BS 1090:1970

Specification for

Flameproof hand-held electric drilling machines primarily for use in mines

Confirmed January 2011

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Co-operating organizations

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

Association of Mining Electrical and Mechanical Engineers*
British Electrical and Allied Manufacturers' Association
British Steel Industry*
Engineering Equipment Users' Association
Federation of Associations of Mining Equipment Manufacturers
Federation of Manufacturers of Construction Equipment and Cranes
Institute of Quarrying
Institution of Mechanical Engineers
Institution of Mining Engineers*
Mechanical Handling Engineers' Association
Ministry of Technology
National Coal Board*

The industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

British Compressed Air Society
British Mining and Quarrying Tools Association
Council of Underground Machinery Manufacturers
Ministry of Defence (Army Department)
National Union of Mineworkers

This British Standard, having been approved by the Mining and Quarrying Requisites Industry Standards Committee, was published under the authority of the Executive Board on 11 December 1970

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

Amd. No.	Date	Comments

Contents

Foreword

This standard makes reference to the following British Standards:

BS 229, *Flameproof enclosure of electrical apparatus.*

BS 309, *Whiteheart malleable iron castings.*

BS 310, *Blackheart malleable iron castings.*

BS 970, *Wrought steels in the form of blooms, billets, bars and forgings.*

BS 1400, *Copper alloy ingots and copper and copper alloy castings.*

BS 2593, *Rotary drill rods and tungsten carbide tipped rotary drill bits for dry drilling, principally in coal.*

BS 2613, *The electrical performance of rotating electrical machinery.*

BS 2757, *Classification of insulating materials for electrical machinery and apparatus on the basis of thermal stability in service.*

BS 3101, *Intrinsically-safe remote-control circuits associated with restrained plugs and sockets for use in coal mines.*

This British Standard, prepared under the authority of the Mining and Quarrying Requisites Industry Standards Committee, was first published in 1943. This revised edition takes cognizance of current practice and in accordance with United Kingdom policy, is appropriately written in metric units.

The prime requirements of this standard relate to flameproof hand-held electric drilling machines used principally in coal mines in the United Kingdom, but certain provisions have been made to admit apparatus of this type as used in other industries.

The drilling machine handle incorporates a grip-operated switch by which the machine can be started and stopped. It is current practice in the UK for the switch in the handle to make and break a control circuit through a pilot conductor in the flexible cable, the circuit being completed by the earthing conductor. This British Standard, however, provides for an alternative design of switch for making and breaking the load current.

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 and ii, pages 1 to 6, 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

ThIS British Standard applies solely to flameproof hand-held electric drilling machines intended primarily for shot-hole drilling in mines.

2 Constructional requirements

2.1 The drilling machine shall embody an electric motor, gearbox and chuck, and shall have two handles (one with a grip-operated switch for starting and stopping). Provision shall be made to receive a flexible cable connection.

2.2 The enclosure of the electrical apparatus comprising the motor, the switch, and plug and socket coupling, shall be designed to be flameproof in accordance with the requirements of BS 229[1)].

2.3 The tensile strength of the material of the external casing shall be not less than 230 N/mm^2 [2)] (15 tonf/in^2).

2.4 Unless otherwise agreed between the manufacturer and the purchaser, no external component (and fan, if any) shall be made of aluminium, magnesium or titanium, neither shall any alloy containing aluminium and/or magnesium and/or titanium be used unless the total content of these three constituents does not exceed 15 % by weight, and in which the content of magnesium and titanium together does not exceed 10 % by weight.

No component part shall be painted or coated with preparations containing, in metallic form, aluminium, magnesium or titanium.

NOTE 1 These limitations have been imposed to avoid the hazards of incendive sparking due to friction between rusted steel or iron and the metals described.

NOTE 2 Acceptable materials are included in the following British Standards:

BS 309, "*Whiteheart malleable iron castings*".

BS 310, "*Blackheart malleable iron castings*".

BS 970, "*Wrought steels in the form of blooms, billets, bars and forgings*".

BS 1400, "*Copper alloy ingots and copper and copper alloy castings*".

2.5 The preferred chuck dimensions shall be in accordance with Figure 1. The driving slots shall be of such form and dimensions that they will engage with diamond or turbine section drill rods conforming to BS 2593[3)]. The driving slots of the chuck shall be effectively shrouded.

2.6 The chuck shall have a through hardness figure of not less than 40 Rockwell C.

NOTE Chucks designed with other than the dimensions of Figure 1, provided they satisfy all other relevant requirements specified herein, are deemed to comply with this British Standard.

2.7 The position of the handles with respect to the centre line of the chuck shall be such that the force on each handle does not exceed 265 N under maximum torque conditions.

2.8 Direct access to any moving part of a fan shall not be possible in normal operation.

2.9 The complete machine shall be of robust construction to withstand the duty required and be designed to exclude, as far as practicable, the ingress of dust and water.

3 Motor

3.1 The motor shall be a cage motor and, unless otherwise agreed between the purchaser and the supplier, shall be capable of operating on a 3-phase electric supply system of 125 V (max.) 50 Hz, or 110 V (max.) 150 Hz.

3.2 The design of the motor shall be such that the output of the drilling machine does not exceed 1.1 kW at the declared speed of the driving chuck with rated voltage applied to the motor terminals, and that the current does not exceed 15 A at this output.

3.3 The motor shall be capable of giving its rated output for 30 minutes continuously without exceeding the temperature rise specified in Clause **6**.

3.4 Unless otherwise agreed between the purchaser and the supplier the current of the motor, when the machine is stalled, shall not exceed 40 A at 125 V (max.) 50 Hz, or 110 V (max.) 150 Hz.

4 Switch

4.1 The switch for starting and stopping the motor shall be designed to be operated by a spring-loaded grip in a handle of the machine, so arranged that, upon release of the grip, the contacts open. The design of the switch shall be such that dust cannot enter and prevent re-opening of the contacts.

4.2 The switch shall be designed to make and break the control circuit or, if so specified by the purchaser, to make and break the line circuit directly.

4.3 When the switch is designed to operate in a control circuit which includes a pilot conductor and the earthing conductor in the flexible cable, the control circuit shall be completed by contacts on the switch irrespective of the contact, if any, existing between the operating spindle or lever and the metallic casing of the machine.

[1)] BS 229, "*Flameproof enclosure of electrical apparatus*".

[2)] 10 N/mm^2 = 0.64749 tonf/in^2.

[3)] BS 2593, "*Rotary drill rods and tungsten carbide tipped rotary drill bits for dry drilling, principally in coal*".

4.4 Provision shall be made adjacent to the switch for the fitting, when required, of a rectifier[4] in the earth line of the switch circuit.

4.5 If the switch is designed to operate in the line circuit directly it shall make and break the circuit on all three phases.

4.6 The switch shall be capable of satisfying the mechanical and electrical endurance tests specified in **9.2.1**.

5 Cable termination

5.1 Provision for the incoming cable shall be made by means of a bolted or restrained type plug and socket. The plug shall include a cable gland suitable to receive and to hold securely the flexible cable.

Where a restrained type plug and socket is used in conjunction with a control circuit, it is essential for the pilot contact to make after, and break before the power contacts.

5.2 Unless otherwise agreed between the purchaser and the supplier, the plug shall include terminals to receive a five-core cable, each conductor having a cross-sectional area of not less than 6 mm^2. Where the plug is to accommodate a screened cable, an additional terminal shall be provided to secure such screen.

5.3 All external metallic parts of the complete machine shall be in effective electrical connection with an earthing terminal which shall be so designed that the attachment thereto of the earthing conductor can be mechanically secure and electrically efficient.

5.4 Except where otherwise agreed between the purchaser and the supplier, provision shall be made in the cable gland to accommodate a strain relief moulding forming an integral part of the cable end, the dimensions being as stated in Figure 2.

6 Limits of permissible temperature rise

6.1 Conditions of test. Tests shall be made at the normal air temperature of the test room and shall begin when the temperature of the windings is the same as that of the atmosphere. Tests should be made as prescribed in BS 2613[5] on the basis of a full load run of the complete machine at the rated voltage of the motor for a period of not less than 30 minutes.

6.2 Limitations. The following limits in temperature rise shall in no instance be exceeded:

1) *Windings and cores.* For class A insulation:[a] 55 K[b]
For class E insulation: 65 K
For class B insulation: 75 K

2) *Case.* External parts of the machine, excluding the handles: 40 K

3) *Handles.* Handle grips of the machine: 20 K

[a] As classified in BS 2757, " *Classification of insulating materials for electrical machinery and apparatus on the basis of thermal stability in service*".
[b] K = 1 °C interval of temperature.

7 Motor torque

The motor shall be capable of developing, without injury and after it has attained the temperature corresponding with its rating, not less than twice full load torque for 30 seconds.

8 Current of stalled machine

The motor shall be capable of carrying, without injury and after it has attained the temperature corresponding with its rating, the current of the stalled machine (see **3.4**) for a period of 15 seconds.

9 Tests

9.1 General. All tests, except the type tests for compliance with BS 229[6], shall be carried out by the manufacturer unless otherwise agreed between the purchaser and the manufacturer. Tests to determine flameproofness shall be carried out by the relevant certifying authority.

9.2 Type tests. Type tests shall be conducted on a representative drilling machine of each type of design to determine its characteristics and show compliance with this British Standard.

9.2.1 *Endurance tests.* The following tests are to determine the mechanical and electrical endurance of the switch and shall be made at the supply frequency for which the machine is designed:

1) Switches designed to make and break a control circuit shall be capable of being operated 10 000 times without mechanical or electric breakdown, when carrying a current of 1 A at 50 V d.c.

[4] For United Kingdom practice see BS 3101, "*Intrinsically-safe remote-control circuits associated with restrained plugs and sockets for use in coal mines*".
[5] BS 2613, "*The electrical performance of rotating electrical machinery*".
[6] BS 229, "*Flameproof enclosure of electrical apparatus*".

2) Switches designed to make and break the line circuit directly shall be capable of being operated 5 000 times without suffering mechanical or electrical breakdown and without flashover between terminals or to the frame when carrying 3-phase current equal to that of the motor when stalled.

For the purpose of this test the voltage between phases, as measured at the terminals of the switch, shall be not less than 125 V on open circuit and not less than 100 V at the prescribed current, at a power factor equal to that of the motor when stalled.

9.2.2 *High voltage tests.* High voltage tests shall be made on the drilling machine and the plug, as follows, with an approximately sinusoidal a.c. voltage of between 42 Hz and 60 Hz applied for not less than one minute:

1) 1 000 V applied between the insulated windings together with the terminals associated therewith (including the switch if designed to make and break the line circuit directly) and the frame of the motor; also between the windings and the pilot terminal, where fitted.

2) Where the switch is designed to operate in a control circuit of 25 V or less, 500 V applied between the contacts of the switch and also between the pilot terminal of the switch and the frame of the motor.

9.3 Routine tests

9.3.1 *High voltage test.* Each complete drilling machine, with or without its plug, shall be subjected to the following tests; each test shall be made with an approximately sinusoidal a.c. voltage of between 42 Hz and 60 Hz:

1) To be applied between the insulated windings together with the terminals associated therewith (including the switch if designed to make and break the line circuit directly) and the frame of the motor; also between the windings and the pilot terminal, where fitted:

a) 1 000 V for not less than one minute, or

b) 1 000 V plus twice the rated voltage of the drilling machine, for not less than 5 seconds.

2) Where the switch is designed to operate in a control circuit of 25 V or less, a voltage of not less than 500 V shall be applied between the contacts of the switch and also between the pilot terminal of the switch and the frame of the motor, for not less than 5 seconds.

Where it is not possible to include the plug in the test with the drilling machine, the plug shall be separately tested by applying the appropriate voltage (as above) between the terminals, also between the terminals and the case.

NOTE It is not intended that the rectifier shall be in circuit when making this lest.

10 Marking

The machine shall bear the following information:

1) The number of this British Standard, i.e. BS 1090.

2) The registered trade name or trademark of the manufacturer or his agent.

3) Type designation and serial number.

4) Rated voltage, frequency and output (kW).

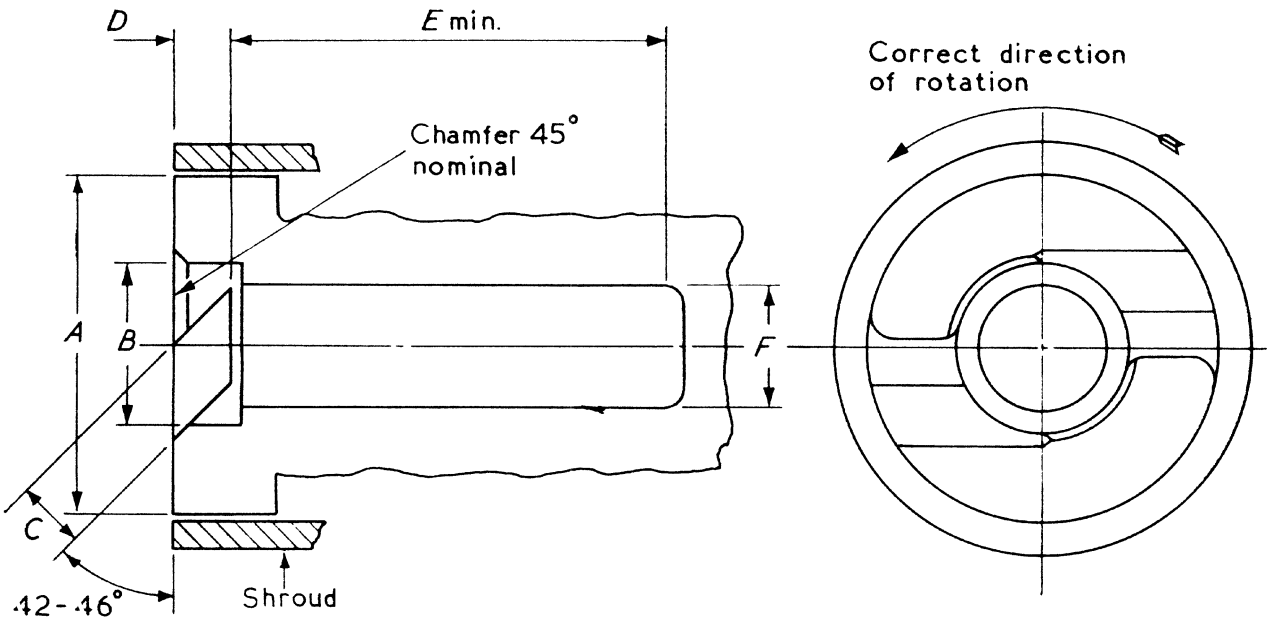
5) Chuck speed.

6) Marking required by the relevant certifying authority.

7) Indication of correct direction of chuck rotation.

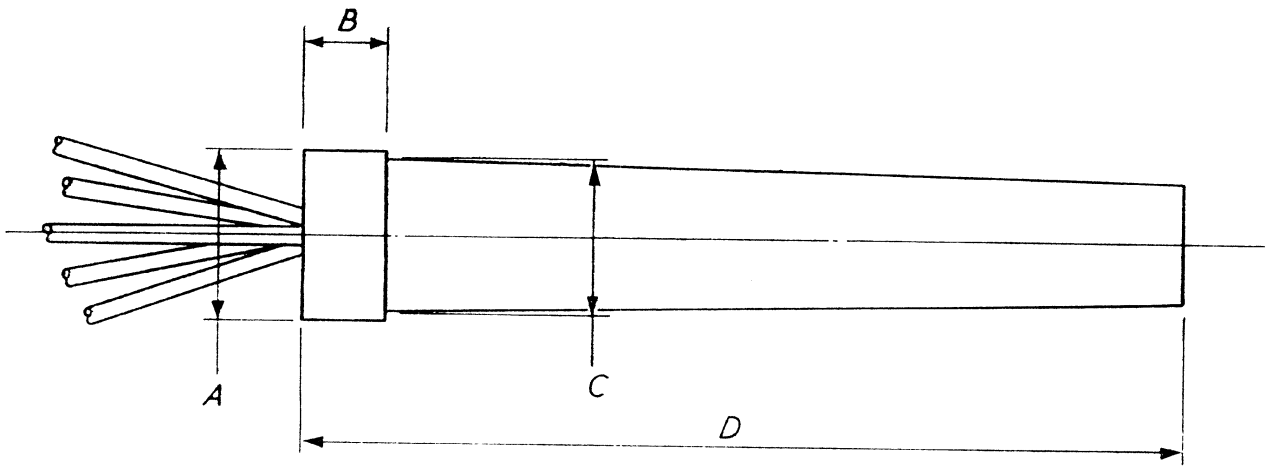
Where specified by the purchaser, provision may be made to indicate the user's plant number

NOTE Attention is drawn to certification facilities offered by BSI; see the inside back cover of this standard.



Item	Dimensions (millimetres)
A diameter (min.)	49
B diameter	28.6 27
C	11.5 11
D	11 9.2
E (min.)	72
F diameter	20.3 19.9

Figure 1 — Dimensions of chuck



Dimensions (millimetres)		
A diameter	44.5	Tolerance
B	19.0	± 0.25
C diameter	36.5	
D	330	Minimum

Figure 2 — Moulded cable end

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