

Gas Industry Standard

GIS/E1:2006

Specification for

**Combined drilling, tapping and service fitting
insertion machines for use up to 2 bar**



Contents

	Page
Foreword	iii
Mandatory and non-mandatory requirements	iii
Disclaimer	iii
Brief history	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Materials	2
5 Attachment to mains	2
6 Valves	4
7 Rotating upper bodies	4
8 Drills/taps	4
9 Tees/nipples	5
10 General	8
11 Marking	9
12 User instructions	9
Figure 1 — Inlet seal test pieces	3
Figure 2 — Limiting dimensions for BS 21 and BS EN 10226-1 thread size designation $\frac{3}{4}$ in and 1 in inlet service tees	6
Figure 3 — Limiting dimensions for BS 21 and BS EN 10226-1 thread size designation $1\frac{1}{2}$ in and 2 in inlet nipples	7
Figure 4 — Minimum tee/nipple insertion depth	8
Table 1 — Mains outside diameters	2
Table 2 — Tapped holes and mains outside diameters	4
Table 3 — Test drillings/tappings and mains outside diameters	5
Table 4 — Minimum tee/nipple insertion depth	8

Foreword

Gas Industry Standards (GIS) are revised, when necessary, by the issue of new editions. Users should ensure that they are in possession of the latest edition. Contractors and other users external to Gas Transporters should direct their requests for copies of a GIS to the department or group responsible for the initial issue of their contract documentation.

Comments and queries regarding the technical content of this document should be directed in the first instance to the contract department of the Gas Transporter responsible for the initial issue of their contract documentation.

This standard calls for the use of procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Compliance with this engineering document does not confer immunity from prosecution for breach of statutory or other legal obligations.

Mandatory and non-mandatory requirements

For the purposes of a GIS the following auxiliary verbs have the meanings indicated:

- can** indicates a physical possibility;
- may** indicates an option that is not mandatory;
- shall** indicates a GIS requirement;
- should** indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment needs to be completed to show that the alternative method delivers the same, or better, level of protection.

Disclaimer

This engineering document is provided for use by Gas Transporters and such of their contractors as are obliged by the terms of their contracts to comply with this engineering document. Where this engineering document is used by any other party, it is the responsibility of that party to ensure that the engineering document is correctly applied.

Brief history

<p> First published as BGC/PS/E1 Amendment No.1 published Amended issue published as GBE/E1 Erratum No.1 published Editorial update to reflect demerger November 2000 Editorial update to reflect merger October 2002 Editorial update to comply with GRM Edited by BSI in accordance with BS 0-3:1997 Reviewed on behalf of the Gas Distribution Networks' Technical Standard Forum by BSI Reviewed by TSF Reviewed by TSF </p>	<p> December 1974 July 1976 August 1993 December 1993 June 2001 November 2002 August 2004 August 2006 September 2013 June 2018 April 2023 </p>
---	--

© Energy Networks Association on behalf of Cadent Gas Limited, Northern Gas Networks, SGN and Wales & West Utilities Ltd.

This Gas Industry Standard is copyright and must not be reproduced in whole or in part by any means without the approval in writing of Energy Networks Association.

1 Scope

This Gas Industry Standard specifies performance requirements for combined drilling, tapping and service fitting insertion machines. They are intended primarily for the drilling and tapping of grey and ductile cast iron gas mains and steel pipe of a suitable wall thickness, and for the insertion of service connections into the tapped holes, at pressures up to 2 bar.

This standard applies to two basic types of machine: single spindle and double spindle (see Clause 4). It does not apply to machines which clamp the tee or nipple inlet seal components to the main before drilling, tapping and inserting the fitting through those components.

This standard applies to machines used to:

- a) fit all service tees up to 1 in BSP inlet diameter and nipples and plugs up to 2 in BSP diameter, as defined in GIS/F2, in mains from 3 in to 48 in or 80 mm to 1 200 mm diameter;
- b) facilitate fitting of these service connections with an acceptably low loss of gas.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Formal standards

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions)*.

BS 1211:1958, *Specification for centrifugally cast (spun) iron pressure pipes for water, gas and sewage*.

BS 2751, *Specification for general purpose acrylonitrile–butadiene rubber compounds*.

BS 4622:1970, *Specification for grey iron pipe and fittings*.

BS 4772:1988, *Specification for ductile iron pipes and fittings*.

BS EN 969:1996, *Specification for ductile iron pipes, fittings, accessories and their joints for gas pipelines — Requirements and test methods*.

BS EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads — Taper external threads and parallel internal threads — Part 1: Dimensions, tolerances and designation*.

3 Terms and definitions

For the purposes of this standard the following terms and definitions apply.

3.1

double spindle machines

drilling, tapping and service fitting insertion machines, which have a rotating top body with the drill/tap and tee or nipple holder side-by-side so that each in turn can be aligned over the same point on the main

NOTE They generally do not have a valve in the lower body nor removable top body.

3.2**single spindle machines**

drilling, tapping and service fitting insertion machines, which have a removable top body to allow the drill/tap to be replaced by a nipple or tee holder

NOTE They generally have a valve in the lower body.

4 Materials

4.1 Elastomeric components shall be in accordance with BS 2751.

Materials used for machine components shall be:

- a) strong enough to cope with site working conditions normally encountered in the field without defects, failure or damage affecting safe operation.
- b) rigid enough to resist vibration and normal operation in the working environment that may reduce the quality of the drill holes or threads produced.

4.2 The requirements specified in **4.1** shall be checked in the field.

5 Attachment to mains

5.1 Machines shall be capable of attachment to the sizes of mains specified in Table 1 using parts supplied with the machine.

Table 1 — Mains outside diameters

Metric, in accordance with BS EN 969	Imperial, in accordance with BS 1211, BS 4622 and BS 4772
mm	in
100, 150, 200, 250, 300, 400, 450, 600, 900, 1200	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 18, 24, 36, 48

The manufacturer shall provide mains attachments to allow assembly on mains up to 1 200 mm and 48 in diameter.

NOTE These should be available as optional extras and not purchased within the up to 300 mm/12 in kit assembly.

A seal shall be provided between the machine body and main and where a number of gaskets and/or their associated components are required to cover the range of main sizes, each gasket and/or its associated components shall be clearly marked with the sizes of main for which they are suitable.

5.2 A tool shall be provided, on an attachment chain of sufficient length, which can be used to form a good seal with moderate hand effort, as specified in **5.3** and **5.4**.

5.3 The efficiency of this seal shall be assessed by attaching the machine to each size of pipe, prepared as shown in Figure 1, using an applied load on the provided tool of 178 N. No leakage shall occur from the seal against an air pressure of 3 bar initially or after 24 h.

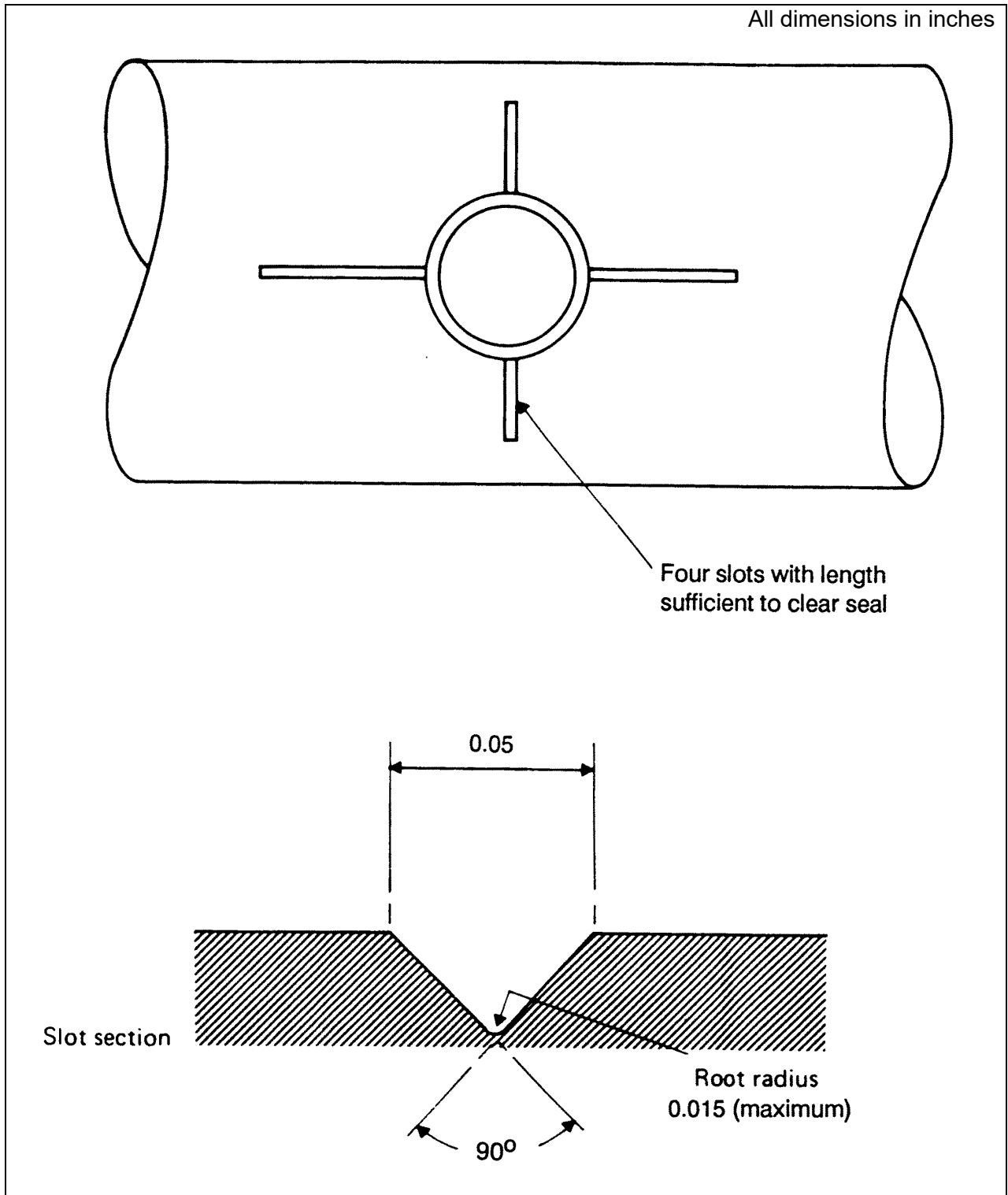


Figure 1 — Inlet seal test pieces

5.4 When a load of 356 N is applied to the tool, no detrimental mechanical failure, tearing or extrusion of the seal shall take place.

6 Valves

6.1 Where the machine incorporates a valve, that is a single spindle machine, this shall provide a completely leak free seal at all pressures from 15 mbar to 3 bar. When the valve is being moved from the open to the closed position or vice versa, slight leakage to atmosphere is permissible, provided this does not exceed $14 \times 10^{-3} \text{ m}^3$.

6.2 The force required to operate the valve at all pressures from 15 mbar to 2 bar shall not be greater than 178 N or torque of 27.2 N·m. No lubricants shall be added during the operation. If necessary, a pressure balancing bypass valve shall be provided which shall itself be leak tight over the pressure range 15 mbar to 3 bar and shall have the open and closed positions clearly indicated.

7 Rotating upper bodies

7.1 Where the machine is fitted with an upper body which has to be rotated, that is a double spindle machine, under pressure during any part of the operation, a seal shall be provided between the upper and lower body halves which is leak tight over the pressure range from 15 mbar to 3 bar. Slight leakage is permissible, while the upper body is being rotated, provided this does not exceed $14 \times 10^{-3} \text{ m}^3$.

7.2 The force required to rotate the upper body at any internal pressure from 15 mbar to 3 bar shall not be greater than 178 N or torque of 27.2 N·m. No lubricants shall be added during operational use.

7.3 The design of the drill feed shall be such that it is not possible to apply feed when the upper body is not in the correct position for drilling.

8 Drills/taps

8.1 Machines, using drills/taps supplied with the machines, shall be capable of making tapped holes in mains sizes specified in Table 2.

Table 2 — Tapped holes and mains outside diameters

Tapped hole diameters to BS 21 and BS EN 10226-1 thread size designation	Mains outside diameters	
	Metric, in accordance with BS EN 969	Imperial, in accordance with BS 1211 , BS 4622 and BS 4772
in	mm	in
$\frac{3}{4}$	100 to 1 200	3 to 48
1	100 to 1 200	4 to 48
$1\frac{1}{2}$	150 to 1 200	6 to 48
2	200 to 1 200	8 to 48

8.2 A positive mechanical stop shall be provided which prevents the drill/tap from penetrating so far into the main as to cause difficulty in withdrawing, or damage to the threads.

8.3 A reversible ratchet type tool of such a length that a force of 356 N, applied 75 mm from the end of the tool, provides sufficient torque to tap a BS 21 thread size designation 2 hole in grey cast iron of 7.5 mm thickness, shall be provided for use during drilling and tapping.

8.4 When force of 712 N is applied at the mid-point of the actuating tool, in any direction in the horizontal plane, mechanical failure of any component shall not occur. Also the centre line of the machine shall remain within 3° of its original position, (to which it shall return on removal of the force), and horizontal or vertical movement of the machine on the main shall not exceed 0.25 mm and shall be completely reversible on removal of the force. During this test and the test drillings/tappings in **8.5**, the machine shall be attached in the manner specified in **5.3**.

8.5 Test drillings/tappings shall be carried out on pipes specified in Table 3.

Dimensions of threads produced shall be in accordance with BS 21 and BS EN 10226-1.

Table 3 — Test drillings/tappings and mains outside diameters

Tapped hole diameters to BS 21 and BS EN 10226-1 thread size designation	Mains outside diameters	
	Metric, in accordance with BS EN 969	Imperial, in accordance with BS 1211
in	mm	in
2	200	8
2	450	18
2	600	24
2	900	36
2	1 200	48

8.6 Where the machine incorporates a valve, the drill feed device shall be such that it is not possible to apply feed with the valve closed; thus preventing any possibility of drilling through the valve plate.

9 Tees/nipples

9.1 Machines shall be capable of inserting BS 21 thread size designation $\frac{3}{4}$ in and 1 in inlet, single piece tees, to the limiting dimensions specified in Figure 2, and BS 21 thread size designation 1½ in and 2 in nipples to the limiting dimensions specified in Figure 3. Tees shall be added to these nipples after removal of the machines. The minimum depth of entry of fittings into the mains shall be as specified in Figure 4 and Table 4.

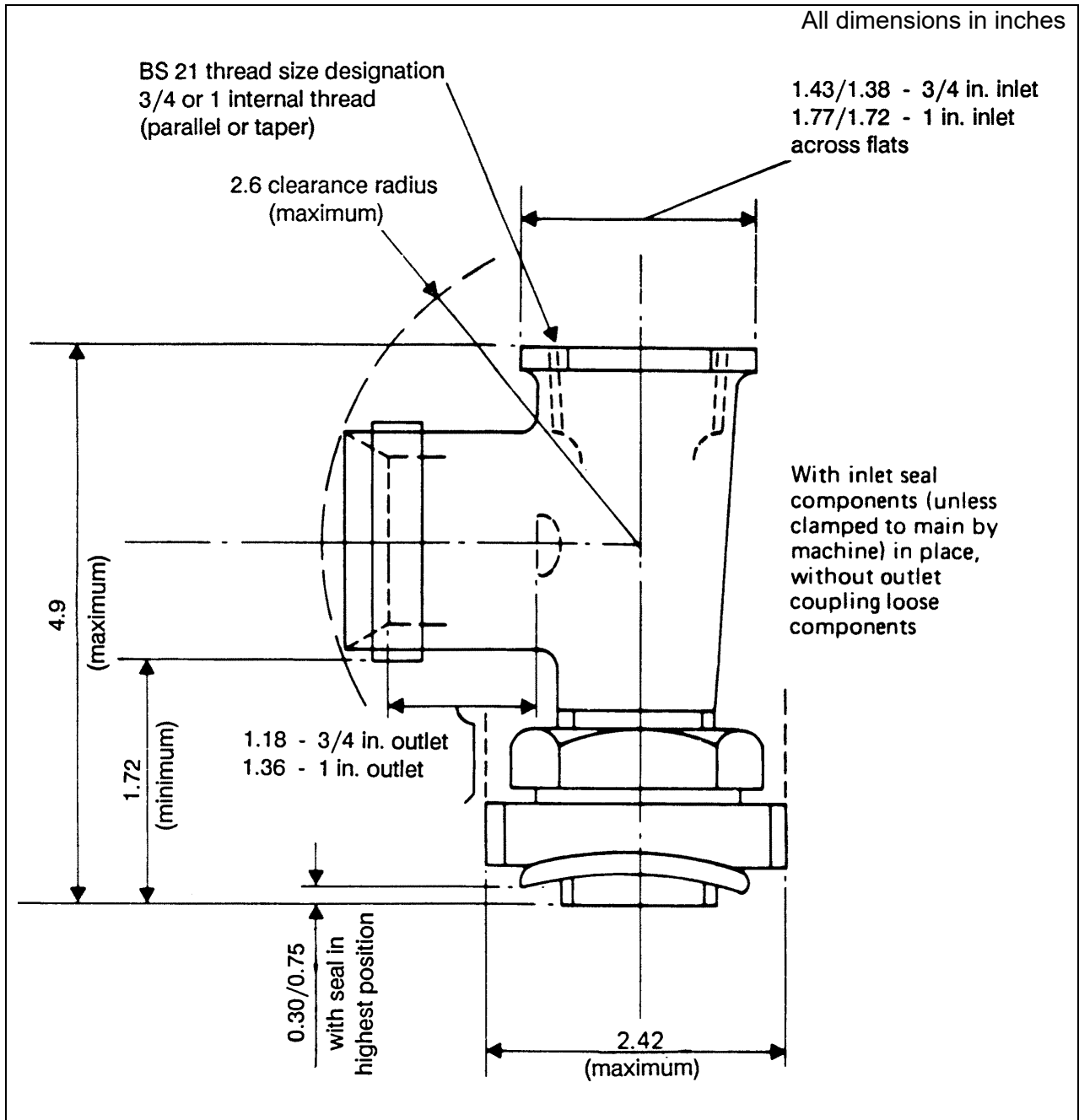


Figure 2 — Limiting dimensions for BS 21 and BS EN 10226-1 thread size designation 3/4 in and 1 in inlet service tees

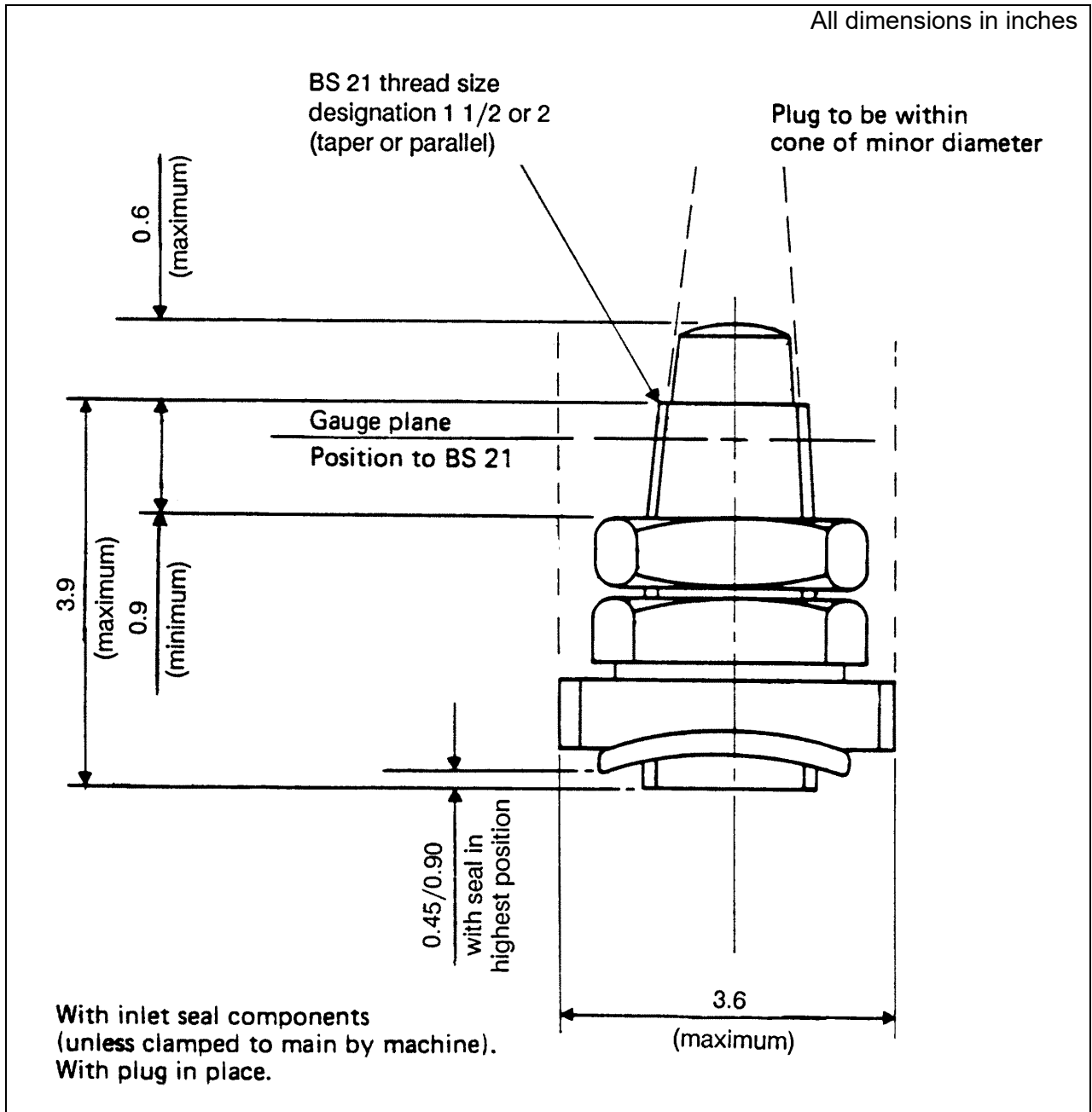


Figure 3 — Limiting dimensions for BS 21 and BS EN 10226-1 thread size designation 1 1/2 in and 2 in inlet nipples

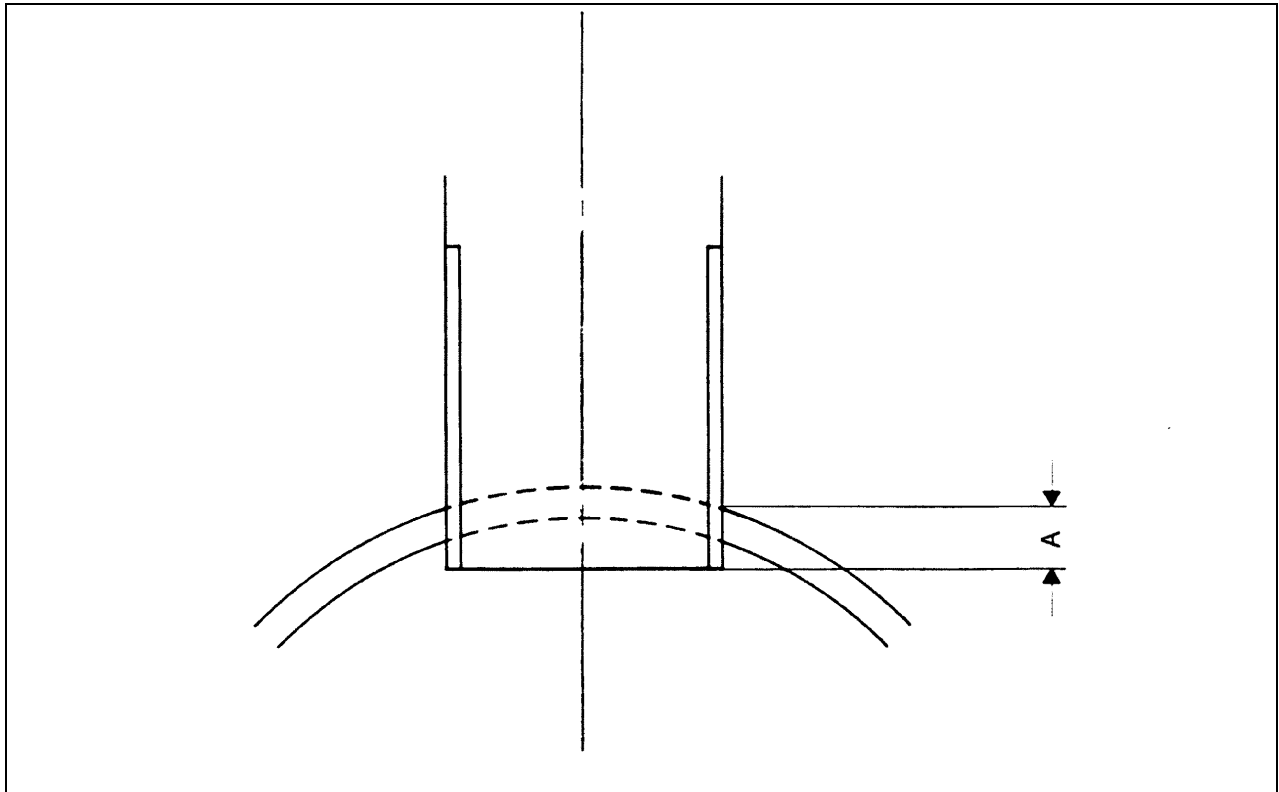


Figure 4 — Minimum tee/nipple insertion depth

Table 4 — Minimum tee/nipple insertion depth

Tapped hole diameters to BS 21 and BS EN 10226-1 thread size designation	Mains outside diameters		A
	Metric, in accordance with BS EN 969	Imperial, in accordance with BS 1211, BS 4772 and BS 4622	
in	mm	in	in
3/4	80 to 1 200	3 to 48	0.2
1	100 to 1 200	4 to 48	0.2
1 1/2	150 to 1 200	6 to 48	0.2
2	200 to 1 200	8 to 48	0.2

9.2 The nipple or tee holder shall be considered as being part of the machine and shall be provided by the machine manufacturer.

10 General

10.1 Any seals or gaskets other than those specifically referred to shall be leak tight against all pressures from 15 mbar to 3 bar at all times during operation of the machine, and shall be replaceable.

10.2 A pressure tapping shall be provided, above the main valve on single spindle machines, to monitor the pressure during testing of drilling equipment, during drilling operations and to relieve the internal pressure before dismantling the machine.

10.3 Each machine shall be supplied in a suitably robust container or box to resist the environment in which it will be used, e.g. transportation, handling and use at site, van or workshop and corrosion resistant. It shall incorporate the following items:

- a) $\frac{3}{4}$ in, 1 in, 1½ in and 2 in parallel drill/taps with BS 21 and BS EN 10226-1 thread size designations;
- b) seals and means of attachment to suit all main sizes specified in 5.1 up to 300 mm or 12 in;
- c) tee and nipple carriers;
- d) gate valve opening/closing and chain securing nut spanners;
- e) operating instructions.

11 Marking

Products conforming to GIS/E1 shall be permanently marked with the following information:

- a) the number and date of this standard, i.e. GIS/E1:2006 ¹⁾;
- b) the name or trademark of the manufacturer or their appointed agent;
- c) the manufacturer's contact details;
- d) where authorized, the product conformity mark of a third party certification body, e.g. BSI Kitemark.
- e) machine type;
- f) any other identification required when ordering spare parts;
- g) a unique serial number.

12 User instructions

User instructions shall be provided with each item of equipment.

¹⁾ Marking GIS/E1:2006 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.