal pressure to be applied for the hydraulic pressure test must be 100 kg/cm<sup>2</sup>.

The pressure test shall be repeated every two years, when a meticulous inspection of the inside of the receptacle shall also be carried out and the receptacle's weight determined.

In addition to the marks prescribed in marginal 2218(1)(a)-(c) and (e)-(g), the receptacles must bear the date (month, year) of the most recent filling.

The maximum filling allowed for the receptacles is 0.55 kg liquid per litre of capacity.

- (c) With regard to the particulars in the transport document, see marginal 2634(2).

(2) Aqueous solutions of hydrocyanic acid [1°(b)] shall be packed in flame-sealed glass ampoules containing not more than 50 g, or in glass-stoppered glass bottles so closed as to be leak-proof and containing not more than 250 g. The ampoules and bottles shall be secured by absorbent cushioning materials in soft-soldered tin-plate boxes or in protective cases with a soft-soldered tin-plate lining. A package comprising a tin-plate box must not weigh more than 15 kg or contain more than 3 kg hydrocyanic acid solution; a package comprising a case must not weigh more than 75 kg.

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2604

(1) Substances of 2° shall be packed:

- (a) 1. in sheet-steel canisters with walls not less than 1 mm thick and a capacity not exceeding 60 litres, the openings being closed by two plugs, one placed over the other, one of them being screw-threaded. The sheet-steel canisters must have welded lengthwise seams, two reinforcing ribs in the walls, and a protective rim below the joint recessed at the bottom. Canisters with a capacity of 40 to 60 litres must have their bottoms welded on and be fitted with means of handling on the side; or
2. in all-welded steel drums with walls not less than 1.25 mm thick, fitted with rolling hoops and reinforcing ribs and having the openings closed by two plugs, one placed over the other, one of them being screw-threaded;

(b) acrylonitrile may also be packed:

1. in aluminium bottles of a capacity not exceeding 2 litres, secured by infusorial-earth cushioning in sheet-metal receptacles whose lids shall be firmly stuck down by means of suitable adhesive strips. The sheet-metal receptacles shall be placed, with filling material, in wooden cases. A package must not weigh more than 75 kg; or
2. in non-returnable metal drums (new packagings intended to be used only once); these drums, whose walls shall not be less than 1.2 mm thick, shall be provided with a screw-threaded plug fitted with a gasket. The plug shall be situated on one of the ends and be protected by the rim of the drum. The drums may have a body with ends recessed, the joints being strengthened by chime reinforcements; if they do not possess rolling hoops they must be provided with reinforcing ribs. A package must not weigh more than 200 kg. Carriage in non-returnable drums shall take place only as a full load on open vehicles; or
3. in non-returnable steel drums (new packagings intended to be used only once) having sides made of sheet steel 1.24 mm thick, ends made of sheet steel 1.5 mm thick, and a tare weight of 22.5 kg; the drums must be provided with reinforcing ribs. The body seam shall be welded and the ends shall be double-seamed by welting to the body, with a polyethylene liner inserted. Two screw-plug closure units, one of 50.8 mm (2") and one of 19.05 mm (3/4"), shall be double-seamed by welting to one of the ends, with a synthetic-rubber liner inserted. Thin sheet-steel caps shall be placed over the closure units;

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- (c) acetonitrile may also be packed in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 1 litre, with the openings closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be secured by absorbent cushioning materials in a wooden case or some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling. 2604 (contd)

(2) Receptacles containing acrylonitrile or acetonitrile must not be filled beyond 93 per cent, and receptacles containing isobutyronitrile not beyond 92 per cent, of their capacity.

(1) Substances of 3° shall be packed in receptacles made of sheet-steel of sufficient thickness, which shall be closed by a screw-threaded bung or plug rendered leak-proof both to liquid and to vapour by means of a suitable gasket. The receptacles must be capable of withstanding an internal pressure of 3 kg/cm<sup>2</sup>. Each receptacle shall be secured by absorbent cushioning materials in a strong and leak-proof protective metal packaging. The protective packaging shall be hermetically closed and its closure shall be secured against any inadvertent opening. The degree of filling shall not exceed 0.67 kg per litre of capacity of the receptacle. 2605

(2) A package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling.

Substances of 4° shall be packed:

2606

- (a) in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres, with the openings closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be secured by absorbent cushioning materials in a wooden case or some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

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(contd)

- (c) in metal receptacles having, if necessary, a suitable lining, the receptacles having a capacity not exceeding 15 litres and having the openings closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be secured by absorbent cushioning materials in a wooden case or some other outer packaging of sufficient strength. The receptacles must not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (d) in welded metal drums having, if necessary, a suitable lining, the drums having the openings closed by two plugs, one placed over the other, one of them being screw-threaded. The drums must not be filled beyond 93 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be equipped with rolling hoops; or
- (e) in receptacles made of strong black sheet-iron or tin-plate and hermetically closed. A tin-plate receptacle must not, with its contents, weigh more than 6 kg. These receptacles shall be secured by absorbent cushioning materials, either singly or in groups, in a wooden packing case. Such a package must not weigh more than 75 kg.

2607

(1) Substances of 5° shall be packed in metal receptacles. The receptacles must be fitted with completely leak-proof closing devices, which shall be secured against mechanical damage by protective caps. Steel receptacles must have walls not less than 3 mm thick and receptacles made of other materials must have walls at least thick enough to ensure equivalent mechanical strength. A package must not contain more than 25 kg of liquid. The maximum filling allowed shall be 1 kg of liquid per litre of capacity.

(2) Receptacles shall be tested before being put into service for the first time. The test pressure to be applied for the hydraulic pressure test shall be not less than 10 kg/cm<sup>2</sup>. The pressure test shall be repeated every five years and shall include a meticulous inspection of the inside of the receptacle and a check of the tare weight. Metal receptacles shall bear the following particulars in clearly legible and indelible characters:

- (a) the name of the product in full (the names of both substances may also be shown side by side);
- (b) the name of the owner of the receptacle;
- (c) the tare of the receptacle, including such fittings and accessories as valves, protective caps, etc.;
- (d) the date (month, year) of the acceptance test and the subsequent tests, and the expert's stamp;

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- (e) the maximum permissible filling per receptacle in kg; 2607 (contd)
- (f) the internal pressure (test pressure) to be applied for the hydraulic pressure test.

(1) Substances of 11°(a) shall be packed: 2608

- (a) in sheet-steel canisters with walls not less than 1 mm thick and a capacity not exceeding 60 litres, the openings being closed by two plugs, one placed over the other, one of them being screw-threaded. The sheet-steel canisters must have welded lengthwise seams, two reinforcing ribs in the walls, and a protective rim below the joint recessed at the bottom. Canisters with a capacity of 40 to 60 litres must have their bottoms welded on and be fitted with means of handling on the side; or
- (b) in all-welded steel drums with walls not less than 1.25 mm thick, fitted with rolling hoops and reinforcing ribs and having the openings closed by two plugs, one placed over the other, one of them being screw-threaded.

(2) Substances of 11°(b) shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in metal receptacles having, if necessary, a suitable lining; the receptacles having a capacity not exceeding 15 litres and having the openings closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be secured by absorbent cushioning materials in a wooden case or some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (c) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops; or

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2608 (contd) (d) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg.

2609 (1) Substances of 12°(a) and (b) shall be packed:

- (a) not more than 5 litres per bottle, in glass bottles placed separately, with absorbent materials, in a strong tin-plate receptacle; in the case of 1-chloro-2,3-epoxypropane, black sheet-iron may be used instead of tin-plate. The receptacles shall be secured by absorbent cushioning materials in a wooden packing case. A package must not weigh more than 75 kg; or
- (b) not more than 5 litres per receptacle, in receptacles, made of stout tin-plate, with leak-proof closures; in the case of 1-chloro-2,3-epoxypropane black sheet-iron may be used instead of tin-plate. The receptacles shall be secured by absorbent cushioning materials or wood-wool cushioning in a wooden packing case. A package must not weigh more than 75 kg; or
- (c) in welded steel drums with the openings closed by two plugs, one placed over the other, one of them being screw-threaded, the drums being fitted with rolling hoops. In the case of glycol chlorohydrin (2-chloroethanol) it is also permissible to use welded canisters with the openings closed by two plugs, one placed over the other, one of them being screw-threaded, the canisters being fitted with means of handling, being made of sheet steel 1 mm thick galvanized on both sides, and having a capacity not exceeding 60 litres;
- (d) the receptacles must not be filled beyond 93 per cent of their capacity.

(2) Substances of 12°(c) shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware, or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

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- (c) in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 95 per cent of their capacity; or
- (d) in hermetically-closed metal drums having, if necessary, a suitable inner lining. The drums must not be filled beyond 95 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.
- 2609  
(contd)

(3) Substances of 12°(d) and (e) shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg. other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (c) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (d) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.

(4) Substances of 12°(e) may also be packed in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 95 per cent of their capacity.

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2609  
(contd)

(5) Substances of 12°(f) shall be packed:

- (a) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (b) in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 93 per cent of their capacity; or
- (c) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 93 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.

2610

(1) Substances of 13°(a) and (b) shall be packed:

- (a) in flame-sealed glass ampoules or in hermetically-closed glass bottles; for this purpose a stopper made of cork coated with paraffin wax, or a ground-glass stopper, may be used. The ampoules and bottles must not be filled beyond 93 per cent of their capacity and must not weigh, with their contents, more than 3 kg. They shall be wrapped in corrugated fibreboard and secured by a sufficient quantity of inert and absorbent cushioning materials (infusorial earth or similar materials) in soft-soldered tin-plate boxes or in wooden cases lined with a tin-plate lining assembled by soft soldering. A package comprising a tin-plate box must not weigh more than 15 kg and a package comprising a wooden case not more than 75 kg; or
- (b) in soldered or seamless sheet-metal receptacles or in receptacles made of a suitable plastics material. These receptacles shall be hermetically-closed; they must not be filled beyond 93 per cent of their capacity and must not weigh, with their contents, more than 50 kg; if they are made of thin sheet-metal, e.g. tin-plate, they must not weigh, with their contents, more than 6 kg. The sheet-metal or plastics receptacles shall be secured by a sufficient quantity of inert and absorbent cushioning materials (e.g. infusorial earth or similar materials) in protective receptacles fitted with means of handling. Such a package must not weigh more than 100 kg; or
- (c) in hermetically-closed welded or seamless metal drums fitted with end bands and rolling hoops and not filled beyond 93 per cent of their capacity.



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(2) Substances of 13°(c) shall be packed:

2610  
(contd)

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in hermetically-closed metal receptacles having, if necessary, a suitable lining and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg; or
- (e) in bags made of a suitable plastics material, so closed as to be leak-proof, and placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg.

Substances of 14° shall be packed:

2611

- (a) in welded steel drums with openings closed by two plugs, one placed over the other, one of them being screw-threaded, the drums being fitted with rolling hoops. The drums must not be filled beyond 95 per cent of their capacity; or
- (b) in receptacles made of strong black sheet-iron or of tin-plate and hermetically closed. A tin-plate receptacle must not, with its content, weigh more than 6 kg. These receptacles shall be secured by absorbent cushioning materials in a wooden packing case. Such a package must not weigh more than 75 kg.

- (1) Substances of 21°(a), (b), (c) and (d), and liquids of 21°  
(e) and (f), shall be packed:

2612

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2612  
(contd)

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (c) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (d) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.

(2) Substances of 21° (b), (c) and (d) and liquids of 21° (e) and (f) may also be packed in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 95 per cent of their capacity.

(3) Substances of 21° (e) and (f) in the solid state, and substances of 21° (g), (h), (i) and (k), shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

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(contd)

(b) in hermetically-closed metal receptacles having, if necessary, a suitable lining and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or

(c) in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.

(4) Substances of 21° (e) and (f) in the solid state, and substances of 21° (g) and (h), may also be packed:

(a) in bags made of a suitable plastics material, so closed as to be leak-proof, and placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

(b) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg.

(5) Substances of 21° (g) may also be packed in hermetically-closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength.

(6) Substances of 21° (l), (m), (n), (o) and (p) shall be packed:

(a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

(b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

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(contd)

- (c) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (d) in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 95 per cent of their capacity; or
- (e) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.

(7) 4-nitrotoluene [21° (1)] may also be packed:

- (a) in bags made of a suitable plastics material, so closed as to be leak-proof, and placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg; or
- (c) in bags made of stout paper of four plies, lined with a bag made of a suitable plastics material, so closed as to be leak-proof. Such a package must not weigh more than 55 kg.

(8) Substances of 21° (o) in flakes may also be packed in bags made of stout paper of four plies, lined with a bag made of a suitable plastics material and so closed as to be leak-proof. Such a package must not weigh more than 55 kg.

2613

Substances of 22° shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

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- (b) in hermetically-closed metal receptacles having, if necessary, a suitable lining and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically-closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength; or
- (e) in bags made of a suitable plastics material, so closed as to be leak-proof, and placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (f) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg.

2613  
(contd)

(1) Liquids of 23° shall be packed:

2614

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

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- 2614 (contd)
- (c) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
  - (d) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If they weigh, with their contents, more than 275 kg, they shall be fitted with rolling hoops.

(2) Solids of 23° shall be packed in the same way as substances of 22°.

2615 (1) Substances of 31° (a) and solid preparations of 31° (c) shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in hermetically-closed metal receptacles having, if necessary, a suitable lining and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically-closed receptacles, made of a suitable plastics material of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength; or
- (e) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg.

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- (2) Substances of 32° (b) shall be packed in receptacles made of glass or of a suitable plastics material. A receptacle must not contain more than 10 kg of barium azide nor more than 20 litres of barium azide solution. The receptacles shall be secured separately, by absorbent cushioning materials, in cases or in iron hampers with complete gades; the volume of the cushioning material must be at least equal to that of the content of the receptacle. Where hampers are used, the cushioning materials, if readily inflammable, shall be fireproofed sufficiently to prevent ignition on contact with a flame.
- 2616 (contd)
- 2617 Zinc phosphide (33°) shall be packed in metal receptacles secured in wooden cases. A package must not weigh more than 75 kg.
- 2618 Substances of 41° shall be enclosed in wooden or metal packages which may be fitted with a device allowing gases to escape. Finely granulated substances may also be packed in bags.
- 2619 Substances of 51° shall be packed:
- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically-closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength; or

(2) Substances of 31° (b) and liquid preparations of 31° (c) shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 50 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 50 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

- (c) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or

- (d) in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 95 per cent of their capacity; or

- (e) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops.

(1) Sodium azide [32° (a)] shall be packed in receptacles made of black sheet-iron or tin-plate.



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(e) in bags made of a suitable plastics material, so closed as to be leak-proof, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

2619  
(contd)

(f) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg.

(1) Substances of 52° shall be packed:

2620

(a) in hermetically-closed receptacles made of glass, porcelain, stoneware, or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each; receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. The receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

(b) in hermetically-closed metal receptacles having, if necessary, a suitable lining and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or

(c) in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or

(d) in hermetically-closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength; or

(e) in bags made of a suitable plastics material, so closed as to be leak-proof, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

(f) in receptacles made of wood or paperboard, lined with a vapour-tight plastics material and hermetically closed. Such a package must not weigh more than 75 kg; or

(g) in hermetically-closed metal receptacles. Such a package must not weigh more than 75 kg.

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2620  
(contd)

(2) When forwarded as a full load, the substances may also be packed:

- (a) in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg; or
- (b) in bags made of stout paper of four plies, lined with a bag made of a suitable plastics material, so closed as to be leak-proof. Such a package must not weigh more than 55 kg.

2621

(1) Solids of 53° shall be packed:

- (a) not more than 10 kg per bag, in bags made of paper of two plies; or
- (b) in bags made of a suitable plastics material; or
- (c) in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material; or
- (d) in steel receptacles or in strong wooden casks or in wooden cases fitted with strengthening bands.

Re (a), (b) and (c): The receptacles and bags shall be secured by cushioning materials in wooden outer packagings.

(2) Liquids or substances in solution of 53° shall be packed:

- (a) in receptacles made of glass, porcelain, stoneware or similar materials. These receptacles shall be secured by cushioning materials in protective packagings which, if not cases, shall be fitted with means of handling; or
- (b) in metal receptacles.

(3) A package containing fragile receptacles or bags made of a plastics material must not weigh more than 75 kg.

2622

Thallium compounds (54°) shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

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- (b) in tin-plate receptacles; or 2622 (contd)
- (c) in wooden cases fitted with strengthening bands; or
- (d) in wooden casks fitted with iron hoops or strong wooden hoops.

(1) Substances of 61° and 62°, other than those of 61° (1), 2623  
shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding five litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in flame-sealed glass ampoules containing not more than 100 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (c) in hermetically-closed metal receptacles having, if necessary, a suitable lining, and having a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (d) in hermetically-closed canisters made of a suitable metal, welded or hard-soldered, having a capacity not exceeding 60 litres, and fitted with means of handling. The canisters must not be filled beyond 95 per cent of their capacity; or
- (e) in hermetically-closed metal drums having, if necessary, a suitable lining. The drums must not be filled beyond 95 per cent of their capacity. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or

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2623  
(contd)

- (f) in hermetically-closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity.

(2) Substances of 61° (1) shall be packed:

- (a) in all-welded steel drums with walls not less than 1.25 mm thick, fitted with rolling hoops and reinforcing ribs and having the openings closed by two plugs, one placed over the other, one of them being screw-threaded; or
- (b) in sheet-steel canisters with walls not less than 1 mm thick and a capacity not exceeding 60 litres, the openings being closed by two plugs, one placed over the other, one of them being screw-threaded. The sheet-steel canisters must have welded lengthwise seams, two reinforcing ribs in the walls, and a protective rim below the joint recessed at the bottom. Canisters with a capacity of 40 to 60 litres must have their bottoms welded on and be fitted with means of handling on the side; or
- (c) in aluminium bottles of a capacity not exceeding 2 litres, secured by infusorial-earth cushioning in sheet-metal receptacles whose lids shall be firmly stuck down by means of suitable adhesive strips. The sheet-metal receptacles shall be placed, with filling materials, in wooden cases. A package must not weigh more than 75 kg; or
- (d) in non-returnable metal drums (new packagings intended to be used only once); these drums, whose walls shall be not less than 1.2 mm thick, shall be provided with a screw-threaded plug fitted with a gasket. The plug shall be situated in one of the ends of the drum and be protected by the rim. The drums may have a body with ends recessed, the joints being strengthened by chime reinforcements; if they do not possess rolling hoops they must be provided with reinforcing ribs. A package must not weigh more than 200 kg. Carriage in non-returnable drums shall take place only as a full load on open vehicles; or
- (e) in non-returnable steel drums (new packagings intended to be used only once) having sides made of sheet steel 1.24 mm thick, ends made of sheet steel 1.5 mm thick, and a tare weight of 22.5 kg; the drums must be provided with reinforcing ribs. The body seam shall be welded and the ends shall be double-seamed by welting to

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the body, with a polyethylene liner inserted. Two screw-plug closure units, one of 50.8 mm (2") and one of 19.05 mm (3/4"), shall be double-seamed by welting to one of the ends, with a synthetic-rubber liner inserted. Thin-sheet-steel caps shall be placed over the closure units. 2623 (contd)

(3) The receptacles referred to under (2)(a) to (e) must not be filled beyond 93 per cent of their capacity.

Substances of 71° shall be packed: 2624

- (a) in iron or wooden packagings; or
- (b) in bags made of stout paper of at least two plies, or made of jute, lined with a bag made of a suitable plastics material, so closed as to be leak-proof.

(1) Substances of 72° and 73° shall be packed: 2625

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in steel or wooden packagings; or
- (c) in bags made of stout paper of at least 2 plies. However, bags for lead acetate must be made:
  - 1. of hemp lined with a suitable plastics material or with stout crepe paper stuck on with bitumen; such a bag, with its contents, must not weigh more than 30 kg; or
  - 2. of stout paper of at least two plies, lined with a bag made of a suitable plastics material; such a bag, with its contents, must not weigh more than 30 kg; or
  - 3. of stout paper of at least five plies, lined with a bag made of a suitable plastics material; such a bag, with its contents, must not weigh more than 55 kg; or
  - 4. of stout paper of at least three plies, placed in jute bags; such a bag, with its contents, must not weigh more than 55 kg; or

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- 2625 (contd) (d) in bags made of a suitable plastics material, so closed as to be leak-proof, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg.

(2) Substances of 72° may also be packed in receptacles made of tin-plate or of sheet-steel.

2626 Substances of 74° and 75° shall be packed:

- (a) in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in steel or wooden packagings; or
- (c) in bags made of stout paper of at least 2 plies, or in jute bags; or
- (d) in receptacles made of tin-plate or sheet-steel.

2627 Pesticides of 81° shall be packed:

- (a) in solid or paste form:
  - 1. in hermetically-closed receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, which must not contain more than 5 kg each. Receptacles made of plastics material may, if forwarded as a full load, contain up to 10 kg of substance. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
  - 2. in hermetically-closed metal receptacles having, if necessary, a suitable lining and which must not contain more than 15 kg each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or

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(contd)

3. in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
4. in hermetically-closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength; or
5. in bags made of a suitable plastics material, so closed as to be leak-proof, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
6. in receptacles made of wood or paperboard, lined with a vapour-tight plastics material and hermetically closed. Such a package must not weigh more than 75 kg; or
7. in hermetically-closed metal receptacles. Such a package must not weigh more than 75 kg;
8. arsenical compounds forwarded as a full load may also be packed in hermetically-closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg;
9. preparations may also be enclosed in packagings ready for use, which shall be firmly packed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg;

(b) in liquid form:

1. in receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, of a capacity not exceeding 5 litres, with the opening closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

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(contd)

2. in flame-sealed glass ampoules containing not more than 50 g, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The ampoules must not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
3. in metal receptacles having, if necessary, a suitable lining, the receptacles having a capacity not exceeding 15 litres and having the openings closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 93 per cent of their capacity. Such a package must not weigh more than 100 kg; or
4. in canisters made of a suitable metal, welded or hard-soldered, with walls not less than 0.5 mm thick and a capacity not exceeding 60 litres, the openings being closed by two plugs, one placed over the other, one of them being screw-threaded, the canisters being fitted with means of handling. The canisters must not be filled beyond 93 per cent of their capacity; or
5. in hermetically-closed metal drums having, if necessary, a suitable lining. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops. The drums must not be filled beyond 93 per cent of their capacity; or
6. in receptacles made of a suitable plastics material, of a capacity not exceeding 60 litres, the openings being closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles must not be filled beyond 93 per cent of their capacity.

2628

Pesticides of 82° shall be packed:

(a) in solid form:

1. in the same way as solids of 81°;



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2. when forwarded as a full load, also in bags made of stout paper of four plies, lined with a bag made of a suitable plastics material, so closed as to be leak-proof. Such a package must not weigh more than 55 kg;

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(contd)

(b) in liquid form:

in the same way as liquids of 81°.

Pesticides of 83° shall be packed:

2629

(a) in solid form:

1. in the same way as solids of 81°; or
2. in jute bags rendered impermeable to moisture by a lining made of a suitable material, stuck on with bitumen, or in jute bags lined with a bag made of a suitable plastics material, so closed as to be leak-proof. Such a package must not weigh more than 55 kg; or
3. in the case of preparations, and of other pesticides if they are forwarded as a full load, in bags made of stout paper of four plies, lined with a bag made of a suitable plastics material and hermetically closed. Such a package must not weigh more than 55 kg; or
4. in the case of solid arsenical compounds:
  - i. in double-walled wooden casks lined with stout paper; or
  - ii. in fibreboard boxes placed in a wooden case; or
  - iii. not more than 12.5 kg per bag, in double bags, made of stout paper or of a suitable plastics material, which shall be placed either in a wooden case lined with stout paper or tightly in a stout case made of double-faced corrugated fibreboard or of solid fibreboard of equivalent strength, the case being lined with stout paper. All joints and flaps shall be covered over with adhesive strips. A package comprising a fibreboard case must not weigh more than 30 kg.
5. in the case of arsenical compounds forwarded as a complete load:
  - i. in ordinary wooden packagings lined with stout paper; or

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(contd)

- ii. not more than 25 kg per bag, in two-ply paper bags, or in bags made of a suitable plastics material, which shall be placed separately in bags made of jute or of a similar material lined with crepe paper; or
- iii. in bags made of paper of at least three plies or in two-ply paper bags lined with a bag made of a suitable plastics material. Such a package must not weigh more than 20 kg; or
- iv. in two-ply paper bags or in bags made of a suitable plastics material, which shall be placed in four-ply paper bags. Such a package must not weigh more than 60 kg.

In cases as referred to under iii. and iv. above, each consignment must be accompanied by empty bags in the proportion of 1 for every 20 bags containing arsenical substances, these empty bags being intended to accommodate such quantity of substances as may escape from bags damaged during carriage.

(b) in liquid form:

- 1. in the same way as liquids of 81°; or
- 2. in the case of preparations:
  - i. in hermetically-closed cylindrical receptacles made of glass, porcelain, stoneware or similar materials, of a capacity not exceeding 25 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
  - ii. in hermetically-closed glass carboys, of a capacity not exceeding 25 litres, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength, or which shall be well secured in iron or wicker hampers. The carboys must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
  - iii. in receptacles, made of a suitable plastics material, with walls not less than 4 mm thick and a capacity not exceeding 60 litres, the openings being closed by two plugs, one placed over the other, one of them being screw-threaded,

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the receptacles having no protective packaging if the competent authority of the country of departure so allows. The receptacles must not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg.

2629  
(contd)

Substances of 84° shall be packed:

2630

- (a) in the same way as solids of 81°; or
- (b) in the case of substances of 84° (a) very conspicuously coloured, in bags made of paper of at least two plies, or of a suitable plastics material, which shall be placed in textile bags; or
- (c) in the case of substances of 84° (b), in closely-woven jute bags.

3. Mixed packing

2631

(1) Substances grouped under the same item number may be included in the same package. The inner packagings shall conform to what is prescribed for each substance, and the outer packaging shall be that laid down for the substances of the item number in question.

(2) If smaller quantities are not prescribed in the section headed "Packing of a single substance", substances of this Class, in quantities not exceeding 6 kg in the case of solids or 3 litres in the case of liquids for all of the substances listed under the same item number or the same letter, may be enclosed in the same package either with substances of another item number or of another letter of the same Class, or with dangerous substances belonging to other Classes (if mixed packing is likewise allowed in the case of such substances), or with other goods, subject to the following special conditions:

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions of marginals 2001 (5) and 2002 (6) and (7) must be observed.

A package must not weigh more than 150 kg, or more than 75 kg if it contains fragile receptacles.

## Class 6.1

2631  
(contd)Special conditions:

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
1°(a)	Hydrocyanic acid	Mixed packing not allowed		
1°(b)	Solutions of hydrocyanic acid containing not more than 4% hydrocyanic acid (solutions containing more than 4% are prohibited)	1 litre	1 litre	Must not be packed together with any other acid
2°	Acrylonitrile, acetonitrile, isobutyronitrile	1 litre	1 litre	Must not be packed together with substances of Classes 5.1 and 8. Glass receptacles must be secured by cushioning materials in protective receptacles
5°(a)	Nickel carbonyl	Mixed packing not allowed		
11°(a)	2-cyanopropan-2-ol	1 litre	1 litre	Must not be packed together with substances of Classes 5.1 and 8. Glass receptacles must be secured by cushioning materials in protective receptacles
13°(b)	Dimethyl sulphate	1 litre	3 litres	
31°(a)	Cyanides in a solid form			Must not be packed together with substances of an acid nature
	- in fragile receptacles	500 g	500 g	
	- in other receptacles	5 kg	5 kg	
31°(b)	Solutions of inorganic cyanides	1 litre	3 litres	
41°(b)	Ferro-silicon alloys with aluminium	2.5 kg	2.5 kg	

4. Marking and danger labels on packages (see Appendix A.9)

2632

(1) Packages containing substances of 1° - 5°, 11° - 14°, 21° - 23°, 31° - 33°, 41°, 51° - 54°, 81° and 82° shall bear a label conforming to model No. 4; packages containing substances of 2°, 4°(a), 5° and 11°(a) shall bear, in addition, a label conforming to model No. 2A. Packages containing substances of 61°, 62°, 71° - 75°, 83° and 84° shall bear a label conforming to model No. 4A.

(2) Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

(3) In the case of consignments forwarded as a full load, labels Nos. 2A, 4 or 4A need not be affixed to the packages if the vehicle bears the marking prescribed in Annex B, marginal 10 500.

B. Particulars in the transport document

2633

(1) In the case of substances which are referred to by name in the list of substances (marginal 2601), the description of the goods in the transport document must conform to the name underlined in marginal 2601. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 6.1, 1°(a), ADR].

2634

In the case of substances which are not referred to by name in the list of substances (marginal 2601), the trade name or the chemical name must be used. This description must be underlined in red and followed by particulars of the Class and item number (together with the letter, if any) of the substance presenting a comparable degree of danger, and the initials "ADR" or "RID" [e.g. 6.1, 21°(m), ADR].

(2) In the case of hydrocyanic acid [1°(a)] the following must be certified in the transport document: "The nature of the goods, and the packaging, are in conformity with the provisions of ADR".

(3) In the case of substances of 41°, the following must be certified in the transport document: "Stored in the open air and in a dry place for not less than three days".

Class 6.1

2634 (4) In the case of consignments of substances which polymerize  
(contd) easily, the following must be certified in the transport document: "The  
necessary steps have been taken to prevent polymerization during carriage".

2635-  
2642

C. Empty packagings

2643 (1) Bags of 91° and 92° must be packed in cases or in  
impermeable bags preventing any loss of substances.

(2) Other packagings and tanks of 91° and 92° must be closed in  
the same manner and leak-proof in the same degree as though they were full.

(3) Packagings of 91° forwarded otherwise than as a full  
load, tanks, and packed bags of 91° shall bear labels conforming to model  
No. 4; packed bags of 92° shall bear labels conforming to model No. 4A  
(see Appendix A.9).

(4) The description in the transport document must be: "Empty  
packaging, 6.1, 91° (or 92°), ADR (or RID)". This description must be  
underlined in red.

2644-  
2649

CLASS 6.2 REPUGNANT SUBSTANCES AND SUBSTANCES  
LIABLE TO CAUSE INFECTION

1. List of substances

Among the substances and articles covered by the heading of Class 6.2, only those listed in marginal 2651 are to be accepted for carriage, and then only subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR. 2650

- 1° (a) Fresh tendons, clippings of fresh skins not limed or salted, trimmings from fresh tendons or from clippings of fresh skins; 2651

Note: Clippings of wet fresh skins, limed or salted, are not subject to the provisions of ADR.

- (b) fresh horns, claws or hoofs not cleansed of bone and soft adhering parts, fresh bones not cleansed of flesh or other soft adhering parts;

- (c) undressed pig's bristles and hair.

- 2° Fresh skins, unsalted or salted, from which offensive quantities of blood or brine drip.

Note: Properly 'salted skins containing only a small quantity of moisture are not subject to the provisions of ADR.

- 3° Cleaned or dried bones, cleaned or dried horns, claws or hoofs.

Note: Dry bones divested of fat, not giving off any putrid odour, are not subject to the provisions of ADR.

- 4° Fresh calf rennets, cleansed of all traces of edible matter.

Note: Dried calf rennets not giving off an offensive odour are not subject to the provisions of ADR.

- 5° Compressed residues arising from the manufacture of skin glue (calcareous residues, residues from the liming of skin clippings, or residues used as fertilizers).

- 6° Non-compressed residues arising from the manufacture of skin glue

- 7° Non-infected urine protected against decomposition.

- 8° Anatomical pieces, entrails and glands.

- (a) non-infected

- (b) infected

Class 6.2

2651  
(contd)

- 9° Manure.
- 10° Excrement.
- 11° Other animal substances, repugnant or liable to cause infection, not already specifically mentioned in 1° to 10°.
- 12° Empty packagings and empty bags which have contained substances of 1° to 8°, 10° and 11°, and sheets which have been used to cover substances of Class 6.2.

Note: If uncleaned, these packagings, bags and sheets are not to be accepted for carriage.

2. Provisions

A. Packages

1. General conditions of packing

2652 (1) Packagings shall be so closed and leak-proof as to prevent any loss of the contents.

(2) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular where substances are in the liquid state or are liable to ferment, receptacles and their closures must, unless the section headed "Packing of a single substance" provides otherwise, be able to withstand any pressure which, the presence of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage.

(3) No trace of the contents must adhere to the outside of packages.

2. Packing of a single substance

2653 Substances of 1° shall be packed:

(a) if forwarded otherwise than as a full load:

- 1. in metal receptacles fitted with a safety closure capable of yielding to internal pressure, or in casks, small vats or cases; or



Class 6.2

2. in the case of substances of 1° (c) in the dry state, also in bags, on condition that the bad odour can be removed by disinfection. In the case of substances not in the dry state, packing in bags is allowed only from 1 November to 15 April;

2653  
(contd)

(b) if forwarded as a full load:

1. in the packagings specified in (a) 1. above; or
2. on condition that the bad odour can be removed by disinfection, in bags impregnated with suitable disinfectants.

Substances of 2° shall be packed:

2654

(a) if forwarded otherwise than as a full load:

1. in casks, small vats or cases; or
2. during the months from November to February inclusive, in bags impregnated with suitable disinfectants, on condition that the bad odour can be removed by disinfection;

(b) if forwarded as a full load:

1. in the packagings specified in (a) 1. above; or
2. on condition that the bad odour can be removed by disinfection, in bags impregnated with suitable disinfectants.

Substances of 3° shall be packed in casks, small vats, cases, metal receptacles or bags.

2655

Substances of 4° shall be packed:

2656

(a) if forwarded otherwise than as a full load:

in casks, small vats, cases, metal receptacles or bags;

(b) if forwarded as a full load: in any suitable packagings.

Substances of 5° and 6° shall be packed in casks, small vats, cases or metal receptacles.

2657

Substances of 7° shall be packed in hermetically closed receptacles made of galvanized sheet-steel.

2658

(1) Substances of 8° shall be packed in metal receptacles fitted with a safety closure capable of yielding to internal pressure, in casks or small vats; substances of 8° (a) may also be packed in cases.

2659

Class 6.2

2659  
(cont'd)

(2) Substances of 8° may also be packed as follows:

- (a) substances of 8° (a), in receptacles made of glass, porcelain, stoneware, metal or a suitable plastics material. These receptacles shall be placed, either singly or in groups, in a strong wooden case, with absorbent cushioning materials if the receptacles are fragile. If the substances to be carried are immersed in a preserving fluid, the absorbent materials shall be sufficient in quantity to absorb all the fluid. The preserving fluid must not be inflammable. Packages weighing more than 30 kg shall be fitted with means of handling;
- (b) substances of 8° (b), in suitable receptacles placed with cushioning materials in a strong wooden case having a metal lining rendered leak-proof e.g. by soldering. Packages weighing more than 30 kg shall be fitted with means of handling;

2660 Substances of 9° shall be forwarded only in bulk.

2661 Substances of 10° shall be packed in receptacles made of sheet-metal.

2662 Substances of 11° shall be packed in metal receptacles fitted with a safety closure capable of yielding to internal pressure, or in casks, small vats or cases.

3. Mixed packing

2663 Substances listed under an item number of marginal 2651 may be included in the same package only with substances listed under the same item number, and then only on condition that the packagings prescribed in sections A.1 and 2 above are used.

4. Marking and danger labels on packages (see Appendix A.9)

2664 Packages containing fragile receptacles not visible from the outside shall bear a label conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

2665

2666 B. Particulars in the transport document

The description of the goods in the transport document must conform to one of the names underlined in marginal 2651. Where the name of the substance is not indicated, the trade name must be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 6.2, 1° (a), ADR]

2667-  
2672

Class 6.2

C. Empty packagings

(1) Articles of 12° shall be cleaned and treated with suitable disinfectants.

2673

(2) The description in the transport document must be:

"Empty packaging (or empty bag, or sheet), 6.2, 12°, ADR (or ADR)".  
This description must be underlined in red.

2674-  
2699

1

2

## CLASS 7

### RADIOACTIVE SUBSTANCES

#### Introduction

##### (1) Scope

2700

(a) Among the substances with a specific activity of more than 0.002 microcurie per gramme and articles containing such substances, only those indicated in the schedules of marginal 2703 are to be accepted for carriage and then only under the conditions set out in the appropriate schedules of the said marginal and in appendix A.6 (marginals 3600 to 3699).

(b) The substances and articles referred to in (a) are substances and articles of ADR.

NOTE Cardiac pacemakers containing radioactive substances, when they have been surgically implanted in medical patients, or radiopharmaceuticals being carried inside patients in the course of medical treatment, are not subject to ADR.

##### (2) Definitions and explanations

A<sub>1</sub> and A<sub>2</sub>

"A<sub>1</sub>" means the maximum activity of special form radioactive substances permitted in a Type A package. "A<sub>2</sub>" means the maximum activity of radioactive substances, other than special form radioactive substances, permitted in a Type A package. These values either are listed in Appendix A.6 Table XXI or may be derived in accordance with the procedure described in marginals 3690 and 3691 of Appendix A.6.

Allowable number of packages

"Allowable number 1/ of packages" means the maximum number of Fissile Class II or Fissile Class III packages which may be grouped together in one place during carriage or during transit storage.

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1/ When the group is made up of packages of different designs, the maximum number of packages shall be such that the following formula is satisfied:

$\frac{n_1}{N_1} + \frac{n_2}{N_2} + \frac{n_3}{N_3} + \dots$  shall not exceed 1. In this formula,  $n_1, n_2, n_3, \dots$

are the numbers of packages for which the corresponding allowable numbers are  $N_1, N_2, N_3, \dots$  respectively.

Containment system

2700  
(contd)

"Containment system" means the components of the packaging specified by the designer as intended to retain the radioactive substance during carriage.

Design

"Design" means the description of a special form substance, or of a package or a packaging of a particular kind, which enables it to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

Fissile substances

"Fissile substance" means plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235, and all substances containing any of these radionuclides. Unirradiated natural and depleted uranium do not come under this definition.

Low-level solid radioactive substances

"Low-level solid radioactive substance" (LLS) means any of the following:

- (a) Solids (e.g. consolidated wastes, activated substances) in which:
  - (i) the activity in normal carriage is and remains distributed throughout the solid or the collection of solids or is and remains uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic);
  - (ii) the activity is and remains insoluble so that even under loss of packaging the loss of radioactive substance per package resulting from the effects of wind, rain, etc., or from total immersion in water is limited to less than  $0.1 A_2$  in a period of one week; and
  - (iii) the activity averaged throughout the radioactive substance does not exceed  $2 \times 10^{-3} A_2/g$ .
- (b) Articles of non-radioactive substance which are contaminated with a radioactive substance, provided that the radioactive contamination is in a non-readily-dispersible form and that the level of contamination averaged over  $1 m^2$  (or over the area of the surface if that area is less than  $1 m^2$ ) does not exceed  
 $20 \mu Ci/cm^2$  for beta and gamma emitters and the low-toxicity alpha emitters indicated in Table XIX of Appendix A.6; and  $2 \mu Ci/cm^2$  for other alpha emitters.

Low specific activity substances (I)

"Low specific activity substances (I)" (LSA) means any of the following: 2700  
(contd)

- (a) Uranium or thorium ores and physical or chemical concentrates of those ores;
- (b) Unirradiated natural or depleted uranium or unirradiated natural thorium;
- (c) Tritium oxide in aqueous solutions, provided that the concentration does not exceed 10 Ci/litre;
- (d) Substances in which the activity is uniformly distributed and which if they were reduced to their minimum volume in conditions likely to be encountered in carriage, such as dissolution in water with subsequent recrystallization; precipitation; evaporation; combustion; abrasion; etc., would have an average specific activity of not more than  $10^{-4} A_2/g$ ;
- (e) Articles of non-radioactive substance which are contaminated with a radioactive substance, provided that the non-fixed surface contamination does not exceed ten times the values in Table XIX of Appendix A.6 and that the contaminated article or the contamination on the article, if it was reduced to its minimum volume in conditions likely to be encountered in carriage, such as dissolution in water with subsequent recrystallization; precipitation; evaporation; combustion; abrasion; etc., would have an average specific activity of not more than  $10^{-4} A_2/g$ .

Low specific activity substances (II)

"Low specific activity substances (II)" (LSA) means any of the following:

- (a) Substances in which the activity in normal carriage is and remains uniformly distributed and in which the average specific activity does not exceed  $10^{-4} A_2/g$ ;
- (b) Articles of non-radioactive substance which are contaminated with a radioactive substance, provided that the radioactive contamination is in a non-readily-dispersible form and that the level of contamination averaged over  $1 m^2$  (or over the area of the surface if that area is less than  $1 m^2$ ) does not exceed  
 $1 \mu Ci/cm^2$  for beta and gamma emitters and the low-toxicity alpha emitters indicated in Table XIX of Appendix A.6; and  $0.1 \mu Ci/cm^2$  for other alpha emitters.

Maximum normal operating pressure

"Maximum normal operating pressure" means the maximum pressure above atmospheric pressure at mean sea-level that would develop in the containment system in a period of one year in conditions of temperature and solar radiation corresponding to environmental conditions of transport in the absence of venting, external cooling by an ancillary system, or operational controls during carriage.

Multilateral approval

2700  
(contd)

"Multilateral approval" means approval by the competent authority of the country of origin and by the competent authority of each country in whose territory the consignment is to be carried.

Package

"Type A package" means a Type A packaging together with its limited radioactive contents. As the contents of a Type A package are limited to  $A_1$  or  $A_2$ , such a package does not require approval by the competent authority.

"Type B(U) package" means a Type B packaging, together with its radioactive contents, which since it is designed in accordance with specified design and containment criteria requires unilateral approval only of the package design and of any stowage provisions that may be necessary for heat dissipation.

"Type B(M) package" means a Type B packaging, together with its radioactive contents, which since its design fails to meet one or more of the specific additional design criteria for Type B(U) packages (see marginal 3603 of Appendix A.6) requires multilateral approval of the package design and, in certain circumstances, of the conditions of despatch.

Packaging

"Packaging" means the assembly of components necessary to ensure compliance with the packaging requirements of this Class. It may, in particular, consist of one or more receptacles, absorbent materials, spacing structures, radiation shielding, and devices for cooling, for absorbing mechanical shocks and for thermal insulation. These devices may include the vehicle with the tie-down system when these are intended to form an integral part of the packaging.

"Type A packaging" means a packaging which in normal carriage is able to prevent any loss or dispersal of the radioactive content and to retain its shielding function. The conditions of normal carriage shall be reproduced by the tests prescribed in marginal 3635 and 3636 of Appendix A.6, which tests the packaging shall be shown to have passed.

"Type B packaging" means a packaging which is able to withstand not only the conditions of normal carriage, as a Type A packaging does, but also a transport accident. The conditions of such an accident shall be reproduced by the tests prescribed in marginals 3635 to 3637 of Appendix A.6, which tests the packaging, shall be shown to have passed in the conditions likewise prescribed.

Radiation level

"Radiation level" means the corresponding radiation dose-equivalent rate expressed in millirem per hour. Radiation levels may be determined by instruments, combined with the use of conversion tables where necessary or by calculation. Measured or calculated neutron flux densities may be converted into radiation levels by using the data given in the following table.



Neutron flux densities to be regarded as  
equivalent to a radiation level of 1 mrem/h

2700  
(contd)

Energy of neutron	Flux density equivalent to 1 mrem/h (n/cm <sup>2</sup> . s)
Thermal	268
5 keV	228
20 keV	112
100 keV	32
500 keV	12
1 MeV	7.2
5 MeV	7.2
10 MeV	6.8

Note: Equivalent flux densities for energies between those listed above should be obtained by linear interpolation.

#### Radioactive contents

"Radioactive contents" means the radioactive substance together with any contaminated solids, liquids or gases in the package.

#### Special form radioactive substance

"Special form radioactive substance" means either a non-dispersible solid radioactive substance or a sealed capsule containing a radioactive substance. The sealed capsule shall be so constructed that it can be opened only by destroying it. The special form radioactive substance shall meet the following requirements:

- (a) It shall have at least one dimension of not less than 5 mm; and
- (b) It shall comply with the relevant test requirements specified in marginals 3640 to 3642 of Appendix A.6.

In general, the "special form" concept enables substances exhibiting a higher activity level to be included in a Type A package.

#### Specific activity

The "specific activity" of a radionuclide means that radionuclide's activity per unit mass. The specific activity of a substance in which the radionuclides are essentially uniformly distributed is that substance's activity per unit mass.

#### Transport index

The "transport index" of a package means:

- (a) The number expressing the maximum radiation level in millirem per hour at 1 m from the external surface of the package; or

2700  
(contd)

(b) In the case of packages of Fissile Class II or Fissile Class III, the higher of the following numbers:

the number expressing the maximum radiation level as under (a) above; and the number obtained by dividing 50 by the allowable number of such packages.

The "transport index" of a container means either;

the sum of the transport indices of all packages within the container, except that for containers carrying Fissile Class III packages, the transport index shall be 50 unless the sum of the transport indices of the packages necessitates a higher figure.

or for containers not carrying Fissile Class II or III packages and under full load, the number expressing the maximum radiation level in mrem/h at 1 m from the external surface of the container multiplied by the value in the following table appropriate to the maximum cross-sectional area of the container.

#### Multiplication factors

Size of load	Multiplication factor
<u>Measurement</u> (cross-sectional area measurements of the load perpendicular to the direction of interest).	
1 m <sup>2</sup> and less	1
> 1 m <sup>2</sup> to 5 m <sup>2</sup>	3
> 5 m <sup>2</sup> to 20 m <sup>2</sup>	6
> 20 m <sup>2</sup> to 100 m <sup>2</sup>	19

(c) The figure expressing the transport index shall be rounded upwards to the first decimal place.

#### Uncompressed gas

"Uncompressed gas" means a gas at a pressure not exceeding the ambient atmospheric pressure at the time when the containment system is closed.

#### Unilateral approval

"Unilateral approval" means approval by the competent authority of the country of origin only. If the country of origin is not a party to ADR, the approval shall require validation by the competent authority of the first ADR country reached by the consignment.

Unirradiated uranium2700  
(contd)

"Unirradiated uranium" means uranium containing not more than  $10^{-6}$  g plutonium per g uranium-235 and a fission product activity of not more than 0.25 mCi per g uranium-235.

Unirradiated thorium

"Unirradiated thorium" means thorium containing not more than  $10^{-7}$  g of uranium-233 per g of thorium-232.

Uranium; natural, depleted, enriched

"Natural uranium" means chemically-separated uranium with the naturally-occurring distribution of uranium isotopes (approximately 99.28 per cent uranium-238 and 0.72 per cent uranium-235). "Depleted uranium" means uranium containing less than 0.72 per cent uranium-235, the remainder being uranium-238. "Enriched uranium" means uranium containing more than 0.72 per cent uranium-235, the remainder being uranium-238. In all cases a very small amount of uranium-234 is present.

(3) Prohibitions on mixed loading

Substances of class 7 contained in packages bearing a label conforming with models Nos. 6A, 6B or 6C shall not be loaded in the same vehicle together with substances and articles of Classes 1a (marginal 2101), 1b (marginal 2131) or 1c (marginal 2171) contained in packages bearing one or two labels conforming with model No. 1.

The substances and articles of this class contain one or more of the radionuclides referred to in chapter VI of Appendix A.6 (marginals 3690 and 3691).

2701

The list hereunder specifies the different types of consignment:

2702

1. Empty packages which have contained radioactive substances;
2. Articles manufactured from natural or depleted uranium or natural thorium;
3. Small quantities of radioactive substances;
4. Instruments and manufactured articles;
5. Low specific activity substances LSA (I)
6. Low specific activity substances LSA (II)
7. Low-level solid radioactive substances;
8. Radioactive substances in Type A packages;
9. Radioactive substances in Type B(U) packages;
10. Radioactive substances in Type B(M) packages;
11. Fissile substances;
12. Radioactive substances carried under special arrangement.

Schedule 1

2703

1. Substances

Danger labels on packages

Empty packages: which have contained radioactive substances.

None

2. Packaging/Package

Note Any label indicating a danger shall be covered or removed

(a) Packaging shall be in accordance with the requirements given in marginal 3600 of Appendix A.6, and shall be securely closed and in good condition.

(b) Permitted internal contamination levels: not more than 100 times those levels set out in paragraph 5.

(c) Where an empty packaging includes natural or depleted uranium or natural thorium in its structure its surface shall be covered with a substantial, inactive sheath made of metal or some other resistant material.

3. Package maximum radiation level

0.5 mrem/h at the surface of the package.

4. Mixed packing

No provisions.

5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low-toxicity alpha emitters	$10^{-4}$	$\mu\text{Ci}/\text{cm}^2$
Natural/depleted uranium/natural thorium	$10^{-3}$	$\mu\text{Ci}/\text{cm}^2$
Other alpha emitters	$10^{-5}$	$\mu\text{Ci}/\text{cm}^2$

For full details, see marginal 3651 of Appendix A.6.

6. Marking on packages

(a) Packages shall be plainly and durably marked with the weight if over 50 kg.

(b) Any marking indicating a radioactive danger shall not be visible.

Schedule 1 (contd)

2703  
(contd)

7. Transport documents

The transport document shall include the description "Radioactive substances (Empty packages), 7, schedule 1, ADR", with the name underlined in red.

8. Storage and despatch

No provisions.

9. Carriage of packages in vehicles and containers

No provisions.

10. Carriage in bulk in vehicles and containers

Not applicable.

11. Carriage in tank vehicles and tank containers

Not applicable.

12. Placards and labels on vehicles, tank vehicles, tank containers and containers

None.

13. Prohibitions on mixed loading

No provisions.

14. Decontamination of vehicles, tank vehicles, tank containers and containers

No provisions.

15. Other provisions

None.

2703  
(cont'd)Schedule 2Danger labels on packages1. Substances

None.

Articles manufactured  
from natural or depleted uranium  
or natural thorium.

The outer surface of the uranium or  
thorium shall be covered by a substantial,  
inactive sheath made of metal or some  
other resistant material.

NOTE Such articles may for example be  
unused packagings intended for the  
transport of radioactive substances.

2. Packaging/Package

Packaging shall be in accordance with the  
requirements given in marginal 3600 of Appendix A.6.

3. Package maximum radiation level

0.5 mrem/h at the surface of the package.

4. Mixed packing

No provisions.

5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low-toxicity alpha emitters	$10^{-4}$	$\mu\text{Ci}/\text{cm}^2$
Natural/depleted uranium/ natural thorium	$10^{-3}$	$\mu\text{Ci}/\text{cm}^2$
Other alpha emitters	$10^{-5}$	$\mu\text{Ci}/\text{cm}^2$

For full details see marginal 3651 of Appendix A.6.

6. Marking on packages

None.

7. Transport documents

The transport document shall include the description "Radioactive  
substances (Manufactured articles), 7, schedule 2, ADR", with  
the name underlined in red.

3. Storage and despatch  
No provisions.
9. Carriage of packages in vehicles and containers  
No provisions.
10. Carriage in bulk in vehicles and containers  
Not applicable.
11. Carriage in tank vehicles and tank containers  
Not applicable.
12. Placards and labels on vehicles, tank vehicles,  
tank containers and containers  
None.
13. Prohibitions on mixed loading  
No provisions.
14. Decontamination of vehicles, tank vehicles,  
tank containers and containers  
No provisions.
15. Other provisions  
None.

2703  
(cont'd)Schedule 3Danger labels on packages1. Substances

Small quantities of radioactive substances  
in amounts which do not exceed those given  
in the table below and which do not contain  
more than 15 g of uranium - 235.

None  
(but see paragraph 15).

Nature of substances	Package limits
Solids and gases	
Special form	$10^{-3}A1$
Other forms	$10^{-3}A2$
Tritium	20 Ci*/
Liquids	
Tritium oxide in aqueous solutions	
less than 0.1 Ci/l	1000 Ci
between 0.1 Ci/l and 1.0 Ci/l	100 Ci
greater than 1.0 Ci/l	1 Ci
Other liquids	$10^{-4}A2$

For mixtures of radionuclides, see marginal 3691 of Appendix A.6.

\*/ The values for tritium also apply to tritium in activated  
luminous paint and tritium adsorbed on solid carriers.

2. Packaging/Package

- (a) Packaging shall be in accordance with the requirements  
given in marginal 3600 of Appendix A.6.
- (b) During transport there shall be no leakage of radioactive  
substance.

3. Package maximum radiation level

0.5 mrem/h at the surface of the package.

4. Mixed packing

No provisions.



Schedule 3 (contd)2703  
(contd)5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low-toxicity alpha emitters	$10^{-4}$	$\mu$ Ci/cm <sup>2</sup>
Natural/depleted uranium/natural thorium	$10^{-3}$	$\mu$ Ci/cm <sup>2</sup>
Other alpha emitters	$10^{-5}$	$\mu$ Ci/cm <sup>2</sup>

For full details, see marginal 3651 of  
Appendix A.6.

6. Marking on packages

The outermost surface of the containment system  
shall be marked "RADIOACTIVE" as a warning on  
opening the package.

7. Transport documents

The transport document shall include the description "Radioactive  
substances (Small quantities), 7, schedule 3, ADR", with the name  
underlined in red.

8. Storage and despatch

No provisions.

9. Carriage of packages in vehicles and containers

No provisions.

10. Carriage in bulk in vehicles and containers

Not permitted.

11. Carriage in tank vehicles and tank containers

Not permitted.

12. Placards and labels on vehicles tank vehicles,  
tank containers and containers

None.

2703  
(cont'd)

Schedule 3 (cont'd)

13. Prohibitions on mixed loading

No provisions.

14. Decontamination of vehicles, tank vehicles,  
tank containers and containers

See marginal 3695 (3) of Appendix A.6.

15. Other provisions

- (a) Accident provisions - see marginal 3695 (1) of Appendix A.6.
- (b) Decontamination in storage - see marginal 3695 (2) of Appendix A.6.
- (c) Radioactive substances which possess other hazardous properties shall also comply with the provisions of the appropriate class.

1. SubstancesDanger labels on packagesInstruments and Manufactured articles

None

such as clocks, electronic tubes or apparatus, having radioactive substances as a component part, whose activity does not exceed the amounts given in the table below and which do not contain more than 15 g. of uranium - 235

Nature of substances	Item limits	Package limits
Solids		
Special form	$10^{-2}A_1$	$A_1$
Other forms	$10^{-2}A_2$	$A_2$
Liquids	$10^{-3}A_2$	$10^{-1}A_2$
Gases		
Tritium	20 Ci *	200 Ci *
Special form	$10^{-3}A_1$	$10^{-2}A_1$
Other forms	$10^{-3}A_2$	$10^{-2}A_2$

For mixtures of radionuclides, see marginal 3691 of Appendix A.6.

\* The values for tritium also apply to tritium in activated luminous paint and tritium adsorbed on solid carriers.

2. Packaging/Package

(a) Packaging shall be in accordance with the requirements given in marginal 3600 of Appendix A.6.

(b) The instruments and articles shall be securely packed.

3. Package maximum radiation level

0.5 mrem/h at the surface of the package and 10 mrem/h at 10 cm from any point on the external surface of any unpacked instrument or article.

4. Mixed packing

No provisions.

2703  
(contd)5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low-toxicity alpha emitters	$10^{-4} \mu\text{Ci/cm}^2$
Natural/depleted uranium/natural thorium	$10^{-3} \mu\text{Ci/cm}^2$
Other alpha emitters	$10^{-5} \mu\text{Ci/cm}^2$

For full details, see marginal 3651 of Appendix A.6.

6. Marking on packages

Each instrument or article (except radioluminescent timepieces or devices) shall bear the marking "RADIOACTIVE".

7. Transport DocumentsThe transport document shall include the description "Radioactive substances (Instruments) or (Manufactured articles), 7, schedule 4, ADR", with the name underlined in red.8. Storage and despatch

No provisions.

9. Carriage of packages in vehicles and containers

No provisions.

10. Carriage in bulk in vehicles and containers

Not applicable.

11. Carriage in tank vehicles and tank containers

Not applicable.

12. Placards and Labels on vehicles, tank vehicles, tank containers and containers

None.

13. Prohibitions on mixed loading

No provisions.

14. Decontamination of vehicles, tank vehicles, tank containers and containers

See marginal 3695(3) of Appendix A.6.

15. Other provisions

(a) Accident provisions - see marginal 3695(1) of Appendix A.6.

(b) Decontamination in storage - see marginal 3695(2) of Appendix A.6.

Schedule 52703  
(contd)1. SubstancesDanger labels on packages  
(see Appendix A.9).

Low specific activity substances LSA(I),  
belonging to one of the following groups  
as defined fully in marginal 2700(2):

- (i) uranium or thorium ores or concentrates (sub-para (a) of definition)
- (ii) unirradiated natural or depleted uranium or unirradiated natural thorium (sub-para (b) of definition)
- (iii) tritium oxide in aqueous solutions - concentration 10Ci/l or less. (sub-para (c) of definition)
- (iv) substances with uniform activity under minimum volume conditions of not more than 10<sup>-4</sup> A2/g (sub-para (d) of definition).
- (v) Non-radioactive articles contaminated to not more than 10 times the package limits set in para 5 below and so that the specific activity under minimum volume conditions never exceeds 10<sup>-4</sup> A2/g (sub-para (e) of definition)

Unless transported as a full load, labels to models 6A, 6B or 6C shall be affixed externally to two opposite sides, see marginals 3653 to 3655 of Appendix A.6 for package category. The contents shall be described on the labels as "Radioactive LSA".  
Subsidiary labelling:

- (i) for thorium nitrate and uranium nitrate - model No. 3 labels are required.
- (ii) for uranium hexafluoride - model No. 4 labels are required.

If fissile substances are present the requirements of schedule 11 shall be met in addition to the requirements of this schedule.

2. Packaging/Package

Packages transported other than as full load-packaging shall be in accordance with the requirements of marginal 3600, marginal 3650 to 3655 and marginal 3656(1) to (4) of Appendix A.6.

Substances of paragraph 1(ii) above in massive solid form shall be packed so as to prevent abrasion, and in other solid forms shall be contained in a substantial sheath.

3. Package maximum radiation level

200 mrem/h at the surface of the package and 10 mrem/h at 1 metre from that surface (see marginals 3653 to 3655 of Appendix A.6).

except in the case of a full load when the limit is 1,000 mrem/h at the surface of the package and may exceed 10 mrem/h at 1 metre from that surface (see marginal 3659(7) of Appendix A.6).

2703  
(contd)Schedule 5 (cont'd)4. Mixed packing

See marginal 3650 of Appendix A.6.

5. Contamination on packages

- (a) Non-fixed external contamination limits for packages carried other than as full load.

Beta/gamma/low-toxicity alpha emitters	$10^{-4}$ <i>M</i> Ci/cm <sup>2</sup>
Natural/depleted uranium/natural thorium	$10^{-3}$ <i>M</i> Ci/cm <sup>2</sup>
Other alpha emitters	$10^{-5}$ <i>M</i> Ci/cm <sup>2</sup>

For full details, see marginal 3651 of Appendix A.6.

- (b) For packages carried in a full load - No provisions.

6. Marking on packages

Packages transported as full load - stencilled or otherwise marked "RADIOACTIVE ISA".

Packages transported other than full load - plainly and durably marked with the weight if over 50 kg.

7. Transport documents

The transport document shall include the description "Radioactive substances (Low specific activity ISA (I)), 7, schedule 5, ADR", with the name underlined in red, and the details specified in marginals 3680 and 3681 of Appendix A.6.

8. Storage and despatch

- (a) Storage and segregation from other dangerous goods - see marginal 3658 (1) of Appendix A.6.
- (b) Storage and segregation from packages labelled "FOTO" - see marginal 240 001 of Appendix B.4 for segregation table.
- (c) Total transport index limitation for storage, no limit except in the case of Fissile Class II or III packages, see marginal 3658 (2) to (5) of Appendix A.6.

9. Carriage of packages in vehicles and containers

- (a) Segregation from packages labelled "FOTO" - see marginal 240 001 of Appendix B.4 for segregation Table.
- (b) Total transport index limitation - 50. This limit does not apply to a full load, provided that if Fissile Class II or III packages are present the allowable number is not exceeded, (see marginal 3659(5) of Appendix A.6).

Class 7

Schedule 5 (contd)

- (c) Maximum radiation levels for vehicles and large containers in the case of a full load 2703  
(contd)

200 mrem/h at surface  
10 mrem/h at 2 metres from surface.  
(see marginal 3659(1) of Appendix A.7)

Also, for vehicles - 2 mrem/h in any normally occupied position - see marginal 3659(8) of Appendix A.6.

- (d) Packages not in conformity with the requirements of marginal 3600 shall be transported as full load, and the limits in the following table shall not be exceeded:

Nature of substances	Vehicle or large container activity limit
Solids	No limit
Tritium oxide in aqueous solutions	50,000 Ci
Other liquids and gases	100 x A <sub>2</sub>

10. Carriage in bulk in vehicles and containers

Permitted under full load provided that, after loading, external surfaces of vehicles are carefully cleaned by the consignor and provided that no leakage can occur under normal transport. Quantity limits as in the table in paragraph 9 above.

11. Carriage in tank-vehicles and tank-containers

- (a) Carriage in tank-vehicles: permitted for liquids or solids other than uranium hexafluoride and substances liable to spontaneous ignition (see Appendix A.6, marginal 3660);
- (b) Carriage in tank-containers: permitted for liquids or solids, including natural or depleted uranium hexafluoride (see Appendix A.6, marginal 3661).

12. Placards and labels on vehicles, tank vehicles, tank containers and containers  
(see Appendices A.9 and B.4)

Containers - labels to models 6A, 6B or 6C on all four sides. Vehicles and large containers - placards to model in Appendix B.4 marginal 240 010 on each lateral side and on rear wall of vehicle (see marginals 3659(6) and 71 500).

Subsidiary labelling

- (i) for thorium nitrate and uranium nitrate - model No. 3 labels are required
- (ii) for uranium hexafluoride - model No. 4 labels are required.

2703  
(contd)

13. Prohibitions on mixed loading

See marginal 2700(3).

14. Decontamination of vehicles, tank vehicles, tank containers and containers

(a) For full load consignments, after unloading, vehicles to be decontaminated by the consignee to the levels in Table XIX of Appendix A.6 unless to be used for carrying the same substances. See also marginal 3695(4) of Appendix A.6.

(b) For non-full load consignments, see marginal 3695(3) of Appendix A.6.

15. Other provisions

(a) Accident provisions - see marginal 3695(1) of Appendix A.6.

(b) Decontamination in storage - see marginal 3695(2) of Appendix A.6.



Schedule 62703  
(contd)Danger labels on packages

None required unless fissile substances are present.  
(see Schedule 11).

1. Substances

Low specific activity substances I-SA(II)  
belonging to either of the following  
groups as defined fully in marginal  
2700(2):

- (i) substances with uniform activity  
of not more than  $10^{-4}$  A2/g. (sub-para  
(a) of definition).
- (ii) non-radioactive articles contaminated  
non-dispersibly to a level not exceeding  
 $1 \mu\text{Ci}/\text{cm}^2$  for beta and gamma emitters and  
low toxicity alpha emitters, or  
 $0.1 \mu\text{Ci}/\text{cm}^2$  for other alpha emitters  
(sub-para (b) of definition).

If fissile substances are present the requirements  
of schedule 11 shall be met in addition to the  
requirements of this schedule.

2. Packaging/Package

Packaging shall be in accordance with the  
requirements of marginal 3600, marginal 3650  
and marginal 3651 of Appendix A.6.

3. Package maximum radiation level

Closed vehicles under conditions of marginal  
3659 (7) (a) of Appendix A.6 - 1000 mrem/h  
at the surface of the package and may exceed  
10 mrem/h at one metre from that surface.  
All other vehicles not under the conditions  
of marginal 3659 (7)(a) of Appendix A.6 -  
200 mrem/h at the surface of the package and  
10 mrem/h at one metre from that surface.

4. Mixed packing

See marginal 3650 of Appendix A.6.

5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low toxicity alpha emitters	$10^{-4} \mu\text{Ci}/\text{cm}^2$
Natural/depleted uranium/natural thorium	$10^{-3} \mu\text{Ci}/\text{cm}^2$
Other alpha emitters	$10^{-5} \mu\text{Ci}/\text{cm}^2$

For full details, see marginal 3651 of Appendix A.6

2703  
(contd)

## Schedule 6 (cont'd)

6. Marking on packages

Packages shall be stencilled or otherwise marked "RADIOACTIVE LSA".

7. Transport documents

The transport document shall include the description "Radioactive substances (Low specific activity LSA (II)), 7, schedule 6, ADR," with the name underlined in red, and the details specified in marginals 3680 and 3681 of Appendix A.6.

8. Storage and despatch

Only under full load

9. Carriage of packages in vehicles and containers

(a) Carriage only by full load

(b) If the consignment includes Fissile Class II or III packages the allowable number shall not be exceeded.  
(see Schedule 11).

(c) Maximum radiation levels for vehicles and large containers -

200 mrem/h at surface  
10 mrem/h at 2 metres from surface (see marginal 3659(7)  
of Appendix A.6)

Also, for vehicles - 2 mrem/h in any normally occupied position -  
(see marginal 3659(8) of Appendix A.6)

(d) The limits in the following table shall not be exceeded:

Nature of substances	Vehicle or large container activity limit
Solids	No limit
Tritium oxide in aqueous solutions	50 000 Ci
Other liquids and gases	100 x A <sub>2</sub>

10. Carriage in bulk in vehicles and containers

Not permitted.

11. Carriage in tank vehicles and tank containers

Not permitted.

12. Placards and labels on vehicles, tank vehicles, tank containers and containers (see Appendices A.9 and B.4)

Containers - labels to 6A, 6B or 6C on all four sides.

Vehicles and large containers - placards to model in Appendix B.4, marginal 240 010 on each lateral side and on rear wall of vehicle (see marginals 3659(6) and 71 500).

13. Prohibitions on mixed loading

See marginal 2700(3).

14. Decontamination of vehicles, tank vehicles, tank containers and containers

See marginal 3695(3) and (4) or Appendix A.6.

15. Other provisions

Accident provisions - see marginal 3695 (1) of Appendix A.6.

2703  
(contd)

1. Substances

Low level solid radioactive substances LLS  
belonging to either of the following  
groups as defined fully in marginal 2700(2):

- (i) substances with uniform activity  
of not more than  $2 \times 10^{-3}$  A2/g.  
(sub-para (a) of definition).
- (ii) non-radioactive articles contaminated to a  
level not exceeding 20  $\mu$ Ci/cm<sup>2</sup> for beta and  
gamma emitters and low toxicity alpha  
emitters or 2  $\mu$ Ci/cm<sup>2</sup> for other alpha emitters.  
(sub-para (b) of definition).

If fissile substances are present the requirements  
of schedule 11 shall be met in addition to the  
requirements of this schedule

2. Packaging/Package

- (a) Packaging shall be in accordance with the  
requirements of marginals 3600 and 3650 of  
Appendix A.6. and shall be capable of  
withstanding the tests set out in marginal  
3635(4) and (5) of Appendix A.6.
- (b) Under the conditions of the tests set out in  
(a) there shall be
  - (i) no loss or dispersal of the radioactive  
contents
  - (ii) no increase of the maximum radiation level  
recorded or calculated at the external  
surface for the condition before the test.

3. Package maximum radiation level

Closed vehicles under conditions of marginal  
3659(7) (a) of Appendix A.6 - 1000 mrem/h at  
the surface of the package and may exceed 10 mrem/h  
at one metre from that surface. All other vehicles  
not under the conditions of marginal 3659(7) (a) of  
Appendix A.6 - 200 mrem/h at the surface of the  
package and 10 mrem/h at one metre from that surface.

4. Mixed packing

See marginal 3650 of Appendix A.6.

Schedule 7

Danger labels on packages

None required unless  
fissile substances are  
present.  
(see schedule 11).

5. Contamination on packages

No provisions.

6. Marking on packages

Packages shall be stencilled or otherwise marked  
"RADIOACTIVE LLS".

7. Transport documents

The transport document shall include the description "Radioactive substances (Low-level solid (LLS)), 7, schedule 7, ADR," with the name underlined in red, and the details specified in marginals 3680 and 3681 of Appendix A.6.

8. Storage and despatch

Only under full load

9. Carriage of packages in vehicles and containers

- (a) Carriage only by full load
- (b) If the consignment contains Fissile Class II or III packages the allowable number shall not be exceeded (see schedule 11).
- (c) Maximum radiation levels for vehicles and large containers -

200 mrem/h at surface  
10 mrem/h at 2 metres from surface -

see marginal 3659(7) of Appendix A.6.

Also, for vehicles - 2 mrem/h in any normally occupied position -  
see marginal 3659(8) of Appendix A.6.

10. Carriage in bulk in vehicles and containers

Not permitted.

11. Carriage in tank vehicles and tank containers

Not applicable.

2703  
(contd)

Schedule 7 (cont'd)

12. Placards and labels on vehicles, tank vehicles, tank containers and containers (See Appendices A.9 and B.4)

Containers - labels to model 6A, 6B or 6C on all four sides.  
Vehicles and large containers - placards to model in Appendix B.4. marginal 240 010 on each lateral side and on rear wall of vehicle (see marginals 3659(6) and 71 500).

13. Prohibitions on mixed loading

See marginal 2700(3).

14. Decontamination of vehicles, tank vehicles, tank containers and containers

After unloading, vehicles to be decontaminated by the consignee to the level set in Table XIX of Appendix A.6 unless to be used for carrying the same substances.  
See also marginal 3695(3) and (4) of Appendix A.6.

15. Other provisions

Accident provisions - see marginal 3695(1) of Appendix A.6.

Schedule 8

2703  
(contd)

1. Substances

Danger labels on packages  
(see Appendix A.9)

Radioactive substances in Type A packages  
up to an activity per package of  $A_2$ ;  
or  $A_1$  if in special form.

Labels to models 6A, 6B or 6C  
shall be affixed externally to  
two opposite sides, see  
marginals 3653 to 3655 of  
Appendix A.6 for package category.

If fissile substances are present the  
requirements of schedule 11 shall be met in  
addition to the requirements of this  
schedule.

2. Packaging/Package

Type A, in accordance with the design  
requirements given in marginals 3600 and  
3601 of Appendix A.6.

3. Package maximum radiation level

200 mrem/h at the surface of the package  
and 10 mrem/h at 1 metre from that surface  
(see marginals 3653 to 3655 of Appendix A.6).

except in the case of a full load, when the  
limit is 1000 mrem/h at the surface of the  
package and may exceed 10 mrem/h at 1 metre  
from that surface (see marginal 3659(7) of  
Appendix A.6).

4. Mixed packing

See marginal 3650 of Appendix A.6.

5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low-toxicity alpha emitters	$10^{-4} \mu\text{Ci}/\text{cm}^2$
Natural/depleted uranium/natural thorium	$10^{-3} \mu\text{Ci}/\text{cm}^2$
Other alpha emitters	$10^{-5} \mu\text{Ci}/\text{cm}^2$

For full details, see marginal 3651 or Appendix A.6.

6. Marking on packages

Packages shall be plainly and durably marked externally with

- (i) "Type A"
- (ii) the weight of the package, if over 50 kg.

7. Transport Documents

- (a) For a summary of the approval and notification requirements - see marginal 2704.
- (b) The transport document should include the description "Radioactive substances in Type A packages, 7, schedule 8, ADR", with the name underlined in red, and the details specified in marginals 3680 and 3681 of Appendix A.6.
- (c) Where advantage is taken of the increased activity per package permitted if the substance is in special form, the unilateral special form design approval certificate shall be in the consignor's possession before the first shipment (see marginal 3671 of Appendix A.6).

8. Storage and despatch

- (a) Storage and segregation from other dangerous goods  
- see marginal 3658(1) of Appendix A.6.
- (b) Storage and segregation from packages labelled "FOTO"  
- see marginal 240 001 of Appendix B.4 for segregation table.
- (c) Total transport index limitation for storage - 50 per group with 6 metres between groups  
- see marginal 3658(2) to (5) of Appendix A.6.

9. Carriage of packages in vehicles and containers

- (a) Segregation from packages labelled "FOTO"  
- see marginal 240 001 of Appendix B.4 for segregation tables.



- (b) Total transport index limitation - 50.  
This limitation does not apply to a full load,  
provided that if Fissile Class II or III  
packages are present the allowable number is not  
exceeded. See marginal 3659(5) of Appendix A.6.

- (c) Maximum radiation level for vehicles and large  
containers in the case of a full load

200 mrem/h at surface  
10 mrem/h at 2 metres from surface

(See marginal 3659(7) of Appendix A.6)  
Also, for vehicles - 2 mrem/h in any normally  
occupied position - see marginal 3659(8) of  
Appendix A.6.

10. Carriage in bulk in vehicles and containers

Not applicable.

11. Carriage in tank vehicles and tank containers

Not applicable.

12. Placards and labels on vehicles, tank vehicles, tank  
containers and containers (see Appendices A.9 and B.4)

Containers - labels to model 6A, 6B or 6C on all four sides.

Vehicles and large containers - placards to model in  
Appendix B.4, marginal 240 1010 each lateral side and on rear  
wall of vehicle (see marginals 3659(6) and 71 500).

13. Prohibition on mixed loading

See marginal 2700(3).

14. Decontamination of vehicles, tank vehicles, tank  
containers and containers

See marginal 3695(3) of Appendix A.6.

15. Other provisions

- (a) Accident provisions - see marginal 3695(1) of Appendix A.6.

- (b) Decontamination in storage - see marginal 3695(2) of  
Appendix A.6.

2703  
(contd)Schedule 91. SubstancesRadioactive substances in Type P(U)  
Packages

No limit on the quantity per package except as prescribed in the approval certificates. If fissile substances are present, the requirements of schedule 11 shall be met in addition to the requirements of this schedule.

Danger labels on packages  
(see Appendix A.9)

Labels to models 6A, 6B or 6C shall be affixed externally to two opposite sides, see marginals 3653 to 3655 of Appendix A.6 for package category.

2. Packaging/Package

Type B(U), in accordance with the design requirements given in marginals 3600 to 3603 of Appendix A.6 requiring competent authority unilateral approval, see marginal 3672 of Appendix A.6.

3. Package maximum radiation level

200 mrem/h at the surface of the package and 10 mrem/h at 1 metre from that surface.  
(see marginals 3653 to 3655 of Appendix A.6).

except in the case of a full load, when the limit is 1000 mrem/h at the surface of the package and may exceed 10 mrem/h at 1 metre from that surface. (See marginal 3659(7) of Appendix A.6)

4. Mixed packing

See marginal 3650 of Appendix A.6.

5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low toxicity alpha emitters	$10^{-4}$ $\mu$ Ci/cm <sup>2</sup>
Natural/depleted uranium/natural thorium	$10^{-3}$ $\mu$ Ci/cm <sup>2</sup>
Other alpha emitters	$10^{-5}$ $\mu$ Ci/cm <sup>2</sup>

For full details, see marginal 3651 of Appendix A.6

6. Marking on packages

Packages shall be plainly and durably marked externally with:

- (i) "TYPE B(U)".
- (ii) competent authority identification mark.
- (iii) the weight if over 50 kg.
- (iv) the trefoil symbol embossed or stamped on the outermost fire and water-resistant receptacle.

7. Transport Documents

- (a) For a summary of the approval and notification requirements, see marginal 2704.
- (b) The transport document shall include the description "Radioactive substances in Type B(U) packages, 7, schedule 9, ADR", with the name underlined in red, and the details specified in marginals 3680 and 3681 of Appendix A.6.
- (c) Unilateral package design approval certificate is required, see marginal 3672 of Appendix A.6.
- (d) Before the shipment of any package the consignor shall be in possession of all relevant approval certificates.
- (e) Before the first shipment of a particular design of package, if the activity is greater than  $3 \times 10^3 A_2$  or  $3 \times 10^3 A_1$  as appropriate, or  $3 \times 10^4 \text{Ci}$  whichever is the lower, the consignor shall ensure that copies of the competent authority approval certificates have been supplied to the competent authorities of countries affected by the movement, see marginal 3682(1) of Appendix A.6.
- (f) Prior to each shipment where the activity is greater than  $3 \times 10^3 A_2$  or  $3 \times 10^3 A_1$  as appropriate, or  $3 \times 10^4 \text{Ci}$  whichever is the lower, the consignor shall notify the competent authorities of all countries affected by the movement, preferably fifteen days in advance as detailed in marginal 3682 of Appendix A.6.

2703  
(contd)

Schedule 9 (cont'd)

- (g) Where advantage is taken of the increased activity per package permitted because the substance is in special form, see paras. (e) and (f) above, a unilateral special form design approval certificate is required (see marginal 3671 of Appendix A.6).

8. Storage and despatch

- (a) Any instructions in the competent authority approval certificate shall be observed.
- (b) Storage and segregation from other dangerous goods - see marginal 3658(1) of Appendix A.6.
- (c) Storage and segregation from packages labelled "FOTO" - see marginal 240 001 Appendix B.4 for segregation table.
- (d) Total transport index limitation for storage - 50 per group with 6 metres between groups - see marginal 3658(2) to (5) of Appendix A.6.
- (e) The consignor shall have complied with the pre-use and pre-shipment requirements of marginals 3643 and 3644 of Appendix A.6.
- (f) The temperature of the accessible surfaces of the package shall not exceed 50°C in the shade unless transport is under full load conditions, in which case the limit is 82°C (see marginals 3602(3)(b) and 3603(8) of Appendix A.6).
- (g) If the average surface heat flux from a package exceeds 15 W/m<sup>2</sup> then the package shall be transported as a full load.

9. Carriage of packages in vehicles and containers

- (a) Segregation from packages labelled "FOTO" - see marginal 240 001 of Appendix B.4 for segregation table.
- (b) Total transport index limitation - 50.  
This limitation does not apply to a full load, provided that if Fissile Class II or III packages are present the allowable number is not exceeded. See marginal 3659(5) of Appendix A.6.
- (c) Maximum radiation levels for vehicles and large containers in the case of a full load
  - 200 mrem/h at surface
  - 10 mrem/h at 2 metres from surface

See marginal 3659(7) of Appendix A.6  
Also for vehicles - 2 mrem/h in any normally occupied  
position - see marginal 3659(8) of Appendix A.6.

10. Carriage in bulk in vehicles and containers

Not applicable.

11. Carriage in tank vehicles and tank containers

Not applicable.

12. Placards and labels on vehicles, tank vehicles,  
tank containers and containers

(see Appendices A.9 and B.4).

Containers - labels to model 6A, 6B or 6C on  
all four sides.

Vehicles and large containers - placards to model  
in Appendix B.4 marginal 240 010 on each lateral  
side and on rear wall of vehicle (see marginals 3659(6)  
and 71 500)

13. Prohibition on mixed loading

See marginal 2700(3).

14. Decontamination of vehicles, tank vehicles, tank  
containers and containers

See marginal 3695(3) of Appendix A.6.

15. Other provisions

(a) Accident provisions - see marginal 3695(1) of  
Appendix A.6.

(b) Decontamination in storage - see marginal 3695(2)  
of Appendix A.6.

2703  
(contd)

1. Substances

Radioactive substances in Type B (M) packages

that is a Type B package design which fails to meet one or more of the specific additional requirements for Type B(U) packages (see marginal 3603 of Appendix A.6). No limit on the quantity per package except as prescribed in the approval certificate. If fissile substances are present the requirements of schedule 11 shall be met in addition to the requirements of this schedule.

2. Packaging/Package

Type B(M), in accordance with the design requirements given in marginal 3604 of Appendix A.6 requiring competent authority multilateral approval, see marginal 3673 of Appendix A.6.

3. Package maximum radiation level

200 mrem/h at the surface of the package and 10 mrem/h at 1 metre from that surface (see marginals 3653 to 3655 of Appendix A.6), except in the case of a full load when the limit is 1000 mrem/h at the surface of the package and may exceed 10 mrem/h at 1 metre from that surface (see marginal 3659(7) of Appendix A.6).

4. Mixed packing

See marginal 3650 of Appendix A.6.

5. Contamination on packages

Non-fixed external contamination limits:

Beta/gamma/low-toxicity  
alpha emitters

$10^{-4} \mu \text{Ci/cm}^2$

Natural/depleted uranium/  
natural thorium

$10^{-3} \mu \text{Ci/cm}^2$

Other alpha emitters

$10^{-5} \mu \text{Ci/cm}^2$

For full details, see marginal 3651 of Appendix A.6.

Schedule 10

Danger labels on packages  
(see Appendix A.9)

Labels to models 6A, 6B or 6C shall be affixed externally to two opposite sides, see marginals 3653 to 3655 of Appendix A.6 for package category.

6. Marking on packages

Packages shall be plainly and durably marked externally with:

- (i) "Type B(M)"
- (ii) competent authority identification mark
- (iii) the weight of the package if over 50 kg
- (iv) the trefoil symbol embossed or stamped on the outermost fire and water-resistant receptacle.

7. Transport documents

- (a) For a summary of the approval and notification requirements - see marginal 2704.
- (b) The transport document shall include the description "Radioactive substances in Type B(M) packages, 7, schedule 10, ADR", with the name underlined in red, and the details specified in marginals 3680 and 3681 of Appendix A.6.
- (c) Multilateral package design approval certificates are required, see marginal 3673 of Appendix A.6.
- (d) If the package is designed to allow for continuous venting or if the total activity of the contents exceed  $3 \times 10^3 A_2$  or  $3 \times 10^3 A_1$ , as appropriate or  $3 \times 10^4 \text{Ci}$ , whichever is the lower, multilateral shipment certificates are required unless a competent authority authorizes transport by a specific provision in its package design certificate, see marginal 3675 of Appendix A.6.
- (e) Where advantage is taken of the increased activity per package permitted if the substance is in special form, see para. (d) above, a unilateral special form design approval certificate is required (see marginal 3671 of Appendix A.6).
- (f) Prior to each shipment the consignor shall notify the competent authorities of all countries affected by the movement preferably fifteen days in advance as detailed in marginal 3682(2) to (4) of Appendix A.6.
- (g) Before the shipment of any package, the consignor shall be in possession of all relevant approval certificates.

2703  
(contd)Schedule 10 (cont'd)**8. Storage and despatch**

- (a) Any instructions in the competent authority approval certificates shall be observed.
- (b) Storage and segregation from other dangerous goods - see marginal 3658(1) of Appendix A.6.
- (c) Storage and segregation from packages labelled "FOTO" - see marginal 240 001 of Appendix B4 for segregation table.
- (d) Total transport index limitation for storage - 50 per group with 6 metres between groups - see marginal 3658(2) to (5) of Appendix A.6.
- (e) The consignor shall have complied with the pre-use and pre-shipment requirements of marginals 3643 and 3644 of Appendix A.6.
- (f) If the surface temperature of the package exceeds 50°C in the shade the package shall be transported as a full load - see marginal 3602(4)(b) of Appendix A.6.
- (g) If the average surface heat flux from a package exceeds 15 W/m<sup>2</sup>, then the package shall be transported as a full load.
- (h) Packages specially designed to allow continuous venting - see marginal 3604(2) of Appendix A.6 - shall only be transported under full load.

**9. Carriage of packages in vehicles and containers**

- (a) Segregation from packages labelled "FOTO" - see marginal 240 001 of Appendix B4 for segregation table.
- (b) Total transport index limitation - 50. This limitation does not apply to a full load, provided that if Fissile Class II or III packages are present the allowable number is not exceeded - see marginal 3659(5) of Appendix A.6.
- (c) Maximum radiation levels for vehicles and large containers in the case of a full load

200 mrem/h at surface  
10 mrem/h at 2m from surface

see marginal 3659(7) of Appendix A.6.  
Also, for vehicles 2 mrem/h in any normally occupied position - see marginal 3659(8) of Appendix A.6.



10. Carriage in bulk in vehicles and containers

Not applicable.

11. Carriage in tank vehicles and tank containers

Not applicable.

12. Placards and labels on vehicles, tank vehicles, tank containers and containers  
(see Appendix A9 and B4)

Containers - labels to model 6A, 6B or 6C on all four sides.

Vehicles and large containers - placards to model in Appendix B4 marginal 240 010 on each lateral side and on rear wall of vehicle (see marginals 3659(6) and 71 500).

13. Prohibition on mixed loading

See marginal 2700(3).

14. Decontamination of vehicles, tank vehicles, tank containers and containers

See marginal 3695(3) of Appendix A.6.

15. Other provisions

(a) Accident provisions - see marginal 3695(1) of Appendix A.6.

(b) Decontamination in storage - see marginal 3695(2) of Appendix A.6.

2703  
(contd)

1. Substances

Fissile substances that is

uranium - 233, uranium-235,

plutonium - 238, plutonium-239,

plutonium - 241, or any substance containing any of the foregoing, except unirradiated natural and depleted uranium.

Fissile substances shall also be consigned in full compliance with the requirements of one of the other schedules, as appropriate to the radioactivity.

2. Packaging/Packages

(a) The following substances specified fully in marginal 3610 of Appendix A6 are exempt from the special packaging requirements of this schedule:

- (i) Fissile substances in quantity not exceeding 15 g.
- (ii) Natural or depleted uranium irradiated in a thermal reactor.
- (iii) Dilute hydrogenous solutions in limited concentrations and quantities.
- (iv) Enriched uranium with not more than 1 per cent of uranium-235, which should not form a lattice arrangement if metal or oxide.
- (v) Substances distributed at not more than 5 g per 10 litre volume.
- (vi) Plutonium where less than 1 kg per package and where not more than 20 per cent by mass consists of plutonium-239 or 241.
- (vii) Enriched uranyl nitrate solution containing uranium with not more than 2 per cent uranium-235.

(b) Otherwise, packages shall be in accordance with the design requirements of Fissile Class I, II or III given in marginals 3611 to 3624 of Appendix A6 and have competent authority approval, where necessary, as detailed in marginal 3674 of Appendix A6.

Schedule 11

Danger labels on packages  
(see Appendix A9)

Fissile Class I - labels to models 6A, 6B or 6C.

Fissile Class II - labels to models 6B or 6C

Fissile Class III - labels to model 6C only. Labels to be affixed externally to two opposite sides, see marginals 3653 to 3655 of Appendix A6 for package category.

3. Package maximum radiation level

See appropriate schedule.

4. Mixed packing

See marginal 3650 of Appendix A6

5. Contamination on packages

See appropriate schedule.

6. Marking on packages

See appropriate schedule.

7. Transport documents

- (a) For a summary of the approval and notification requirements - see marginal 2704.
- (b) The transport document shall include the details specified in the schedule appropriate to the nature of the contents with the word "Fissile" prefixed to the description and underlined in red.
- (c) Unilateral or multilateral package design approval certificates may be required, see marginal 3674 of Appendix A6.
- (d) Fissile Class II package designs complying with marginal 3620 of Appendix A6 shall have multilateral shipment approval certificates. Such a package design requires no prior notification unless specified in the competent authority's shipment approval.
- (e) Fissile Class III package designs shall have multilateral shipment approval certificates unless a competent authority authorizes transport by a specific provision in its package design certificate, see marginal 3675 of Appendix A6.
- (f) Prior to each shipment of a Fissile Class III package which requires multilateral package design approval, see marginal 3674 of Appendix A6 the consignor shall notify the competent authorities of all countries affected by the movement preferably fifteen days in advance as detailed in marginal 3682(2) to (4) of Appendix A6.
- (g) Before the shipment of any package the consignor shall be in possession of any relevant approval certificates.

2703  
(contd)Schedule 11 (cont'd)8. Storage and despatch

- (a) Any instructions in the competent authority approval certificates must be observed.
- (b) Total transport index limitation for storage - 50 per group with 6 metres between groups - see marginal 3658 (2) to (5) of Appendix A6.
- (c) The consignor shall have complied with the pre-use requirements of marginal 3643 of Appendix A6.

9. Carriage of packages in vehicles and containers

- (a) Any instructions in the competent authority approval certificates shall be observed.
- (b) Total transport index limitation - 50. This limitation does not apply to a full load, provided that if Fissile Class II or III packages are present the allowable number is not exceeded. See marginal 3659(5) of Appendix A6.

10. Carriage in bulk in vehicles and containers

- (a) No restrictions for fissile material up to 15g total or for solutions within certain concentration and quantity limits, see paragraph 2(a) (i), (iii) and (vii) and marginal 3610 of Appendix A6.
- (b) Not applicable for Fissile Class I or II packages.
- (c) Permitted under Fissile Class III only if so specified in the competent authority certificate.

11. Carriage in tank vehicles and tank containers

Not applicable.

12. Placards and labels on vehicles, tank vehicles,  
tank containers and containers  
(see Appendices A9 and B.4)

Containers - labels to models 6A, 6B or 6C  
on all four sides.

Vehicles and large containers - placards to model in Appendix B4  
marginal 240 010 on each lateral side and on rear wall of vehicle  
(see marginals 3659(6) and 71 500).

13. Prohibitions on mixed loading

See marginal 2700 (3)

14. Decontamination of vehicles, tank vehicles,  
tank containers and containers

See appropriate schedule.

15. Other provisions

Accident provisions - see marginal 3695(1)  
of Appendix A6.

2703  
(contd)

1. Substances

Radioactive substances carried under  
special arrangement

If it is not possible to comply with the package design or shipment requirements, consignments shall be transported under a special arrangement which will ensure that the over-all safety level is no less than it would have been had all the applicable requirements been met.  
See marginal 3676 of Appendix A6.

NOTE For a summary of the approval and notification requirements, see marginal 2704.

Schedule 12

Danger labels on packages  
(see Appendix A9)

Labels in conformity with model no. 6C shall be affixed externally to two opposite sides unless otherwise prescribed in the competent authority certificate. See marginal 3655(1) of Appendix A6.

Summary of approvals and prior notification requirements

2704

(a) Approval of special form substances, and package designs

	Subject of approval	Competent authority whose approval is required
1	Special form substance excepting those items specified in Schedules 3 and 4.	Country of origin
2	Type A, LSA and LLS.	None unless contents are fissile and not exempted from the fissile requirements under marginal 3610 of Appendix A6: Country of origin
3	Type B (U)	Country of origin
4	Type B (M)	Country of origin and all countries en route
5	Fissile packages	
	Package designs complying with marginal 3620, 3623 or 3624 of Appendix A6	None
	Package designs complying with marginal 3616 or 3622 of Appendix A6	Country of origin
	All other package designs	Country of origin and all countries en route
<p>Note: "Country of origin" refers to the country where the design originated.</p> <p>Packages in the fissile classes also fall into one or other of package design categories 2, 3 or 4 above and the relevant provisions also apply to them.</p>		

## Class 7

2704  
(contd)(b) Approval of shipments and prior notification

	Package	Competent authority whose approval is required for each shipment	Prior notification of each shipment
1.	Type A, ISA and LLS	None	None
2.	Type B(U)	None	Country of origin and all countries en route when contents exceed $3 \times 10^3 A_1$ or $3 \times 10^3 A_2$ , as appropriate or $3 \times 10^4 Ci$ whichever is lower.
3.	Type B(M)-Continuously venting	Country of origin and all countries en route.	Country of origin and all countries en route.
4.	Type B(M)-Not continuously venting	Country of origin and all countries en route when contents exceed $3 \times 10^3 A_1$ or $3 \times 10^3 A_2$ , as appropriate or $3 \times 10^4 Ci$ whichever is lower	Country of origin and all countries en route.
5	Fissile packages		
	Fissile Class I	None	None
	Fissile Class II	Packages complying with marginal 3620 of Appendix A6 only: Country of origin and all countries en route.	None unless specified in the competent authority shipment approval
	Fissile Class III	Country of origin and all countries en route.	Country of origin and all countries en route.
6.	Packages subject to transport under special arrangements	Country of origin and all countries en route.	Country of origin and all countries en route.
<p>Note: Before shipping a Type B(U) package the contents of which exceed <math>3 \times 10^3 A_1</math> or <math>3 \times 10^3 A_2</math>, as appropriate, or <math>3 \times 10^4 Ci</math> whichever is lower, for the first time, the consignor shall ensure that copies of each applicable competent authority certificate applying to the design have been submitted to the competent authority of those countries in whose territory it is to be transported. Country of origin refers to the country where the shipment originated.</p>			
<p>Packages in the fissile classes also fall into one or other of the other headings of this Table and the relevant provisions also apply to them.</p>			

2705-  
2799



## CLASS 8 CORROSIVE SUBSTANCES

### 1. List of substances

Among the substances and articles covered by the heading of Class 8 2800 those which are listed in marginal 2801 or are covered by a collective heading of that marginal are subject to the provisions of this Annex and of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of ADR.

#### A. Acid substances

2801

##### (a) Inorganic acids

##### 1° Sulphuric acid:

- (a) sulphuric acid containing more than 85 per cent pure acid ( $\text{H}_2\text{SO}_4$ ), and oleum (fuming sulphuric acid);
- (b) sulphuric acid containing more than 75 per cent but not more than 85 per cent pure acid ( $\text{H}_2\text{SO}_4$ );
- (c) sulphuric acid containing not more than 75 per cent pure acid ( $\text{H}_2\text{SO}_4$ );
- (d) waste sulphuric acid, completely denitrated;

Note: Incompletely denitrated waste sulphuric acid is not to be accepted for carriage.

- (e) lead sludge containing sulphuric acid;

Note: Lead sludge containing less than 3 per cent free acid is a substance of Class 6.1 (see marginal 2601, 73°).

- (f) storage batteries filled with sulphuric acid.

For (a) to (d), see also marginal 2801a, under (a).

##### 2° Nitric acid:

- (a) nitric acid containing more than 70 per cent pure acid ( $\text{HNO}_3$ );
- (b) nitric acid containing more than 55 per cent but not more than 70 per cent pure acid ( $\text{HNO}_3$ );
- (c) nitric acid containing not more than 55 per cent pure acid ( $\text{HNO}_3$ ).

For (a) to (c), see also marginal 2501a, under (a) and (b).

2801  
(contd)3° Mixed nitrating acids (sulphuric and nitric acids):

- (a) mixed nitrating acids containing more than 30 per cent pure nitric acid ( $\text{HNO}_3$ );
- (b) mixed nitrating acids containing not more than 30 per cent pure nitric acid ( $\text{HNO}_3$ );

Note: For waste mixed nitrating acids, see 1° (d).

For (a) and (b), see also marginal 2801a, under (a) and (b).

4° Perchloric acid in aqueous solutions containing not more than 50 per cent pure acid ( $\text{HClO}_4$ ). See also marginal 2801a under (a).

Note: Aqueous solutions of perchloric acid containing more than 50 per cent but not more than 72.5 per cent pure acid ( $\text{HClO}_4$ ) are substances of Class 5.1 (see marginal 2501, 3°).<sup>4</sup> Solutions containing more than 72.5 per cent pure acid are not to be accepted for carriage; the same applies to mixtures of perchloric acid with any liquid other than water.

5° Solutions of hydrochloric acid, solutions of hydrobromic acid, solutions of hydriodic acid, and mixtures of sulphuric acid and hydrochloric acid. See also marginal 2801a, under (a).

Notes: 1. Mixtures of nitric acid with hydrochloric acid are not to be accepted for carriage.

2. Liquefied anhydrous hydrobromic acid and liquefied hydrochloric acid are substances of Class 2 (see marginal 2201, 3° (a t) and 5° (a t)).

6° Hydrogen fluoride (anhydrous hydrofluoric acid) and aqueous solutions of hydrofluoric acid:

- (a) hydrogen fluoride (anhydrous hydrofluoric acid);
- (b) aqueous solutions of hydrofluoric acid containing more than 85 per cent hydrogen fluoride;
- (c) aqueous solutions of hydrofluoric acid containing more than 60 per cent but not more than 85 per cent hydrogen fluoride;
- (d) aqueous solutions of hydrofluoric acid containing not more than 60 per cent hydrogen fluoride.

For (c) and (d), see also marginal 2801a under (a).

Class 8

- 7° Fluoboric acid [aqueous solutions containing not more than 78 per cent pure acid ( $\text{HBF}_4$ )]. See also marginal 2801a under (a). 2801 (contd)

Note: Solutions of fluoboric acid containing more than 78 per cent pure acid ( $\text{HBF}_4$ ) are not to be accepted for carriage.

- 8° Fluosilicic acid [hydrofluosilicic acid ( $\text{H}_2\text{SiF}_6$ )]. See also marginal 2801a, under (a).

- 9° Stabilized sulphur trioxide. See also marginal 2801a, under (a) and (c).

Note: Unstabilized sulphur trioxide is not to be accepted for carriage.

- (b) Inorganic halides, acid salts and similar halogenated substances.

- 11° Liquid halides and similar halogenated substances (except compounds of fluorine) which, in contact with moist air or water, give off acid fumes, such as:

- (a) antimony pentachloride ( $\text{SbCl}_5$ ), chlorosulphonic acid [ $\text{SO}_2(\text{OH})\text{Cl}$ ], disulphur dichloride (stabilized) ( $\text{S}_2\text{Cl}_2$ ), chromyl chloride (chromium oxychloride) ( $\text{CrO}_2\text{Cl}_2$ ), phospheryl chloride (phosphorus oxychloride) ( $\text{POCl}_3$ ), phosphorus trichloride ( $\text{PCl}_3$ ), silicon tetrachloride ( $\text{SiCl}_4$ ), sulphuryl chloride ( $\text{SO}_2\text{Cl}_2$ ), thionyl chloride ( $\text{SOCl}_2$ ), titanium tetrachloride ( $\text{TiCl}_4$ ) and stannic chloride ( $\text{SnCl}_4$ );

Note: Unstabilized disulphur dichloride is not to be accepted for carriage.

- (b) phosphorus tribromide ( $\text{PBr}_3$ ), pyrosulphuryl chloride ( $\text{S}_2\text{O}_5\text{Cl}_2$ ) and thiophosphoryl chloride ( $\text{PSCl}_3$ ).

For (a) and (b), see also marginal 2801a, under (a).

- 12° Solid halides and similar halogenated substances (except compounds of fluorine) which, in contact with moist air or water, give off acid fumes, such as:

aluminium chloride (anhydrous) ( $\text{AlCl}_3$ ), antimony trichloride (technical) ( $\text{SbCl}_3$ ), phosphorus pentachloride ( $\text{PCl}_5$ ) and zinc chloride ( $\text{ZnCl}_2$ ).

See also marginal 2801a, under (a) and (d).

Note: Non-anhydrous aluminium chloride is not to be accepted for carriage.

Class 8

2801  
(contd)

13° Bisulphates. See also marginal 2801a, under (a).

Note: Bisulphates are not subject to the provisions of ADR if the sender certifies in the transport document that the products are free from free sulphuric acid and are dry.

14° Bromine. See also marginal 2801a, under (a).

15° The following compounds of fluorine:

- (a) difluorides;
- (b) ammonium fluoride, chromic fluoride, antimony pentafluoride;
- (c) boron trifluoride-acetic acid complex, boron trifluoride-propionic acid complex;
- (d) bromine trifluoride ( $\text{BrF}_3$ ), bromine pentafluoride ( $\text{BrF}_5$ ).

For (a) to (d), see also marginal 2801a, under (a).

(c) Organic substances:

21° The following acids:

- (a) chloroacetic acids:
  - 1. monochloroacetic and trichloroacetic acids (solid);
  - 2. dichloroacetic acid (liquid) and mixtures of chloroacetic acids;
- (b) formic acid containing not less than 70 per cent pure acid;
- (c) glacial acetic acid and its aqueous solutions containing more than 80 per cent pure acid;
- (d) propionic acid containing more than 80 per cent pure acid;
- (e) acetic anhydride.

For (a) to (e), see also marginal 2801a, under (a).

22° Liquid acid halides, such as:

acetyl chloride and benzoyl chloride. See also marginal 2801a, under (a).

## 23° Alkyl and aryl chlorosilanes:

- (a) alkyl chlorosilanes and aryl chlorosilanes having a flash-point below 21°C;
- (b) alkyl chlorosilanes and aryl chlorosilanes having a flash-point of 21°C or above;

Note: Substances of this item number which give off inflammable gases on contact with water are not to be accepted for carriage.

For (a) and (b), see also marginal 2801a, under (a).

B. Substances of basic character

- 31° (a) Sodium hydroxide and potassium hydroxide (caustic soda, caustic potash), in lumps, in flakes or in powdered form. See also marginal 2801a, under (a);
- (b) Sodium hydroxide filled in the molten state.
- 32° Sodium hydroxide and potassium hydroxide in solutions (soda lye, potash lye), also in mixtures (caustic lyes), alkaline solutions of phenol, cresols and xlenols, alkaline residues from oil refineries.

See also marginal 2801a, under (a).

- 33° Storage batteries filled with alkaline solutions. See also marginal 2801a, under (e).

- 34° Hydrazine in aqueous solutions containing not more than 72 per cent hydrazine ( $N_2H_4$ ). See also marginal 2801a, under (a).

Note: Aqueous solutions containing more than 72 per cent hydrazine ( $N_2H_4$ ) are not to be accepted for carriage.

- 35° Alkyl and aryl amines and polyamines, such as:

1,2-diaminoethane (ethylenediamine), hexamethylenediamine, triethylenetetramine.

See also marginal 2801a, under (a).

- 36° Sodium sulphide containing not more than 70 per cent  $Na_2S$ .

Note: Sodium sulphide containing more than 70 per cent  $Na_2S$  is not to be accepted for carriage.

Class 8

2801  
(contd)

37° Hypochlorite solutions:

- (a) hypochlorite solutions containing more than 50 g available chlorine per litre;
- (b) hypochlorite solutions containing not more than 50 g available chlorine per litre.

For (a) and (b), see also marginal 2801a, under (a).

C. Other corrosive substances

41° Solutions of hydrogen peroxide:

- (a) aqueous solutions of hydrogen peroxide containing more than 40 per cent but not more than 60 per cent hydrogen peroxide;
- (b) aqueous solutions of hydrogen peroxide containing more than 6 per cent but not more than 40 per cent hydrogen peroxide.

For (a) and (b), see also marginal 2801a, under (a).

Note: Hydrogen peroxide and its aqueous solutions containing more than 60 per cent hydrogen peroxide are substances of Class 5.1 (see marginal 2501, 1°).

D. Empty receptacles and empty tanks

- 51° Empty packagings, uncleaned, and empty tanks, uncleaned, except those which have contained substances of 13° and 36°.

2801a

Substances handed over for carriage in conformity with the following provisions are not subject to the provisions relating to this Class contained in this Annex or in Annex B:

- (a) substances of 1° (a) to (d), 2° (b) and (c), 3° (b), 4°, 5°, 6°(c) and (d), 7° to 9°, 11° to 15°, 21° to 23°, 31° (a), 32°, 34°, 35°, 37° and 41° in quantities not exceeding 1 kg for each substance, on condition that they are packed in leak-proof receptacles incapable of being attacked by the contents and that these receptacles are packed with care in strong, leak-proof wooden packagings with leak-proof closures;
- (b) substances of 2° (a) and 3° (a), in quantities not exceeding 200 g for each substance, on condition that they are packed in leak-proof receptacles incapable of being attacked by the contents and that these receptacles are secured, not more than 10 per case, in wooden cases with inert absorbent cushioning materials;

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- (c) sulphur trioxide (9°), whether or not mixed with a small quantity of phosphoric acid, on condition that it is packed in strong sheet-metal boxes weighing not more than 15 kg, hermetically closed and fitted with a handle; 2801a (contd)
- (d) phosphorus pentachloride (12°) compressed into blocks weighing not more than 10 kg each, on condition that these blocks are packed in welded and air-tight sheet-metal boxes placed, either singly or in groups, in a crate, a case or a container;
- (e) metal-cased storage batteries filled with an alkaline solution (33°), on condition that they are so closed as to prevent leakage of the solution and are protected against short circuits.

2. Provisions

A. Packages

1. General conditions of packing

(1) Packagings shall be so closed and arranged as to prevent any loss of the contents. For the special provision relating to storage batteries [1° (f) and 33°], see marginals 2804 and 2816; for hypochlorite solutions of 37° and hydrogen peroxide of 41°, see marginals 2820 and 2821 respectively. 2802

(2) The materials of which the packagings and their closures are made must not be liable to attack by the contents, or cause the contents to decompose, or form harmful or dangerous compounds therewith.

(3) Packagings, including their closures, must be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. In particular, where substances are in the liquid state or in solution, receptacles and their closures must, unless the section headed "Packing of a single substance or of articles of the same kind" provides otherwise, be able to withstand any pressure which, the presence of air also being taken into account, may arise inside the receptacles in normal carriage. For this purpose a free space must be left, account being taken of the difference between the temperature of the substances at the time of filling and the highest mean temperature which they are likely to reach during carriage. Inner packagings shall be firmly secured in outer packagings. Unless otherwise specified in the section entitled "Packing of a single substance or of articles of the same kind", inner packagings may be enclosed in outer packagings, either singly or in groups.

Class 8

2802  
(contd)

(4) Bottles and other glass receptacles must be free from faults liable to impair their strength; in particular, internal stresses must have been suitably relieved. The walls must be not less than 3 mm thick in the case of receptacles weighing, with their contents, more than 35 kg and not less than 2 mm in the case of other receptacles.

The tightness of the closure system must be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage.

(5) When receptacles made of glass, porcelain, stoneware or similar materials, or of a suitable plastics material, are prescribed or allowed, they must, in the absence of any provision to the contrary, be provided with protective packagings. Receptacles made of glass, porcelain, stoneware or similar materials shall be carefully secured therein by cushioning materials. Cushioning materials shall be suited to the nature of the contents.

2803

2. Packing of a single substance or of articles of the same kind

(1) Substances of 1<sup>o</sup> (a) to (c) and 2<sup>o</sup> to 5<sup>o</sup> shall be packed:

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 50 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in hermetically closed cylindrical receptacles made of glass, porcelain, stoneware or similar material. These receptacles shall be secured by absorbent cushioning materials in a wooden case or other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
- (c) in hermetically closed glass carboys, which shall be secured by absorbent cushioning materials in a wooden case or other outer packaging of sufficient strength, or firmly fixed in iron or wicker hampers. The carboys shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg.

(2) Substances of 1<sup>o</sup> (a) to (c), 2<sup>o</sup> and 3<sup>o</sup> may also be packed in hermetically closed metal drums having a suitable lining in the case of substances of 1<sup>o</sup> (b), (c), (d) and (e) and a lining only if necessary in the case of substances of 2<sup>o</sup> and 3<sup>o</sup>. The drums shall not be filled beyond 95 per cent of their capacity. If, with their contents, they weigh more than 275 kg they shall be fitted with rolling hoops.



Class 8

(3) Substances of 1° (a) to (e), 2° and 5° may also be packed in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg. 2803 (contd)

(4) Substances of 5° may also be packed in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres, with walls of sufficient thickness, which shall be not less than 4 mm in the case of receptacles of 50 litres, or over; the openings shall be closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles need have no protective packaging if the competent authority of the country of departure so allows. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg.

(5) In the case of substances of 2° (a), 3° (a) and 4°, the absorbent cushioning materials must be incombustible; in the case of substances of 2° (b), they shall be fire-resistant.

Storage batteries filled with sulphuric acid [1° (f)] shall be secured in battery cases. The batteries shall be protected against short circuits and be secured by absorbent cushioning materials in a wooden packing case. Packing cases shall be fitted with means of handling. 2804

Nevertheless, if the storage batteries are made of a shock-resistant material and their upper part is so designed that the acid cannot splash out in dangerous quantities, the batteries need not be packed, but they must be protected against any short circuits sliding, falling or damage, and be fitted with means of handling. No dangerous quantities of acid must appear on the outside of packages.

Similarly, storage batteries forming part of the equipment of vehicles need not have special packaging if the vehicles are loaded upright on their wheels and secured against falling.

(1) Substances of 6° (c) and (d), 7° and 8° shall be packed: 2805

(a) in hermetically closed metal receptacles, with a suitable lining if necessary, of a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 90 per cent of their capacity. Such a package must not weigh more than 100 kg; or

Class 8

- 2805 (contd)
- (b) in hermetically closed metal drums, with a suitable lining if necessary. The drums shall not be filled beyond 90 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops; or
  - (c) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles shall not be filled beyond 90 per cent of their capacity. Such a package must not weigh more than 100 kg.

(2) Substances of 6°, (a) and (b), shall be packed in receptacles made of carbon steel or suitable alloy steel. The receptacles must be able to withstand a test pressure of 10 kg/cm<sup>2</sup>. The following kinds of receptacle shall be accepted:

- (a) cylinders with a capacity not exceeding 150 litres;
- (b) cylindrical receptacles equipped with rolling hoops and having a capacity of not less than 100 litres and not more than 1,000 litres.

At the test pressure, the stress in the metal at the most severely stressed point of the receptacle shall not exceed three-quarters of the yield stress. By "yield stress" is meant the stress at which a permanent elongation of 2°/00 (i.e. 0.2 per cent) of the gauge length on the test-piece has been produced. In addition, the material used for the receptacles must have adequate impact strength down to a temperature of -20°C.

The receptacles must be of seamless construction or welded. For welded receptacles, a steel of fully satisfactory weldability must be used. Welded receptacles are to be accepted only on condition that the manufacturer guarantees the workmanship of the welding and that the competent authority of the country of origin has given its approval.

The wall thickness of the receptacles must not be less than 3 mm.

Openings for filling and discharging receptacles shall be fitted with flap valves or needle-valves. Valves (cocks) of other types may however be accepted if they present equivalent guarantees of safety and have been approved in the country of origin. Nevertheless, whatever the type of valve adopted, its system of attachment shall be strong and such that its satisfactory condition can be verified easily before each filling.

Apart from a manhole, which if provided shall be closed by an effective closure, receptacles shall not be equipped with more than two openings, for filling and discharge.

Class 8

2805  
(contd)

Valves (cocks) shall be protected by caps having vents. Valves placed inside the neck of the receptacles and protected by a screw-threaded plug, and receptacles carried packed in protective cases, shall not require a cap.

Receptacles shall be subjected, under the supervision of an expert approved by the competent authority, to a hydraulic pressure test at an internal pressure of not less than 10 kg/cm<sup>2</sup> before being placed in service, and subsequently to the following periodic tests:

The pressure test shall be repeated every eight years and shall be accompanied by an internal inspection of the receptacles and a check of their equipment. In addition, the resistance of the receptacles to corrosion shall be checked by means of suitable instruments (e.g. by ultrasound), and the condition of the equipment verified, every two years.

Receptacles shall bear in clearly legible and durable characters:

- (a) the name of the substance in full, the name or mark of the maker and the manufacturer's identification number of the receptacle;
- (b) the tare of the receptacle, including fittings other than the protective cap;
- (c) the test pressure, the date (month, year) of the most recent test undergone and the stamp of the expert who carried out the test and inspections;
- (d) the capacity and permissible maximum load of the receptacle.

The permissible maximum weight shall be 0.84 kg per litre of capacity.

Class 8

2806

(1) Sulphur trioxide (9°) shall be packed:

- (a) in soldered receptacles made of black sheet-iron or tin-plate, or in hermetically closed bottles made of black sheet-iron, tin-plate or copper; or
- (b) in flame-sealed glass receptacles, or in hermetically closed receptacles made of porcelain, stoneware or similar materials; or
- (c) in steel drums which have been pressure-tested at  $1.5 \text{ kg/cm}^2$ .

(2) The receptacles referred to in (a) and (b) above shall be secured by incombustible and absorbent cushioning materials in packagings made of wood, black sheet-iron or tin-plate.

2807

Substances of 11° shall be packed:

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in hermetically closed metal drums, with a suitable lining if necessary. The drums shall not be filled beyond 95 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (c) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or

Class 8

- (d) in hermetically closed glass carboys, which shall be secured by absorbent cushioning material in a wooden case or in some other outer packaging of sufficient strength. The carboys shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. 2807 (contd)

Substances of 12° shall be packed: 2808

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, which must not contain more than 5 kg of substance each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in hermetically closed metal receptacles, with a suitable lining if necessary, which must not contain more than 15 kg of substance each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically closed metal drums, with a suitable lining if necessary. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. Such a package must not weigh more than 100 kg; or
- (e) in hermetically closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg;
- (f) zinc chloride may also be packed in hermetically closed bags, made of a suitable plastics material, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg.

Substances of 13° and 15° shall be packed: 2809

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, which must not contain more than 5 kg of substance each; however, glass receptacles

Class 8

2809  
(contd)

are not accepted for fluorides of 15°. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

- (b) in hermetically closed metal receptacles, with a lead lining if necessary, which must not contain more than 15 kg of substance each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically closed metal drums, with a lead lining if necessary. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. Such a package must not weigh more than 100 kg; or
- (e) in hermetically closed bags, made of a suitable plastics material, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (f) in hermetically closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg; or
- (g) in stout paper bags of four plies, lined with a hermetically closed bag made of a suitable plastics material. Such a package must not weigh more than 55 kg.

2810

(1) Bromine (14°) shall be packed in suitable receptacles containing not more than 7.5 kg of substance per receptacle.

(2) Bromine containing less than 0.005 per cent water, or between 0.005 per cent and 0.2 per cent water provided that in the latter case measures are taken to prevent corrosion of the lining of the receptacles, may also be carried in receptacles satisfying the following conditions:

- (a) the receptacles shall be made of steel and be equipped with a leak-proof lining made of lead or of some other material affording equivalent protection, and with hermetic closures; receptacles made of monel metal or nickel, or equipped with a nickel lining, shall also be permitted;

Class 8

2810  
(contd)

- (b) their capacity must not exceed 1250 litres;
- (c) the receptacles shall not be filled beyond 92 per cent of their capacity or beyond 2.86 kg per litre of capacity;
- (d) the receptacles shall be welded and designed for a pressure of not less than 21 kg/cm<sup>2</sup>.

The materials and workmanship must in other respects meet the requirements of marginals 2211 (1) and (2) (b). The initial test of unlined steel receptacles shall be subject to the provisions of marginals 2215 (1) and 2216 (1), A and B.

- (e) the closing devices must project as little as possible from the receptacle and be fitted with a protective cap. The closing devices and the cap shall be fitted with gaskets made of a material not capable of being attacked by bromine. The closing devices must be in the upper part of the receptacles, so that they can in no case be in permanent contact with the liquid;
- (f) the lead lining must be leak-proof and be not less than 3 mm thick. If some other material is used, it must provide protection equivalent to that provided by lead;
- (g) the receptacles must be provided with fittings enabling them to stand stably upright, and with lifting attachments (rings, flanges, etc.) at the top, which must be tested at twice the working load.

(3) Receptacles in conformity with (2) above shall, before being put into service, be subjected to a tightness test at a pressure of 2 kg/cm<sup>2</sup>. The tightness test shall be repeated every two years and shall be accompanied by an internal inspection of the receptacle and a check of its tare. This test and this inspection shall be supervised by an expert approved by the competent authority.

(4) The receptacles must bear, in clearly legible and indelible characters:

- (a) the name or mark of the maker and the number of the receptacle;
- (b) the word "Bromine";
- (c) the tare of the receptacle and its maximum weight when filled;
- (d) the date (month and year) of the last test undergone;
- (e) the stamp of the expert who carried out the test and the inspections.

(1) Substances of 21° (a) 1 shall be packed:

2811

- (a) in hermetically closed receptacles made of glass, porcelain, stone-ware or similar material, or of a suitable plastics material, which must not contain more than 5 kg of substance each. These receptacles

Class 8

2811  
(contd)

shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

- (b) in hermetically closed metal receptacles, with a suitable lining if necessary, which must not contain more than 15 kg of substance each. These receptacles shall be secured with cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically closed metal drums, with a suitable lining if necessary. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. Such a package must not weigh more than 100 kg; or
- (e) in hermetically closed bags, made of a suitable plastics material, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (f) in hermetically closed wooden casks of sufficient strength, with a suitable lining. Such a package must not weigh more than 250 kg; or
- (g) in stout paper bags of four plies, lined with a hermetically closed bag made of a suitable plastics material. Such a package must not weigh more than 55 kg; or
- (h) in jute bags rendered moisture-proof by a lining made of a suitable material, coated with bitumen, or in jute bags lined with a hermetically closed bag made of a suitable plastics material. Such a package must not weigh more than 55 kg.

(2) Substances of 21° (a) 2., (b), (c), (d) and (e) shall be packed:

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or



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- (b) in hermetically closed glass carboys, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The carboys shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or 2811 (contd)
- (c) in hermetically closed metal receptacles, with a suitable lining if necessary, of a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (d) in hermetically closed canisters made of a suitable metal, welded or hard-soldered, of a capacity not exceeding 60 litres and fitted with means of handling. The canisters shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
- (e) in hermetically closed metal drums, with a suitable lining if necessary. The drums shall not be filled beyond 95 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (f) in hermetically closed receptacles made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (g) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres, with walls of sufficient thickness, which shall be not less than 4 mm in the case of receptacles of 50 litres or over; the openings shall be closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles need have no protective packagings if the competent authority of the country of departure so allows. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg.

Substances of 22° shall be packed:

2812

- (a) in hermetically closed receptacles made of glass, porcelain, stone-ware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be

Class 8

- 2812  
(contd)
- filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in hermetically closed metal drums, with a suitable lining if necessary. The drums shall not be filled beyond 95 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops; or
  - (c) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. Receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
  - (d) in hermetically closed glass carboys, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The carboys shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg.
- 2813
- (1) Substances of 23° shall be packed:
- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, except those forwarded as a full load, shall be fitted with means of handling; or
  - (b) in hermetically closed metal receptacles, with a suitable lining if necessary, of a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
  - (c) in hermetically closed metal drums, with a suitable lining if necessary. Drums intended to hold substances of 23° (a) must satisfy the requirements of Appendix A.5. The drums shall not be filled beyond 95 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops.

Class 8

(2) Substances of 23° (b) may also be packed:

2813  
(contd)

- (a) in hermetically closed canisters made of a suitable metal, welded or hard-soldered, of a capacity not exceeding 60 litres and fitted with means of handling. The canisters shall not be filled beyond 95 per cent of their capacity. Such package must not weigh more than 75 kg; or
- (b) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres, with walls of sufficient thickness, which shall be not less than 4 mm in the case of receptacles of 50 litres or over; the openings shall be closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles need have no protective packaging if the competent authority of the country of departure so allows. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg.

(1) Substances of 31° (a) shall be packed:

2814

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, which must not contain more than 5 kg of substance each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or
- (b) in hermetically closed metal receptacles, with a suitable lining if necessary, which must not contain more than 15 kg of substance each. These receptacles shall be secured by cushioning materials in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 100 kg; or
- (c) in hermetically closed metal drums, with a suitable lining if necessary. If the drums, with their contents, weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (d) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. Such a package must not weigh more than 100 kg; or
- (e) in hermetically closed bags, made of a suitable plastics material, which shall be placed in a wooden case or in some other outer packaging of sufficient strength. Such a package must not weigh more than 75 kg; or

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- 2814 (contd) (f) in jute bags rendered moisture-proof by a lining made of a suitable material, coated with bitumen, or in jute bags lined with a hermetically closed bag made of a suitable plastics material. Such a package must not weigh more than 55 kg.

(2) Substances of 31° (a) in flakes or in powdered form may also be packed in stout paper bags of four plies, lined with a hermetically closed bag made of a suitable plastics material. Such a package must not weigh more than 55 kg.

(3) Sodium hydroxide of 31° (b) filled in a molten state shall be contained in steel drums with walls not less than 0.5 mm thick. The drums, with their contents, must not weigh more than 450 kg.

2815 Substances of 32° shall be packed:

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in hermetically closed metal receptacles, with a suitable lining if necessary, of a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (c) in hermetically closed canisters made of a suitable metal, welded or hard-soldered, of a capacity not exceeding 60 litres, and fitted with means of handling. The canisters shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
- (d) in hermetically closed metal drums, with a suitable lining if necessary. The drums shall not be filled beyond 95 per cent of their capacity. If, with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (e) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles shall not be filled beyond

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95 per cent of their capacity. Such a package must not weigh more than 100 kg; or

2815  
(contd)

- (f) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres and with walls of sufficient thickness, which shall be not less than 4 mm in the case of receptacles of 50 litres or over; the openings shall be closed by two plugs, one placed over the other, one of them being screw-threaded. These receptacles need have no protective packaging if the competent authority of the country of departure so allows. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (g) in hermetically closed cylindrical receptacles made of glass, porcelain, stoneware or similar material, of a capacity not exceeding 20 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
- (h) in hermetically closed glass carboys, which shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength, or be firmly fixed in iron or wicker hampers. The carboys shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg.

Storage batteries filled with alkaline solutions (33°) shall be made of metal and the upper part shall be so designed that the lye cannot splash out in dangerous quantities. The batteries shall be protected against short-circuits and be packed in a wooden packing case.

2816

(1) Hydrazine (34°) shall be packed:

2817

- (a) in hermetically closed glass receptacles, of a capacity not exceeding 5 litres, which shall be secured by suitable cushioning materials in boxes placed in a wooden case; or
- (b) in receptacles made of aluminium not less than 99.5 per cent pure or of stainless steel or of lead-lined iron; or
- (c) in receptacles, made of a suitable plastics material, fitted with a screw closure and having a capacity not exceeding 65 litres, placed singly in suitable protective packagings or secured in groups by suitable cushioning materials in suitable protective packagings; a package must not weigh more than 100 kg, or more than 50 kg if the protective packaging consists of a fibreboard case; or

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- 2817 (contd) (d) in drums, made of a suitable plastics material, of a capacity not exceeding 220 litres and with walls not less than 1.5 mm thick, placed singly in drums fitted with rolling hoops.

(2) No receptacle shall be filled beyond 93 per cent of its capacity. The receptacles under (b), (c) and (d) shall be pressure-tested at 1 kg/cm<sup>2</sup>.

2818 Substances of 35° shall be packed:

- (a) in hermetically closed receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, of a capacity not exceeding 5 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or
- (b) in hermetically closed metal receptacles, with a suitable lining if necessary, of a capacity not exceeding 15 litres. These receptacles shall be secured by absorbent cushioning materials in a wooden case or in some other outer packaging of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (c) in hermetically closed canisters made of a suitable metal, welded or hard-soldered, of a capacity not exceeding 60 litres, and fitted with means of handling. The canisters shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 75 kg; or
- (d) in hermetically closed metal drums, with a suitable lining if necessary. The drums shall not be filled beyond 95 per cent of their capacity. If with their contents, they weigh more than 275 kg, they shall be fitted with rolling hoops; or
- (e) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres. These receptacles shall be placed singly and tightly in a protective packaging with complete sides, made of paperboard or of some other material of sufficient strength. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg; or
- (f) in hermetically closed receptacles, made of a suitable plastics material, of a capacity not exceeding 60 litres, with walls of sufficient thickness, which shall be not less than 4 mm in the case

Class 8

of receptacles of 50 litres or over; the openings shall be closed by two plugs, one placed over the other, one of them being screw-threaded. (contd) 2818  
These receptacles need have no protective packaging if the competent authority of the country of departure so allows. The receptacles shall not be filled beyond 95 per cent of their capacity. Such a package must not weigh more than 100 kg.

(1) Sodium sulphide (36°) shall be packed: 2819

- (a) in lead-proof iron receptacles; or
- (b) in quantities not exceeding 5 kg, also in receptacles, made of glass or of a suitable plastics material, which shall be secured in strong wooden receptacles, glass receptacles being secured therein by cushioning materials.

(2) Sodium sulphide in solid form may also be enclosed in other leak-proof receptacles. If carried as a full load, it may also be packed:

- (a) in stout paper bags of five plies, so closed as to be leak-proof and lined with a bag made of a suitable plastics material; or
- (b) in bags made of a suitable plastics material equal in strength to the paper bags.

Packages made up of bags must not weigh more than 55 kg.

(1) Hypochlorite solutions (37°) shall be packed: 2820

- (a) in receptacles made of glass, porcelain, stoneware or similar material, or of a suitable plastics material, secured in protective packagings; fragile receptacles shall be secured therein by cushioning materials;

or

- (b) in metal drums, suitably lined.

(2) In the case of hypochlorite solutions of 37° (a), the receptacles or drums shall be so designed as to allow gases to escape, or shall be fitted with pressure-relief valves.

(1) Aqueous solutions of hydrogen peroxide containing more than 40 per cent but not more than 60 per cent hydrogen peroxide [41° (a)] shall be contained: 2821

- (a) in receptacles, which must be able to stand stably upright, made of aluminium not less than 99.5 per cent pure or of a special steel not liable to cause the hydrogen peroxide to decompose. The capacity of these receptacles must not exceed 200 litres; or

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2821  
(contd)

- (b) in receptacles, made of glass, porcelain, stoneware or a suitable plastics material, of a capacity not exceeding 20 litres. Each receptacle shall be secured by absorbent, incombustible and inert cushioning materials in a sheet-steel packaging with complete sides, lined with suitable materials. This packaging shall be placed in a wooden packing case with a sloping protective cover.

For closure and degree of filling, see under (3).

(2) Aqueous solutions of hydrogen peroxide containing more than 6 per cent but not more than 40 per cent hydrogen peroxide [41°(b)] shall be contained in receptacles made of glass, porcelain, stoneware, aluminium not less than 99.5 per cent pure, special steel not liable to cause the hydrogen peroxide to decompose, or a suitable plastics material.

Receptacles of a capacity not exceeding 3 litres shall be secured by cushioning materials in wooden cases; if the receptacles contain aqueous solutions of hydrogen peroxide containing more than 35 per cent hydrogen peroxide, the cushioning materials must be suitably fire-proofed. A package must not weigh more than 35 kg.

If the receptacles have a capacity of more than 3 litres they must satisfy the following conditions:

- (a) receptacles made of aluminium or of special steel must be able to stand stably upright. A package must not weigh more than 250 kg;
- (b) receptacles made of glass, porcelain, stoneware or a suitable plastics material shall be placed in suitable strong protective packagings which will keep them securely upright; the packagings shall be fitted with means of handling. Inner receptacles other than those made of a plastics material shall be secured in outer packagings by cushioning materials. Where receptacles contain aqueous solutions of hydrogen peroxide containing more than 35 per cent but not more than 40 per cent hydrogen peroxide, the cushioning materials shall be suitably fire-proofed. A package of this kind must not weigh more than 90 kg; however, it may weigh up to 110 kg if the protective packagings are, in addition, packed in a case or crate;
- (c) aqueous solutions of hydrogen peroxide containing more than 6 per cent but not more than 40 per cent hydrogen peroxide may also be contained, without protective packagings, in receptacles made of a suitable plastics material, provided that the thickness of the walls (including areas recessed for labelling) is not at any point less than 4 mm, the walls are protected by strong ribs, and the ends are reinforced. The receptacles shall be fitted with means of handling. The capacity must not exceed 60 litres.



## Class 8

For closure and degree of filling, see under (3).

2821  
(contd)

(3) Receptacles of a capacity not exceeding 3 litres may have a hermetic closure. In such cases the receptacles shall be filled with a weight of solution which, expressed in grammes, is equal to not more than two-thirds of the figure expressing the capacity of the receptacle in cm<sup>3</sup>.

Receptacles of a capacity exceeding 3 litres shall be fitted with a special closure preventing excess internal pressure, leakage of the liquid, and the entry of foreign matter into the receptacle. Where receptacles are packed separately, the outer packaging shall be fitted with a cover which, while protecting the closure, makes it possible to verify that the closure is directed upwards. These receptacles may not be filled beyond 95 per cent of their capacity.

### 3. Mixed packing

2822

(1) Substances grouped under the same item number may be included in the same package. The inner packagings shall conform to what is prescribed for each substance, and the outer packaging shall be that laid down for the substances of the item number in question.

(2) If smaller quantities are not prescribed in the section entitled "Packing of a single substance or of articles of the same kind" and no special conditions are laid down below, substances of this Class, in quantities not exceeding 6 kg in the case of solids or 3 litres in the case of liquids for all of the substances listed under the same item number or the same letter, may be enclosed in the same package either with substances of another item number or of another letter of the same Class, or with substances or articles belonging to other Classes (if mixed packing is likewise allowed in the case of such substances or articles), or with other goods, subject to the following special conditions.

The inner packagings must satisfy the general and special conditions of packing. In addition, the general provisions of marginals 2001 (5) and 2002 (6) and (7) must be observed.

Mixed packing of an acid substance with a basic substance in the same package is not allowed if both substances are contained in fragile receptacles.

A package must not weigh more than 150 kg, or more than 75 kg if it contains fragile receptacles.

## Class 8

2822  
(contd)Special conditions

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
1 <sup>o</sup> (a)	Oleum	3 litres	12 litres	Must not be packed together with chlorates, permanganates, solutions of hydrogen peroxide, perchlorates, peroxides or hydrazine. The limitation of 18 litres applies to sulphuric, nitric and hydrochloric acids, and mixed nitrating acids, for all of these substances. If the package contains an acid subject to a limitation of 12 litres, this limitation must be applied.
1 <sup>o</sup> (a), (b), (c)	Sulphuric acid other than oleum	3 litres	18 litres	
2 <sup>o</sup> (a)	Nitric acid containing more than 70% pure acid	3 litres	12 litres	Must not be packed together with formic acid, triethanolamine, aniline, xylidine, toluidine, chlorates, permanganates, inflammable liquids with a flash-point below 21° C, solutions of hydrogen peroxide, perchlorates, peroxides, hydrazine, glycerine, glycols. Only inert filling materials must be used.
2 <sup>o</sup> (b) and	Nitric acid containing not more than 70% pure acid	3 litres	18 litres	
3 <sup>o</sup>	Mixed nitrating acids	3 litres	18 litres	

## Class 8

2822  
(contd.)

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
4°	Perchloric acid	Mixed packing not allowed		
5°	Hydrochloric acid	5 litres	18 litres	Must not be packed together with chlorates, permanganates, perchlorates, peroxides (other than solutions of hydrogen peroxide).
6°	Solutions of hydrofluoric acid	1 litre	10 litres	
11°(a)	Disulphur dichloride	500 g	500 g	
11°(a)	Antimony pentachloride Chlorosulphonic chloride Sulphuryl acid Thionylchloride Titanium tetrachloride Stannic chloride	2.5 kg	5 kg	Must not be packed together with substances of 36° of Class 8 or with substances of Class 5.1; must be protected against penetration of moisture
12°	Antimony trichloride			
14°	Bromine			
	- in fragile receptacles	500 g	500 g	
	- in other receptacles	1 kg	3 kg	

## Class 8

2822  
(contd)

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
15 <sup>o</sup> (a)	Difluorides	5 kg	15 kg	Must not be packed together with substances of Classes 4.2, 4.3 and 5.1, or with nitric acid or mixed nitrating acids.
21 <sup>o</sup> (b)	Formic acid	5 litres	15 litres	Must not be packed together with chlorates, permanganates, solutions of hydrogen peroxide, nitric acid, mixed nitrating acids.
21 <sup>o</sup> (c)	Acetic acid	5 litres	15 litres	Must not be packed together with chlorates or permanganates.
34 <sup>o</sup>	Hydrazine	5.5 kg	5.5 kg	Must not be packed together with sulphuric acid, chlorosulphonic acid, nitric acid, mixed nitrating acids, chlorates, permanganates, sulphur, solutions of hydrogen peroxide, perchlorates and peroxides. Must be kept separate from caustic alkaline substances and strong oxidizing agents.

## Class 8

2822  
(contd)

Item No.	Description of substance	Maximum quantity		Special provisions
		per receptacle	per package	
36 <sup>o</sup>	Sodium sulphide containing not more than 70% Na <sub>2</sub> S	2.5 kg	15 kg	Must not be packed together with acid substances.
41 <sup>o</sup> (a)	Solutions of hydrogen peroxide containing more than 35% hydrogen peroxide	Mixed packing not allowed		
41 <sup>o</sup> (b)	Solutions of hydrogen peroxide containing more than 15% but not more than 35% hydrogen peroxide - in fragile receptacles - in other receptacles	1 litre 3 litres	3 litres 12 litres	Must not be packed together with sulphuric acid, chlorosulphonic acid, formic acid, nitric acid, mixed nitrating acids, triethanolamine, aniline, xylydine, toluidine, permanganates, inflammable liquids with a flash-point below 21°C, metallic peroxides, hydrazine.
	Solutions of hydrogen peroxide containing more than 6% but not more than 15% hydrogen peroxide	3 litres	12 litres	Only inorganic filling materials must be used.

Class 8

2823 4. Marking and danger labels on packages  
(see Appendix A.9)

Cases containing storage batteries [1° (f) and 33°] shall be legibly and indelibly marked: "Storage batteries". This inscription shall be in an official language of the country of departure and also, if that language is not English or French, or German, in English, French or German, unless otherwise provided in agreements, if any, concluded between the countries concerned in the transport operation.

2824 (1) Packages containing substances of 1° to 7°, 9°, 11°, 12°, 14°, 15°, 22°, 31°, 35° or 41° (a) shall bear a label conforming to model No. 5.

However, if liquids of 1° (a) to (e), 2° to 5°, 11°, 22° or 32° are packed in receptacles made of glass, porcelain, stoneware or similar material, of a capacity exceeding 5 litres, the packages shall bear two labels conforming to model No. 5.

(2) Packages containing fragile receptacles not visible from the outside shall bear labels conforming to model No. 9. If the fragile receptacles contain liquids, the packages shall in addition, except in the case of sealed ampoules, bear labels conforming to model No. 8; these labels shall be affixed high up on two opposite sides of cases or in an equivalent manner when other packagings are used.

(3) Every case containing storage batteries [1°(f) and 33°], and packages weighing not more than 75 kg containing substances of 1° to 7°, 9°, 11°, 21°, 31° to 35° and 37°, shall, in addition, bear on two opposite sides labels conforming to model No. 8.

(4) In the case of consignments carried as a full load, label No. 5, as prescribed under (1), need not be affixed to the packages if the vehicle bears the marking prescribed in Annex B, marginal 10 500.

2825 B. Particulars in the transport document

2826 (1) The description of the goods in the transport document must conform to one of the names underlined in marginal 2801. Where the name of the substance is not indicated in the case of 11°, 12°, 13°, 15°, 22° and 35°, the trade name must be used. The description of the goods must be underlined in red and followed by particulars of the Class, the item number (together with the letter, if any), and the initials "ADR" or "RID" [e.g. 8,1 (a), ADR].

(2) In the case of bromine containing 0.005 per cent to 0.2 per cent water, carried in receptacles in conformity with marginal 2810 (2), the following must be certified in the transport document: "Steps have been taken to prevent corrosion of the lining of the receptacles".

Class 8

2827-  
2834

C. Empty packagings

(1) Receptacles and tanks of 51° must be closed in the same manner and leak-proof in the same degree as though they were full.

2835

(2) The description of the goods in the transport document must be: "Empty receptacle, 8, 51, ADR (or RID)". This description must be underlined in red.

(3) Uncleaned receptacles which have contained substances of 6° or bromine (14°) shall bear a label conforming to model No. 5 (Appendix A.9). They must have no traces of acid or bromine on the outside.

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