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of Dangerous Goods

**REPORT OF THE SESSION
held in Bern from 17 to 21 March 1997**

Addendum 2

**CHAPTERS 6.1 AND 6.3 OF THE RESTRUCTURED RID/ADR
REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGINGS**

The text reproduced hereafter is that of document INF.6 submitted to the Joint Meeting at its spring 1997 session, and should be considered at the autumn session.

This text is based on chapters 6.1 and 6.3 of the Model Regulations annexed to the 10th revised edition of the UN Recommendations on the Transport of Dangerous Goods.

Square brackets mean that the text is that of the UN Recommendations and does not appear in the existing (1997) RID/ADR Appendices V/A.5; underlining means that the text is specific to the existing RID/ADR and does not appear in the UN Recommendations.

Chapter 6.1

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGINGS (OTHER THAN FOR DIVISION 6.2 SUBSTANCES)

NOTE: *For types of packagings, see definitions in section 1.2.1.*

6.1.1 General

[6.1.1.1 The requirements of this Chapter do not apply to:

- (a) packages containing radioactive material, which shall comply with the Regulations of the International Atomic Energy Agency (IAEA), except that :
 - (i) [packagings used for] radioactive material possessing other dangerous properties (subsidiary risks) shall [also comply with special provision 172] [also comply with requirements of this Chapter]; and
 - (ii) low specific activity (LSA) material and surface contaminated objects (SCO) may be carried in certain packagings defined in this Chapter provided that the supplementary provisions set out in the IAEA Regulations are also met.
- (b) gas cylinders;
- (c) packages whose net mass exceeds 400 kg;
- (d) packagings with a capacity exceeding 450 litres.]

6.1.1.2 The requirements for packagings in 6.1.4 are based on packagings currently used. In order to take into account progress in science and technology, there is no objection to the use of packagings having specifications different from those in 6.1.4, provided that they are equally effective, acceptable to the competent authority and able successfully to withstand the tests described in 6.1.1.3 and 6.1.5. Methods of testing other than those described in these Regulations [this chapter] are acceptable, provided they are equivalent.

6.1.1.3 Every packaging intended to contain liquids shall successfully undergo [a suitable leakproofness test, and be capable of meeting the appropriate test level indicated in 6.1.5.4.3] [the leakproofness test required in 6.1.6]:

- (a) before it is first used for transport;

- (b) after remanufacturing or reconditioning, before it is re-used for transport.

[For this test, packagings need not have their own closures fitted.]

[The inner receptacle of composite packagings may be tested without the outer packaging provided the test results are not affected]. This test is not necessary for:

- inner packagings of combination packagings;
- inner receptacles of composite packagings (glass, porcelain or stoneware) conforming to a type having successfully passed the drop test according to 6.1.5.3.1 (e);
- removable head packagings intended for substances with a viscosity at 23 °C exceeding 200 mm²/s;
- light gauge metal packagings conforming 6.1.4.21

6.1.2 Code for [designating] design types of packagings

6.1.2.1 The code number consists of:

- (a) an Arabic numeral indicating the kind of packaging, e.g. drum, jerrican, etc., followed by
- (b) a capital letter(s) in Latin characters indicating the nature of the material, e.g. steel, wood, etc., followed where necessary by
- (c) an Arabic numeral indicating the category of packaging within the kind to which the packaging belongs.

6.1.2.2 In the case of composite packagings, two capital letters in Latin characters are used [in sequence in the second position of the code]. The first indicates the material of the inner receptacle and the second that of the outer packaging.

6.1.2.3 In the case of combination packagings and infectious substances packagings marked in accordance with 6.3.1.1, only the code number for the outer packaging [shall be] is used.

6.1.2.4 The letters 'T', 'V' or 'W' may follow the packaging code. The letter 'T' signifies a salvage packaging conforming to the requirements of 6.1.5.1.11. The letter 'V' signifies a special packaging conforming to the requirements of 6.1.4.20.5. The letter 'W' signifies that the packaging, although of the same type indicated by the code, is manufactured to a specification different to that in 6.1.4 and is considered equivalent under the requirements of 6.1.1.2.

6.1.2.5 The following numerals shall be used for the kinds of packaging:

1. Drum
2. Wooden barrel
3. Jerrican
4. Box
5. Bag
6. Composite packaging
- [7. Pressure receptacle]
0. Light gauge metal packagings

6.1.2.6 The following capital letters shall be used for the types of material:

- A. Steel (all types and surface treatments)
- B. Aluminium
- C. Natural wood
- D. Plywood
- F. Reconstituted wood
- G. Fibreboard
- H. Plastics material, including expanded plastics material
- L. Textile
- M. Paper, multiwall
- N. Metal (other than steel or aluminium)
- P. Glass, porcelain or stoneware

6.1.2.7 The following table indicates the codes to be used for designating types of packagings depending on the kind of packagings, the material used for their construction and their category; it also refers to the paragraphs to be consulted for the appropriate requirements:

| Kind | Material | Category | Code | Paragraph |
|--------------|--------------|--------------------------|------|-----------|
| 1. Drums | A. Steel | non-removable head | 1A1 | 6.1.4.1 |
| | | removable head <u>*/</u> | 1A2 | |
| | B. Aluminium | non-removable head | 1B1 | 6.1.4.2 |
| | | removable head <u>*/</u> | 1B2 | |
| | D. Plywood | <u>*/</u> | 1D | 6.1.4.4 |
| | G. Fibre | <u>*/</u> | 1G | 6.1.4.6 |
| | H. Plastics | non-removable head | 1H1 | 6.1.4.7 |
| | | removable head <u>*/</u> | 1H2 | |
| | C. Wooden | bung type | 2C1 | 6.1.4.5 |
| | | removable head | 2C2 | |
| 3. Jerricans | A. Steel | non-removable head | 3A1 | 6.1.4.3 |
| | | removable head <u>*/</u> | 3A2 | |
| | B. Aluminium | non-removable head | 3B1 | 6.1.4.3 |
| | | removable head <u>*/</u> | 3B2 | |
| | H. Plastics | non-removable head | 3H1 | 6.1.4.7 |
| | | removable head <u>*/</u> | 3H2 | |
| 4. Boxes | A. Steel | ----- | 4A | 6.1.4.13 |
| | | with liner <u>*/</u> | | |

*/

These packagings can be used as outer packagings for combination packagings.

| Kind | Material | Category | Code | Paragraph |
|----------------------|-----------------------|--|------------|-----------|
| 4. Boxes (cont'd) | B. Aluminium | ----- with liner <u>*/</u> | 4B | 6.1.4.13 |
| | C. Natural wood | ordinary ----- with sift-proof walls <u>*/</u> | 4C1 4C2 | 6.1.4.8 |
| | D. Plywood | <u>*/</u> | 4D | 6.1.4.9 |
| | F. Reconstituted wood | <u>*/</u> | 4F | 6.1.4.10 |
| | G. Fibreboard | <u>*/</u> | 4G | 6.1.4.11 |
| | H. Plastics | expanded ----- solid <u>*/</u> | 4H1 4H2 | 6.1.4.12 |
| 5. Bags | H. Woven plastics | without inner liner or coating | 5H1 | 6.1.4.15 |
| | | ----- sift-proof | 5H2 | |
| | | ----- water resistant | 5H3 | |
| | H. Plastics film | | 5H4 | 6.1.4.16 |
| | L. Textile | without inner liner or coating | 5L1 | 6.1.4.14 |
| | | ----- sift-proof | 5L2 | |
| | | ----- water resistant | 5L3 | |

*/

These packagings can be used as outer packagings for combination packagings.

| Kind | Material | Category | Code | Paragraph |
|----------------------------|---|--------------------------------|------|-----------|
| 5. Bags (cont'd) | M. Paper | multiwall | 5M1 | 6.1.4.17 |
| | | multiwall, water resistant | 5M2 | |
| 6. Composite packagings | H. Plastics receptacle | in steel drum | 6HA1 | 6.1.4.18 |
| | | in steel crate */or box | 6HA2 | 6.1.4.18 |
| | | in aluminium drum | 6HB1 | 6.1.4.18 |
| | | in aluminium crate or box | 6HB2 | 6.1.4.18 |
| | | in wooden box | 6HC | 6.1.4.18 |
| | | in plywood drum | 6HD1 | 6.1.4.18 |
| | | in plywood box | 6HD2 | 6.1.4.18 |
| | | in fibre drum | 6HG1 | 6.1.4.18 |
| | | in fibreboard box | 6HG2 | 6.1.4.18 |
| | | in plastics drum | 6HH1 | 6.1.4.18 |
| | | in solid plastics box | 6HH2 | 6.1.4.18 |
| | P. Glass, porcelain or stoneware receptacle | in steel drum | 6PA1 | 6.1.4.19 |
| | | in steel crate or box | 6PA2 | 6.1.4.19 |
| | | in aluminium drum | 6PB1 | 6.1.4.19 |
| | | in aluminium crate or box | 6PB2 | 6.1.4.19 |
| | | in wooden box | 6PC | 6.1.4.19 |
| | | in plywood drum | 6PD1 | 6.1.4.19 |
| | | in wickerwork hamper | 6PD2 | 6.1.4.19 |
| | | in fibre drum | 6PG1 | 6.1.4.19 |
| | | in fibreboard box | 6PG2 | 6.1.4.19 |
| | | in expanded plastics packaging | 6PH1 | 6.1.4.19 |
| | | in solid plastics packaging | 6PH2 | 6.1.4.19 |
| Kind | Material | Category | Code | Paragraph |

*/

Crates are outer packagings with incomplete surfaces.

| Kind | Material | Category | Code | Paragraph |
|--|-----------------|---|------------------------------|-----------------|
| 0. <u>Light gauge metal packagings</u> | <u>A. Steel</u> | <u>non-removable head</u> ----- <u>removable head</u> | <u>0A1</u> <u>0A2</u> | <u>6.1.4.21</u> |

6.1.3 Marking

NOTE 1: The marking indicates that the packaging which bears it corresponds to a successfully tested design type and that it complies with the requirements of this Chapter which are related to the manufacture, but not to the use, of the packaging. In itself, therefore, the mark does not necessarily confirm that the packaging may be used for any substance: generally the type of packaging (e.g. steel drum), its maximum capacity and/or mass, and any special requirements are specified for each substance in Table A of Chapter 3.2.

NOTE 2: The marking is intended to be of assistance to packaging manufacturers, reconditioners, packaging users, carriers and regulatory authorities. In relation to the use of a new packaging, the original marking is a means for its manufacturer(s) to identify the type and to indicate those performance test regulations that have been met.

NOTE 3: The marking does not always provide full details of the test levels, etc., and these may need to be taken further into account, e.g. by reference to a test certificate, to test reports or to a register of successfully tested packagings. For example, a packaging having an X or Y marking may be used for substances to which a packing group having a lesser degree of danger has been assigned with the relevant maximum permissible value of the relative density^{1/} determined by taking into account the factor 1.5 or 2.25 indicated in the packaging test requirements in 6.1.5 as appropriate, i.e. Group I packaging tested for products of relative density 1.2 could be used as a Group II packaging for products of relative density 1.8 or a Group III packaging of relative density 2.7, provided of course that all the performance criteria can still be met with the higher relative density product.


6.1.3.1 Each packaging intended for use according to this Annex shall bear markings which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible. For packages with a gross mass of more than 30 kg, the markings or a duplicate thereof shall appear on the top or on a side of the packaging. Letters, numerals and symbols shall be at least 12 mm high, except for packagings of 30 litres or 30 kg capacity or less, when they shall be at least 6 mm in height and for packagings of 5 litres or 5 kg or less when they shall be of an appropriate size. The marking for new packagings manufactured in conformity with the approved design type consists of:

[The marking shall show:]

(a) The United Nations packaging symbol



^{1/} Relative density (d) is considered to be synonymous with Specific Gravity (SG) and is used throughout this text.

This shall not be used for any purpose other than certifying that a packaging complies with the relevant regulations in this chapter. For embossed metal packagings the capital letters "UN" may be applied as the symbol instead of the symbol  ;

(b) The symbol "ADR" (or "RID/ADR" for packagings approved for rail transport as well as road transport) instead of the symbol  ;

for composite packagings (glass, porcelain or stoneware) and light gauge metal packagings, and removable head drums and jerricans intended to contain liquids having a viscosity at 23 °C exceeding 200 mm²/s conforming to simplified conditions.

(c) The code designating the type of packaging according to 6.1.2.

(d) A code in two parts:

(i) a letter designating the packing group(s) for which the design type has been successfully tested:

X for Packing Groups I, II and III

Y for Packing Groups II and III

Z for Packing Group III only;

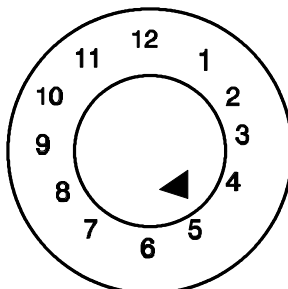
[(ii) the relative density, rounded off to the first decimal, for which the design type has been tested for packagings without inner packagings intended to contain liquids; this may be omitted when the relative density does not exceed 1.2. For packagings intended to contain solids or inner packagings, the maximum gross mass in kilograms;]

(ii) for packagings without inner packagings, intended to contain liquids, which have successfully passed the hydraulic pressure test, the relative density, rounded off to the first decimal of more than 1.2, for which the design type has been tested; this information may be omitted if the relative density is not more than 1.2; or

for packagings intended to contain solids or inner packagings and removable head packagings intended to contain substances having a viscosity at 23 °C of more than 200 mm²/s and for removable head light gauge metal packagings intended to contain substances of Class 3, [5° (c)], the maximum gross mass in kg.

(e) Either the letter "S" denoting that the packaging is intended [for the transport of] to contain liquids having a viscosity at 23 °C of more than 200 mm²/s, solids or inner packagings, and for light gauge metal packagings, removable head, intended for substances of Class 3, [5° (c)], or where a hydraulic pressure test has been uncessfully passed, [or, for packagings (other than combination packagings) intended to contain liquids, the hydraulic] the test pressure [which the packaging was shown to withstand in kPa] rounded down to the nearest 10 kPa;

- (f) The last two digits of the year during which the packaging was manufactured. Packagings of types LH and 3H shall also be appropriately marked with the month of manufacture; this may be marked on the packaging in a different place from the remainder of the marking. An appropriate method is:



- (g) The State authorizing the allocation of the mark */, indicated by the distinguishing sign for motor vehicles in international traffic;
- (h) The name of the manufacturer or other identification of the packaging specified by the competent authority.

6.1.3.2 Every reusable packaging liable to undergo a reconditioning process which might obliterate the packaging markings shall bear the marks indicated in 6.1.3.1 (a) to (e) in a permanent form. Marks are permanent if they are able to withstand the reconditioning process (e.g. embossed). For packagings other than metal drums of a capacity greater than 100 litres, these permanent marks may replace the corresponding durable markings prescribed in 6.1.3.1.

6.1.3.2.1 In addition to the durable markings prescribed in 6.1.3.1, every new metal drum of a capacity greater than 100 litres shall bear the marks described in 6.1.3.1 (a) to (e) on the bottom, with an indication of the nominal thickness of at least the metal used in the body (in mm, to 0.1 mm), in permanent form (e.g. embossed). When the nominal thickness of either head of a metal drum is thinner than that of the body, the nominal thicknesses of the top head, body, and bottom head shall be marked on the bottom in permanent form (e.g. embossed), for example '1.0-1.2-1.0' or '0.9-1.0-1.0'. Nominal thicknesses of metal shall be determined according to the appropriate ISO standard, for example ISO 3574:1986 for steel. The marks indicated in 6.1.3.1 (f) and (g) shall not be applied in a permanent form (e.g. embossed) except as provided in 6.1.3.2.3.

6.1.3.2.2 For remanufactured metal drums, if there is no change to the packaging type and no replacement or removal of integral structural components, the required markings need not be permanent (e.g. embossed). Every other remanufactured metal drum shall bear the markings in 6.1.3.1 (a) to (e) in a permanent form (e.g. embossed) on the top head or side.

6.1.3.2.3 Metal drums made from materials (e.g. stainless steel) designed to be reused repeatedly may bear the markings indicated in 6.1.3.1 (f) and (g) in a permanent form (e.g. embossed).

*/ Distinguishing sign for motor vehicles in international traffic prescribed in Vienna Convention on Road Traffic (1968).

6.1.3.2.4 The registration number is valid for only one design type or series of design types. Different surface treatments may fall within the same design type.

A "series of design types" means packagings of the same structural design, wall thickness, material and cross-section, which differ only in their lesser design heights from the design type approved.

The closures of receptacles shall be identifiable as those referred to in the test report.






[6.1.3.3 Marking shall be applied in the sequence of the subparagraphs in 6.1.3.1; for examples, see 6.1.3.6. Any additional markings authorized by a competent authority shall still enable the parts of the mark to be correctly identified with reference to 6.1.3.1.]

6.1.3.4 After reconditioning a packaging, the reconditioner shall apply to it, in sequence, a durable marking showing:

- (i) The State in which the reconditioning was carried out, indicated by the distinguishing sign */ for motor vehicles in international traffic;
- (j) The name or authorized symbol of the reconditioner;
- (k) The year of reconditioning; the letter "R"; and, for every packaging successfully passing the leakproofness test in 6.1.1.3, the additional letter "L".

6.1.3.5 When, after reconditioning, the markings required by 6.1.3.1 (a) to (d) no longer appear on the top head or the side of a metal drum, the reconditioner also shall apply them in a durable form followed by 6.1.3.4 (h), (i) and (j). These markings shall not identify a greater performance capability than that for which the original design type had been tested and marked.

6.1.3.6 Examples of markings for NEW packagings:

| | | | |
|---|-------------------------------|---|--|
|  | 4G/Y145/S/83 NL/VL823 | as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g) | For a new fibreboard box <u>intended to contain inner packagings or solids</u> |
|  | 1A1/Y1.4/I50/83 NL/VL[824] | as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g) | For a new steel drum to contain liquids |
|  | [1A2/Y150/S/83 NL/VL825] | as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g) | For a new steel drum to contain solids, or inner packagings] |
|  | [4HW/Y136/S/83 NL/VL826] | as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g) | For a new plastics box of equivalent specification] |
|  | 1A2/Y/100/91 USA/MM5 | as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g) | For a remanufactured steel drum to contain liquids |

*/ Distinguishing sign for motor vehicles in international traffic prescribed in Vienna Convention on Road Traffic (1968).



4AW/Y136/S/90 as in 6.1.3.1 (a), (b), (c), (d) and (e), For a steel box of equivalent
GB/MC123 as in 6.1.3.1 (f) and (g) specification

RID/ADR/OA1/100/83 as in 6.1.3.1 (a) (ii), (b), (c), (d) and (e) For new light gauge metal
 NL/VL/123 as in 6.1.3.1 (f) and (g) packagings, non-removable head

RID/ADR/OA2/Y20/S/83 as in 6.1.3.1 (a) (ii), (b), (c), (d) and (e) For new light gauge metal
 NL/VL/124 as in 6.1.3.1 (f) and (g) packagings, removable head,
 intended for liquids with a viscosity
 at 23 °C exceeding 200 mm²/s, and
 for substances of Class 3 [5°(c)]

RID/ADR/3H2/Z25/S/97.05 as in 6.1.3.1 (a) (ii), (b), (c), (d) and (e) For removable head packagings
 CH-3458 PLASTPAC AG as in 6.1.3.1 (f) and (g) intended to contain liquids having a
 viscosity at 23 °C exceeding
 200 mm²/s conforming to simplified
 conditions

6.1.3.7 Examples of markings for RECONDITIONED packagings



1A1/Y1.4/150/83 as in 6.1.3.1 (a), (b), (c), (d) and (e)
 NL/RB/[85] RL as in 6.1.3.4 (h), (i) and (j).



[1A2/Y150/S/83 as in 6.1.3.1 (a), (b), (c), (d), and (e)
 USA/RB/85 R as in 6.1.3.4 (h), (i) and (j).]

6.1.3.8 Example of marking for SALVAGE packagings:



1A2T/Y/300/94 as in 6.1.3.1 (a), (b), (c), (d) and (e)
 USA/abc as in 6.1.3.1 (f) and (g)

NOTE: The markings, for which examples are given in 6.1.3.6, 6.1.3.7 and 6.1.3.8 may be applied in a single line or in multiple lines provided the correct sequence is respected.

6.1.3.10 Packagings marked in accordance with 6.1.3.1 but which were approved in a State which is not a contracting party to the ADR may nevertheless be used for carriage under ADR. */

6.1.3.11 Certification

By affixing marking in accordance with 6.1.3.1, it is certified that mass-produced packagings correspond to the approved design type and that the requirements referred to in the approval have been met. **/

6.1.4 Requirements for packagings

6.1.4.1 Steel drums

- 1A1 non-removable head
- 1A2 removable head

6.1.4.1.1 Body and heads shall be constructed of steel sheet of a suitable type and of adequate thickness in relation to the capacity of the drum and to its intended use.

6.1.4.1.2 Body seams shall be welded on drums intended to contain more than 40 litres of liquid. Body seams shall be mechanically seamed or welded on drums intended to contain solids or 40 litres or less of liquids.

6.1.4.1.3 Head and chime seams[Chimes] shall be mechanically seamed or welded. [Separate reinforcing rings may be applied.]

6.1.4.1.4 [The body of a drum of a capacity greater than 60 litres shall, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops]. If there are [separate] rolling hoops they shall be fitted tightly on the body and so secured that they cannot shift. Rolling hoops shall not be spot welded.

6.1.4.1.5 Openings for filling, emptying and venting in the bodies or heads of non-removable head (1A1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1A2). Closures for openings in the bodies and heads of drums shall be so designed and applied that they will remain secure and leakproof [under normal conditions of transport]. [Closure flanges may be mechanically seamed or welded in place.] Gaskets or other sealing elements shall be used [with closures, unless the closure is inherently leakproof.]

6.1.4.1.6 Closure devices for removable head drums shall be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with all removable heads.

6.1.4.1.7 [If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments shall be applied. These coatings or treatments shall retain their protective properties under normal conditions of transport.] Internal coatings of lead, zinc, tin, laques and the like shall be tough and resilient and shall adhere to the steel at every point, including the closures.

*/ Note by the secretariat: To be transferred to Chapter 4.1?

**/ Note by the secretariat: See also NOTE 1 to 6.1.3.

6.1.4.1.8 Maximum capacity of drum: 450 litres

6.1.4.1.9 Maximum net mass: 400 kg.

6.1.4.2 *Aluminium drums*

1B1 non-removable head

1B2 removable head

6.1.4.2.1 Body and heads shall be constructed of aluminium at least 99% pure or of an aluminium base alloy. Material shall be of a suitable type and of adequate thickness in relation to the capacity of the drum and to its intended use.

[6.1.4.2.2 All seams shall be welded. Chime seams, if any, shall be reinforced by the application of separate reinforcing rings.

6.1.4.2.3 The body of a drum of a capacity greater than 60 litres shall, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If there are separate rolling hoops they shall be fitted tightly on the body and so secured that they cannot shift. Rolling hoops shall not be spot welded.

6.1.4.2.4 Openings for filling, emptying and venting in the bodies or heads of non-removable head (1B1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1B2). Closures for openings in the bodies and heads of drums shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges shall be welded in place so that the weld provides a leakproof seam. Gaskets or other sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.1.4.2.5 Closure devices for removable head drums shall be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with all removable heads.]

6.1.4.2.6 Maximum capacity of drum: 450 litres

6.1.4.2.7 Maximum net mass: 400 kg.

6.1.4.3 *Steel or aluminium jerricans*

3A1 steel, non-removable head

3A2 steel, removable head

3B1 aluminium, non-removable head

3B2 aluminium, removable head

6.1.4.3.1 Body and heads shall be constructed of steel sheet, of aluminium at least 99% pure or of an aluminium base alloy. Material shall be of a suitable type and of adequate thickness in relation to the capacity of the jerrican and to its intended use.

6.1.4.3.2 Chimes of steel jerricans shall be mechanically seamed or welded. Body seams of steel jerricans intended to contain more than 40 litres of liquid shall be welded. Body seams of steel jerricans intended to contain 40 litres or less shall be mechanically seamed or welded. For aluminium jerricans, all seams shall be welded. Chime seams, if any, shall be reinforced by the application of a separate reinforcing ring.

6.1.4.3.3 Openings in jerricans (3A1 and 3B1) shall not exceed 7 cm in diameter. Jerricans with larger openings are considered to be of the removable head type (3A2 and 3B2). Closures shall be so designed that they will remain secure and leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with closures, unless the closure is inherently leakproof.

[6.1.4.3.4 If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments shall be applied. These coatings or treatments shall retain their protective properties under normal conditions of transport.]

6.1.4.3.5 Maximum capacity of jerrican: 60 litres

6.1.4.3.6 Maximum net mass: 120 kg.

6.1.4.4 *Plywood drums*

1D

6.1.4.4.1 The wood used shall be well seasoned, commercially dry and free from any defect likely to lessen the effectiveness of the drum for the purpose intended. If a material other than plywood is used for the manufacture of the heads, it shall be of a quality equivalent to the plywood.

6.1.4.4.2 At least two-ply plywood shall be used for the body and at least three-ply plywood for the heads; the plies shall be firmly glued together by a water resistant adhesive with their grain crosswise.

6.1.4.4.3 The body and [heads of the drum and their joins] ends shall be of a design appropriate to the capacity of the drum and to its intended use.

6.1.4.4.4 In order to prevent sifting of the contents, lids shall be lined with kraft paper or some other equivalent material which shall be securely fastened to the lid and extend to the outside along its full circumference.

6.1.4.4.5 Maximum capacity of drum: 250 litres

6.1.4.4.6 Maximum net mass: 400 kg.

6.1.4.5 *Wooden barrels*

2C1 bung type

2C2 removable head

6.1.4.5.1 The wood used shall be of good quality, straight grained, well seasoned and free from knots, bark, rotten wood, sapwood or other defects likely to lessen the effectiveness of the barrel for the purpose intended.

6.1.4.5.2 The body and [heads] ends shall be of a design appropriate to the capacity of the barrel and to its intended use.

6.1.4.5.3 Staves and [heads] ends shall be sawn or cleft with the grain so that no annual ring extends over more than half the thickness of a stave or head.

6.1.4.5.4 Barrel hoops shall be of steel or iron of good quality. The hoops of 2C2 barrels may be of a suitable hardwood.

6.1.4.5.5 Wooden barrels 2C1: the diameter of the bunghole shall not exceed half the width of the stave in which it is placed.

6.1.4.5.6 Wooden barrels 2C2: heads shall fit tightly into the crozes.

6.1.4.5.7 Maximum capacity of barrel: 250 litres

6.1.4.5.8 Maximum net mass: 400 kg.

6.1.4.6 *Fibre drums*

1G

6.1.4.6.1 The body of the drum shall consist of multiple plies of heavy paper or fibreboard (without corrugations) firmly glued or laminated together and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

6.1.4.6.2 Heads shall be of natural wood, fibreboard, metal, plywood, plastics or other suitable material and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

6.1.4.6.3 The body and heads of the drum and their joins shall be of a design appropriate to the capacity of the drum and to its intended use.

6.1.4.6.4 The assembled packaging shall be sufficiently water resistant so as not to delaminate under normal conditions of transport.

6.1.4.6.5 Maximum capacity of drum: 450 litres

6.1.4.6.6 Maximum net mass: 400 kg.

6.1.4.7 *Plastics drums and jerricans*

1H1 drums, non-removable head

1H2 drums, removable head

3H1 jerricans, non-removable head

3H2 jerricans, removable head

6.1.4.7.1 [The packaging shall be manufactured from suitable plastics material and be of adequate strength in relation to its capacity and intended use. Except for recycled plastics material, no used material other than production residues or regrind from the same manufacturing process may be used. The packaging shall be adequately resistant to ageing and to degradation caused either by the substance contained or by ultra-violet radiation. [Any permeation of the substance contained in the package, or recycled plastics material used to produce new packaging, shall not constitute a danger under normal conditions of transport.]

The packagings shall be capable of withstanding the physical (in particular mechanical and thermal) and chemical stresses to be expected in carriage and of remaining leakproof. They shall be capable of withstanding dangerous substances and their vapours. They shall also have the necessary degree of resistance to ageing and ultra-violet radiation. Packagings shall be safe to handle.

6.1.4.7.2 Unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous substances [is] shall not exceed five years from the date of manufacture of the packaging except where a shorter period of use is prescribed because of the nature of the substance to be transported. [Packagings manufactured with such recycled plastics material shall be marked "REC" near the marks prescribed in 6.1.3.1.]

6.1.4.7.3 If protection against ultra-violet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if the carbon black content does not exceed 2% by mass or if the pigment content does not exceed 3% by mass; the content of inhibitors of ultra-violet radiation is not limited.

6.1.4.7.4 Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastics material provided that they do not adversely affect the chemical and physical properties of the material of the packaging. In such circumstances, retesting may be waived.

6.1.4.7.5 The wall thickness at every point of the packaging shall be appropriate to its capacity and intended use, taking into account however the stresses to which each point is liable to be exposed.

6.1.4.7.6 Openings for filling, emptying and venting in the bodies or heads of non-removable head drums (1H1) and jerricans (3H1) shall not exceed 7 cm in diameter. Drums and jerricans with larger openings are considered to be of the removable head type (1H2 and 3H2). [Closures for openings in the bodies or heads of drums and jerricans shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with closures unless the closure is inherently leakproof.]

6.1.4.7.7 [Closure devices for removable head drums and jerricans shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Gaskets shall be used with all removable heads unless the drum or jerrican design is such that, where the removable head is properly secured, the drum or jerrican is inherently leakproof.]

Removable head drums (1H2) and jerricans (3H2) used for solid substances shall remain leakproof at every point with respect to the filling substance. Closures of non-removable-head drums and jerricans (1H1, 3H1) shall either be of the screw-threaded type or be capable of being secured by a screw-threaded device or a device at least equally effective. Closure devices of removable-head drums and jerricans (1H2, 3H2) shall be so designed and fitted that they will remain secure and the drums or jerricans will remain leakproof under normal conditions of carriage.

Gaskets shall be used with all removable heads unless the drum or jerrican design is such that, where the removable head is properly secured, the drum or jerrican is inherently leakproof.

[6.1.4.7.8 Recycled plastics material may be used to produce new plastics drums and jerricans.]

6.1.4.7.9 Appropriate steps shall be taken to ensure that the plastics material to be used in the manufacture of the packaging is chemically compatible with the goods which the packaging is intended to contain.

Packagings shall be manufactured from suitable plastics material of known origin and specifications; their construction shall be fully appropriate to plastics materials and in accordance with technological developments. For new packagings, no used material other than production residues or regrind from the same manufacturing process may be used.

6.1.4.10.2 Other parts of the boxes may be made of other suitable material.

6.1.4.10.3 Boxes shall be securely assembled by means of suitable devices.

6.1.4.10.4 Maximum net mass: 400 kg.

6.1.4.11 *Fibreboard boxes*

4G

6.1.4.11.1 [Strong and] good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used, appropriate to the capacity of the box and to its intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m² (in accordance with the International standard - see ISO 535:1991). [It shall have proper bending qualities.] The fibreboard shall be capable of bending sufficiently without breaking. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, [surface breaks or undue bending] its surfaces tearing or bulging unduly. The fluting of corrugated fibreboard shall be firmly glued to the facings.

6.1.4.11.2 The ends of boxes may have a wooden frame or be entirely of wood or other suitable material. Reinforcements of wooden battens or other suitable material may be used.

6.1.4.11.3 [Manufacturing] joins [in the body] of boxes shall be taped, lapped and glued, or lapped [and stitched] with metal staples. Lapped joins shall have an appropriate overlap.

6.1.4.11.4 Where clos[ing] is effected by gluing or taping, a water resistant adhesive shall be used.

6.1.4.11.5 Boxes shall be designed so as to provide a good fit to the contents.

6.1.4.11.6 Maximum net mass: 400 kg.

6.1.4.12 *Plastics boxes*

4H1 expanded plastics boxes

4H2 solid plastics boxes

6.1.4.12.1 The box shall be manufactured from suitable plastics material and be of adequate strength in relation to its capacity and intended use. The box shall be adequately resistant to ageing and to degradation caused either by the substance contained or by ultra-violet radiation.

6.1.4.12.2 An expanded plastics box shall comprise two parts made of a moulded expanded plastics material, a bottom section containing cavities for the inner packagings and a top section covering and interlocking with the bottom section. The top and bottom sections shall be designed so that the inner packagings fit snugly. The closure cap for any inner packaging shall not be in contact with the inside of the top section of this box.

6.1.4.12.3 For dispatch, an expanded plastics box shall be closed with a self-adhesive tape having sufficient tensile strength to prevent the box from opening. The adhesive tape shall be weather resistant and its adhesive compatible with the expanded plastics material of the box. Other closing devices at least equally effective may be used.

6.1.4.12.4 For solid plastics boxes, protection against ultra-violet radiation, if required, shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be

- (a) paper bonded to the inner surface of the bag by a water resistant adhesive such as bitumen; or
- (b) plastics film bonded to the inner surface of the bag; or
- (c) one or more inner liners made of paper or plastics material.

6.1.4.14.3 Bags, water resistant, 5L3: to prevent the entry of moisture the bag shall be made waterproof, for example by the use of:

- (a) separate inner liners of water resistant paper (e.g. waxed kraft paper, tarred paper or plastics-coated kraft paper); or
- (b) plastics film bonded to the inner surface of the bag; or
- (c) one or more inner liners made of plastics material.

6.1.4.14.4 Maximum net mass: 50 kg.

6.1.4.15 *Woven plastics bags*

- 5H1 without inner liner or coating
- 5H2 sift-proof
- 5H3 water resistant

6.1.4.15.1 Bags shall be made from stretched tapes or monofilaments of a suitable plastics material. The strength of the material used and the construction of the bag shall be appropriate to the capacity of the bag and to its intended use. Bags may be fitted with an inner liner of plastics film or given a thin inner coating of plastic material.

6.1.4.15.2 If the fabric is woven flat, the bags shall be made by sewing or some other method ensuring closure of the bottom and one side. If the fabric is tubular, the bag shall be closed by sewing, weaving or some other equally strong method of closure.

6.1.4.15.3 Bags, sift-proof, 5H2: the bag shall be made sift-proof, for example by means of:

- (a) paper or a plastics film bonded to the inner surface of the bag; or
- (b) one or more separate inner liners made of paper or plastics material.

6.1.4.15.4 Bags, water resistant, 5H3: to prevent the entry of moisture, the bag shall be made waterproof, for example by means of:

- (a) separate inner liners of water resistant paper (e.g. waxed kraft paper, double-tarred kraft paper or plastics-coated kraft paper); or
- (b) plastics film bonded to the inner or outer surface of the bag; or
- (c) one or more inner plastics liners.

6.1.4.15.5 Maximum net mass: 50 kg.

6.1.4.16 *Plastics film bags*

5H4

6.1.4.16.1 Bags shall be made of a suitable plastics material. The strength of the material used and the construction of the bag shall be appropriate to the capacity of the bag and to its intended use. Joins and closures shall withstand pressures and impacts liable to occur under normal conditions of transport.

6.1.4.16.2 Maximum net mass: 50 kg.

6.1.4.17 *Paper bags*

5M1 multiwall

5M2 multiwall, water resistant

6.1.4.17.1 Bags shall be made of a suitable kraft paper or of an equivalent paper with at least three plies. The strength of the paper and the construction of the bags shall be appropriate to the capacity of the bag and to its intended use. Joins and closures shall be sift-proof.

6.1.4.17.2 Bags 5M2: to prevent the entry of moisture, a bag of four plies or more shall be made waterproof by the use of either a water resistant ply as one of the two outermost plies or a water resistant barrier made of a suitable protective material between the two outermost plies; a bag of three plies shall be made waterproof by the use of a water resistant ply as the outermost ply. Where there is a danger of the substance contained reacting with moisture or where it is packed damp, a waterproof ply or barrier, such as double-tarred kraft paper, plastics-coated kraft paper, plastics film bonded to the inner surface of the bag, or one or more inner plastics liners, shall also be placed next to the substance. Joins and closures shall be waterproof.

6.1.4.17.3 Maximum net mass: 50 kg.

6.1.4.18 *Composite packagings (plastics material)*

| | |
|------|---|
| 6HA1 | plastics receptacle with outer steel drum |
| 6HA2 | plastics receptacle with outer steel crate <i>*/</i> or box |
| 6HB1 | plastics receptacle with outer aluminium drum |
| 6HB2 | plastics receptacle with outer aluminium crate or box |
| 6HC | plastics receptacle with outer wooden box |
| 6HD1 | plastics receptacle with outer plywood drum |
| 6HD2 | plastics receptacle with outer plywood box |
| 6HG1 | plastics receptacle with outer fibre drum |
| 6HG2 | plastics receptacle with outer fibreboard box |
| 6HH1 | plastics receptacle with outer plastics drum |
| 6HH2 | plastics receptacle with outer solid plastics box |

6.1.4.18.1 Inner receptacle

6.1.4.18.1.1 The requirements of 6.1.4.7.1 and 6.1.4.7.4 to 6.1.4.7.7 apply to plastics inner receptacles.

6.1.4.18.1.2 The plastics inner receptacle shall fit snugly inside the outer packaging, which shall be free of any projection that might abrade the plastics material.

6.1.4.18.1.3 Maximum capacity of inner receptacle:

| | |
|------------------------------------|------------|
| 6HA1, 6HB1, 6HD1, 6HG1, 6HH1: | 250 litres |
| 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2: | 60 litres. |

**/ Crates are outer packagings with incomplete surfaces.*

6.1.4.18.1.4 Maximum net mass:

6HA1, 6HB1, 6HD1, 6HG1, 6HH1: 400 kg
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2: 75 kg.

6.1.4.18.2 Outer packaging

6.1.4.18.2.1 Plastics receptacle with outer steel or aluminium drum 6HA1 or 6HB1; the relevant requirements of 6.1.4.1 or 6.1.4.2, as appropriate, apply to the construction of the outer packaging.

6.1.4.18.2.2 Plastics receptacle with outer steel or aluminium crate or box 6HA2 or 6HB2; the relevant requirements of 6.1.4.13 apply to the construction of the outer packaging.

6.1.4.18.2.3 Plastics receptacle with outer wooden box 6HC; the relevant requirements of 6.1.4.8 apply to the construction of the outer packaging.

6.1.4.18.2.4 Plastics receptacle with outer plywood drum 6HD1; the relevant requirements of 6.1.4.4 apply to the construction of the outer packaging.

6.1.4.18.2.5 Plastics receptacle with outer plywood box 6HD2; the relevant requirements of 6.1.4.9 apply to the construction of the outer packaging.

6.1.4.18.2.6 Plastics receptacle with outer fibre drum 6HG1; the requirements of 6.1.4.6.1 to 6.1.4.6.4 apply to the construction of the outer packaging.

6.1.4.18.2.7 Plastics receptacle with outer fibreboard box 6HG2; the relevant requirements of 6.1.4.11 apply to the construction of the outer packaging.

6.1.4.18.2.8 Plastics receptacle with outer plastics drum 6HH1; the requirements of 6.1.4.7.1 and 6.1.4.7.3 to 6.1.4.7.7 apply to the construction of the outer packaging.

6.1.4.18.2.9 Plastics receptacles with outer solid plastics box (including corrugated plastics material) 6HH2; the requirements of 6.1.4.12.1 and 6.1.4.12.4 to 6.1.4.12.6 apply to the construction of the outer packaging.

6.1.4.19 *Composite packagings (glass, porcelain or stoneware)*

| | |
|------|---|
| 6PA1 | receptacle with outer steel drum |
| 6PA2 | receptacle with outer steel crate */ or box |
| 6PB1 | receptacle with outer aluminium drum |
| 6PB2 | receptacle with outer aluminium crate */ or box |
| 6PC | receptacle with outer wooden box |
| 6PD1 | receptacle with outer plywood drum |
| 6PD2 | receptacle with outer wickerwork hamper |
| 6PG1 | receptacle with outer fibre drum |
| 6PG2 | receptacle with outer fibreboard box |
| 6PH1 | receptacle with outer expanded plastics packaging |
| 6PH2 | receptacle with outer solid plastics packaging |

*/ Crates are outer packagings with incomplete surfaces.

6.1.4.19.1 Inner receptacle

6.1.4.19.1.1 Receptacles shall be of a suitable form (cylindrical or pear-shaped) and be made of good quality material free from any defect that could impair their strength. The walls shall be sufficiently thick at every point and free from internal stresses.

6.1.4.19.1.2 Screw-threaded plastics closures, ground glass stoppers or closures at least equally effective shall be used as closures for receptacles. Any part of the closure likely to come into contact with the contents of the receptacle shall be resistant to those contents. Care shall be taken to ensure that the closures are so fitted as to be leakproof and are suitably secured to prevent any loosening during transport. If vented closures are necessary, they [shall comply with 4.1.1.8] shall be leakproof.

6.1.4.19.1.3 The receptacle shall be firmly secured in the outer packaging by means of cushioning and/or absorbent materials.

6.1.4.19.1.4 Maximum capacity of receptacle: 60 litres

6.1.4.19.1.5 Maximum net mass: 75 kg.

6.1.4.19.2 Outer packaging

6.1.4.19.2.1 Receptacle with outer steel drum 6PA1; the relevant requirements of 6.1.4.1 apply to the construction of the outer packaging. The removable lid required for this type of packaging may nevertheless be in the form of a cap.

6.1.4.19.2.2 Receptacle with outer steel crate or box 6PA2; the relevant requirements of 6.1.4.13 apply to the construction of the outer packaging. For cylindrical receptacles the outer packaging shall, when upright, rise above the receptacle and its closure. If the crate surrounds a pear-shaped receptacle and is of matching shape, the outer packaging shall be fitted with a protective cover (cap).

6.1.4.19.2.3 Receptacle with outer aluminium drum 6PB1; the relevant requirements of 6.1.4.2 apply to the construction of the outer packaging.

6.1.4.19.2.4 Receptacle with outer aluminium crate or box 6PB2; the relevant requirements of 6.1.4.13 apply to the construction of the outer packaging.

6.1.4.19.2.5 Receptacle with outer wooden box 6PC; the relevant requirements of 6.1.4.8 apply to the construction of the outer packaging.

6.1.4.19.2.6 Receptacle with outer plywood drum 6PD1; the relevant requirements of 6.1.4.4 apply to the construction of the outer packaging.

6.1.4.19.2.7 Receptacle with outer wickerwork hamper 6PD2. The wickerwork hamper shall be properly made with material of good quality. It shall be fitted with a protective cover (cap) so as to prevent damage to the receptacle.

6.1.4.19.2.8 Receptacle with outer fibre drum 6PG1; the relevant requirements of 6.1.4.6.1 to 6.1.4.6.4 apply to the construction of the outer packaging.

6.1.4.19.2.9 Receptacle with outer fibreboard box 6PG2; the relevant requirements of 6.1.4.11 apply to the construction of the outer packaging.

6.1.4.19.2.10 Receptacle with outer expanded plastics or solid plastics packaging (6PH1 or 6PH2); the materials of both outer packagings shall meet the relevant requirements of 6.1.4.12. Solid plastics packaging shall be manufactured from high density polyethylene or some other comparable plastics material. The removable lid for this type of packaging may nevertheless be in the form of a cap.

6.1.4.20 Combination packagings

6.1.4.20.1 Inner packagings

The following may be used:

glass, porcelain or stoneware packagings with a maximum permissible capacity of 5 litres for liquids or 5 kg for solids;

plastics packagings with a maximum permissible capacity of 30 litres for liquids or 30 kg for solids;

metal packagings with a maximum permissible capacity of 40 litres for liquids or 40 kg for solids;

paper, textile, woven plastics or plastics-film sachets and bags with a maximum permissible capacity of 5 kg for solids in sachets and 50 kg in bags;

cans, folding cartons and boxes made of fibreboard or plastics with a maximum permissible capacity of 10 kg for solids;

other types of small packagings such as tubes with a maximum permissible capacity of 1 litre for liquids or 1 kg for solids.

6.1.4.20.2 Outer packaging

The following may be used:

steel drums, removable head (1A2);

aluminium drums, removable head (1B2);

steel jerricans, removable head (3A2);

aluminium removable head jerricans (3B2);

plywood drums (1D);

fibre drums (1G);

plastics drums, removable head (1H2);

plastics jerricans, removable head (3H2);

natural wood boxes (4C1, 4C2);

plywood boxes (4D);

reconstituted wood boxes (4F);

fibreboard boxes (4G);

plastics boxes (4H1, 4H2);

steel or aluminium boxes (4A, 4B).

6.1.4.20.3 Where several types of combination packaging having different types of inner packaging have been approved, the various inner packagings may also be assembled in a single outer packaging if the sender certifies that this package meets the test requirements.

6.1.4.20.4 */ Where an outer packaging of a combination packaging has been successfully tested with different types of inner packagings, a variety of such different inner packagings may also be assembled in this outer packaging. In addition, provided an equivalent level of performance is maintained, the following variations in inner packagings are allowed without further testing of the package:

- (a) Inner packagings of equivalent or smaller size may be used provided:
 - (i) The inner packagings are of similar design to the tested inner packagings (e.g. shape - round, rectangular, etc.);
 - (ii) The material of construction of the inner packagings (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested inner packaging;
 - (iii) The inner packagings have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);
 - (iv) Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings; and
 - (v) Inner packagings are oriented within the outer packaging in the same manner as in the tested package.
- (b) A lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in (a) above, may be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the inner packagings.

6.1.4.20.5 */ Articles or inner packagings of any type for solids or liquids may be assembled and transported without testing in an outer packaging under the following conditions:

- (a) The outer packaging shall have been successfully tested in accordance with 6.1.5.3 with fragile (e.g. glass) inner packagings containing liquids using the Packing Group I drop height.
- (b) The total combined gross mass of inner packagings shall not exceed one half the gross mass of inner packagings used for the drop test in (a) above.
- (c) The thickness of cushioning material between inner packagings and between inner packagings and the outside of the packaging shall not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single inner packaging was used in the original test, the thicknesses of cushioning between inner packagings shall not be less than the thickness of cushioning between the outside of the packaging and the inner packaging in the original test. If either fewer or smaller inner packagings are used (as compared to the inner packagings used in the drop test), sufficient additional cushioning material shall be used to take up void spaces.

*/ Note by the secretariat: Paragraphs 6.1.4.20.4 and 6.1.4.20.5 are included in section 6.1.5 of the UN Recommendations (6.1.5.1.6 and 6.1.5.1.7). However, they seem to deal with design and use of combination packagings rather than with testing.

- (d) The outer packaging shall have passed successfully the stacking test in 6.1.5.6 while empty. The total mass of identical packages shall be based on the combined mass of inner packagings used for the drop test in (a) above.
- (e) Inner packagings containing liquids shall be completely surrounded with a sufficient quantity of absorbent material to absorb the entire liquid contents of the inner packagings.
- (f) If the outer packaging is intended to contain inner packagings for liquids and is not leakproof, or is intended to contain inner packagings for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage shall be provided in the form of a leakproof liner, plastics bag or other equally efficient means of containment. For packagings containing liquids, the absorbent material required in (e) above shall be placed inside the means of containing the liquid contents.
- (g) Packagings shall be marked in accordance with 6.1.3 as having been tested to Packing Group I performance for combination packagings. The marked gross mass in kilograms shall be the sum of the mass of the outer packaging plus one half of the mass of the inner packaging(s) as used for the drop test referred to in (a) above. Such a package mark shall also contain a letter "V" as described in 6.1.2.4.

6.1.4.21 Light gauge metal packagings

OA1 non-removable-head

OA2 removable-head

- | | | |
|-------------------|---|------------------|
| <u>6.1.4.21.1</u> | <u>The sheet metal for the body and ends shall be of suitable steel, and of a gauge appropriate to the capacity and intended use of the packaging.</u> | |
| <u>6.1.4.21.2</u> | <u>The joints shall be welded, at least double-seamed by welting or produced by a method ensuring a similar degree of strength and leakproofness.</u> | |
| <u>6.1.4.21.3</u> | <u>Inner coatings of zinc, tin, lacquer, etc. shall be tough and shall adhere to the steel at every point, including the closures.</u> | |
| <u>6.1.4.21.4</u> | <u>Openings for filling, emptying and venting in the bodies or heads of non-removable head (OA1) packagings shall not exceed 7 cm in diameter. Packagings with larger openings shall be considered to be of the removable-head type (OA2).</u> | |
| <u>6.1.4.21.5</u> | <u>The closures of non-removable-head packagings (OA1) shall either be of the screw-threaded type or be capable of being secured by a screwable device or a device at least equally effective. The closures of removable-head packagings (OA2) shall be so designed and fitted that they stay firmly closed and the packagings remain leakproof in normal conditions of carriage.</u> | |
| <u>6.1.4.21.6</u> | <u>Maximum capacity of packagings:</u> | <u>40 litres</u> |
| <u>6.1.4.21.7</u> | <u>Maximum net mass:</u> | <u>50 kg.</u> |

6.1.5 Test requirements for packagings**6.1.5.1 Performance and frequency of tests**

6.1.5.1.1 The design type of each packaging shall be tested as provided in 6.1.5 in accordance with procedures established by the competent authority or by a body designated by that authority.

6.1.5.1.2 [Tests shall be successfully performed on each packaging design type before such packaging is used]. Tests in accordance with 6.1.5 shall be carried out again after any modification of the design type. In the latter event a new approval of the design type is not required .A packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes packagings which differ from the design type only in their lesser design height.

6.1.5.1.3 Tests shall be repeated on production samples at intervals established by the competent authority. For such tests on paper or fibreboard packagings, preparation at ambient conditions is considered equivalent to the requirements of 6.1.5.2.3.

6.1.5.1.4 [Tests shall also be repeated after each modification which alters the design, material or manner of construction of a packaging.]

6.1.5.1.5 The competent authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and packagings such as drums, bags and boxes which are produced with small reductions in external dimension(s).

6.1.5.1.6 Combination packagings shall be tested in accordance with the provisions applicable to the outer packaging.

6.1.5.1.7 During design-type tests of combination packagings, approval may at the same time be given for packagings:

- (a) containing inner packagings of less volume;
- (b) having a lower net mass than that of the design type tested.

6.1.5.1.8 The competent authority may at any time require proof, by tests in accordance with this section, that serially-produced packagings meet the requirements of the design type tests. For such tests on paper or fibreboard packagings, preparation at ambient conditions shall be considered equivalent to the requirements of 6.1.5.2.3. For verification purposes the authorized testing body shall keep a record of the materials used, through materials testing or by retaining samples or pieces of the materials.

6.1.5.1.9 If [an inner treatment or] coating is required for safety reasons, it shall retain its protective properties even after the tests.

6.1.5.1.10 Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

6.1.5.1.11 Salvage packagings

Salvage packagings (see 6.1.3.8) shall be tested and marked in accordance with the provisions applicable to Packing Group II packagings intended for the transport of solids or inner packagings, except as follows:

- (a) The test substance used in performing the tests shall be water, and the packagings shall be filled to not less than 98% of their maximum capacity. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass so long as they are placed so that the test results are not affected. Alternatively, in performing the drop test, the drop height may be varied in accordance with 6.1.5.3.4(b).
- (b) Packagings shall, in addition, have been successfully subjected to the leakproofness test at 30 kPa, with the results of this test reflected in the test report required by 6.1.5.10; and
- (c) Packagings shall be marked with the letter 'T' as described in 6.1.2.4.

6.1.5.2 Preparation of packagings for testing

6.1.5.2.1 Tests shall be carried out on packagings prepared as for transport including, with respect to combination packagings, the inner packagings used. Inner or single receptacles or packagings shall be filled to not less than 98% of their maximum capacity for liquids or 95% for solids. For combination packagings where the inner packaging is designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The substances or articles to be transported in the packagings may be replaced by other substances or articles except where this would invalidate the results of the tests. For solids, when another substance is used it shall have the same physical characteristics (mass, grain size, etc.) as the substance to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected. Suitable mixtures of powdery solids, such as polyethylene or PVC powder with sawdust, fine sand, etc., may be used as a substitute filling substance for substances having a viscosity in excess of 2680 mm²/s at 23 °C.

6.1.5.2.2 In the drop tests for liquids, when another substance is used, it shall be of similar relative density and viscosity to those of the substance being transported. Water may also be used for the liquid drop test under the conditions in 6.1.5.3.4.

6.1.5.2.3 Paper or fibreboard packagings shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h.). There are three options, one of which shall be chosen. The preferred atmosphere is 23 ± 2°C and 50% ± 2% r.h. The two other options are 20 ± 2°C and 65% ± 2% r.h. or 27 ± 2°C and 65% ± 2% r.h.

NOTE: *Average values shall fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to ± 5% relative humidity without significant impairment of test reproducibility.*

6.1.5.2.4 Bung-type barrels made of natural wood shall be left filled with water for at least 24 hours before the tests.

[6.1.5.2.5 Additional steps shall be taken to ascertain that the plastics material used in the manufacture of plastics drums, plastics jerricans and composite packagings (plastics material) intended to contain liquids complies with the requirements in 6.1.1.2, 6.1.4.7.1 and 6.1.4.7.4. This may be done, for example, by submitting sample receptacles or packagings to a preliminary test extending over a long period, for example six months, during which the samples would remain filled with the substances they are intended to contain, and after which the samples shall be submitted to the applicable tests listed in 6.1.5.3, 6.1.5.4, 6.1.5.5 and 6.1.5.6. For substances which may cause stress-cracking or weakening in plastics drums or jerricans, the sample, filled with the substance or another substance that is known to have at least as severe a stress-cracking influence on the plastics materials in question, shall be subjected to a superimposed load equivalent to the total mass of identical packages which might be stacked on it during transport. The minimum height of the stack, including the test sample which shall be considered, is 3 metres.]

6.1.5.2.5 To check that their chemical compatibility with the liquids is sufficient, plastics drums and jerricans in accordance with 6.1.4.7 and if necessary composite packagings (plastics material) in accordance with 6.1.4.18 shall be subjected to storage at ambient temperature for six months, during which time the test samples shall be kept filled with the goods they are intended to carry.

For the first and last 24 hours of storage, the test samples shall be placed with the closure downwards. However, packagings fitted with a vent shall be so placed on each occasion for five minutes only. After this storage the test samples shall undergo the tests prescribed in 6.1.5.3 to 6.1.5.6.

When it is known that the strength properties of the plastics material of the inner receptacles of composite packagings (plastics material) are not significantly altered by the action of the filling substance, it shall not be necessary to check that the chemical compatibility is sufficient.

A significant alteration in strength properties means:

- (a) distinct embrittlement; or
- (b) a considerable decrease in elasticity, unless related to a not less than proportionate increase in the elongation under load.

Where the behaviour of the plastics material has been established by other means, the above compatibility test may be dispensed with. Such procedures shall be at least equivalent to the above compatibility test and be recognized by the competent authority.

NOTE: For plastics drums and jerricans and composite packagings (plastics material) made of high molecular mass polyethylene, see also 6.1.5.2.6 below.

6.1.5.2.6 For high molecular mass polyethylene drums and jerricans in accordance with 6.1.4.7 and if necessary composite packagings of high molecular mass polyethylene in accordance with 6.1.4.18, conforming to the following specifications:

- relative density at 23 °C after thermal conditioning for one hour at 100 °C ≥ 0.940 , in accordance with ISO Standard 1183,
- melt flow rate at 190 °C/21.6 kg load ≤ 12 g/10 min. in accordance with ISO Standard 1133,

chemical compatibility with the liquids listed in 6.1.7.2 may be verified as follows with standard liquids (see 6.1.7.1)

The sufficient chemical compatibility of these packagings may be verified by storage for three weeks at 40 °C with the appropriate standard liquid; where this standard liquid is water, proof of chemical compatibility is not required.

For the first and last 24 hours of storage, the test samples shall be placed with the closure downwards. However, packagings fitted with a vent shall be so placed on each occasion for five minutes only. After this storage, the test samples shall undergo the tests prescribed in 6.1.5.3 to 6.1.5.6.

When a packaging design-type has satisfied the approval tests with a standard liquid, the comparable filling substances listed in 6.1.7.2 may be accepted for carriage without further testing, subject to the following conditions:

the relative densities of the filling substances shall not exceed that used to determine the height for the drop test and the mass for the stacking test;

the vapour pressures of the filling substances at 50 °C or 55 °C shall not exceed that used to determine the pressure for the internal pressure test.

The compatibility test for tert-Butyl hydroperoxide with more than 40% peroxide content of 3° (b), 5° (b) and 9° (b) and peracetic acid of 5° (b), 7° (b) and 9° (b) of Class 5.2, shall not be carried out using standard liquids. For these substances, proof of sufficient chemical compatibility of the test samples shall be provided during a storage period of six months at ambient temperature with the substances they are intended to carry.

6.1.5.2.7 For drums and jerricans conforming to 6.1.4.7, and where necessary composite packagings conforming to 6.1.4.18, made of high molecular mass polyethylene, which have passed the test in paragraph 6.1.5.2.6, filling substances other than those listed in 6.1.7.2 may also be approved. Such approval shall be based on laboratory tests proving that the effect of such filling substances on the test specimens is less than that of the standard liquids. The processes of deterioration to be taken into account shall be the following: softening through swelling, cracking under stress and molecular degradation. The same conditions as those set out in 6.1.5.2.6 above shall apply with respect to relative density and vapour pressure.

6.1.5.2.8 Provided that the strength properties of the plastics inner packagings of a combination packaging are not significantly altered by the action of the filling substance, proof of chemical compatibility is not necessary. A significant alteration in strength properties means:

- (a) distinct embrittlement;
- (b) a considerable decrease in elasticity, unless related to a not less than proportionate increase in elastic elongation.

6.1.5.3 *Drop test* */

6.1.5.3.1 Number of test samples (per design type and manufacturer) and drop orientation.

For other than flat drops the centre of gravity shall be vertically over the point of impact.

Where more than one orientation is possible for a given drop test, the orientation most likely to result in failure of the packaging shall be used.

**/ See ISO Standard 2248.*

| Packaging | No. of test samples | Drop orientation |
|---|---|---|
| a) Steel drums Aluminium drums Steel jerricans Aluminium jerricans Plywood drums Wooden barrels Fibre drums Plastics drums and jerricans Composite packagings which are in the shape of a drum <u>Light gauge metal packagings</u> ----- | Six (three for each drop) ----- | First drop (using three samples): the packaging shall strike the target diagonally on the chime or, if the packaging has no chime, on a circumferential seam or an edge. Second drop (using the other three samples): the packaging shall strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body ----- |
| b) Boxes of natural wood Plywood boxes Reconstituted wood boxes Fibreboard boxes Plastics boxes Steel or aluminium boxes Composite packagings which are in the shape of a box ----- | Five (one for each drop) ----- | First drop: flat on the bottom Second drop: flat on the top Third drop: flat on the long side Fourth drop: flat on the short side Fifth drop: on a corner ----- |
| c) <u>Textile bags</u> <u>Paper bags</u> ----- | <u>Three</u> <u>(three drops per bag)</u> ----- | <u>First drop: flat on a face of the bag</u> <u>Second drop: on an end of the bag</u> ----- |
| d) <u>Woven plastics bags</u> <u>Plastics film bags</u> ----- | <u>Three</u> <u>(two drops per bag)</u> ----- | <u>First drop: flat on a wide face</u> <u>Second drop: flat on a narrow face</u> <u>Third drop: on the end of the bag</u> ----- |
| e) <u>Composite packagings (glass, stoneware or porcelain) and which are in the shape of a drum or box</u> ----- | <u>Three</u> <u>(one for each drop)</u> ----- | <u>Diagonally on the bottom chime, or, if there is no chime, on a circumferential seam or the bottom edge</u> ----- |

6.1.5.3.2 Special preparation of test samples for the drop test

The temperature of the test sample and its contents shall be reduced to -18°C or lower for the following packagings:

- (a) plastics drums (see 6.1.4.7);
- (b) plastics jerricans (see 6.1.4.7);
- (c) plastics boxes other than expanded polystyrene boxes (see 6.1.4.12);
- (d) composite packagings (plastics material) (see 6.1.4.18) and;
- (e) combination packagings with plastics inner packagings, other than plastics bags intended to contain solids or articles.

Where test samples are prepared in this way, the conditioning in 6.1.5.2.3 may be waived. Test liquids shall be kept in the liquid state by the addition of anti-freeze if necessary.

6.1.5.3.3 Target

The target shall be a rigid, non-resilient, flat and horizontal surface.

6.1.5.3.4 Drop height

For solids and liquids, if the test is performed with the solid or liquid to be carried or with another substance having essentially the same physical characteristics:

| Packing Group I | Packing Group II | Packing Group III |
|-----------------|------------------|-------------------|
| 1.8 m | 1.2 m | 0.8 m |

For liquids if the test is performed with water:

- (a) where the substances to be transported have a relative density not exceeding 1.2:

| Packing Group I | Packing Group II | Packing Group III |
|-----------------|------------------|-------------------|
| 1.8 m | 1.2 m | 0.8 m |

- (b) where the substances to be transported have a relative density exceeding 1.2, the drop height shall be calculated on the basis of the relative density (d) of the substance to be carried, rounded up to the first decimal, as follows:

| Packing Group I | Packing Group II | Packing Group III |
|--------------------|--------------------|---------------------|
| $d \times 1.5$ (m) | $d \times 1.0$ (m) | $d \times 0.67$ (m) |

- (c) for light-gauge metal packagings intended for the carriage of substances having a viscosity at 23 °C greater than 200 mm²/s (corresponding to a flow time of 30 seconds with an ISO flow cup having a jet orifice of 6 mm diameter in accordance with ISO Standard 2431-1980), and for substances of Class 3, 5° (c).

- (i) if the relative density does not exceed 1.2:

| <u>Packing group II</u> | <u>Packing group III</u> |
|--------------------------------|---------------------------------|
| 0.6 m | 0.4 m |

- (ii) where the substances to be carried have a relative density (d) exceeding 1.2 the drop height shall be calculated on the basis of the relative density (d) of the substance to be carried, rounded up to the first decimal place, as follows:

| <u>Packing group II</u> | <u>Packing group III</u> |
|--------------------------------|---------------------------------|
| $d \times 0.5 \text{ m}$ | $d \times 0.33 \text{ m}$ |

If the test is performed with the substance to be carried or with a liquid of at least equal relative density:

| <u>Packing group I</u> | <u>Packing group II</u> | <u>Packing group III</u> |
|-------------------------------|--------------------------------|---------------------------------|
| <u>1.8 m</u> | <u>1.2 m</u> | <u>0.8 m</u> |

6.1.5.3.5 Criteria for passing the test:

6.1.5.3.5.1 Each packaging containing liquid shall be leakproof when equilibrium has been reached between the internal and external pressures, except for inner packagings of combination packagings when it is not necessary that the pressures be equalized.

6.1.5.3.5.2 Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle (e.g. a plastics bag), even if the closure is no longer sift-proof.

6.1.5.3.5.3 The packaging or outer packaging of a composite or combination packaging shall not exhibit any damage liable to affect safety during transport. There shall be no leakage of the filling substance from the inner receptacle or inner packaging(s).

6.1.5.3.5.4 Neither the outermost ply of a bag nor an outer packaging may exhibit any damage liable to affect safety during transport.

6.1.5.3.5.5 A slight discharge from the closure(s) upon impact is not considered to be a failure of the packaging provided that no further leakage occurs.

6.1.5.3.5.6 No rupture is permitted in packagings for goods of Class 1 which would permit the spillage of loose explosive substances or articles from the outer packaging.

6.1.5.4 Leakproofness test

The leakproofness test shall be performed on all types of packagings intended to contain liquids; however, this test is not required for

- inner packagings of combination packagings.
- inner receptacles of composite packagings (glass, porcelain or stoneware) conforming to a type having successfully passed the drop test prescribed in 6.1.5.3.1 (e);
- removable head packagings intended for substance with a viscosity at 23 °C exceeding 200 mm²/s;
- light gauge metal packagings, removable head, intended for substances of Class 3, [5° (c)].

6.1.5.4.1 *Number of test samples:* Three test samples per design type and manufacturer.

6.1.5.4.2 Special preparation of test samples for the test:

Test samples shall be pierced for entry of the compressed air at a neutral point, so as also to test the tightness of the closure. Vented closures of packagings shall be replaced by non-vented closures.

6.1.5.4.3 Test method and pressure to be applied: the packagings including their closures shall be restrained under water for 5 minutes while an internal air pressure is applied, the method of restraint shall not affect the results of the test.

The air pressure (gauge) to be applied shall be:

| Packing Group I | Packing Group II | Packing Group III |
|-----------------------------------|-----------------------------------|-----------------------------------|
| Not less than 30 kPa (0.3 bar) | Not less than 20 kPa (0.2 bar) | Not less than 20 kPa (0.2 bar) |

Other methods at least equally effective may be used.

6.1.5.4.4 Criterion for passing the test: there shall be no leakage.

6.1.5.5 *Internal pressure (hydraulic) test*

6.1.5.5.1 The hydraulic pressure test shall be carried out on all types of steel, aluminium and plastics packagings, and on all composite packagings intended to contain liquids. However, this test is not required for:

- inner packagings of combination packagings;
- inner receptacles of composite packagings (glass, porcelain or stoneware), conforming to a type having successfully passed the drop test of 6.1.5.3.1 (e);

- removable head packagings intended for substance with a viscosity at 23 °C exceeding 200 mm²/s;
- light gauge metal packagings, removable head, intended for substances of Class 3, [5° (c)].

6.1.5.5.2 Number of test samples: three test samples per design type and manufacturer.

6.1.5.5.3 Special preparation of packagings for testing: either vented closures shall be replaced by similar non-vented closures or the vent shall be sealed.

6.1.5.5.4 Test method and pressure to be applied: metal packagings and composite packagings (glass, porcelain or stoneware) including their closures shall be subjected to the test pressure for 5 minutes. Plastics packagings and composite packagings (plastics material) including their closures shall be subjected to the test pressure for 30 minutes. This pressure is the one to be included in the marking required by 6.1.3.1 (d). The manner in which the packagings are supported shall not invalidate the test. The test pressure shall be applied continuously and evenly; it shall be kept constant throughout the test period. The hydraulic pressure (gauge) applied, as determined by any one of the following methods, shall be:

- (a) not less than the total gauge pressure measured in the packaging (i.e. the vapour pressure of the filling substance and the partial pressure of the air or other inert gases, minus 100 kPa) at 55°C, multiplied by a safety factor of 1.5; this total gauge pressure shall be determined on the basis of a maximum degree of filling in accordance with [4.1.3.1 (4)] and a filling temperature of 15°C;
- (b) not less than 1.75 times the vapour pressure at 50°C of the substance to be transported, minus 100 kPa but with a minimum test pressure of 100 kPa;
- (c) not less than 1.5 times the vapour pressure at 55°C of the substance to be transported, minus 100 kPa but with a minimum test pressure of 100 kPa.

6.1.5.5.5 In addition, packagings intended to contain substances of Packing Group I shall be tested to a minimum test pressure of 250 kPa (gauge) for a test period of 5 or 30 minutes depending upon the material of construction of the packaging.

6.1.5.5.6 The special requirements for air transport, including minimum test pressures, may not be covered in 6.1.5.5.4.

6.1.5.5.7 Criterion for passing the test: no packaging may leak.

6.1.5.6 *Stacking test*

All design types of packagings other than bags and non-stackable composite packagings (glass, porcelain, or stoneware) conforming to a type having successfully passed the drop test prescribed in 6.1.5.3.1 (e) shall be subject to a stacking test.

6.1.5.6.1 Number of test samples: three test samples per design type and manufacturer.

6.1.5.6.2 Test method: the test sample shall be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport; where the contents of the test sample are non-dangerous liquids with relative density different from that of the liquid to be transported, the force shall be calculated in relation to the latter. The

minimum height of the stack including the test sample shall be 3 metres. The duration of the test shall be 24 hours except that plastics drums, jerricans, and composite packagings 6HH1 and 6HH2 intended for liquids shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40°C.

For the test in accordance with 6.1.5.2.5, the original filling substance shall be used. For the test in accordance with 6.1.5.2.6, a stacking test shall be carried out with a standard liquid.

Where the contents of the test samples are non-dangerous liquids with relative density different from that of the liquid to be carried, the force shall be calculated in relation to the latter.

6.1.5.6.3 Criterion for passing the test: no test sample may leak. In composite packagings or combination packagings, there shall be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages. [Plastics packagings shall be cooled to ambient temperature before the assessment.]

Stacking stability shall be considered sufficient when, after the stacking test, and in the case of plastics packagings, after cooling to ambient temperature, two filled packagings of the same type placed on the test sample maintain their position for one hour.

6.1.5.7. *Cooperage test for bung type wooden barrels*

6.1.5.7.1 Number of samples: one barrel per design type and manufacturer.

6.1.5.7.2 Method of testing: remove all hoops above the bilge of an empty barrel at least two days old.

6.1.5.7.3 *Criterion for passing test:* the diameter of the cross section of the upper part of the barrel shall not increase by more than 10 %.

6.1.5.8 Supplementary permeability test for plastics drums and jerricans in accordance with 6.1.4.7 and for composite packagings (plastics material) in accordance with 6.1.4.18 intended for the carriage of liquids having a flash point ≤ 61 °C, other than 6HA1 packagings

Polyethylene packagings need be subjected to this test only if they are to be approved for the carriage of benzene, toluene, xylene or mixtures and preparations containing those substances.

6.1.5.8.1 Number of test samples: Three packagings per design type and manufacturer.

6.1.5.8.2 Special preparation of the test sample for the test:

The test samples are to be pre-stored with the original filling substance in accordance with 6.1.5.2.5, or, for high molecular mass polyethylene packagings, with the standard liquid mixture of hydrocarbons (white spirit) in accordance with 6.1.5.2.6.

6.1.5.8.3 Test method:

The test samples filled with the substance for which the packaging is to be approved shall be weighed before and after storage for 28 days at 23 °C and 50 % relative atmospheric humidity. For high molecular mass polyethylene packagings, the test may be carried out with the standard liquid mixture of hydrocarbons (white spirit) in place of benzene, toluene or xylene.

6.1.5.8.4 Criterion for passing the test: Permeability shall not exceed 0.008 g/l.h

6.1.5.9 Test Report

6.1.5.9.1 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the packaging:

1. Testing body;
2. Applicant;
3. Manufacturer of packaging;
4. Description of packaging (e.g. distinctive features such as material, inner lining dimensions, wall thickness, mass, closures, colouring of plastics materials);
5. Design drawing of packaging and closures (if necessary, photographs);
6. Method of manufacture;
7. Maximum capacity;
8. Characteristics of test contents, e.g. viscosity and relative density for liquids and particle size for solids;
9. Drop height;
10. Test pressure in leakproofness test in accordance with 6.1.5.4;
11. Test pressure in internal pressure test in accordance with 6.1.5.5;
12. Stacking height;
13. Test results;
14. A unique test report identification;
15. Date of the test report;
16. The test report shall be signed with the name and status of the signatory.

6.1.5.9.2 The test report shall contain statements that the packagings prepared as for transport was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

6.1.6 Leakproofness test for all new, remanufactured or reconditioned packagings intended to contain liquids (see 6.1.1.3)

6.1.6.1 Application of the test

Every packaging intended to contain liquids shall successfully undergo a suitable leakproofness test:

- before it is first used for carriage;
- after remanufacturing or reconditioning, before it is re-used for carriage.

For this test, packagings need not have their own closures fitted.

The inner receptacle of composite packagings may be tested without the outer packaging provided the test results are not affected.

This test is not required for:

- inner packagings of combination packagings;

- inner receptacles of composite packagings (glass, porcelain or stoneware) conforming to a type having successfully passed the drop test prescribed in 6.1.5.3.1 (e);
- removable head packagings intended for substances with a viscosity at 23 °C exceeding 200 mm²/s;

light gauge metal packagings conforming to 6.1.4.21

6.1.6.2 Test method:

Compressed air shall be introduced through the filling orifice of each packaging. The packaging shall be immersed in water; it shall be kept under water in such a way as not to distort the result of the test. The packaging may also be covered with soap solution, heavy oil or other suitable liquid on its seams or at any other place where leakage might occur. Other methods at least equally effective may also be used.

6.1.6.3 Air pressure to be applied:

| <u>Packing group I</u> | <u>Packing group II</u> | <u>Packing group III</u> |
|-----------------------------|-----------------------------|-----------------------------|
| <u>Not less than 30 kPa</u> | <u>Not less than 20 kPa</u> | <u>Not less than 20 kPa</u> |

6.1.6.4 Criterion for passing the test: There shall be no leakage.

6.1.7 Standard liquids for verifying the chemical compatibility of high molecular mass polyethylene packagings in accordance with 6.1.5.2.6 and list of substances to which the standard liquids may be regarded as equivalents

6.1.7.1 Standard liquids for verifying the chemical compatibility of high molecular mass polyethylene packagings in accordance with 6.1.5.2.6.

Section I

The following standard liquids shall be used for this plastics material.

- (a) **Wetting Solution** for substances causing severe cracking in polyethylene under stress, in particular for all solutions and preparations containing wetting agents.

An aqueous solution of 1 to 10 % of a wetting agent shall be used. The surface tension of this solution shall be 31 to 35 mN/m at 23 °C.

The stacking test shall be carried out on the basis of a relative density of not less than 1.20.

A compatibility test with acetic acid is not required if adequate chemical compatibility is proved with a wetting solution.

- (b) **Acetic acid** for substances and preparations causing cracking in polyethylene under stress, in particular for monocarboxylic acids and monovalent alcohols.

Acetic acid in 98 to 100 % concentration shall be used.

Relative density = 1.05

The stacking test shall be carried out on the basis of a relative density not less than 1.1.

In the case of filling substances causing polyethylene to swell more than acetic acid and to such an extent that the polyethylene mass is increased by up to 4 %, adequate chemical compatibility may be proved after preliminary storing for three weeks at 40 °C, in accordance with 6.1.5.2.6 but with the original filling matter.

- (c) **Normal butyl acetate/normal butyl acetate-saturated wetting solution** for substances and preparations causing polyethylene to swell to such an extent that the polyethylene mass is increased by about 4 % and at the same time causing cracking under stress, in particular for phyto-sanitary products, liquid paints and esters. Normal butyl acetate in 98 to 100 % concentration shall be used for preliminary storage in accordance with 6.1.5.2.6.

For the stacking test in accordance with 6.1.5.6, a test liquid consisting of a 1 to 10 % aqueous wetting solution mixed with 2 % normal butyl acetate conforming to (a) above shall be used.

The stacking test shall be carried out on the basis of a relative density not less than 1.0.

In the case of filling substances causing polyethylene to swell more than normal butyl acetate and to such an extent that the polyethylene mass is increased by up to 7.5 %, adequate chemical compatibility may be proved after preliminary storing for three weeks at 40 °C, in accordance with 6.1.5.2.6 but with the original filling matter.

- (d) **Mixture of hydrocarbons (white spirit)** for substances and preparations causing polyethylene to swell, in particular for hydrocarbons, esters and ketones.

A mixture of hydrocarbons having a boiling range 160 °C to 220 °C, relative density 0.78-0.80, flash-point > 50 °C and an aromatic content 16 % to 21 % shall be used.

The stacking test shall be carried out on the basis of a relative density not less than 1.0.

In the case of filling substances causing polyethylene to swell to such an extent that the polyethylene mass is increased by more than 7.5 %, adequate chemical compatibility may be proved after preliminary storing for three weeks at 40 °C, in accordance with 6.1.5.2.6 but with the original filling matter.

- (e) **Nitric acid** for all substances and preparations having an oxidizing effect on polyethylene and causing molecular degradation identical to or less than 55 % nitric acid.

Nitric acid in a concentration of not less than 55 % shall be used.

The stacking test shall be carried out on the basis of a relative density of not less than 1.4.

In the case of filling substances more strongly oxidizing than 55 % nitric acid or causing degradation of the molecular mass proceed in accordance with 6.1.5.2.5.

- (f) **Water** for substances which do not attack polyethylene in any of the cases referred to under (a) to (e), in particular for inorganic acids and lyes, aqueous saline solutions, polyvalent alcohols and organic substances in aqueous solution.

The stacking test shall be carried out on the basis of a relative density of not less than 1.2.

- 6.1.7.2 List of substances to which the standard liquids may be regarded as equivalents for the purposes of 6.1.5.2.6.

Class 3

| <u>Item</u> | <u>Substance</u> | <u>Standard Liquid</u> |
|-------------|---|--|
| A. | Substance having a flashpoint below 23 °C, not toxic, not corrosive | |
| 3° (b) | Substances having a vapour pressure at 50 °C of not more than 110 kPa (1.1 bar) | |
| | - Crude petroleum and other crude oils | Mixture of hydrocarbons |
| | - Hydrocarbons | " |
| | - Halogenated substances | " |
| | - Alcohols | Acetic acid |
| | - Ethers | Mixture of hydrocarbons |
| | - Aldehydes | " |
| | - Ketones | Normal butyl acetate where the swelling effect is up to 4 % (mass): other cases, mixture of hydrocarbons |

| | | |
|--|--|--|
| 4° (b) | Mixtures of substances of 3° (b) having a boiling point or initial boiling point exceeding 35 °C, containing not more than 55 % nitrocellulose with a nitrogen content not exceeding 12.6 %. | Normal butyl acetate/ normal butyl acetate- saturated wetting solution <u>and</u> mixture of hydrocarbons. |
| 5° | Viscous substances | Mixture of hydrocarbons |
| B. Substances having a flashpoint below 23 °C and toxic | | |
| 17°(b) | Methanol | Acetic acid |
| E. Substances having a flashpoint between 23 °C and 61 °C inclusive which might be slightly toxic or slightly corrosive | | |
| 31°(c) | Substances having a flashpoint between 21 °C and 61 °C inclusive: | |
| | - Petroleum, solvent naphta | Mixture of hydrocarbons |
| | - White spirit (turpentine substitute) | " |
| | - Hydrocarbons | " |
| | - Halogenated substances | " |
| | - Alcohols | Acetic acid |
| | - Ethers | Mixture of hydrocarbons |
| | - Aldehydes | " |
| | - Ketones | " |
| | - Esters | Normal butyl acetate where the swelling effect is up to 4 % (mass): other cases, mixture of hydrocarbons |
| | - Nitrogenous substances | Mixture of hydrocarbons |
| 34°(c) | Mixtures of substances of 31° (c) containing not more than 55 % nitrocellulose with a nitrogen content not exceeding 12.6 %. | Normal butyl acetate/ normal butyl acetate- saturated wetting solution <u>and</u> mixture of hydrocarbons. |

Class 5.1

A. Liquid oxidizing substances and their aqueous solutions

1° Hydrogen peroxide and its solutions */

- | | | |
|-----|--|-------|
| (b) | Aqueous solutions with not less than 20 % but not more than 60 % hydrogen peroxide | Water |
| (c) | Aqueous solutions with not less than 8 % but less than 20 % hydrogen peroxide | Water |

| | | |
|--------|--|-------------|
| 3° (a) | Perchloric acid with more than 50 % but not more than 72 % acid (mass) | Nitric acid |
|--------|--|-------------|

B. Aqueous solutions of solid oxidizing substances

- | | | | |
|-----|-----|-----------------------------|-------|
| 11° | (b) | Calcium chlorate solution | Water |
| | | Potassium chlorate solution | Water |
| | | Sodium chlorate solution | Water |

Class 5.2

NOTE: *tert-butyl hydroperoxide with more than 40 % peroxide content and peroxyacetic acids are excluded from the following items.*

The following are included:

- | | | | |
|-----|------|---|---------------------------------|
| 1° | (b), | All organic peroxides in a technically pure form or in | Normal butyl acetate/ |
| 3° | (b), | solution in solvents which, as far as their compatibility | wetting solution with 2% |
| 5° | (b), | is concerned, are covered by the standard liquid | normal butyl acetate <u>and</u> |
| 7° | (b), | "mixture of hydrocarbons" in this list of 6.1.7.2 | mixture of hydrocarbons |
| 9° | (b), | | <u>and</u> nitric acid at 55% |
| 11° | (b), | | |
| 13° | (b), | | |
| 15° | (b), | | |
| 17° | (b), | | |
| 19° | (b) | | |

Compatibility of vents and gaskets with organic peroxides may be verified, also independently of the design type test, by laboratory tests with nitric acid.

*/ Test to be performed only with a vent.

Class 6.1**B. Organic substances which have a flashpoint of 23 °C or above or non-flammable organic substances**

| | | |
|-----|--|-------------|
| 12° | Nitrogenous substances having a flashpoint above 61 °C: | |
| (b) | aniline | Acetic acid |
| 14° | Oxygenated substances having a flashpoint above 61 °C: | |
| (c) | ethylene glycol monobutyl ether | Acetic acid |
| | furfuryl alcohol | Acetic acid |
| | phenol solution | Acetic acid |
| 27° | Corrosive toxic organic substances, articles containing corrosive toxic organic substances (such as preparations and wastes), which cannot be classified under other collective headings | |
| (b) | cresols or cresylic acid | Acetic acid |

Class 6.2

| | | |
|--------------------|--|-------|
| 3 ° a n d 4° | All infectious substances considered to be liquids in accordance with [2.2.62.1 (4)] | Water |
|--------------------|--|-------|

Class 8**A. Acid substances***Inorganic acids*

| | | |
|-------------------|---|----------------|
| 1° (b) | Sulphuric acid Sulphuric acid, spent | Water Water |
| 2° (b) | Nitric acid with not more than 55 % acid | Nitric acid |
| 4° (b) | Perchloric acid with not more than 50 % acid, by mass in aqueous solution | Nitric acid |
| 5° (b) and (c) | Hydrochloric acid with not more than 36 % pure acid Hydrobromic acid Hydriodic acid | Water |
| 7° (b) | Hydrofluoric acid with not more than 60 % hydrogen fluoride */ | Water |

*/ Maximum 60 litres; permissible period of use two years.

| | | | |
|-----|---------|--|-------------|
| 8° | (b) | Fluoroboric acid with not more than 50 % pure acid | Water |
| | | Fluorosilicic acid (hydrofluorosilicic acid) | Water |
| 17° | (b) | Chromic acid solution with not more than 30 % | Nitric acid |
| | and (c) | pure acid | |
| 17° | (c) | Phosphoric acid | Water |

Organic substances

| | | | |
|-----|-----|---|-------------|
| 32° | (b) | Acrylic acid, formic acid, acetic acid, thioglycolic acid | Acetic acid |
| 32° | (c) | Methacrylic acid, propionic acid | Acetic acid |
| 40° | (c) | Alkylphenols, liquid | Acetic acid |

B. Basic substances*Inorganic substances*

| | | | |
|-----|---------|--|-------|
| 42° | (b) | Sodium hydroxide solution, potassium hydroxide | Water |
| | and (c) | solution | |
| 43° | (c) | Ammonia solution | Water |
| 44° | (b) | Hydrazine, aqueous solutions with not more than 64 % | Water |
| | | hydrazine, by mass | |

C. Other corrosive substances

| | | | |
|-----|-----|---|-------------|
| 61° | (c) | Chlorite and hypochlorite solutions <u>*/</u> | Nitric acid |
| 63° | (c) | Formaldehyde solutions | Water |

*/ Test to be carried out only with vent. If the test is carried out with nitric acid as the standard liquid, an acid-resistant vent shall be used. For hypochlorite solutions, vents of same design type, resistant to hypochlorite (e.g. of silicone rubber) but not resistant to nitric acid, are also permitted.

Chapter 6.3

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGINGS FOR DIVISION 6.2 SUBSTANCES

6.3.1 General

6.3.1.1 A packaging that meets the requirements of this section and of 6.3.2 may, after decision by the competent authority, be marked with:

- (a) the United Nations packaging symbol;
- (b) the code designating the type of packaging according to the requirements of 6.1.2;
- (c) the text CLASS 6.2;
- (d) the last two digits of the year of manufacture of the packaging;
- (e) the state authorizing the allocation of the mark, indicated by the distinguishing sign for motor vehicles in international traffic;
- (f) the name of the manufacturer or other identification of the packaging specified by the competent authority;
- (g) for packagings meeting the requirements of 6.3.2.9, the letter "U" shall be inserted immediately following the marking required in (b) above.

6.3.1.2 *Example of marking:*



| | |
|--------------------|-------------------------------------|
| 4G/CLASS 6.2/92 | as in 6.3.1.1 (a), (b), (c) and (d) |
| S/SP-9989-ERIKSSON | as in 6.3.1.1 (e), (f) |

6.3.2 Test requirements for packagings

6.3.2.1 Other than for packagings for live animals and organisms, samples of each packaging shall be prepared for testing as described in 6.3.2.2 and then subjected to the tests in 6.3.2.4 to 6.3.2.6. If the nature of the packaging makes it necessary, equivalent preparation and tests are permitted, provided that these may be demonstrated to be at least as effective.

6.3.2.2 Samples of each packaging shall be prepared as for transport except that a liquid or solid infectious substance shall be replaced by water or, where conditioning at -18°C is specified, by water/antifreeze. Each primary receptacle shall be filled to 98% capacity.

6.3.2.3 Tests required

| Material of | | | | | Tests required | | | | |
|-----------------|----------|-------|-----------------|-------|------------------|-----|-----|--------|------------------|
| outer packaging | | | inner packaging | | Refer to 6.3.2.4 | | | | Refer to 6.3.2.5 |
| Fibre-board | Plastics | Other | Plastics | Other | (a) | (b) | (c) | (d) | |
| x | | | x | | | x | x | when | x |
| x | | | | x | | x | | dry | x |
| | x | | x | | | | x | ice is | x |
| | x | | | x | | | x | used | x |
| | | x | x | | | | | | x |
| | | x | | x | x | | | | x |

6.3.2.4 Packagings prepared as for transport shall be subjected to the tests in 6.3.2.3, which - for test purposes - categorizes packagings according to their material characteristics. For outer packagings, the headings in the table relate to fibreboard or similar materials whose performance may be rapidly affected by moisture; plastics which may embrittle at low temperature; and other materials such as metal whose performance is not affected by moisture or temperature. If a primary receptacle and a secondary packaging of an inner packaging are made of different materials, the material of the primary receptacle determines the appropriate test. In instances where a primary receptacle is made of two materials, the material most liable to damage determines the appropriate test.

6.3.2.5 (a) Samples shall be subjected to free-fall drops on to a rigid, non-resilient, flat, horizontal surface from a height of 9 m. Where the samples are in the shape of a box, five shall be dropped in sequence:

- (i) flat on to the base,
- (ii) flat on to the top,
- (iii) flat on to the longest side,
- (iv) flat on to the shortest side,
- (v) on to a corner.

Where the samples are in the shape of a drum, three shall be dropped in sequence:

- (vi) diagonally on to the top chime, with the centre of gravity directly above the point of impact,
- (vii) diagonally on to the base chime,
- (viii) flat on to the side.

Following the appropriate drop sequence, there may be no leakage from the primary receptacle(s) which shall remain protected by absorbent material in the secondary packaging.

NOTE: *While the sample shall be released in the required orientation, it is accepted that for aerodynamic reasons the impact may not take place in that orientation.*

- (b) The sample shall be subjected to a water spray that simulates exposure to rainfall of approximately 5 cm per hour for at least one hour. It shall then be subjected to the test described in (a).
- (c) The sample shall be conditioned in an atmosphere of -18°C or less for a period of at least 24 hours and within 15 minutes of removal from that atmosphere be subjected to the test described in (a). Where the sample contains dry ice, the conditioning period may be reduced to 4 hours.
- (d) Where the packaging is intended to contain dry ice, a test additional to that specified in (a) or (b) or (c) shall be carried out. One sample shall be stored so that all the dry ice dissipates and then be subjected to the test described in (a).

6.3.2.6 Packagings with a gross mass of 7 kg or less shall be subjected to the tests described in (a) below and packagings with a gross mass exceeding 7 kg to the tests in (b) below.

- (a) Samples shall be placed on a level hard surface. A cylindrical steel rod with a mass of at least 7 kg, a diameter not exceeding 38 mm and the impact end edges a radius not exceeding 6 mm, shall be dropped in a vertical free fall from a height of 1 m, measured from the impact end to the impact surface of the sample. One sample shall be placed on its base. A second sample shall be placed in an orientation perpendicular to that used for the first. In each instance the steel rod shall be aimed to impact the primary receptacle. Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).
- (b) Samples shall be dropped on to the end of a cylindrical steel rod. The rod shall be set vertically in a level hard surface. It shall have a diameter of 38 mm and the edges of the upper end a radius not exceeding 6 mm. The rod shall protrude from the surface a distance at least equal to that between the primary receptacle(s) and the outer surface of the outer packaging with a minimum of 200 mm. One sample shall be dropped in a vertical free fall from a height of 1 m, measured from the top of the steel rod. A second sample shall be dropped from the same height in an orientation perpendicular to that used for the first. In each instance the packaging shall be so orientated that the steel rod would penetrate the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).

6.3.2.7 The competent authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and packagings such as drums, bags and boxes which are produced with small reductions in external dimension(s).

6.3.2.8 Provided an equivalent level of performance is maintained, the following variations in the primary receptacles placed within a secondary packaging are allowed without further testing of the completed package:

- (a) Primary receptacles of equivalent or smaller size as compared to the tested primary receptacles may be used provided:
 - (i) the primary receptacles are of similar design to the tested primary receptacle (e.g. shape: round, rectangular, etc.);
 - (ii) the material of construction of the primary receptacle (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested primary receptacle;
 - (iii) the primary receptacles have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);
 - (iv) sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the primary receptacles; and
 - (v) primary receptacles are oriented within the secondary packaging in the same manner as in the tested package.
- (b) A lesser number of the tested primary receptacles, or of the alternative types of primary receptacles identified in (a) above, may be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the primary receptacles.

6.3.2.9 Inner receptacles of any type may be assembled within an intermediate (secondary) packaging and transported without testing in the outer packaging under the following conditions:

- (a) The intermediate/outer packaging combination shall have been successfully tested in accordance with 6.3.2.5 with fragile (e.g., glass) inner receptacles;
- (b) The total combined gross mass of inner receptacles shall not exceed one half the gross mass of inner receptacles used for the drop test in (a) above;
- (c) The thickness of cushioning between inner receptacles and between inner receptacles and the outside of the intermediate packaging shall not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single inner receptacle was used in the original test, the thickness of cushioning between inner receptacles shall not be less than the thickness of cushioning between the outside of the intermediate packaging and the inner receptacle in the original test. When either fewer or smaller inner receptacles are used (as compared to the inner receptacles used in the drop test), sufficient additional cushioning material shall be used to take up the void;
- (d) The outer packaging shall have successfully passed the stacking test in 6.1.5.6 while empty. The total mass of identical packages shall be based on the combined mass of inner receptacles used in the drop test in (a) above;
- (e) For inner receptacles containing liquids, an adequate quantity of absorbent material to absorb the entire liquid content of the inner receptacles shall be present;

- (f) If the outer packaging is intended to contain inner receptacles for liquids and is not leakproof, or is intended to contain inner receptacles for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage shall be provided in the form of a leakproof liner, plastics bag or other equally effective means of containment;
- (g) In addition to the markings prescribed in 6.3.1.1(a) to (f), packagings shall be marked in accordance with 6.3.1.1 (g).

Annex 1**CORRESPONDENCE BETWEEN 1997 RID/ADR AND THE RESTRUCTURED RID/ADR**

| RESTRUCTURED RID/ADR | RID/ADR 1997 MARGINALS <u>*/</u> |
|-----------------------------|---|
| 6.1 | Appendix V/A.5 |
| 6.1.1.1 | - |
| 6.1.1.2 | 3500 (15) |
| 6.1.1.3 | 3500 (10) |
| 6.1.2.1 | 3511 (1) |
| 6.1.2.2 | 3511 (1) |
| 6.1.2.3 | 3511 (1) |
| 6.1.2.4 | 3511 (5) |
| 6.1.2.5 | 3511 (1) |
| 6.1.2.6 | 3511 (1) |
| 6.1.2.7 | 3514 |
| 6.1.3 | 3512 |
| 6.1.3.1 (d) (i) | 3511 (2) |
| [6.1.3.3] | |
| 6.1.3.11 | 3513 |
| 6.1.4.1 | 3520 |
| 6.1.4.2 | 3521 |
| 6.1.4.3 | 3522 |
| 6.1.4.4 | 3523 |

*/ For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654".

| RESTRUCTURED RID/ADR | RID/ADR 1997 MARGINALS ^{*/} |
|-----------------------------|---|
| 6.1.4.5 | 3524 |
| 6.1.4.6 | 3525 |
| 6.1.4.7 | 3526 |
| 6.1.4.8 | 3527 |
| 6.1.4.9 | 3528 |
| 6.1.4.10 | 3529 |
| 6.1.4.11 | 3530 |
| 6.1.4.12 | 3531 |
| 6.1.4.13 | 3532 |
| 6.1.4.14 | 3533 |
| 6.1.4.15 | 3534 |
| 6.1.4.16 | 3535 |
| 6.1.4.17 | 3536 |
| 6.1.4.18 | 3537 |
| 6.1.4.19 | 3539 |
| 6.1.4.20.1 | 3538 (a) |
| 6.1.4.20.2 | 3538 (b) |
| 6.1.4.20.3 | 3558 (2) |
| 6.1.4.20.4 | 3558 (4) |
| 6.1.4.20.5 | 3558 (5) |
| 6.1.4.21 | 3540 |
| 6.1.5.1.1 | 3550 (1) |

^{*/} For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654". /

| RESTRUCTURED RID/ADR | RID/ADR 1997 MARGINALS */ |
|-----------------------------|----------------------------------|
| 6.1.5.1.2 | 3550 (2) |
| 6.1.5.1.3 | 3550 (2) |
| 6.1.5.1.4 | 3550 (2) |
| 6.1.5.1.5 | 3550 (6) |
| 6.1.5.1.6 | 3558, NOTA |
| 6.1.5.1.7 | 3558 (1) |
| 6.1.5.1.8 | 3550 (3), (4) |
| [6.1.5.1.9] | 3550 (5) |
| 6.1.5.1.10 | 3550 (7) |
| 6.1.5.1.11 | 3559 |
| 6.1.5.2 | 3551 |
| 6.1.5.2.8 | 3558 (3) |
| 6.1.5.3 | 3552 |
| 6.1.5.4 | 3553 |
| 6.1.5.5 | 3554 |
| 6.1.5.6 | 3555 |
| 6.1.5.7 | 3557 |
| 6.1.5.8 | 3556 |
| 6.1.5.10 | 3560 |
| 6.1.6 | 3561 |
| 6.1.7 | Annex to the Appendix V/A.5 |

*/ For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654".

| RESTRUCTURED RID/ADR | RID/ADR 1997 MARGINALS <u>*/</u> |
|-----------------------------|---|
| 6.3 | |
| 6.3.1 | 3512 |
| 6.3.2 | 2654 |
| 6.3.2.1 | 2654 (1) |
| 6.3.2.2 | 2654 (2) |
| 6.3.2.3 | 2654 (3) |
| 6.3.2.4 | 2654 (3) |
| 6.3.2.5 | 2654 (3) |
| 6.3.2.6 | 2654 (5) |
| 6.3.2.7 | 2654 (4) |
| 6.3.2.8 | 2654 (6) |
| 6.3.2.9 | 2654 (7) |

*/ For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654".

Annex 2

CORRESPONDENCE BETWEEN RESTRUCTURED RID/ADR AND 1997 RID/ADR

| RID/ADR 1997 MARGINALS */ | RESTRUCTURED RID/ADR |
|----------------------------------|---|
| 2654 | 6.3.2 |
| 2654 (1) and (2) | 6.3.2.1, 6.3.2.2 |
| 2654 (3) | 6.3.2.3, 6.3.2.4, 6.3.2.5 |
| 2654 (4) | 6.3.2.7 |
| 2654 (5) | 6.3.2.6 |
| 2654 (6) et (7) | 6.3.2.8 et 6.3.2.9 |
| Appendix V/A.5 | Chapter 6.1 |
| 3500 | 4.1.3.1 |
| 3510 | 1.2.1 |
| 3511 | 6.1.2.1 6.1.2.2 6.1.2.3 6.1.2.5 6.1.2.6 6.1.3.1. d) i) |
| 3512 | 6.1.2.4 6.1.3 6.3.1 |
| 3513 | 6.1.3.11 |
| 3514 | 6.1.2.7 |
| 3520 | 6.1.4.1 |
| 3521 | 6.1.4.2 |
| 3522 | 6.1.4.3 |

*/ For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654".

| RID/ADR 1997 MARGINALS */ | RESTRUCTURED RID/ADR |
|----------------------------------|--|
| 3523 | 6.1.4.4 |
| 3524 | 6.1.4.5 |
| 3525 | 6.1.4.6 |
| 3526 | 6.1.4.7 |
| 3527 | 6.1.4.8 |
| 3528 | 6.1.4.9 |
| 3529 | 6.1.4.10 |
| 3530 | 6.1.4.11 |
| 3531 | 6.1.4.12 |
| 3532 | 6.1.4.13 |
| 3533 | 6.1.4.14 |
| 3534 | 6.1.4.15 |
| 3535 | 6.1.4.16 |
| 3536 | 6.1.4.17 |
| 3537 | 6.1.4.18 |
| 3538 | 6.1.4.20 (1) and (2) |
| 3539 | 6.1.4.19 |
| 3540 | 6.1.4.21 |
| 3550 | 6.1.5.1.1 à 6.1.5.1.5 + 6.1.5.1.8 + 6.1.5.1.10 |
| 3551 | 6.1.5.2 |
| 3552 | 6.1.5.3 |
| 3553 | 6.1.5.4 |

*/ For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654".

| RID/ADR 1997 MARGINALS <u>*/</u> | RESTRUCTURED RID/ADR |
|---|-----------------------------|
| 3554 | 6.1.5.5 |
| 3555 | 6.1.5.6 |
| 3556 | 6.1.5.8 |
| 3557 | 6.1.5.7 |
| 3558 NOTA | 6.1.5.1.6 |
| 3558 (1) | 6.1.4.1.7 |
| 3558 (2) | 6.1.4.20.3 |
| 3558 (3) | 6.1.5.2.8 |
| 3558 (4) | 6.1.4.20.4 |
| 3558 (5) | 6.1.4.20.5 |
| 3559 | 6.1.5.1.11 |
| 3560 | 6.1.5.10 |
| 3561 | 6.1.6 |
| Annex to the Appendix V/A.5 | 6.1.7 |

**/ For RID, when the first figure of the marginal is "3", replace that figure by "1", i.e. "1500" instead of "3500". When the first figure is "2", delete that figure, i.e. "654" instead of "2654".*