



**WORKING PAPER**

**DANGEROUS GOODS PANEL (DGP)**

**TWENTY-THIRD MEETING**

**Montréal, 11 to 21 October 2011**

**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 2013-2014 Edition**

**FUEL CELL INDUSTRY  
UPDATE INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC) 62282-6-100  
INTERNATIONAL STANDARD FOR MICRO FUEL CELLS  
CORRIGENDUM**

(Presented by FCHEA)

**SUMMARY**

This paper provides an update on the submission to the IEC member countries for voting of a Corrigendum to IEC 62282-6-100 to correct some errors and recommends to the ICAO DGP some follow up actions.

This paper also advises the DGP regarding an Amendment to IEC 62282-6-100 that is being developed for consideration.

**Action by the DGP:** The DGP is invited to remove the square brackets around the text that was agreed in principle during the DGP Working Group of the Whole Meeting in Atlantic City (DGP-WG/11, 4 to 8 April 2001) (DGP/23-WP/3, paragraph 3.2.24 refers). The DGP is also invited to review the additional information to be provided by FCHEA regarding voting results for the Corrigendum as well as the developing amendment to IEC 62282-6-100 when they become available. Following this review, the DGP will be asked to consider referencing IEC 62282-6-100 including *Amendment 1* in the portions of the Technical Instructions given in paragraph 2 of this working paper.

**1. INTRODUCTION**

1.1 During the DGP Working Group of the Whole Meeting in Atlantic City (DGP-WG/11, 4 to 8 April 2001) the Fuel Cell and Hydrogen Energy Association presented a paper advising the DGP of

the publication of IEC 62282-6-100 and advising on the differences between IEC PAS 62282-6-1 and the new IEC 62282-6-100 (DGP/23-WP/3, paragraph 3.2.24 refers). The working group was asked to strike the citations to IEC PAS 62282-6-1 and replace them with IEC International Standard 62282-6-100 in the Technical Instructions Part 8, 1.1.2 t) 4) and t) 8), Provisions for Dangerous Goods Carried by Passengers or Crew, and in Part 4, Packing Instructions 216, 375, 496 and 874, for fuel cell cartridges contained in equipment. The working group decided that “the proposal in DGP-WG/11-WP/12 was agreed in principle and placed in square brackets” (DGP/23-WP/3, paragraph 3.2.24 refers).

1.2 Subsequent to this decision, the fuel cell industry reviewed IEC 62282-6-100 and found some errors and ambiguities, detailed in Paragraph 2 below, necessitating a Technical Corrigendum. A Corrigendum has been prepared and released by the IEC for a six-week voting period by the participating member countries of IEC Technical Committee 105 on Fuel Cells, ending September 16, 2011. When voting is completed, the FCHEA will update the DGP with results of the voting. A copy of the Corrigendum is attached for review by members of the DGP.

1.3 An amendment to the Standard is also being developed to address further improvements to the Standard as published. Although this amendment is not finalized, a draft for voting should be available prior to the DGP/23 meeting in October. Once finalized, the amendment will be circulated for a five-month voting and comment period, to enable all participating member countries sufficient time to review and comment on the changes. More information on the Amendment will be provided at DGP/23.

1.4 As fuel cell technologies evolve and changes such as these are made to update the standards and specifications that cover fuel cell cartridges, fuel cells and fuel cell powered devices, the fuel cell industry will continue to keep the Dangerous Goods Panel apprised.

1.5 This paper provides recommendations for the DGP to consider in relation to this issue.

## 2. **DISCUSSION OF THE CHANGES INCLUDED IN THE CORRIGENDUM TO IEC 62282-6-100**

2.1 **Correction of editorial and typographical errors:** In several instances, decimal point errors were found that must be corrected. None of these corrections change any of the information found in the table of differences included in DGP-WG/11-WP/12. Correction of these errors does not affect the overall technical principles on which the standard is based, and merely corrects typographical and editorial mistakes.

2.2 Correction to lower the vapour loss limit for the formic acid micro fuel cell power system (system off) during a depressurization incident from 23 g/h to 0.018 g/h: During DGP-WG/11, some DGP members noted a concern with the large increase of the formic acid vapour loss limit under loss of pressure testing. Following WG-11, the industry reviewed the limit and determined that the previous limit of 0.018g/h was more appropriate. This correction by the corrigendum makes IEC 62282-6-100 consistent with PAS 62282-6-1 in this respect.

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APPENDIX



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

TECHNICAL COMMITTEE 105: FUEL CELL TECHNOLOGIES

**Proposed Technical Corrigendum to IEC 62282-6-100 Ed.1: 2010, Fuel cell technologies – Part 6-100: Micro fuel cell power systems – Safety**

**Background**

The purpose of the present document is to propose a technical corrigendum to IEC 62282-6-100 edition 1 (published in 2010); the contents of the proposed technical corrigendum as well as the technical justifications (“Rationale” in red font) are reproduced in the annex.

NOTE Portions of red text (“Rationale”) will be removed in the final publication.

The present proposal for a technical corrigendum has been agreed within WG 8 of TC 105; other items raised by WG 8 with regard to IEC 62282-6-100 will be processed in the form of an amendment to the standard.

**Action**

The P-members of TC 105 are invited to indicate whether they agree that there are technical errors or ambiguities in the subject standard which could lead to incorrect or unsafe application (see ISO/IEC Directives Part 1, subclause 2.10.2) and that the proposed corrigendum is the right way to correct them.

**The P-members of TC 105 are invited to send their votes and any comments to the IEC electronic voting system**

**by 2011-09-16 at the latest.**

If there is consensus among P-members on the above question, IEC Central Office will proceed with the publication of the technical corrigendum.

**Annex:** Proposed technical corrigendum to IEC 62282-6-100 (2010)

IEC 62282-6-100  
(First edition – 2010)

Fuel cell technologies –  
Part 6-100: Micro fuel cell power systems - Safety

**Proposed Technical C O R R I G E N D U M 1**

(With background and rationale included in red color)

**General** – During the IEC plenary meeting in Seattle 2010, corrections to the IEC 62282-6-100 were presented and a summary was circulated to the full working group following the meeting. Leading up to the April 2011 WG-8 meeting in Vancouver, a small working group of industry experts was formed to review each correction and agreed to a resolution that warrants a technical corrigendum. During and after the Vancouver meeting, specific changes were presented with supporting rationale, and reviewed by the working group. After allowing for comment, this technical corrigendum was finalized during the July 2011 WG-8 meeting in Northbrook, IL. The red font information in this document is intended for TC 105 Officers and IEC Central Office Staff review and shall be removed prior to publication.

**Item 1**

**Rationale:** Correct the “no fuel vapour loss” limit of formic acid technical error that currently exceeds the correct safe level of 0,018 g/h.

**Figure A.6 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 68kPa low external pressure test**

*Replace the mass loss rate of “0,18 g/h” in the two decision diamonds and note with “0,018 g/h”*

**A.7.3.1.4.1 d) Passing criteria – Micro fuel cell power system or micro fuel cell power unit 68 kPa low external pressure test**

*Replace the mass loss rate of “0,18 g/h” in the last sentence with “0,018 g/h”*

**Figure A.7 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 11.6 kPa low external pressure test**

*Replace the mass loss rate of “0,18 g/h” in the bottom decision diamond to “0,018 g/h”*

**Figure A.9 – Fuel cartridge leakage and mass loss test flow chart for long-term storage test - NOTE**

*Replace the mass loss rate of “0,18 g/h” in the last sentence of the NOTE to “0,018 g/h”*

**Item 2**

**Rationale:** This change corrects a technical error noted by the International Civil Aviation Organization (ICAO) regulators in the standard where the limit was based on flammability, which could lead to an incorrect application of the standard, when it should have been based on toxicity. As a general principle the WG has adopted an approach where both toxicity and flammability limits for a given scenario are examined and the limit to be used for each type test is the more stringent of the two. The 23,0 g/h mass loss limit, currently in the standard, is based on the 25 percent of LFL (lower flammability limit for 85 percent formic acid fuel) allowance for the formic acid fuel cell system in the overhead bin (280L, 0 Air Changes per Hour). This 0,018 g/h mass loss number is more conservative and is based on the “DEVICE OFF” toxicity limit for formic acid fuel cell systems, also applied elsewhere in the standard.

**Figure A.7 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 11,6 kPa low external pressure test**

*Replace the mass loss rate of "23,0 g/h" in the top decision diamond and note with "0,018 g/h".*

**A.7.3.1.4.2 c) 2) & Passing criteria – Micro fuel cell power system or micro fuel cell power unit 11,6 kPa low external pressure test**

*Replace the mass loss rate "23,0 g/h" in the last sentence with "0,018 g/h"*

### **Item 3**

**Rationale:** Correct the "Device-On" hydrogen emissions rate from 0,08 g/h to 0,8 g/h in Annex E, F & G. The incorrect placement of the decimal point was inadvertently introduced during technical editing process and could lead to incorrect application of the standard.

**E & F.7.3.12 d) 5) iii) – Emissions test**

*Replace the emission rate of "0,08 g/h" in the last sentence with "0,8 g/h"*

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