

Specification for

Basic ball-lock punches

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- Association of Hydraulic Equipment Manufacturers Ltd
- Association of Mining Electrical and Mechanical Engineers
- British Compressed Air Society
- British Electrical and Allied Manufacturers' Association
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- British Internal Combustion Engine Manufacturers' Association
- British Mechanical Engineering Confederation
- British Pump Manufacturers' Association
- British Steel Corporation
- British Steel Industry
- Crown Agents for Oversea Governments and Administrations
- Department of the Environment
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- Electricity Supply Industry in England and Wales
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- Institution of Mechanical Engineers*
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- Amalgamated Union of Engineering Workers
- British Power Press Manufacturers' Association
- Engineering Industries Association
- Gauge and Tool Makers' Association

This British Standard, having been prepared under the direction of The Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 31 March 1976

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Foreword

This British Standard has been prepared under the authority of the Mechanical Industry Standards Committee.

This standard is one of a series for interchangeable punches and accessories for precision stamping dies. It comprises a group of punches primarily intended for use in various stamping dies, as built by die makers, for long-run production of specific and individual metal parts in many different kinds of punch presses.

Retention of these punches requires precision, ball-lock retainers incorporating a spring loaded hardened retainer ball in an angular hole which locks into a detent provided in the punches. The punch can normally be released from the retainer allowing punch replacement without dismounting the retainer.

An examination of existing practice in several countries was made prior to development of this standard. Metric modules and engineering systems are incorporated, such as the ISO system for preferred numbers and limits and fits. The functional requirements and economy of usage and punch manufacturing were also considered.

Certification. Attention is drawn to the certification facilities described on the inside back cover of this standard.

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 22, 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 specifies dimensions for basic ball-lock light and heavy duty punches.

Light duty interchangeable punches are standard in round, oblong, square and rectangular shapes with punches available in 6.3 mm to 25.0 mm overall diameter shank sizes. Size of the locking ball in the retainer, ranges from 6.0 mm to 10.0 mm diameter. The light duty series will pierce up to 3.2 mm stock.

Heavy duty interchangeable punches are standard in round, oblong, square and rectangular shapes, with punches available in 13.0 mm to 32.0 mm overall diameter shank sizes. Size of the locking ball in the retainer is 12.0 mm diameter.

NOTE The heavy duty series generally will pierce up to 9.0 mm stock in all but a few of the larger sizes.

2 References

The titles of the British Standards referred to in this standard are listed on the inside back cover.

3 Nomenclature

For the purposes of this British Standard the following nomenclature applies.

3.1 punch. The male force element of a stamping die that contacts the stock to perforate, bend, draw or shape the desired work piece. It generally consists of a working end and a retaining portion.

3.2 working end (point). The working end produces the desired hole, form, or shape in the part. In the case of a perforating punch, the point shape is constant for a length to provide for passage through the stock and for sharpening. The point shape is blended into the shank by a smooth radius (radii) tangent to the point shape to resist fatigue in transmitting the punching forces to the shank.

3.3 retaining portion (shank). The shank is cylindrical to fit a round hole in the punch retainer. The fit of the shank to the retainer hole provides the location of the punch (relative to other punches) in the stamping die. The forces applied to the punch are transmitted by the shank to the retainer and the retainer backing plate or punch holder.

3.4 ball seat. The locking detent in the shank provides the locking and alignment function of the ball-lock punch. The ball in the retainer fits into this area to provide the retention of the punch in the retainer. When the ball in the retainer is forced back from the detent, the punch is free to be removed from the retainer and die. The ball seat also serves to radially locate the punch in respect to the retainer and other punches in the die. Ball-lock punches are divided into two basic categories: light and heavy duty. The ball seat size determines the classification of these two categories. Light duty punches are intended for light to moderate stampings. Thick materials require the heavy duty punch ranges.

4 Material

Ball-lock punches complying with the requirements of this British Standard shall be manufactured from steel complying with the requirements of BS 4659 or from any steel having equivalent or better mechanical properties.

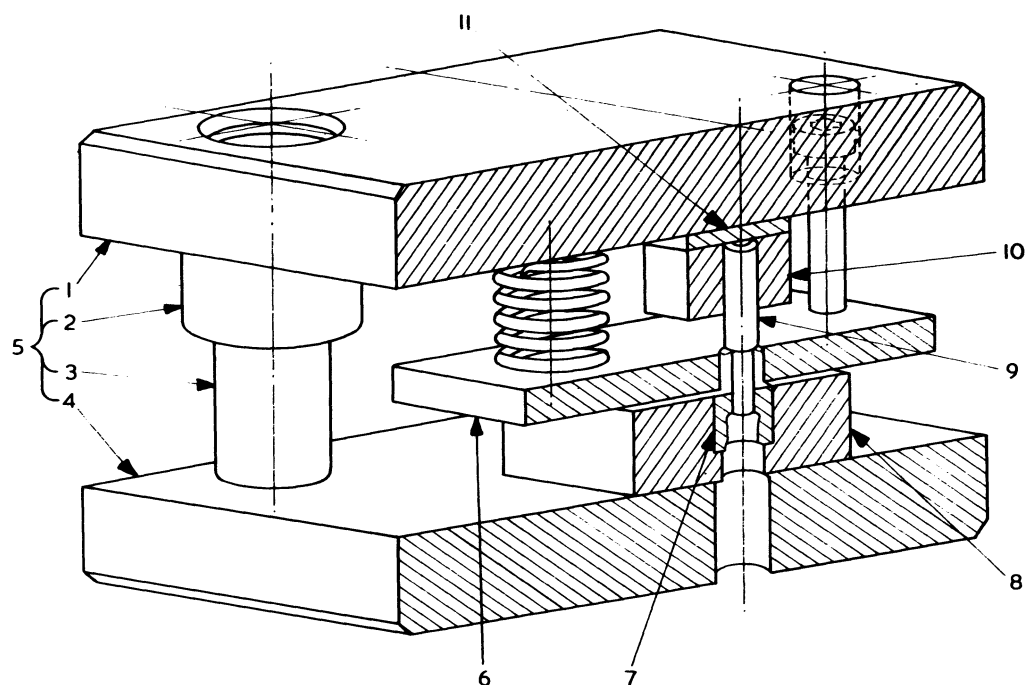
5 Hardness

The scale and hardness value of the material used for the point and shank (see Table 2 to Table 23) shall be 60 HRC to 63 HRC complying with the requirements of BS 891.

6 Marking

Ball-lock punches shall be plainly and indelibly marked with the following.

- a) The number of this British Standard i.e. BS 5307.
- b) The manufacturer's name or trade mark.



1. Top shoe
2. Guide pillar bushing
3. Guide pillar
4. Bottom shoe
5. Die set
6. Stripper pad
7. Die button
8. Die block
9. Perforating (piercing) punch
10. Punch retainer
11. Retainer backing plate

Figure 1 — Terminology

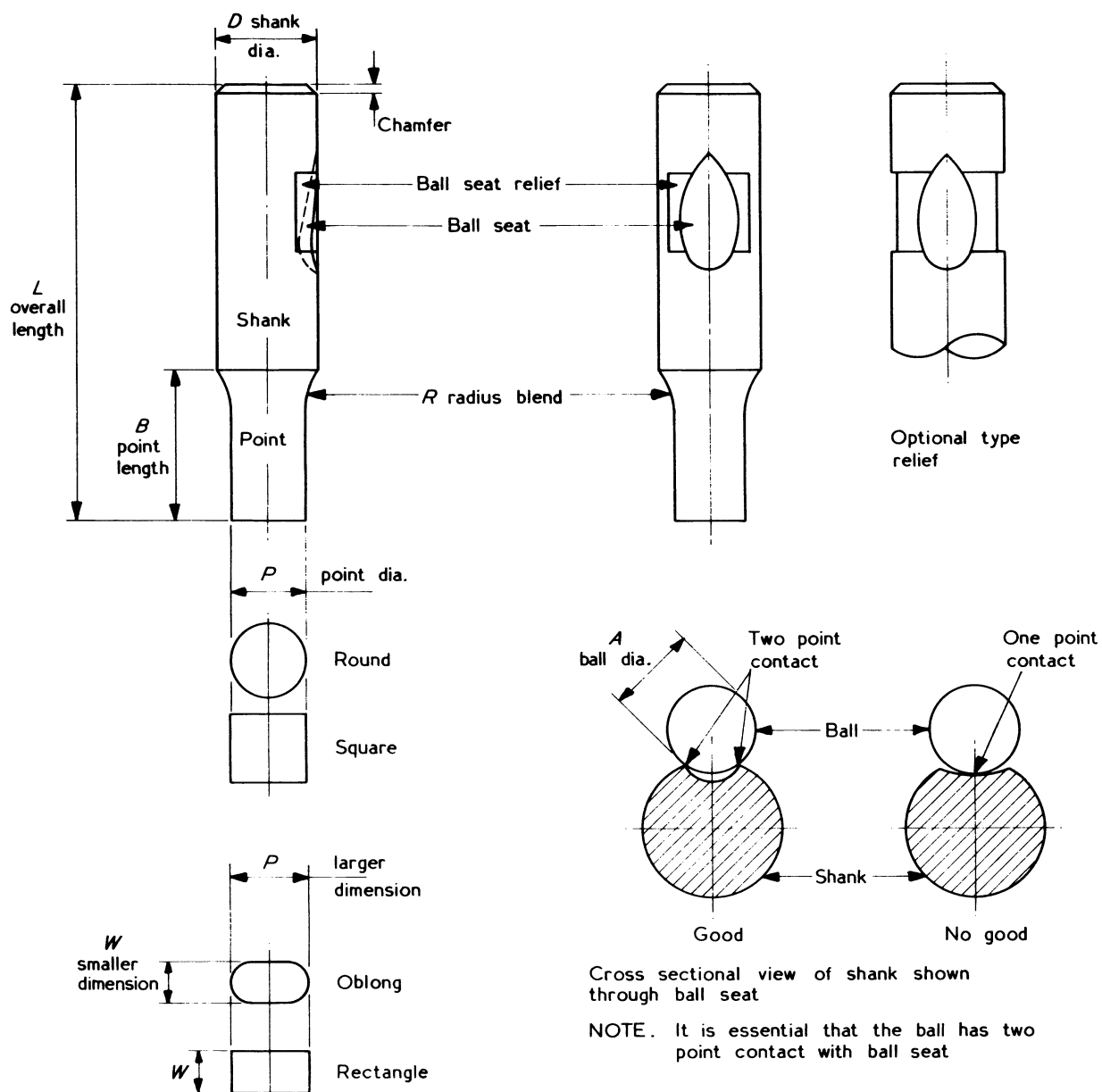


Table 1 — Basic ball-lock punches, light and heavy duty

Light duty punch		Heavy duty punch	
D Diameter of punch shank	A Ball diameter	D Diameter of punch shank	A Ball diameter
6.3	6.0	13.0	12.0
10.0	8.0	16.0	
13.0		20.0	
16.0		25.0	
20.0	8.0	32.0	
25.0			

All dimensions are in mm.

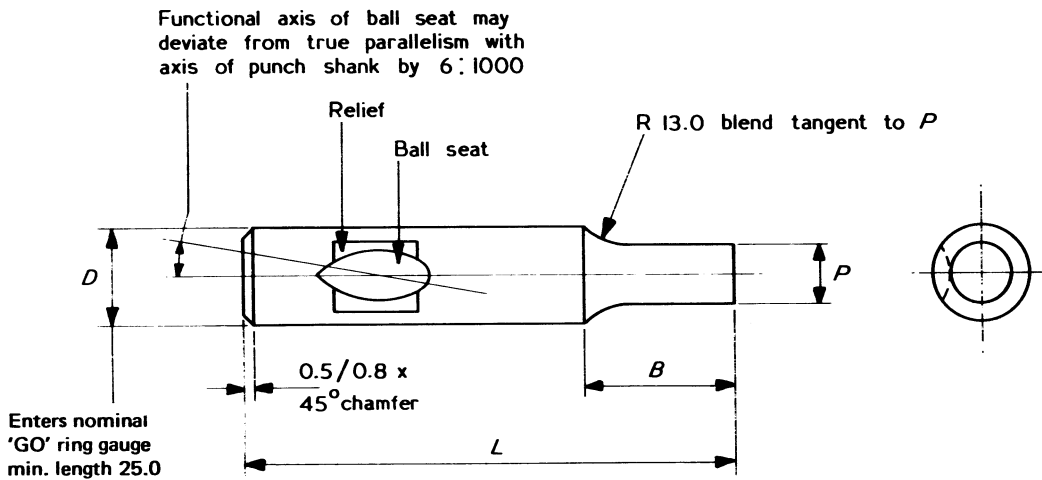
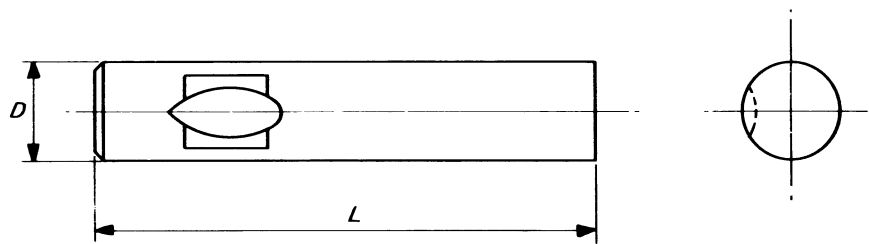


Table 2 — Basic ball-lock light duty perforating punch, round

Nominal shank Diameter <i>D</i>	Range of Point <i>P</i>	Point length <i>B</i>	Overall length <i>L</i>				
Tolerance h5 ^a	Tolerance +0.01 −0.00	Tolerance +1.5 −0.0	Tolerance +1.0 −0.0				
6.3	1.6 to 6.2	13.0	50	56	63	71	80
10.0	3.2 to 9.9	16.0	50	56	63	71	80
13.0	5.0 to 12.9	19.0	50	56	63	71	80
16.0	8.0 to 15.9	25.0	50	56	63	71	80
20.0	12.5 to 19.9		50	56	63	71	80
25.0	18.0 to 24.9		50	56	63	71	80

All dimensions are in mm.
Concentricity point *P* to shank *D* 0.010 max. total identical radius.
^a See BS 4500

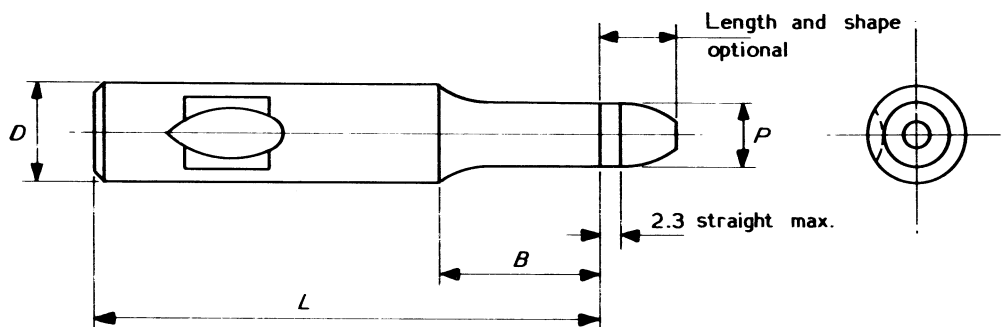


NOTE Dimensions are the same as in Table 2 unless otherwise shown

Table 3 — Basic ball-lock light duty perforating punch blank, round

Nominal shank Diameter D	Overall length L				
Tolerance h5	Tolerance +1.0 -0.0				
6.3	50	56	63	71	80
10.0	50	56	63	71	80
13.0	50	56	63	71	80
16.0	50	56	63	71	80
20.0	50	56	63	71	80
25.0	50	56	63	71	80

All dimensions are in mm.



NOTE Dimensions are the same as in Table 2 unless otherwise shown.

Table 4 — Basic ball-lock light duty pilot punch, round

Nominal shank diameter D	Range of point P	Point length B	Nominal length L				
Tolerance h5	Tolerance +0.01 -0.00	Tolerance +1.5 -0.0	Tolerance +1.0 -0.0				
6.3	1.59 to 6.20	13.0	50	56	63	71	80
10.0	3.19 to 9.90	16.0	50	56	63	71	80
13.0	4.99 to 12.90	19.0	50	56	63	71	80
16.0	7.99 to 15.90	25.0	50	56	63	71	80
20.0	12.49 to 19.90		50	56	63	71	80
25.0	17.99 to 24.90		50	56	63	71	80

All dimensions are in mm.