International Civil Aviation Organization

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**WORKING PAPER**

# DANGEROUS GOODS PANEL (DGP)
# MEETING OF THE WORKING GROUP OF THE WHOLE

**Auckland, New Zealand, 4 to 8 May 2009**

**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 2011/2012 Edition**

**Agenda Item 2.8: Part 8 — Provisions Concerning Passengers and Crew**

## FUEL CELL SYSTEMS USED TO POWER PORTABLE ELECTRONIC DEVICES

(Presented by D. Brennan)

**SUMMARY**

This paper proposes amendments to Part 8;1.1.1.2 r) relating to fuel cell systems.

Action by the DGP-WG is in paragraph 2.

## 1. INTRODUCTION

1.1 This paper is presented jointly with the Japan Electrical Manufacturers' Association (JEMA) and the USFCC. JEMA represents major Japanese and international companies active in the electrical industry such as power & industrial systems, home appliances and related industries. The products handled by JEMA cover a wide spectrum; from boilers and turbines for power generation to home electrical appliances and consumer's electronics.

1.2 The 2009-2010 Edition of the Technical Instructions incorporated a number of revisions to the provisions for fuel cell systems used to power portable electronic devices carried by passengers and crew into Part 8;1.1.1 r) to simplify the text as well as to permit a wider range of fuel cell chemistries.

1.3 In addition, to remove any possible confusion with pneumatic tools and compressed gas cartridges, a definition for "Fuel cell cartridge" as well as "Fuel cell" was adopted at DGP-WG/08 for inclusion in the "Glossary of terms" (refer to DGP-WG/08-WP/068, 3.2.1.1.).

1.4 The term "fuel cell system", which appears seven times in 8;1.1.2 r), is not defined in the Technical Instructions, but the implied meaning is that a "Fuel cell system" consists of a fuel cell unit and a fuel cell cartridge. This interpretation is confirmed by the definitions appearing in Section 3 of IEC PAS 62282-6-1 Ed.1. Figure 1 OF IEC PAS 62282-6-1 Ed.1, entitled "Micro Fuel cell power system block

diagram" is reproduced below. This figure illustrates the interrelationship of the various parts of a micro fuel cell system.

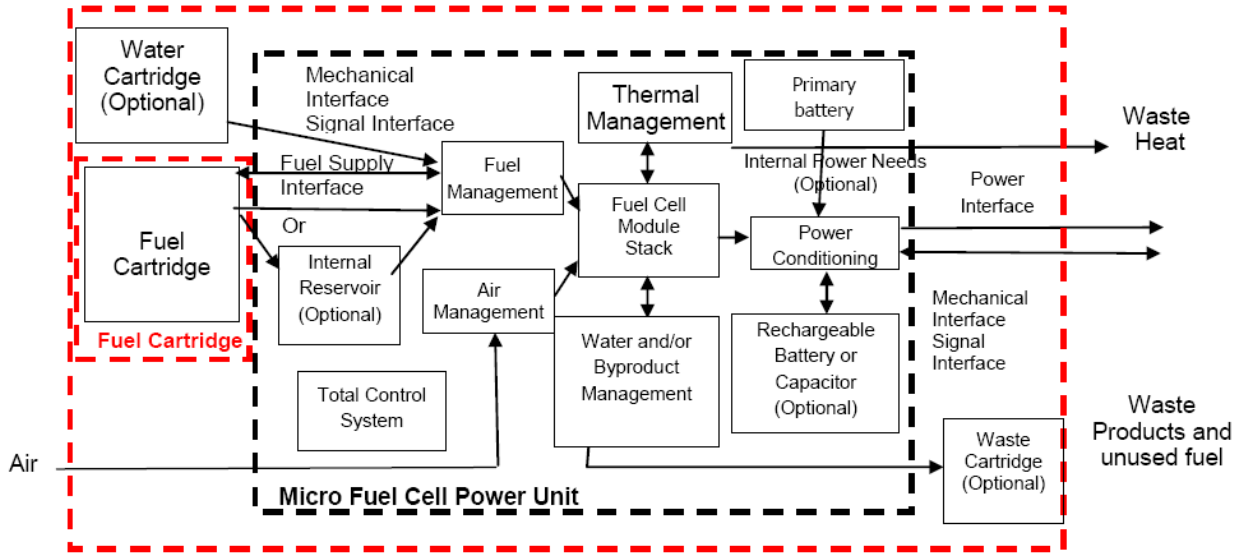


**Figure 1 – Micro fuel cell power system**

1.5 In the context of the use of the term "fuel cell system", Part 8;1.1.2 r) 1) states that fuel cell cartridges may only contain flammable liquids, corrosive substances, liquefied flammable gas, water reactive substances or hydrogen in metal hydride. Can a fuel cell power system also contain those same fuels, for example in the fuel lines? Alternatively, that same sentence could be interpreted in a less restrictive way by implying that the restriction on the specific type of fuel only applies to the cartridges and that a fuel cell system could contain fuels that are not listed in 8;1.1.2 r) 1). It is suggested that the expectation is that the fuel cell system and the cartridge may contain only those fuels identified and this should be clearly stated.

1.6 The requirement that fuel cartridges must not be refillable by the user appearing in the first sentence of 8;1.1.2 r) 2) may be interpreted as prohibiting the carriage of a micro fuel cell having an internal reservoir. Such fuel cells are refilled by means of a refill (cartridge) that is not designed or intended to remain installed in the fuel cell. This interpretation appears at odds with the second sentence of current 8;1.1.2 r) 2), which recognises such systems and specifies that the fuel cell **refills** are not permitted to be carried. Consumer devices posing a similar hazard such as cigarette lighters containing liquefied gas, whether refillable by the user or not, are permitted in accordance with 8;1.1.2 m). Similarly, 8;1.1.2 i) permits hair curlers containing hydrocarbon gas (in a fuel cartridge or an internal reservoir as was demonstrated to the DGP previously) to be carried by passengers. Of course, in both cases, ***refills*** are not permitted. This is done to avoid any possibility of refuelling such devices onboard the aircraft. A similar restriction is imposed on fuel cell refills in 8;1.1.2 r) 2).

1.7 The second sentence in 8;1.1.2 r) 2) states that refuelling of the fuel system is not permitted. It is assumed that it is the refuelling of the fuel cell unit **on board an aircraft** which is not permitted. Accordingly it is suggested to amend paragraph 8;1.1.2 r) 2) to state that restriction.

## 2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to amend Part 8;1.1.2 r) 1) and 2) as indicated below:

### 1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

. . .

1.1.2 Notwithstanding any additional restrictions which may be implemented by States in the interests of aviation security, except for the incident reporting provisions of 7;4.4, the provisions of these Instructions do not apply to the following when carried by passengers or crew members or in baggage 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 systems and 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.~~ ~~R~~refuelling of a fuel cell ~~systems~~ unit on board an aircraft 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;

. . .

— END —