

Test Requirements

For the Kiwa 20% Hydrogen Authorisation Agreement and the Kiwa 20% Hydrogen Mark

For natural gas appliances burning up to 20% hydrogen admixture,
using EN15502 as the reference standard

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Preface

These test requirements have been prepared by Kiwa, being active in the field of Testing and Certification of gas appliances. The approval and operational implementation of these test requirements are according to the procedures and regulations of the quality system of Kiwa.

Kiwa N.V.

Sir Winston Churchillaan 273
Postbus 70
2280 AB RIJSWIJK
The Netherlands

Tel. +31 88 998 44 00
Fax +31 88 998 44 20
info@kiwa.nl
www.1kiwa.com

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1 Introduction

1.1 General

These Test Requirements have been identified by Kiwa to allow GAR certification of a natural gas appliances burning up to 20% Hydrogen admixture, using EN15502 as the reference standard.

1.2 Acceptance of test reports provided by the supplier

If the supplier provides reports from test institutions or laboratories to prove that the products meet the requirements of this document, the supplier shall prove that these reports have been drawn up by an institution that complies with the applicable accreditation standards, namely:

- NEN-EN-ISO/IEC 17025 for laboratories.

2 Testing requirements

2.1 General

Identified below are the test clauses of harmonized standards by appliance type.

2.1.1 **Natural gas appliances burning up to 20% Hydrogen admixture, using EN15502 as the reference standard.**

Further the appliance shall make use of one of the following techniques:

- Pneumatic gas air ratio (PGAR) controller using a fully premixed burner. This may be an appliance which may/may not be adjusted in the field. The manufacturer has to decide on this.
- Electronic gas air ratio controller with an adaptive combustion control function (ACCF) using a fully premixed burner (with reservation, depending on the applied technique and in consultation with Kiwa)

The test program makes use of CH boiler standard EN 15502-2-1:2012+A1:2016, since this is the most widely used and complete standard.

This program is based on documents:

- TS 15502-3-1 – N1504.
- UNI/TS 11854:2022.
- N@NG_BS15502_v1.
- ZP3100 (07.10.2020)

Described tests to be performed are the minimum tests to be executed. Additional tests are allowed to cover one or more of the above-mentioned documents.

An updated data plate, supplementary markings and manual must be supplied to Kiwa before certification.

Tests to be performed:

Chapter from EN 15502-2-1

5.3.1.

Materials

8.4.1/8.4.6

Determination of the nominal (domestic hot water) heat input or the maximum and minimum heat input

8.6.2 test 1

Ignition, cross lighting, flame stability, limit conditions

8.6.2 test 2

Ignition, cross lighting, flame stability, limit conditions

8.6.2 test 3

Ignition, cross lighting, flame stability, limit conditions

8.7

Reduction of the gas pressure

Remark:

For H2NG application, in the risk analysis additionally the hydrogen risk for the materials used have to be taken into account.

Reduced heat input [kW]

Note: Boiler set at reference gas and operated at gas with 20% hydrogen admixture.

Note: It is required to measure heat inputs with 20% hydrogen but there is no requirement to declare the reduced heat input.

Boiler set at reference gas and operated at gas with 20% admixture

Boiler set on reference gas and operated at incomplete combustion gas

Boiler set at reference gas and operated at lift gas

Boiler set and operated at gas with 20% hydrogen admixture

8.9.102 Verification of the protected nature of a combustion chamber	<i>Note: In addition, for H2NG boilers this test must also be performed with gas with 20% hydrogen admixture.</i>
8.9.103 Verification of normal ignition in a combustible air/gas mixture for type C boilers incorporating a fan	<i>Note: In addition, for H2NG boilers this test must also be performed with gas with 20% hydrogen admixture</i>
8.11.101.3.2/ 8.11.101.3.3 Supervision of the combustion air rate or the combustion products rate	All tests should be performed twice. If, according to the manufacturer, it is possible to change the gas/air ratio, tests should be performed at max. and min. CO ₂ /O ₂ settings: - Boiler set and operated at gas with 20% hydrogen admixture - Boiler set to gas with 20% hydrogen admixture and operated at reference gas
8.11.6.2.5 Delayed ignition	Boiler set and operated at gas with 20% hydrogen admixture
8.12.2.102 Carbon monoxide Limit conditions	Boiler set to gas with 20% hydrogen admixture, max. CO ₂ setting +0.5% CO ₂ (or min. O ₂ setting -/ -1,0%O ₂), change to reference gas
8.12.3.1 Incomplete combustion	Boiler set to gas with 20% hydrogen admixture, change to incomplete combustion gas
8.12.3.3 Flame Lift	Boiler set to reference gas and operated at lift gas (not applicable if already tested)
8.16 temperature of combustion products	<i>Note: If there is a risk for a higher temperature with 20% Hydrogen volume in the gas compared to the reference gas condition, test according to chapter 8.16.2 must be performed with this 20% hydrogen volume in the gas.</i>
12.1.1 Data plate	It is not a requirement to place the reduced heat input or a different gas type on the data plate.
12.1.2 Supplementary markings	It is not a requirement to place the reduced heat input or a different gas type in the installation manual.
12.1.4 Warnings notices on the boiler and the packaging	<i>Warning notices should be placed on the packaging informing installer/user that the appliance is certified to operate on hydrogen blends up to 20%.</i>

Note:

The above test program is based on today's common knowledge and might be subject to future changes.