



WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTIETH MEETING

Montréal, 24 October to 4 November 2005

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 2007-2008 Edition

**EXCEPTIONS FOR FUEL CELL CARTRIDGES AND SYSTEMS
CARRIED BY PASSENGERS AND CREW**

(Presented by US Fuel Cell Council)

SUMMARY

This submission proposes addition of a new provision in Part 8;1.1.2 to allow passengers and crew to carry consumer electronic devices powered by fuel cell systems and spare fuel cartridges for such systems that are certified to conform to IEC 62282-6-1. The proposal includes all fuel cell types included in the IEC standard.

1. INTRODUCTION

1.1 Innovations in consumer electronics are resulting in new technologies to fuel laptops, cell phones, and similar devices, giving them greater utility and longer running times. Portable electronic devices are used today in many environments, including the passenger and crew areas of passenger aircraft. The existing ICAO Technical Instructions (TI) and other dangerous goods codes authorize passenger and crew carriage and use of today's devices. Anticipated public demand for the new technologies, therefore, requires consideration of modifications to the existing provisions of Part 8 of the TI.

1.2 Several of these technologies have been discussed at previous ICAO sessions, insofar as the fuel cartridges utilized contain dangerous goods. During this same period, the International Electrotechnical Commission (IEC), a worldwide standard-setting organization operating as the electrical counterpart to ISO, has been developing a comprehensive standard that outlines safety requirements for the design and consumer use of fuel cell power systems, power units, and fuel cell cartridges that are not

refillable by the user. The IEC Micro Fuel Cell Safety Standard - 62282-6-1 includes rigorous design type testing, anticipating not only normal use and abuse by consumers in all parts of the world, but transport aboard passenger aircraft.

1.3 A committee draft (CD) of this standard has been completed and has been distributed for final international comment. Publication as an International Standard is expected before January 2007. It is proposed that changes to the ICAO TI effective 2007-2008 be adopted at this meeting, contingent upon formal adoption of IEC 62282-6-1 by January 2007.

1.4 The IEC 62282-6-1 standard is applicable to methanol, formic acid, hydrogen stored in metal alloy, methanol clathrate, borohydride compounds, and butane fuel types. A summary of the Committee Draft of this standard is attached, and full copies of the draft may be provided upon request. For each type of system or fuel, an information paper has been prepared to briefly describe the system and how it operates along with a analysis of the risks and measures provided in the particular fuel cell device or cartridge that remediates potential risks identified. The following Information Papers have been provided:

Direct Methanol Fuel Cell Information Paper

Reformed Methanol Fuel Cell Information Paper

Hydrogen Micro Fuel Cell Information Paper

Formic Acid Fuel Cell Information Paper

Butane Micro Fuel Cell Information Paper

Borohydride Fuel Cell Information Paper

1.5 Flammable liquids are in Packing Group II of Class 3; formic acid and solution-based borohydride compounds are in Packing Group II of Class 8; dry borohydride compounds are in Packing Group I of Class 4.3; and, hydrogen and butane are in Class 2.1. Comparable quantities of materials are now authorized for transport in carry-on baggage in the form of perfumes, alcoholic beverages, cosmetics, toiletries, nickel metal hydride batteries, cigarette lighters, hydrocarbon gas-fueled hair curlers, and aerosol containers.

1.6 IEC test criteria include successful temperature cycling, altitude simulation, vibration, drop, compressive loading, short circuit, surface temperature, exhaust gas, long-term storage, internal pressure, and emission tests without flammable, corrosive, or toxic leakage. These devices are designed with valves to preclude leakage and only release their contents when properly affixed to suitable electronic equipment.

1.7 Given the small quantity of regulated material in each cartridge, the thorough design qualification test protocol, and the considerable benefit of not carrying extra batteries, we believe a broader passenger exception in Part 8 is appropriate.

2. PROPOSAL

2.1 It is proposed to add the following provision to Part 8 (Provisions Concerning Passengers and Crew), Chapter 1, in 1.1.2 (Dangerous Goods Carried by Passengers and Crew):

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 systems only may utilize fuel cell cartridges that are not refillable by the user, containing flammable liquids (including methanol), formic acid, butane, hydrogen stored in metal hydrides, or borohydride compounds;
- 2) fuel cell cartridges must comply with IEC Micro Fuel Cell Safety Standard - 62282-6-1 (date);
- 3) the maximum quantity of fuel in any fuel cell cartridge must not exceed 200 mL for liquids and liquefied gases, 200 g for solids, and 25 g for hydrogen;
- 4) each fuel cell cartridge must be marked with a manufacturer's certification that it conforms to IEC 62282-6-1, and with the maximum quantity of fuel in the cartridge;
- 5) the fuel cell system in portable electronic devices also must conform to IEC 62282-6-1, and the device must be marked with a manufacturer's certification that it conforms to that standard;
- 6) no more than three spare fuel cell cartridges may be carried for each portable electronic device; and,
- 7) electronic devices with fuel cell cartridges installed may be carried in carry on baggage only.

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