

AS ISO 19880.8:2021
Gaseous hydrogen — Fuelling stations
Part 8: Fuel quality control

Amendment No. 1

International adoption identical

Publishing and Approval Dates

Council of Standards Australia Approval: 4 February 2022

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Summary

This Amendment applies to the following elements:

- Front cover
- Preface
- Amendment 1

Amendment Details

AS ISO 19880.8:2021 is amended as follows. The amendments should be inserted in the locations as instructed.

Element	Instruction/New text
Front cover	Top left-hand corner, after ISO 19880-8:2019 <i>add</i> : ISO 19880-8:2019/Amd 1:2021 (Incorporating Amendment No. 1)
Preface	After the first paragraph, <i>add</i> the following: Amendment No. 1 to this Standard was prepared by the Standards Australia Committee ME-093, Hydrogen Technologies. <i>Delete</i> third paragraph and <i>replace</i> with the following: This document is identical with, and has been reproduced from, ISO 19880-8:2019, <i>Gaseous hydrogen — Fuelling stations — Part 8: Fuel quality control</i> and its Amendment No. 1 (2021), which has been added at the end of the source text.
Amd 1 (new)	After Bibliography, <i>add</i> the following Amendment No. 1 (2021):

Amendment 1

Clause 5, first paragraph

Replace the paragraph with the following:

The quality requirements of hydrogen fuel dispensed to PEM fuel cells for road vehicles are listed in Grade D of ISO 14687.

8.4, first paragraph

Replace the paragraph with the following:

It is necessary to evaluate the possible consequences on a fuel cell vehicle if any impurity exceeds the threshold value of ISO 14687 Grade D.

8.4, second paragraph

Replace the paragraph with the following:

An estimation of the concentration above the ISO 14687 Grade D threshold values at which the severity increases (if applicable) is named “Level 1” and is given in column 5 for each impurity where the “severity class” is not already 4.

Table 4

Replace Table 4 with the following table:

Table 4 — Impact of impurities on fuel cell powertrain

Impurity		ISO 14687 Grade D threshold value ^a [μmol/mol]	Severity class (from ISO 14687 Grade D threshold value to Level 1)	Level 1 value [μmol/mol]	Severity class (greater than Level 1 threshold)
Total non-H ₂ gases		300	UD ^b	UD ^b	4
Helium	He	300	UD ^b	UD ^b	4
Nitrogen	N ₂	300	UD ^b	UD ^b	4
Argon	Ar	300	UD ^b	UD ^b	4
Oxygen	O ₂	5	UD ^c	UD ^c	4
Carbon dioxide	CO ₂	2	1	3	4
Carbon monoxide	CO	0,2	2-3 ^d	1	4
Methane	CH ₄	100	1	300	4
Water	H ₂ O	5	4	N/A	4
Total sulphur compounds	H ₂ S basis	0,004	4	N/A	4
Ammonia	NH ₃	0,1	4	N/A	4
Total hydrocarbons except methane	CH ₄ basis	2	1-4 ^d	N/A	4
Formaldehyde	HCHO	0,2	2-3 ^d	1	4
Formic acid	HCOOH	0,2	2-3 ^d	1	4
Halogens		0,05	4	N/A	4
Maximum particulate concentration (liquid and solid) ^e		1 mg/kg	4	N/A	4

Key

UD: undetermined

N/A: not applicable

^a The threshold value is according to hydrogen specification of Grade D of ISO 14687.^b The severity class (from ISO 14687 Grade D threshold value to Level 1) and Level 1 value for this impurity is undetermined because no specific study has been conducted yet in alignment with the new threshold value. It needs to be covered in the next edition of this document.^c The severity class (from ISO 14687 Grade D threshold value to Level 1) and Level 1 value for oxygen are undetermined because data are lacking to confirm those values. It needs to be covered in the next edition of this document.^d A higher value is to be considered for risk assessment approach until more specific data is available.^e Particulates are based upon mass density mg/kg.*A.15 first paragraph*

Replace “ISO 14687-2” with “Grade D of ISO 14687” in the second last sentence.

Table B.1

Replace Table B.1 with the following table:

Table B.1 — Probability of occurrence for off-site SMR

Impurity	Threshold μmol/mol	Possible causes For the source studied	Typical barriers employed in this process	Probability with barriers
Inert gas N ₂	300	Present in natural gas and syngas PSA malfunction	— PSA — Double analysis PSA outlet <100 μmol/mol	UD ^a
Inert gas Ar	300	Only ATR and POx present in O ₂ typical 0,6 % in syngas from ATR	— PSA. Not sized to remove Ar. Ar content may be higher if H ₂ comes from ATR, POX or feeds with high Ar content	UD ^a
O₂	5	Not present in syngas. O ₂ is unstable in the condition of reforming and shift reactions. Combines with H ₂ , CO, and CH ₄	— PSA cannot be used with significant O ₂ content for safety reasons	0
CO₂	2	Present in syngas (%)	— PSA adsorption strength of MS, activated carbon, silicagel higher for CO ₂ than CO. A CO content lower than 10 μmol/mol insures a CO ₂ content lower than 2 μmol/mol	0
CO	0,2	Normal operation below threshold. Occasional peaks at μmol/mol level	— Double analysis at the PSA outlet + trip if the CO > 1-10 μmol/mol at PSA outlet	4
CH₄	100	Present in syngas at % level	— In most cases CO is sizing the PSA, therefore CO < 10 μmol/mol ==> C H ₄ < 100 μmol/mol depending on users' specification (Europe pipeline 2 μmol/mol).	2
H₂O	5	Syngas saturated in H ₂ O	— PSA adsorbed in alumina and MS adsorption strength higher than CO ₂ . A CO content lower than 10 μmol/mol insures a H ₂ O content lower than 5 μmol/mol.	0

Table B.1 (continued)

TS	0,004	TS from natural gas	— Desulphuration upstream reformer (typical values: normal < 10 ppb, maximum < 20 ppb, guarantee < 50 ppb) — Typical dilution factor 2,5 (1 mole natural gas produces 2,5 mole H₂) — Pre-reformer catalyst poisoning by sulphur is irreversible. Sulphur trapped at this stage. In case of breakthrough, process condition cannot be achieved — Reformer catalyst poisoning by sulphur is irreversible. Sulphur trapped at this stage. In case of breakthrough, process condition cannot be achieved — Shift catalyst poisoning by sulphur is irreversible. Sulphur trapped at this stage. In case of breakthrough, process condition cannot be achieved — PSA adsorption of H₂S before CO, CO₂, species — H₂S adsorption in pipe and vessels. Strong affinity with steel	0
NH₃	0,1	Traces present in syngas	— PSA adsorption strength of alumina and molecular sieve higher than CO. A CO content lower than 10 µmol/mol insures a NH ₃ content lower than 0,1 µmol/mol	0
THC	2	Traces of C ₂ + after reforming reaction	— PSA C ₂ C ₃ , C ₄ , C ₅ +adsorbed by activated carbon layer. A CO content lower than 10 µmol/mol insures a THC (C ₄ excluded) content lower than 2 µmol/mol	0
HCHO	0,2	May be present in syngas. essentially liquid	— PSA. Formaldehyde adsorption strength of alumina and molecular sieve higher than CO. A CO content lower than 10 µmol/mol insures a HCHO content lower than 0,1 µmol/mol. To guarantee 0,01 µmol/mol would require more experience of measuring at those levels	UD ^a
HCOOH	0,2	May be present in syngas essentially liquid	— PSA. Formic adsorption strength of alumina and molecular sieve higher than CO. A CO content lower than 10 µmol/mol insures a HCOOH content lower than 0,2 µmol/mol	0