


Certification programme ZP
“Zertifizierungsprogramm” 2100
of DVGW CERT GmbH, Bonn

Supplementary tests for catering
equipment for gaseous fuels with a
hydrogen content of up to 20 % by
volume

0	Preliminary remark.....	3
1	Certification procedure.....	4
2	Certificate of conformity	4
3	Marks.....	4
3.1	Certification mark.....	4
3.2	Note on use	4
3.3	Labelling of the hydrogen admixture	4
4	Type of certificate of conformity	5
5	Scope	5
6	Testing laboratories	5
7	Requirements for up to 20 % hydrogen by volume.....	5
8	Other applicable documents	7
9	Period of validity	7

	Certification programme ZP 2100 Supplementary tests for catering equipment for gaseous fuels with a hydrogen content of up to 20 % by volume	52100.20-00-E-GB	
		Doc. type	ZP
		Author	DVGW CERT GmbH
		Stand	09.07.2024

0 Preliminary remark

The following certification and test basis describes the supplementary tests required to qualify catering equipment for the addition of up to 20 % hydrogen by volume to natural gas (G 20) as a fuel gas. This ZP will continue to apply to fireplaces in appliance category E until there is a standardised European regulation.


A conformity assessment under the Gas Appliances Regulation (see 4.) is applied, as the appliances are made available on the market and put into operation in accordance with Art. 3 of Regulation (EU) 2016/426.

This certification and testing programme is based on DVGW research projects (e.g. G 201205 [1], G 201615 [2], G 201824 [3], G 201902 [4], G 202138 [5], G 202021), further research (e.g. THyGA [6]), and also the diverse literature on hydrogen use in (chemical) industry (e.g. Marchi et al. [7], NASA publication series [8]).

The main results were that the elastomeric or polymeric (PTFE, fibre sealants/adhesive sealants) sealing materials for their respective temperature ranges of use are chemically compatible, even when used with 100 % hydrogen. The technical feasibility of adding up to 20 % hydrogen to gas appliances is also demonstrated. Under the pressure and temperature conditions in gas appliances, no further special material requirements are necessary, even for metallic materials in accordance with the assessments from [2], among others, that go beyond the requirements of the DIN EN 203 series of standards.

Bibliography

- [1] Dörr, H., Kröger, P., Nitschke-Kowsky, P., Senner, J., Tali, E., Feldpausch-Jägers, S., „Untersuchungen zur Einspeisung von Wasserstoff in ein Erdgasnetz - Auswirkungen auf den Betrieb von Anwendungen im Bestand, auf Gas-Plus-Technologien und auf Verbrennungsregelungsstrategien“, DVGW G 201205, DVGW Deutscher Verein des Gas- und Wasserfaches e. V. Technisch-wissenschaftlicher Verein, Bonn, 2016.
- [2] Scholten, F., Dörr, H., Werschy, M., „Mögliche Beeinflussung von Bauteilen der Gasinstallation durch Wasserstoffanteile im Erdgas unter Berücksichtigung der TRGI“, DVGW 201615, DVGW Deutscher Verein des Gas- und Wasserfaches e. V. Technisch-wissenschaftlicher Verein, Bonn, 2018.
- [3] Köppel, W., Mörs, F., Hüttenrauch, J., Burmeister, F., „Entwicklung einer Roadmap zur Umsetzung des DVGW-Energie-Impulses bis zum Jahr 2050“, DVGW G 201824, DVGW Deutscher Verein des Gas- und Wasserfaches e. V. Technisch-wissenschaftlicher Verein, Bonn, 2023.
- [4] Dörr, H., Brandes, A., Kronenberger, M., Janßen, N., Gehrmann, S., „Wasserstoff in der Gasinfrastruktur: DVGW/Avacon-Pilotvorhaben mit bis zu 20 Vol.-% Wasserstoff-Einspeisung in Erdgas – H₂-20“, DVGW G 201902, DVGW Deutscher Verein des Gas- und Wasserfaches e. V. Technisch-wissenschaftlicher Verein, Bonn, 2023
- [5] Anghilante, R., Bhagwan, R., Dörr, H., Burmeister, F., Joormann, N., Oberschelp, L., Tali, E., „Experimentelle Charakterisierung der Leckraten von Prüflücken mit Wasserstoff und/oder Methan-Gasmischungen gegenüber Luft“, DVGW G 202138, DVGW Deutscher Verein des Gas- und Wasserfaches e. V. Technisch-wissenschaftlicher Verein, Bonn, 2023
- [6] THyGA, Testing Hydrogen admixture for Gas Applications, <https://thyga-project.eu/>
- [7] C. S. Marchi, B. P. Someday, Technical Reference for Hydrogen Compatibility of Materials, Sandia Report SAND2012-7321 (unlimited release), (2012)
- [8] NASA, SAFETY STANDARD FOR HYDROGEN AND HYDROGEN SYSTEMS, Guidelines for Hydrogen System Design, Materials Selection, Operations, Storage, and Transportation, Report NSS 1740.16 (1997)
- [9] K. E. Cox und K. D. Williamson, Hydrogen: Its Technology and Implications, Volume IV: Utilization of Hydrogen, Boca Raton, Florida: CRC Press, 1979.
- [10] W. U. u. G. V. H. Rottländer, Grundlagen der Lecksuchtechnik, Oerlikon Leybold Vacuum GmbH, 2014

	Certification programme ZP 2100 Supplementary tests for catering equipment for gaseous fuels with a hydrogen content of up to 20 % by volume	52100.20-00-E-GB	
		Doc. type	ZP
		Author	DVGW CERT GmbH
		Stand	09.07.2024

1 Certification procedure

Products, Gas Appliance Regulation EU/2016/426

2 Certificate of conformity

Issue of an EU type examination certificate in accordance with EU/2016/426, Module B.

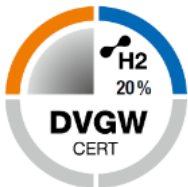
3 Marks

3.1 Certification mark



Labelling in accordance with gas appliance regulation EU/2016/426 (monitoring by NB 0085)

3.2 Note on use



Note: The H₂-Ready mark of DVGW CERT GmbH has no direct reference to the tests described in this ZP. It is an indication that the appliance can be used with natural gas-H₂ mixtures.


3.3 Labelling of the hydrogen admixture

In its "Guidance sheet Hydrogen in Gas certificate" dated 27 September 2023, the NBGA (Notified Bodies group Gas Appliances) defines that the suitability of gas appliances for burning H₂NG pending to include H₂NG in the new revision of the EN 437, should be mentioned in the Eu Type Examination Certificate like the following:

Gas groups:		Gas groups:	
Group	mbar	Group	mbar
H	20	HY20	20
E	20	EY20	20
N	20 - 25	NY20	20 - 25

The above gas groups can be combined in accordance with the EN 437:2021 standard and the national circumstances of the countries.

Note: The suffix "Y20" means that the appliances are suitable for use with natural gas of the specified gas group, which is mixed with hydrogen to produce a gas mixture containing up to 20 % hydrogen gas (H₂) when the appliance is set to the reference gas G20.

	Certification programme ZP 2100 Supplementary tests for catering equipment for gaseous fuels with a hydrogen content of up to 20 % by volume	52100.20-00-E-GB	
		Doc. type	ZP
		Author	DVGW CERT GmbH
		Stand	09.07.2024

4 Type of certificate of conformity

Issue of an EU type-examination certificate, with ≤ 10 years duration

Registration number scheme/ product identification number: CE-0085CR0123

5 Scope

Product group	Product code	Product type
Catering appliances	21...	Appliances/product types within the scope of DIN EN 203-1:2022

6 Testing laboratories

Testing laboratories accredited according to EN ISO/IEC 17025 for the relevant test standards and contractually bound to DVGW CERT GmbH.

7 Requirements for up to 20 % hydrogen by volume

In addition to the tests defined in DIN EN 203-1:2024-07 for natural gas (standard test gas G 20), the tests must also be carried out with a mixture consisting of 80 % by volume methane (G 20) / 20 % by volume hydrogen as standard test gas 2 (NPG2).

The introduction of NPG2 is intended to consider that the hydrogen concentration in the distributed gas can vary between 0 and 20 % by volume and that the basic requirements for the respective gas category with the standard test gas G 20 are still covered. They are supplemented by the following requirements. All tests are carried out with the manufacturer's specifications for the basic setting to G 20 and no adjustment to NPG2 is made.

For the certification of gas appliances within the meaning of this certification programme, the following requirements must also be met for proof of safe operation (combustion, ignition, exhaust gas leakage and escape of unburned gases):


Section	Requirements	Test condition	Comment	Test gas
	Resistance up to 20 % H ₂ by volume in natural gas Components and materials	Manufacturer's declaration of resistance in conjunction with risk assessment and safety concept	Conformity assessment of the manufacturer for the selection and assessment of compatibility with 20 % H ₂ by volume in natural gas of metallic and non-metallic materials The standard references from DIN EN 203-1:2024-07 can be used as a basis	

Section	Requirements	Test condition	Comment	Test gas
6.1	Soundness	7.2.1 (if applicable 7.4.1.2) 7.2.2.1, 7.2.2.2	Air leakage rate <140 cm ³ /h Devices according to type B ₁ , B ₁₄ and B ₂ : CO ₂ con- centration < 0.2 %	NPG NPG2
6.2	Obtaining the gas rate / Nominal heat input (Q _n)	Testing according to 7.3.2.3 7.3.2.4 7.3.3 7.3.4 7.3.5	Setting to G 20 - change to NPG2 and determination of Q _n with NPG2	NPG NPG2
6.3	Safety of operation 6.3.1.1 6.3.1.2 6.3.2.1.1 6.3.2.1.2 6.3.2.2.1 6.3.2.2.2 6.3.2.2.3 6.3.3.1 6.3.3.2 6.3.4 6.3.5.1 6.3.5.2	Testing according to 7.4.2 7.4.2.5 7.4.3.2 7.4.3.3 7.4.3.4.1 7.4.3.4.2 7.4.3.4.3 7.4.3.5 7.4.3.6	Setting to G 20 - change to NPG2 and determination of the changing surface tem- peratures When exposed to limit gas I, the ignition behaviour and flame stability must be checked Checking the maximum switch-off times according to Table 3 (6.3.4)	NPG2 I
6.5	Auxiliary equipment Thermoelectric flame supervision device and auto- matic burner control unit	7.5.1.1 7.5.1.2.1 7.5.1.2.2 6.5.1.2.3 6.5.1.2.4 7.1.6 7.4.3.2	Checking the shut-off be- haviour and compliance with the safety time	NPG 2
6.7	Combustion	7.6.1	No soot formation Check of the exhaust gas values (CO concentration)	NPG2 I

Standard test gas "NPG": G 20

Standard test gas 2 "NPG2": 80 vol.-% CH₄, 20 vol.-% H₂

Limit gas I: 65 vol.-% CH₄, 35 vol.-% H₂ ("knock-back", G 22), - counterpart to G 222

	Certification programme ZP 2100 Supplementary tests for catering equipment for gaseous fuels with a hydrogen content of up to 20 % by volume	52100.20-00-E-GB	
		Doc. type	ZP
		Author	DVGW CERT GmbH
		Stand	09.07.2024

8 Other applicable documents

In the case of undated references, the current edition of the following documents applies:

- DVGW CERT GmbH <40005> „Geschäftsordnung zur Durchführung des Konformitätsbewertungsverfahrens nach den EU-Produktharmonisierungsrechtsakten“
- EU/2016/426 Gasgeräteverordnung
- DIN EN 203-1:2024-07
Großküchengeräte für gasförmige Brennstoffe - Teil 1: Allgemeine Sicherheitsanforderungen
- DIN EN 437:2021-07
Prüfgase - Prüfdrücke – Gerätekategorien
- EN ISO/IEC 17025
Allgemeine Anforderungen an die Kompetenz von Prüf- und Kalibrierlaboratorien

The current issue status applies.

9 Period of validity

This certification programme is valid from 08.07.24.

In case of doubt, the German document is the legally binding document