

## COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the  
Transport of Dangerous Goods

Thirty-third session  
Geneva, 30 June-9 July (a.m) 2008  
Item 4 (c) of the provisional agenda

### LISTING, CLASSIFICATION, PACKING

#### Assignment of proper shipping names

Transmitted by the International Civil Aviation Organization (ICAO)

### INTRODUCTION

1. An ad-hoc meeting of the Working Group of the Dangerous Goods Panel met in Montreal from 8 to 10 April 2008. The meeting was called to discuss an incident in which a cylinder exploded in a cargo warehouse at Dubai Airport (3 December 2007) and to consider possible actions by the Panel. A report of the incident and the results of the Working Group meeting are attached for the information of the Sub-Committee.

Video of exploding cylinder - ([http://www.unece.org/trans/doc/2008/ac10c3/inf16\\_video.mpg](http://www.unece.org/trans/doc/2008/ac10c3/inf16_video.mpg))

2. One of the issues raised by this incident is the lack of criteria available in the UN Model Regulations and, consequently, in the ICAO Technical Instructions, for classifying mixtures or solutions such as those composed of two or more dangerous goods, or two or more dangerous goods and goods not subject to the Model Regulations, particularly when contained as trace or small quantities.

3. The members of the Dangerous Goods Panel believe that the classification of dangerous goods is a multi-modal issue. Consequently, the UN Model Regulations is the document in which classification criteria must be established for adoption by the modes and national authorities. However, it is noted that the issue has been addressed by ADR, RID and ADN e.g. see the applicable provisions in section 2.1.3 of ADR, in particular 2.1.3.4, 2.1.3.5 and 2.1.3.6

4. The members of the Dangerous Goods Panel have indicated their support for ICAO to request the UNSCETDG to establish a working group to review and revise the classification criteria for mixtures and solutions and to request that working group to take into account the following items:



- (a) Definition: for the terms "mixture", "solution" and "substance";
- (b) Establish criteria for classifying mixtures or solutions such as those mixtures or solutions containing two or more dangerous goods or two or more dangerous goods and goods not subject to the Model Regulations;
- (c) Clarify the meaning of "trace" and "small quantities" of dangerous goods with the possibility of incorporating the GHS cut-off threshold limits; and
- (d) Conduct an editorial review of existing text to improve clarity.

5. The members of the Dangerous Goods Panel have also indicated their support for ICAO to request that the working group undertake a review of the text of P200 with a view to improving the clarity of the text.

6. ICAO recognizes that a working group cannot complete such an extensive review and revision in this biennium and further recognizes that consultation with the modal groups and within national jurisdictions is required. However, it may be possible in this biennium to establish a working group, determine the Terms of Reference for the working group and begin to gather comments and suggestions on the issues raised in Item 4 of this paper.

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Annex

International Civil Aviation  
Organization

DGP-AH-WG08-WP/3  
10/4/08

**WORKING PAPER****DANGEROUS GOODS PANEL (DGP)****AD HOC MEETING OF THE WORKING GROUP**

**Montréal, 8 to 10 April 2008**

**REPORT OF THE AD HOC MEETING OF THE WORKING GROUP**

(Presented by the Secretary)

**1. BACKGROUND**

1.1 On 3 December 2007 a cylinder that had previously been transported aboard a cargo aircraft violently burst in a cargo warehouse at Dubai Airport injuring one person. An ad hoc working group meeting of the Dangerous Goods Panel (DGP) was held to discuss the incident and to decide if amendments to the Technical Instructions were necessary. The meeting, held in Montreal from 8 to 10 April 2008, was chaired by Ms. K. Vermeersch.

**2. ATTENDANCE**

2.1 The meeting was attended by the following panel members and advisers:

<b>Member</b>	<b>Adviser</b>	<b>State/International Organization</b>
K. Vermeersch	A. Tusek	Australia
G. Branscombe	D. Evans	Belgium
	L. Hume Sastre	Canada
H. Brockhaus	B. Wienecke	Germany
D. Raadgers*	L. Calleja Bárcena	Netherlands
	G. Perez Herrero	Spain
G. Leach		United Kingdom

<b>Member</b>	<b>Adviser</b>	<b>State/International Organization</b>
R.A. Richard	C. Bonanti J. McLaughlin D. Pfund*	United States
D. Brennan		IATA
M. Rogers	N. McCulloch A. Park	IFALPA DGAC Compressed Gas Association

\* via WEB-EX

### 3. DISCUSSION

3.1 The group was given an overview of the incident. The cylinder had been filled with 99.995% **Ethyl chloride**, 20 ppm **1,1,1 Trichloroethane** and 30 ppm **Trichloroethylene**, and an overpressure of 20 bar of **Helium**. The substance was classified as “Liquefied gas, flammable, n.o.s. (Trichloroethylene, Ethyl Chloride mixture)”, UN 3161, Division 2.1. The cylinder was marked, labelled and documented as required by the Technical Instructions.

3.2 The timeline of events was given as follows:

19 November, 2007:	cylinder was filled (the cylinder was new and it was the first time it had been filled)
27 November, 2007:	cylinder was carried by air from Manchester to Dubai
3 December, 2007:	explosion occurred

3.3 Results of a metallurgical examination by the United Kingdom were presented. It was explained that the interior of the cylinder had been subjected to a severe corrosion attack. It was believed that the probable sequence of events was that a chemical reaction between the cylinder contents and the aluminium cylinder generated corrosion and an increase in the internal pressure, to an estimated 500 bar. As the reaction process continued with time, the cylinder wall would have become weaker and the pressure greater, until the cylinder ruptured. The group was alerted to the short time frame for the rate of corrosion, which was only a matter of fourteen days.

3.4 It was suggested that three issues had been raised by the incident:

- a) compatibility and reference to an ISO standard;
- b) the continued application of Special Provision A1 for substances of the type involved in this incident; and
- c) assignment of an n.o.s. proper shipping name.

### 4. COMPATIBILITY AND REFERENCE TO AN ISO STANDARD

4.1 It was suggested that anomalies exist in the text relating to compatibility in Packing Instruction 200. For **Ethyl chloride**, special packing provision “a” applies which states:

“Aluminium alloy cylinders are not authorized”. The packing instruction also refers to ISO 11114-1:1997 which states only that aluminium alloy is “not recommended” but can be used if assessed and authorized by a “competent person”. It was agreed that the intent of the provision was to forbid the use of aluminium cylinders, but that perhaps the wording in the TIs and the ISO standard did not make that sufficiently clear. An amendment to paragraph 4 a) to clarify this prohibition was agreed to as was an amendment to 4 b) for consistency. It was also agreed to delete the reference to the ISO standards next to the compatibility heading under paragraph 4) in order to eliminate any confusion between the TI requirement and the ISO standards.

4.2 New text was also developed to clarify the prohibition for all gas mixtures assigned special packing provision “a” unless approved by the appropriate national authority of the State of Origin. It was decided the optimum location for this text was as a new paragraph 5 within Packing Instruction 200. There was considerable discussion on the reference to approval from the State of Origin. It was noted that as for all other instances where such an approval is sought, the burden of proof remained with the applicant; it was the responsibility of the State of Origin to review the application. It was explained that should the approval condition be deleted, a shipper could still request an exemption to the Instructions. However, on the basis this was a more complicated procedure, and on the basis of the other proposals being agreed, it was decided to keep the State of Origin approval. It was agreed further discussion on the issue of approvals and exemptions should be carried out during this biennium.

4.3 The practice of referring to ISO standards and whether or not the standards were provided as guidance or requirements was discussed. It was explained that there are two types of ISO provisions: normative, which could be considered standards and informative, which could be considered guidance material. Normative provisions did not become law until they were referenced in a regulation. Some members felt that if the TIs were referring to an ISO standard, that the mandatory requirements should be transferred from the ISO and replicated in the TIs. Others were wary of doing so fearing the possibility that some requirements would be missed or that extra ISO guidance material not included in the TIs would be ignored. Still others felt that the process of creating an ISO standard was recognized as a responsible process which involved a vast array of expertise and should be trusted. It was agreed that it was the responsibility of each panel member and their State to review relevant ISO standards and report on any anomalies and it should be the panel’s responsibility to look closely at a standard before it is referred to in the TIs. It was agreed the secretary would seek to obtain a set of all standards incorporated by reference in the TIs for use by the DGP (i.e. ISO and IEC standards). The working group recognized that the requirements of the Technical Instructions can be more restrictive than the ISO provisions, agreed that the TI requirements take precedence over the ISO standards and that this should be made clear in the Instructions. An amendment clarifying this precedence in the general requirements of packing provisions for Class 2 was therefore agreed (paragraph 4;4.1.1.2). It was suggested that consideration be taken in the future to add a more general statement to the TIs, confirming the precedence of the Instructions over any other referred standards.

4.4 It was suggested that text in 6;5.2.2 on material requirements for UN cylinders be deleted and the ISO standards referred to in this paragraph be referenced under the material requirements of generic cylinders in 6;5.1.2 in the form of a note. The note would also state that the publications are for guidance only and that the text in Packing Instruction 200 and Part 6

would take precedence. Some panel members felt that since Part 6 related to the design and construction of cylinders and not to what they were filled with and therefore was not a factor in the incident, it was not necessary to consider any amendments to it at this time. The reaction of the contents with the cylinder was what needed to be reviewed, which fell under Part 4. It was therefore suggested to amend 4;1.1.2 in order to indicate that the applicable provisions of ISO 11114-1:1997 must be met in addition to the requirements specified in the relevant packing instruction, which take precedence over the ISO standard.

4.5 Other anomalies in Packing Instruction 200 were presented. Brass and copper alloy valves are not recommended for a number of substances in ISO 11114-1:1997 and it was suggested that there is no reference to this restriction for these substances in the packing instruction. It was pointed out that of the eight substances listed, four were forbidden for transport on both passenger and cargo aircraft. The other four were listed in Packing Instruction 200 with special packing provision b) assigned to them, which restricts the use of copper valves. With regard to the forbidden/forbidden substances, it was noted that there were inconsistencies in the supplement which would need to be addressed. It was anticipated a paper would be presented on the subject at WG08.

4.6 The second related to special packing provision d). It was suggested that the text of the provision could be misinterpreted to mean that steel cylinders not bearing the "H" mark do not require authorization when the intent of the provision was to restrict the use of steel cylinders to only those bearing the "H" mark. Amended text which clarified only those bearing the "H" mark were permitted was agreed. It was also agreed a review of the TIs for other references to such steel cylinders would be done.

4.7 It was suggested that the reference in Packing Instruction 200 specifying the general packing requirements which must be met was incomplete. It referred to general requirements specific to dangerous goods of Class 2 and not to the requirements applicable to all classes (except Class 7). By omitting this reference, the compatibility requirements in 4;1.1.3 were ignored. It was agreed that a reference to the general requirements applicable to all classes (except Class 7) should be added in the first sentence of Packing Instruction 200.

4.8 It was noted there was an omission of a reference to special packing provision "z" next to UN 3156 **Compressed gas, oxidizing, n.o.s.** in Packing Instruction 200.

## **5. CARRIAGE ON A PASSENGER AIRCRAFT UNDER SPECIAL PROVISION A1**

5.1 Given the apparent anomalies in the text relating to aluminium cylinders it was queried whether it was appropriate to maintain special provision A1 against the flammable gases affected. However, as the text was clarified by the ad-hoc working group, members believed this provision should remain.

## **6. ASSIGNMENT OF AN N.O.S. PROPER SHIPPING NAME**

6.1 A paper on selection of proper shipping names for solutions and mixtures of dangerous goods was presented. The criteria for identifying at what point a mixture or solution of two or more dangerous goods should be identified by a generic proper shipping name instead of the proper shipping name of a listed substance was questioned and examined. It was suggested that

the provisions contained in the Technical Instructions, identified as 2;0.3 and 3;1, are not clear and that they do not specifically address the assignment of a proper shipping name where there may be very small amounts of one or more dangerous goods in a mixture or solution with what is otherwise a listed substance.

6.2 A further problem was outlined in which many listed substances may be shown as Forbidden / Forbidden or only permitted on Cargo Aircraft Only but when contained in a mixture or solution, the appropriate n.o.s. proper shipping name may have no such restriction.

6.3 Before the paper was discussed, it was agreed that the issue as a whole was of a multi-modal nature and could only be resolved at the UN. However, it was decided that guidance material could be developed to assist the shipper in the correct assignment of a proper shipping name specifically for mixtures or solutions containing two or more dangerous goods. After considerable discussion, the material was developed. Although there was initial support for including the text in a new paragraph 3;1.4 as guidance material, there was concern that it may be interpreted as a requirement and therefore would be more appropriate to include the text in a note. It was ultimately agreed to add a new paragraph 3;1.4 with the heading “mixtures and solutions containing two or more dangerous goods”, the word “reserved” in 3;1.4.1 followed by the proposed new text clarifying that the classification should be based on the properties of the mixture or solution rather than on the individual substances in a note.

6.4 It was suggested that the wording of 2;0.3.8 and 3;1.3.3, which was identical and similar to UN text, was unclear. Although the issue would be raised at the UN, it was agreed the text in the Instructions should be clarified at this time.

6.5 It was agreed that ICAO should ask the UN for a dedicated working group to consider the following issues:

- a) incorporation of definitions for mixtures, solutions, and substances;
- b) clarification on the meaning of “trace” and “small quantities” of dangerous substances with the possibility of incorporating the GHS cut-off threshold limits; and
- c) assignment of proper shipping names for mixtures or solutions containing two or more dangerous goods.

It was also agreed that there were several places in the Technical Instructions which contain UN text which is not editorially clear. It was agreed that proposed new wording should be presented to the UN. It was also suggested that those panel members attending UN meetings should encourage clear language before requirements are adopted.

## **7. CONCLUSION**

7.1 The working group agreed the secretary would request DGP members to approve the amendments proposed in the appendix and to then seek approval from the ANC and Council to issue an addendum to the 2007/2008 Edition of the Technical Instructions.

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## APPENDIX

### PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

#### Part 2

#### CLASSIFICATION OF DANGEROUS GOODS

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#### INTRODUCTION CHAPTER

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3.8 A mixture or solution containing one or more substances identified by name in [these Instructions Table 3-1](#) or classified under a n.o.s. entry and one or more substances [not subject to these Instructions](#), is not subject to these Instructions if the hazard characteristics of the mixture or solution are such that they do not meet the criteria (including human experience criteria) for any class.

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#### Part 3

#### DANGEROUS GOODS LIST AND LIMITED QUANTITIES EXCEPTIONS

#### Chapter 1

#### GENERAL

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#### 1.3 MIXTURES AND SOLUTIONS CONTAINING ONE DANGEROUS SUBSTANCE

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1.3.3 A mixture or solution containing one or more substances identified by name in [Table 3-1](#) or classified under a n.o.s. entry and one or more substances [not subject to these Instructions](#), is not subject to these Instructions if the hazard characteristics of the mixture or

solution are such that they do not meet the criteria (including human experience criteria) for any class.

## **1.4 Mixtures and Solutions Containing Two or More Dangerous Goods**

### **1.4.1 Reserved**

*Note. — Classification of mixtures or solutions containing two or more dangerous goods should be based on the properties of the mixture or solution, not the individual substances. In some instances, it may be appropriate to select the UN Number of a substance specifically listed by name in Table 3-1. For example, it may be more appropriate for mixtures or solutions containing a substance specifically listed by name in Table 3-1 and traces or small quantities of one or more other dangerous goods to be assigned the UN number and proper shipping name of the predominant substance.*

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## **PART 4**

### **PACKING INSTRUCTIONS**

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#### **Chapter 4**

### **CLASS 2 — GASES**

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#### **4.1 SPECIAL PACKING PROVISIONS FOR DANGEROUS GOODS OF CLASS 2**

##### **4.1.1 General requirements**

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4.1.1.2 Parts of cylinders and closed cryogenic receptacles that are in direct contact with dangerous goods must not be affected or weakened by those dangerous goods and must not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods). In addition to the requirements specified in the relevant packing instruction, which take precedence, the applicable provisions of ISO 11114-1:1997 and ISO 11114-2:2000 must be met. Cylinders for UN 1001 **Acetylene, dissolved** and UN 3374 **Acetylene, solvent free** must be filled with a porous mass, uniformly distributed, of a type that conforms to the requirements and testing specified by the appropriate national authority and which:

...

200

## PACKING INSTRUCTION 200

200

For cylinders, the general packing requirements of 1.1 and 4.1.1 must be met.

...

4) Keys for the column “Special packing provisions”:

Material compatibility

- a) Aluminium alloy cylinders are forbidden.
- b) Copper valves are forbidden.
- c) Metal parts in contact with the contents must not contain more than 65 per cent copper.
- d) When steel cylinders are used, only those bearing the “H” mark are permitted.

...

5) Gas mixtures containing any of the following gases must not be offered for transport in aluminium alloy cylinders unless approved by the appropriate national authority of the State of Origin:

UN 1037 **Ethyl chloride**

UN 1063 **Methyl chloride**

UN 1063 **Refrigerant gas R 40**

UN 1085 **Vinyl bromide, stabilized**

UN 1086 **Vinyl chloride, stabilized**

UN 1860 **Vinyl fluoride, stabilized**

UN 1912 **Methyl chloride and methylene chloride mixture**

Table 1. COMPRESSED GASES

≠	UN No.	Name and description	Class or Division	Subsidiary risk	LC <sub>50</sub> ml/m <sup>3</sup>	Cylinders	Test period, years	Test pressure, bar*	Maximum working pressure, bar*	Special packing provisions *
	3156	<b>Compressed gas, oxidizing, n.o.s.</b>	2.2	5.1		X	10			z

\* Where the entries are blank, the working pressure must not exceed two-thirds of the test pressure.

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— END —