



WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTY-FIRST MEETING

Montréal, 5 to 16 November 2007

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009-2010 Edition

CARRIAGE OF FUEL CELLS BY PASSENGERS AND CREW

(Presented by the US Fuel Cell Council (USFCC))

SUMMARY

This working paper proposes to align the ICAO provisions concerning passengers and crew with the latest UN provisions for fuel cells and permit the carriage of these fuel systems in carry-on baggage, as proposed at WG07 in DGP-WG/07-WP/23, which is attached.

Action by the DGP is in paragraph 3.

1. INTRODUCTION

1.1 The purpose of this working paper is to consolidate the decisions made previously and highlight the remaining open items for consideration at DGP/21.

1.2 The Working Group of the Whole Meeting in Memphis (WG07) discussed the freight transport of fuel cells (DGP-WG/07-WP/22). The results of this discussion are found in paragraph 5.13 of the WG07 meeting report (DGP-WG/07-WP/55). Paragraph 5.13.2 of the WG07 meeting report requested the fuel cell industry to inform the panel regarding the quantity of Class 4.3 fuel in the fuel cell cartridge for entry UN 3476 and to provide the relevant data. The fuel cell industry was also asked to comment on whether the proposed quantity limits are practical for freight transport.

1.3 WG07 proposed to align the ICAO provisions concerning passengers and crew with the latest UN provisions for fuel cells and permit the carriage of these fuel systems in carry-on baggage (DGP-WG/07-WP/23). The results of the discussion on this topic are shown in paragraph 5.62 of the WG07 report. As shown in the meeting report, this proposal was considered by the working group and the proposed change was placed in square brackets.

1.4 WG07 proposed several clarifications and consolidations to the text in the current Part 8 provisions concerning fuel cell and fuel cell cartridge carry-on by passengers and crew (DGP-WG/07-WP/31). These proposed changes were considered by the working group and agreed to, as shown in paragraph 5.65 of the WG07 report.

2. DISCUSSION

2.1 The fuel cell industry has considered the proposed limitations in square brackets on UN 3476 and UN 3477 (5 kg for passenger aircraft), and finds that these limits are practical for freight transport since larger quantities can still be shipped on cargo aircraft.

2.2 The fuel cell industry also has verified that the quantity of fuel contained in the fuel cell cartridges might be as high as the 1 kg limit, less the mass of the cartridge shell itself. Designs will vary from manufacturer to manufacturer so the limit on the cartridge mass of 1 kg will also limit the amount of fuel contained within it to less than 1 kg.

2.3 The changes proposed below include the changes already agreed to in reference to DGP-WG/07-WP/31 discussed above. Items that are still open are in square brackets.

3. ACTION BY THE DGP

3.1 Although the entire proposal of DGP WG/07-WP/23 was placed in square brackets in the WG07 meeting report, the proposal below puts only the remaining open items **highlighted** in square brackets for simplification.

3.2 The DGP is invited to align the ICAO provisions concerning passengers and crew with the latest UN provisions for fuel cells and allow the carriage of fuel systems, in carry-on baggage, by passengers and crew, by amending Part 8;1.1.2 as indicated hereafter:

3.3 The original amendment proposed in DGP-WG/07-WP/23 is provided in the appendix to this working paper.

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

...

1.1.2 The provisions of these Instructions do not apply to the following when carried by passengers or crew members or in baggage, transported by the operator, that has been separated from its owner during transit (e.g. lost baggage or improperly routed baggage):

...

r) fuel cell systems used to power portable electronic devices (for example cameras, cellular phones, laptop computers, and camcorders) and spare fuel cartridges, under the following conditions:

[1) fuel cell cartridges may only contain flammable liquids, corrosive substances, liquefied flammable gas, water reactive substances or hydrogen in metal hydride;]

- 2) fuel cell cartridges must not be refillable by the user. Refuelling of fuel cell systems is not permitted except that the installation of a spare cartridge is allowed. Fuel cell cartridges, which are used to refill fuel cell systems but which are not designed or intended to remain installed (fuel cell refills) are not permitted to be carried;
- 3) the maximum quantity of fuel in any fuel cell cartridge must not exceed:
 - a) for liquids 200 mL;
 - [b) for solids 200 grams]**
 - c) for liquefied gases, 120 mL for non-metallic fuel cell cartridges or 200 mL for metal fuel cell cartridges;
 - [d) for hydrogen in metal hydride the fuel cell cartridges shall have a water capacity of 120 mL or less.]**
- 4) each fuel cell system and each fuel cell cartridge must conform to IEC PAS 62282-6-1 Ed. 1, and must be marked with a manufacturer's certification that it conforms to the specification. In addition, each fuel cell cartridge must be marked with the maximum quantity and type of fuel in the cartridge.
- 5) no more than two spare fuel cell cartridges may be carried by a passenger;
- 6) fuel cell systems containing fuel and fuel cell cartridges including spare cartridges are permitted in carry-on baggage only;
- 7) interaction between fuel cells and integrated batteries in a device must conform to IEC PAS 62282-6-1 Ed. 1. Fuel cell systems whose sole function is to charge a battery in the device are not permitted;
- 8) fuel cell systems must be of a type that will not charge batteries when the portable electronic device is not in use and must be durably marked by the manufacturer: "APPROVED FOR CARRIAGE IN AIRCRAFT CABIN ONLY" to so indicate; and
- 9) in addition to the languages which may be required by the State of Origin for the markings specified above, English should be used.

APPENDIX

AMENDMENT PROPOSED TO DGP-WG07

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

...

1.1.2 The provisions of these Instructions do not apply to the following when carried by passengers or crew members or in baggage, transported by the operator, that has been separated from its owner during transit (e.g. lost baggage or improperly routed baggage):

...

- r) portable electronic devices (for example cameras, cellular phones, laptop computers and camcorders) powered by fuel cell systems, and spare fuel cartridges, under the following conditions:
- 1) fuel cell cartridges may only contain flammable liquids ~~(including methanol, formic acid and butane,~~ corrosive substances, liquefied flammable gas, water reactive substances or, hydrogen in metal hydride;
 - 2) fuel cell cartridges must comply with ~~International Electrotechnical Commission (IEC) PAS 62282-6-1 Ed. 1;~~
 - 3) fuel cell cartridges must not be refillable by the user. Refuelling of fuel cell systems is not permitted except that the installation of a spare cartridge is allowed. Fuel cell cartridges which are used to refill fuel cell systems but which are not designed or intended to remain installed (fuel cell refills) are not permitted to be carried;
 - 4) the maximum quantity of fuel in any fuel cell cartridge must not exceed:
 - a) for liquids 200 mL;
 - b) for solids 200 grams;
 - c) for liquefied gases, 120 mL for non-metallic fuel cell cartridges or 200 ml for metal fuel cell cartridges;
 - d) for hydrogen in metal hydride the fuel cell cartridges shall have a water capacity of 120 mL or less;
 - 5) each fuel cell cartridge must be marked with a manufacturer's certification that it conforms to IEC PAS 62282-6-1 Ed. 1, and with the maximum quantity and type of fuel in the cartridge;
 - 6) each fuel cell system must conform to IEC PAS 62282-6-1 Ed. 1, and must be marked with a manufacturer's certification that it conforms to the specification;
 - 7) no more than two spare fuel cell cartridges may be carried by a passenger;
 - 8) fuel cell systems containing fuel and fuel cell cartridges including spare cartridges are permitted in carry-on baggage only;
 - 9) interaction between fuel cells and integrated batteries in a device must conform to IEC PAS 62282-6-1 Ed. 1. Fuel cell systems whose sole function is to charge a battery in the device are not permitted;
 - 10) fuel cell systems must be of a type that will not charge batteries when the portable electronic device is not in

use and must be durably marked by the manufacturer: “APPROVED FOR CARRIAGE IN AIRCRAFT CABIN ONLY” to so indicate; and

- 11) in addition to the languages which may be required by the State of Origin for the markings specified above, English should be used.

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