

Specification for Gas meters —

Part 2: Meters of plate construction above 1000 cubic feet (28 cubic metres) per hour rating

UDC 681.122

Co-operating organizations

The Gas Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government department and scientific and industrial organizations:

- Gas Council*
- Heating and Ventilating Contractors' Association
- Institution of Gas Engineers*
- Liquefied Petroleum Gas Industry Technical Committee*
- Ministry of Power*
- Society of British Gas Industries*

The Government department and scientific and industrial organizations marked with an asterisk in the above list were directly represented on the committee entrusted with the preparation of this British Standard.

This British Standard, having been approved by the Gas Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 16 August 1967

© BSI 03-2000

The following BSI references relate to the work on this standard:
Committee reference GSE/25
Draft for comment 66/15511

ISBN 0 580 34577 7

Amendments issued since publication

Amd. No.	Date of issue	Comments
899	March 1972	
4215	April 1983	Indicated by a sideline in the margin

Contents

	Page
Co-operating organizations	Inside front cover
Foreword	iii
1 Scope	1
2 Definitions	1
3 Ratings	1
4 Materials	1
5 Design and dimensions	2
6 Assembly and workmanship	5
7 Connections	5
8 External leakage	5
9 Internal leakage	5
10 Performance	5
11 Mechanical strength	6
12 Finish	6
13 Transit disk	6
14 Marking	6
Appendix A Method of ordering	7
Appendix B Accuracy test for registration	7
Appendix C Tests for pressure loss and pressure oscillation	8
Appendix D Requirements for the inclined pressure gauge	8
Appendix E Paint scratch test	8
Appendix F Paint resistance to humidity test	9
Appendix G Notes on case sizes	9
Appendix H Conversion factors	9
Figure 1 — Connector sockets	10
Figure 2 — Meter index, dial type, over 1 000 ft ³ /h up to 3 000 ft ³ /h badged rating	11
Figure 3 — Meter index, dial type, over 3 000 ft ³ /h badged rating	11
Figure 4 — Meter index; alternative test dials for meters having a badged rating over 15 000 ft ³ /h	11
Figure 5 — Meter index, direct reading with test dial, over 1 000 ft ³ /h up to 3 000 ft ³ /h badged rating	12
Figure 6 — Meter index, direct reading with test dial over 3 000 ft ³ /h badged rating	12
Figure 7 — Inclined pressure gauge — 3 in range	13
Figure 8 — Paint scratch test apparatus	14
Figure 9 — Escape badge	14
Figure 10 — Property badge	15
Figure 11 — Maker's badge	15
Figure 12 — Meter index, direct reading with test drum from 28 m ³ /h up to 100 m ³ /h badged rating	15
Figure 13 — Meter index, direct reading with test drum over 100 m ³ /h up to 1 000 m ³ /h rating	16
Figure 14 — Meter index, direct reading with test drum, over 1 000 m ³ /h badged rating	16

	Page
Table 1 — Case dimensions and ratings	2
Table 2 — Case thickness	3
Table 3 — Sealing gland packing length	4
Table 4 — Internal leakage test rates	5
Table 5 — Pressure loss and oscillation	6
Table 6 — Connector socket dimensions	10

Foreword

This standard makes reference to the following British Standards:

BS 10, *Flanges and bolting for pipes, valves and fittings.*

BS 21, *Pipe threads.*

BS 143, *Malleable cast iron and cast copper alloy pipe fittings for steam, air, water, gas and oil. Screwed BSP taper thread or API line pipe thread.*

BS 381C, *Colours for specific purposes.*

BS 1179, *Glossary of terms used in the gas industry.*

BS 1250, *Domestic appliances burning town gas — Part 1: General requirements.*

BS 1387, *Steel tubes and tubulars suitable for screwing to BS 21 pipe threads.*

BS 1452, *Grey iron castings.*

BS 1872, *Electroplated coatings of tin.*

BS 2045, *Preferred numbers.*

BS 2660, *Colours for building and decorative paints.*

BS 2797, *Leather for gas meter diaphragms — Part 1: E.I. sheep skin leather — Part 2: Split hide leather.*

BS 2920, *Cold-reduced tinplate and cold-reduced blackplate.*

BS 3900, *Methods of test for paints — Part F2: Resistance to humidity under condensation conditions.*

BS 4161, *Gas meters — Part 1: Meters of plate construction up to 1 000 ft³/h rating.*

CP 331, *Installation of pipes and meters for town gas — Part 2: Metering and meter control.*

This British Standard is the second part of a series relating to gas meters for registering the volume of gaseous fuel consumed.

The method of ordering meters adopted in Part 1 has been extended to these larger meters and is explained in Appendix A.

The dimensions specified in this part embrace those recommended by the Institution of Gas Engineers for meters up to 15 000 ft³/h badged rating. Since the majority of meters of these dimensions are now available with badged ratings higher than those previously recommended by the Institution of Gas Engineers, these higher ratings (in the past referred to as “Super Small Case”) are adopted in this part. However, for guidance, Appendix G gives the relationship between the BS and the previous IGE designations.

The standard at present includes the following, either published or in course of preparation:

BS 4161-1, *Meters of plate construction up to 1 000 ft³/h rating — Part 2: Meters of plate construction above 1 000 ft³/h (28 m³/h) rating — Part 3: Unit construction meter of 212 ft³/h (6 m³/h) rating.* (In course of preparation.)

Factors for the conversion of Imperial units to metric units are given in Appendix H. More accurate conversion should be based on the tables in BS 350, “*Conversion factors and tables*”.

Obsolescent (by Amendment No. 2)

The need for the equipment covered by this Part of this British Standard has been reviewed and although it was decided not to amend or revise the text, the standard should be regarded as obsolescent and not therefore used for new designs. The standard will be withdrawn in due course.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 16, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

1.1 This Part of BS 4161 covers the construction and performance of plate constructed credit meters above 1 000 ft³/h (28 m³/h) badged rating, with side connections, for gas pressures up to 20 in water gauge (w.g.). It includes the requirements for flanges and connector socket connections, together with provision for fitting a proprietary non-rigid coupling on one side of the meter.

The installation of meters is dealt with in British Standard Code of Practice CP 331-2¹⁾.

1.2 Notwithstanding the requirements specified in this standard, any new designs, materials and methods of assembly giving at least equivalent results are acceptable.

2 Definitions

2.1 The terms used in this British Standard are defined in BS 1179²⁾.

3 Ratings

3.1 Ordered rating. The meter shall be rated in cubic feet or cubic metres as ordered.

3.2 Cubic feet rating. A meter registering in cubic feet shall be badged at one of the badged ratings shown in Table 1 or at another badged rating rounded to the nearest thousand ft³/h and conforming to the R20 series of preferred numbers (see BS 2045³⁾).

NOTE The badged rating as defined in BS 1179²⁾ is determined on air.

3.3 Cubic metre rating. A meter registering in cubic metres shall be badged in m³/h, preferably at a badged rating conforming to the R40 series of preferred numbers (see BS 2045³⁾).

NOTE These meters are basically designed for registering in ft³/h thus making it impossible for some meters to be modified to give an equivalent metric badged rating. For this reason no metric equivalents are specified in column 2 of Table 1.

4 Materials

4.1 General requirements. The meter shall be constructed of materials of good quality complying, where applicable, with British Standards. The materials used shall not be adversely affected by the conditions arising in that part of the meter in which they are used.

4.2 Tinning⁴⁾. All steel components, unless inherently corrosion resistant, shall be tinned as follows:

1) *Pretinned steel sheet for case and valve plate assembly.* The tinning shall be evenly applied on both sides, the two coatings having a combined weight of not less than 0.6 oz/ft² (a coat thickness each side of 0.0005 in).

2) *Internal mild steel sheet components.* The tinning shall be evenly applied on both sides, the two coatings having a combined weight of not less than 0.4 oz/ft² (a coat thickness each side of 0.000 33 in).

3) *Other steel components*, e.g. flag rods, which are tinned shall have an equivalent coating of tin of not less than 0.15 oz/ft² of the surface area (a coat thickness of 0.000 25 in).

4.3 Diaphragms. The diaphragms shall comply with the requirements of BS 2797, Part 1 or 2 as appropriate⁵⁾. The dressing shall be non-acid, covering the surface and filling the pores and any stitches, and it shall be suitable for the gas for which the meter is intended. The dressed leather, when fitted, shall be impermeable to air at a differential pressure of 2 in w.g.

Alternatively, synthetic or reinforced synthetic diaphragms may be used. These shall have a performance and useful life no less than that of dressed leather diaphragms and the material shall have the same properties as are given for synthetic diaphragms in BS 4161-1⁶⁾, Appendix B.

4.4 Index window. The index window shall be of 1/4 in (minimum) plate glass or material of equivalent properties, and it shall withstand the test in 11.2.

4.5 Bearings. All linkage, pivot and other bearings shall be made of corrosion and wear resistant material.

4.6 Valves. The valve covers should preferably be made of or faced with graphited phenolformaldehyde, or a material having equivalent properties, such as wear resistance, dimensional stability and low coefficient of friction. The valve grids shall be made of a material compatible with that of the valve covers. A suitable combination is graphited phenolformaldehyde for the valve covers and an alloy of tin, antimony and lead for the valve grids.

¹⁾ CP 331, "Installation of pipes and meters for town gas", Part 2, "Metering and meter control".

²⁾ BS 1179, "Glossary of terms used in the gas industry".

³⁾ BS 2045, "Preferred numbers."

⁴⁾ See BS 1872, "Electroplated coatings of tin" and BS 2920, "Cold-reduced tinplate and cold-reduced blackplate".

⁵⁾ BS 2797, "Leather for gas meter diaphragms", Part 1, "E.I. Sheep skin leather", Part 2, "Split hide leather".

⁶⁾ BS 4161, "Gas meters", Part 1, "Meters of plate construction up to 1 000 ft³/h rating".

4.7 Worm gears. The gears shall be made of materials which are wear resistant and they shall be dimensionally stable.

4.8 Grease. Where grease is used for lubricating bearings and gears, the grease shall not contain solids, unless the solids have lubricating properties. Metallic soap based greases shall not be used.

4.9 Sealing gland packing. The packing shall consist of a suitable permanent packing material, such as felt wads together with a non-acid grease, or the gland may be of a design incorporating a proprietary type seal having an equivalent performance and useful life.

4.10 Connector socket. The socket shall be made from cast iron to BS 1452⁷⁾ Grade 10 or of a material at least equivalent in mechanical strength and durability.

The long screw material shall comply with the requirements of BS 1387⁸⁾.

4.11 Flanges. The flanges shall be made of cast iron complying with the requirements of BS 10⁹⁾.

5 Design and dimensions

5.1 Case. A meter shall have a case size conforming to Table 1.

Table 1 — Case dimensions and ratings

1	2	3	4	5	6	7	8
BS case reference no.	Badged rating ^b	Connection size BSP		Overall width (over connections)	Height of centre of connections	Overall height	Overall depth
		Flanges	Connector sockets				
	ft ³ /h	in	in	in	in	in	in
P.12	1 200	3	3	limits, + 0, - 1/2 24	limits, + 0, - 1/2 17 1/4	max. 25	max. 15
P.18	1 800	3	3	27 1/4	20 1/4	29	17
P.30	3 000	4	4	30 1/4	20 1/4	34	24
P.60	6 000	{ 6	4	34 3/4 } 35 1/4 }	27	43	27
P.90	9 000		6	42 3/4	34 3/4	52	33
P.120	12 000	6	6	limits, + 0, - 1 49	limits, + 0, - 1 41 1/2	61	36
P.150	15 000	{ 8	6	53 1/2 } 56 }	48 1/2	66	40
P.200	20 000			61 1/4 } 59 }	49	72	46
P.250	25 000	{ 8 } 10 }		61 1/2	49 1/2	75	49
P.300	30 000	10		65 ^a	57 1/4	82	53
P.500	50 000	{ 10 } 12 }					
	60 000			77	64 1/4	93	65
	70 000						

^a This is the preferred width but at the time of publication some are made 66 in wide.

^b For badged rating in m³/h see Note to 3.3.

⁷⁾ BS 1452, "Grey iron castings".

⁸⁾ BS 1387, "Steel tubes and tubulars suitable for screwing to BS 21 pipe threads".

⁹⁾ BS 10, "Flanges and bolting for pipes, valves and fittings".