DRAFT AMENDMENT

ISO 19880-8:2019/DAM 1

ISO/TC **197** Secretariat: **SCC**

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Gaseous hydrogen — Fuelling stations —

Part 8: Fuel quality control

AMENDMENT 1

Hydrogène gazeux — Stations de remplissage —

Partie 8: Contrôle qualité du carburant

AMENDEMENT 1

ICS: 43.060.40; 71.100.20

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

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Gaseous hydrogen — Fuelling stations —

Part 8: Fuel quality control

AMENDMENT 1

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Normative references

Add the following document before ISO 19880-1.

ISO 14687, *Hydrogen fuel — Product specification*

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 paragraphs

Replace Replace the first paragraph with

“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.”

Second paragraphs

Replace the second paragraph with

“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.”

8.4 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 [b]	UD [b]	4
Carbon dioxide	CO_2	2	1	3	4
Carbon monoxide	CO	0,2	2-3[c]	1	4
Methane	CH_4	100	1	300	4
Water	H_2O	5	4	NA	4
Total sulphur compounds	H_2S basis	0,004	4	NA	4
Ammonia	NH_3	0,1	4	NA	4
Total hydrocarbons except methane	CH_4 basis	2	1-4[c]	NA	4
Formaldehyde	**HCHO**	0,2	2-3[c]	1	4
Formic acid	HCOOH	0,2	2-3[c]	1	4
Halogens		0,05	4	NA	4
Maximum particulate concentration (liquid and solid)[d]		1 mg/kg	4	NA	4

Key

UD: Undetermined.

NA: 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 was done yet on that in order to be modified to be aligned with the new threshold value. It needs to be covered in the next edition of this international standard.

[c] A higher value is to be considered for risk assessment approach until more specific data is available.

[d] Particulates are based upon mass density mg/kg.

Annex A

A.15 first paragraph

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

Annex B

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]
O_2	5	Not present in syngas. O_2 is unstable in the condition of reforming and shift reactions. Combines with H_2, CO CH_4	— PSA cannot be used with significant O_2 content for safety reasons	0
CO_2	2	Present in syngas (%)	— PSA adsorption strength of MS, activated carbon, silicagel higher for CO_2 than CO. A CO content lower than 10µmol/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
CH_4	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
H_2O	5	Syngas saturated in H_2O	— PSA adsorbed in alumina and MS adsorption strength higher than CO_2. A CO content lower than 10 µmol/mol insures a H_2O content lower than 5 µmol/mol.	0

Key

UD: Undetermined.

[a] The probability of occurrence for this impurity is undetermined because no specific study was done yet on that in order to be modified to be aligned with the new threshold value. It needs to be covered in the next edition of this international standard.

Table B.1 *(continued)*

Impurity	Threshold µmol/mol	Possible causes For the source studied	Typical barriers employed in this process	Probability with barriers
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 (1mole natural gas produces 2,5 mole H_2) — 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 H_2S before CO, CO_2, species — H_2S adsorption in pipe and vessels. Strong affinity with steel	0
NH_3	0,1	Traces present in syngas	— PSA adsorption strength of alumina and molecular sieve higher than CO. A CO content lower than 10µmol/mol insures a NH_3 content lower than 0,1 µmol/mol	0
THC	2	Traces of C2+ after reforming reaction	— PSA C2 C3, C4, C5+adsorbed by activated carbon layer. A CO content lower than 10 µmol/mol insures a THC (CH_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

Key

UD: Undetermined.

[a] The probability of occurrence for this impurity is undetermined because no specific study was done yet on that in order to be modified to be aligned with the new threshold value. It needs to be covered in the next edition of this international standard.

Table B.1 *(continued)*

Impurity	Threshold µmol/mol	Possible causes For the source studied	Typical barriers employed in this process	Probability with barriers
Halogens	0,05	Present in natural gas	— Any Cl present in natural gas would be stopped by HDS — Pre-reformer catalyst poisoning by Cl irreversible Cl trapped at this stage. If breakthrough, process condition cannot be achieved — Reformer catalyst poisoning by Cl irreversible. Cl trapped at this stage I break through, process condition cannot be achieved — Shift catalyst poisoning by Cl irreversible. Cl trapped at this stage. I break through, process condition cannot be achieved — PSA adsorption of Cl before CO, CO_2, species	0
He	300	Not present in natural gas in N Europe (<10 µmol/mol). Passes through the whole process. Dilution factor 2,5		0

Key

UD: Undetermined.

[a] The probability of occurrence for this impurity is undetermined because no specific study was done yet on that in order to be modified to be aligned with the new threshold value. It needs to be covered in the next edition of this international standard.