

# PAS 4443:2024

## Assessment criteria: Ancillary valves, devices and components used in hydrogen gas installations – Specification



Department for  
Energy Security  
& Net Zero



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# Foreword

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## Relationship with other publications

PAS 4443 is part of the Hydrogen Skills and Standards for Heat programme.

Other PASs in the programme are:

- PAS 4441, *Components used in hydrogen gas metering – Specification*<sup>1)</sup>
- PAS 4442, *Material requirements for pipework and fittings used in hydrogen gas installation – Specification*

## Information about this document

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## Presentational conventions

The provisions of this PAS are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. “organization” rather than “organisation”).

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<sup>1)</sup> In preparation.

# 0 Introduction

The Hydrogen Skills and Standards for Heat programme is developing technical standards for domestic and non-domestic hydrogen gas installations, as well as associated competence frameworks and training specifications for installers. These aim to enable the existing natural gas system to be repurposed for use with 100% hydrogen downstream of the emergency control valve (ECV).

The standards developed define the required criteria to safely repurpose existing natural gas equipment for hydrogen, to design and install new hydrogen-safe pipework and appliances, and to train a workforce of competent hydrogen gas installers. This work intends to contribute evidence informing strategic decisions in 2026 on the role of hydrogen in heat decarbonization. The programme forms part of the Department for Energy Security and Net Zero, Net Zero Innovation Portfolio (NZIP).

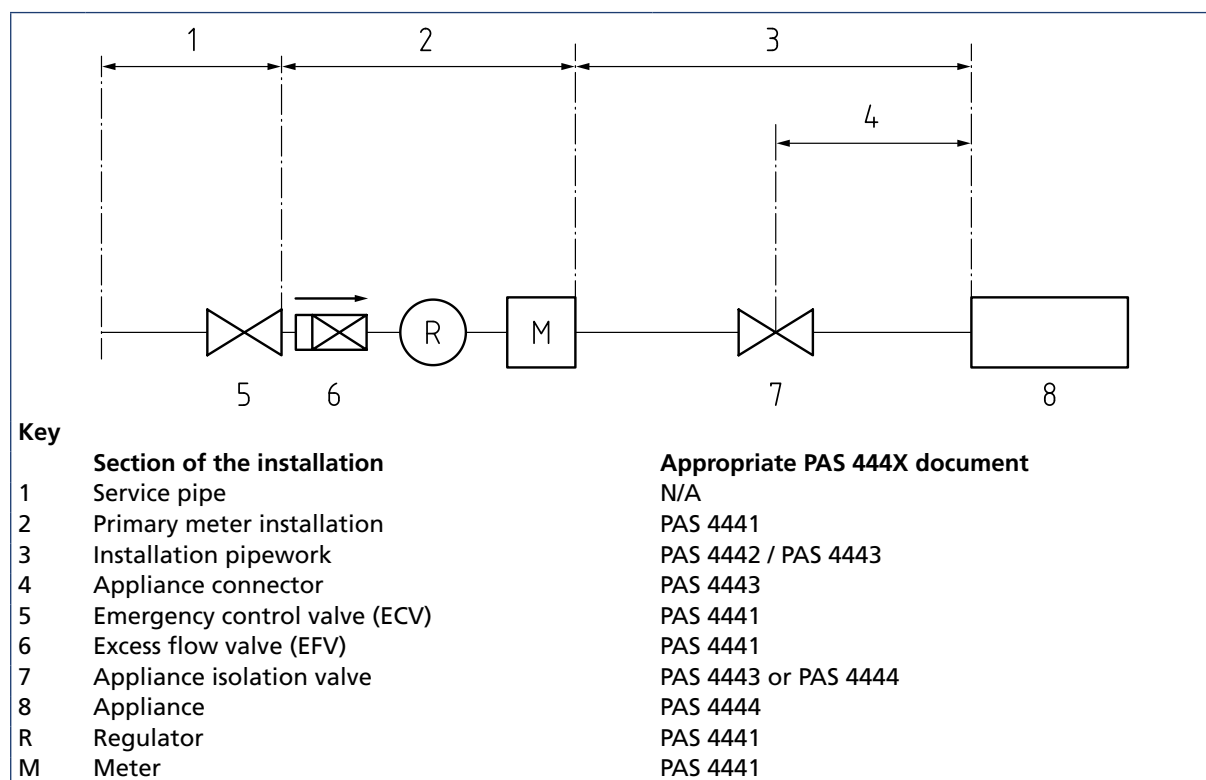
As part of this programme, BSI have developed a series of PAS standards that codify an agreed set of principles, requirements and guidance on the functionality, safety, installation, operating and servicing requirements for hydrogen meters, pipework, fittings, and ancillary devices.

The Hydrogen Skills and Standards for Heat programme PASs are:

- PAS 4441, *Components used in hydrogen gas metering – Specification*<sup>2)</sup>
- PAS 4442, *Material requirements for pipework and fittings used in hydrogen gas installation – Specification*
- PAS 4443, *Assessment criteria: Ancillary valves, devices and components used in hydrogen gas installations – Specification*

The interrelationship between PAS 4441, PAS 4442, PAS 4443 and PAS 4444 and their applicability to a typical hydrogen 4<sup>th</sup> family gas installation is illustrated in Figure 1.

**Figure 1** – Interrelationship between PASs for typical hydrogen 4<sup>th</sup> family gas installation



<sup>2)</sup> In preparation.

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# 1 Scope

This PAS specifies the requirements for ancillary valves, devices and components used in hydrogen gas installations, supplied with hydrogen 4<sup>th</sup> family gas.

The PAS covers requirements for ancillary components downstream of the emergency control valve (ECV), excluding those components within the scope of PAS 4441 (gas meter installations).

The PAS also covers test and measuring equipment that do not necessarily form part of the final installation but are used in applications associated with the hydrogen gas installation.

The PAS covers gas installations in domestic, residential and non-domestic premises, including commercial and light industrial, in line with the scopes of BS 6891 and IGEN/UP/2.

The maximum nominal operating pressure of the installations covered by this PAS is 250 mbar (gauge), with a maximum gas flow capacity of 1 076 m<sup>3</sup>/h.

**NOTE 1** Reference conditions for units of volumetric gas flow (m<sup>3</sup>) are 15 °C and 1 013.25 mbar (absolute).

**NOTE 2** For a hydrogen-fed installation, this gas flow rate would supply appliances/equipment connected to it with an approximate maximum heat input of 3 050 kW (net) or 3 600 kW (gross).

The PAS is intended to be used to determine requirements for hydrogen-fed installations as a supplement to existing standards and generally assumes that any default performance requirements (e.g. leakage) align with those of equivalent ancillary components utilized on 2<sup>nd</sup> family gas installations unless specifically stated otherwise.

This PAS is for use by the manufacturers of valves, devices and components used in hydrogen gas installations.

The PAS might also be of interest to:

- a) approved bodies;
- b) architects;
- c) consultants;
- d) designers;
- e) gas emergency service or network operators;
- f) government regulators;
- g) installers;
- h) facility managers;
- i) specifiers; and
- j) insurers/underwriters.

This PAS is intended for use in Great Britain (England, Scotland and Wales) but can be used internationally under local gas regulations.

## 2 Normative references

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

BS 669-2, *Flexible hoses, end fittings and sockets for gas burning appliances – Part 2: Specification for corrugated metallic flexible hoses, covers, end fittings and sockets for catering appliances burning 1st, 2nd, and 3rd family gases*

BS 1552, *Specification for open bottomed taper plug valves for 1st, 2nd, and 3rd family gases up to 200 mbar*

BS 6172, *Installation and maintenance of domestic gas cooking appliances (2nd and 3rd family gases) – Specification*

BS 6173, *Installation and maintenance of gas fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases) – Specification*

BS 6501-1, *Metal hose assemblies – Part 1: Guidance on the construction and use of corrugated hose assemblies*

BS 7624, *Installation and maintenance of domestic direct gasfired tumble dryers of up to 6 kW heat input (2nd and 3rd family gases) – Specification*

BS 8487, *The design and construction of gas boosters used in association with combustion equipment – Specification*

BS EN 88-1 *Pressure regulators and associated safety devices for gas appliances – Pressure regulators for inlet pressures up to and including 50 kPa*

BS EN 161, *Automatic shut-off valves for gas burners and gas appliances*

BS EN 331, *Manually operated ball valves and closed bottom taper plug valves for gas installations in buildings*

BS EN 437:2021, *Test gases – Test pressures – Appliance categories*

BS EN 1254-4, *Copper and copper alloys – Plumbing fittings – Part 4: Threaded fittings*

BS EN 10226-1, *Pipe threads where pressure tight joints are made on the threads – Part 1: Taper external threads and parallel internal threads – Dimensions, tolerances and designation*

BS EN 10226-2, *Pipe threads where pressure tight joints are made on the threads – Part 2: Taper external threads and taper internal threads – Dimensions, tolerances and designation*

BS EN 13611, *Safety and control devices for burners and appliances burning gaseous and/or liquid fuels – General requirements*

BS EN 14800, *Corrugated safety metal hose assemblies for the connection of domestic appliances using gaseous fuels*

BS EN 15069, *Safety gas connection valves for metal hose assemblies used for the connection of domestic appliances using gaseous fuel*

BS EN 15970, *Natural gas – Measurement of properties – Volumetric properties: density, pressure, temperature and compression factor*

BS EN 50194-1, *Electrical apparatus for the detection of combustible gases in domestic premises – Part 1: Test methods and performance requirements*