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Australian STANDARD®

Hydrogen fuel quality — Product specification

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Australian STANDARD®

Hydrogen fuel quality — Product specification

First published as AS ISO 14687:2020.

Preface

This Standard was prepared by the Standards Australia Committee ME-093, Hydrogen Technologies.

The objective of this document is to specify the minimum quality characteristics of hydrogen fuel as distributed for utilization in vehicular and stationary applications.

It is applicable to hydrogen fuelling applications, which are listed in Table 1.

This document is identical with, and has been reproduced from, ISO 14687:2019, *Hydrogen fuel quality — Product specification*.

As this document has been reproduced from an International Standard, a full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms "normative" and "informative" are used in Standards to define the application of the appendices or annexes to which they apply. A "normative" appendix or annex is an integral part of a Standard, whereas an "informative" appendix or annex is only for information and guidance.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 197, *Hydrogen technologies*.

This first edition of ISO 14687 cancels and replaces ISO 14687-1:1999, ISO 14687-2:2012 and ISO 14687-3:2014. It also incorporates the Technical Corrigenda ISO 14687-1:1999/Cor 1:2001 and ISO 14687-1:1999/Cor 2:2008.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

As mentioned in the Foreword, this document is a combination of three former standards for the specifications of hydrogen fuel, ISO 14687-1, ISO 14687-2 and ISO 14687-3, incorporating their revisions at the same time.

In recent years, PEM (proton exchange membrane) fuel cell technologies have shown a remarkable progress such as lowering of platinum (Pt)-loading, thinned electrolyte membrane, operation with high current density and operation under low humidity. With this progress, it has become necessary to reconsider the tolerances of hydrogen impurities for the PEM fuel cells which were previously specified in ISO 14687-2 and ISO 14687-3.

Therefore, this document has been mainly revised based on the research and development of PEM fuel cells focusing on the following items[1], [3] to [15]:

— PEM fuel cell catalyst and fuel cell tolerance to hydrogen fuel impurities;

— effects/mechanisms of impurities on fuel cell power systems and components;

— impurity detection and measurement techniques for laboratory, production and in-field operations;

— fuel cell vehicle demonstration and stationary fuel cell demonstration results.

The grade D and the grade E of this document are intended to apply to PEM fuel cells for road vehicles and stationary appliances respectively. These aim to facilitate the provision of hydrogen of reliable quality balanced with acceptable lower cost for the hydrogen fuel supply.

This document reflects the state of the art at the date of its publication, but since the quality requirements for hydrogen technology applications are developing rapidly, this document may need to be further revised in the future according to technological progress.

NOTES

Australian Standard®

Hydrogen fuel quality — Product specification

1 Scope

This document specifies the minimum quality characteristics of hydrogen fuel as distributed for utilization in vehicular and stationary applications.

It is applicable to hydrogen fuelling applications, which are listed in Table 1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19880-8, *Gaseous Hydrogen — Fuelling stations — Part 8: Fuel Quality Control*

ISO 21087, *Gas analysis — Analytical methods for hydrogen fuel — Proton exchange membrane (PEM) fuel cell applications for road vehicles*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
boundary point
<PEM *fuel cell* (3.7) for stationary applications> point between the *hydrogen fuel supply equipment* (3.13) and the PEM *fuel cell power system* (3.9) at which the quality characteristics of the hydrogen fuel are to be determined

3.2
constituent
component (or compound) found within a hydrogen fuel mixture

3.3
contaminant
impurity that adversely affects the components within the *fuel cell system* (3.8), the *fuel cell power system* (3.9) or the hydrogen storage system

Note 1 to entry: An adverse effect can be reversible or irreversible.

3.4
customer
<PEM *fuel cell* (3.7) for stationary applications> party responsible for sourcing hydrogen fuel in order to operate the *fuel cell power system* (3.9)

3.5
detection limit
lowest quantity of a substance that can be distinguished from the absence of that substance with a stated confidence limit