

CONFIRMED
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Specification for

Symbols for machine tools —

Part 3: Additional general symbols

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Association of Mining Electrical and Mechanical Engineers	Institution of Gas Engineers
British Compressed Air Society	Institution of Heating and Ventilating Engineers
British Electrical and Allied Manufacturers' Association	Institution of Mechanical Engineers*
British Gear Manufacturers' Association	Institution of Mechanical Engineers (Automobile Division)
British Internal Combustion Engine Manufacturers' Association	Institution of Plant Engineers
British Mechanical Engineering Confederation	Institution of Production Engineers*
British Pump Manufacturers' Association	Locomotive and Allied Manufacturers' Association of Great Britain
British Steel Industry	London Transport Executive
Crown Agents for Oversea Governments and Administrations	Machine Tool Trades Association*
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Department of the Environment*	Ministry of Defence, Army Department*
Department of Trade and Industry	National Coal Board
Department of Trade and Industry — National Engineering Laboratory*	National Physical Laboratory (Department of Trade and Industry)
Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales	Process Plant Association
	Royal Institute of British Architects
	Telecommunications Engineering Manufacturing Association
	Water-tube Boilermakers' Association

The Government departments and 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:

Association of Scientific Technical and Managerial Staffs	Society of Motor Manufacturers and Traders Ltd.
Gauge and Toolmaster Association	Trades Union Congress
Machine Tool Industry Research Association	University of Aston in Birmingham
Ministry of Defence, Air Force Department	University of Manchester Institute of Science and Technology
Ministry of Defence, Navy Department	Ten individual experts
National Federation of Engineers' Tool Manufacturers	

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 30 April 1973

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The following BSI references relate to the work on this standard:
Committee reference MEE/6, MEE/6/18
Draft for comment 71/32671

Amendments issued since publication

Amd. No.	Date of issue	Comments
1357	January 1974	
3976	June 1982	Indicated by a sideline in the margin

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Foreword

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee. It is an extension to the range of symbols in Part 1 of the standard which deals with general mechanical symbols. Symbols associated with numerically controlled machine tools are given in Part 2, “*Numerical control*”, of the standard.

As this part of the standard is simply an addition to the list of symbols in Part 1, “*General symbols*”, it cannot be used effectively in isolation, but only in conjunction with the symbols in Part 1.

Symbols for lubrication systems are given in BS 4412, “*Lubrication symbols*”.

Where considered appropriate symbols have been adopted from other sources of ISO, IEC, and various British Standards.

In general it should be appreciated that symbols may be modified to conform more closely with the specific part of the machine with which they are associated. It is hoped that in normal use however, in order to promote ready recognition of symbols by machine operators, the form shown in this standard will be found to be generally acceptable in itself.

This standard was amended in 1982 to take account of the requirements of BS 5378-1 (1980) and the Safety Signs Regulations, 1980 (S.I. 1980, No. 1471), because machine tools are used in places of work where these regulations apply. Symbols in this standard are intended primarily for purposes of operator information but where a symbol is used for safety reasons attention is drawn to BS 5378-1.

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 26, 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.

0 General

0.1 Scope

This British Standard specifies additions to the range of symbols given in BS 3641-1.

This British Standard specifies basic designs for symbols intended for use on machine tools.

Drawings in this British Standard relate to the form of symbols only and are not absolute dimensional representations.

This British Standard makes recommendations for proportions to be used in the design of symbols, independent of actual dimensions.

This British Standard provides for the grouping together of symbols selected from the same or different sections of the standard according to individual requirements.

Examples of groupings of symbols are given in Appendix A of BS 3641-1 for guidance purposes.

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

0.2 Classification scheme

The classification scheme adopted for symbols in this part of the standard extends that already used in Part 1, viz:

Modes

Elements

Values

Actions

Status indications.

0.3 Numbering of symbols

In this Part of this standard, symbols are numbered by adding on serially to the symbols in Part 1 of the standard. This avoids the use of two different numbering systems for each part of the standard.

0.4 Sizes and proportions

The symbols shown in this standard are accurately reproduced at basic size to a 0.8 mm grid. Where it is necessary to establish actual sizes then the symbols shown may be measured using a 0.8 mm transparent grid.

The absolute size of symbol is at the designer's discretion and indeed it may be desirable to have symbols in two different basic sizes to achieve proper display balance; again, when using two different basic sizes the proportions shown here will give a consistent appearance within each of the two size ranges selected.

The symbols have been designed using a basic reference grid of 5 units by 5 units where 1 unit = 0.8 mm. Each symbol is built up so that, with only a few exceptions, the symbol is circumscribed by rectangles which are modular with respect to the 5 unit grid, e.g. 5×10 , 10×15 , 10×40 .

The normal line thickness is 0.8 mm; where it has proved necessary to depart from the standard 0.8 mm line thickness this is immediately apparent.

In certain symbols, points and circles need to appear in contact with one another. However, if reproduced touching (no matter which method of reproduction is used) blurring of points and fusing of tangential circles would occur. To minimize these effects, certain symbols show a small but deliberate clearance of 0.4 unit between some of the constituent elements of the symbol.

0.5 The use of the arrow

The arrow shape is a unique symbol in relation to all of the symbols in this standard and thus deserves special consideration on its own. It rarely appears as an isolated element, but is frequently used as the basis for a symbol, or qualifies another symbol to give it additional meaning.

directional information,
dimensional information,
relative motion information,
functional information.



0.5.4 Functional arrows. Many symbols require a functional dynamic in the form of an arrow to improve their ease of interpretation. It is inappropriate to use the same arrow form as is used to define spatial directions, as the arrow shown on such symbols need not imply a specific direction. A heavier, bolder form of functional arrow is used in these cases.

It is comparatively rare for a single symbol to be used in isolation and the grouping of symbols on displays is implicit in their application. These groupings generally fall into one of three types of association:

- 1) Hierarchical arrangements. One symbol serves as a general label or heading for a further more detailed group of symbols, e.g.

pump	worktable
start stop	clockwise anticlockwise
- 2) Pairing of symbols to build more complex symbols, e.g. transverse feed; engage tracer
- 3) Association of symbol with value or quantity, e.g. feed $\times$ mm per revolution.

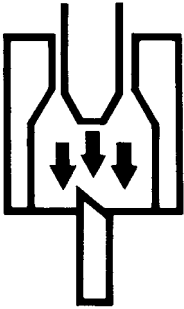
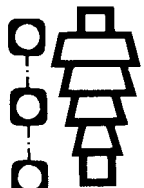
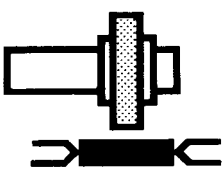
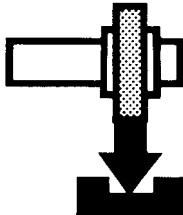
Section 1. Modes

1.1 Operating modes: major machining functions.

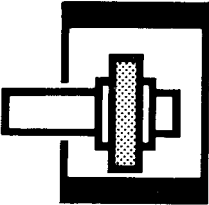
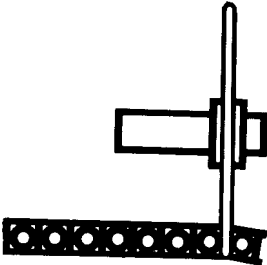
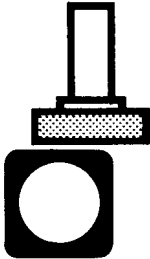
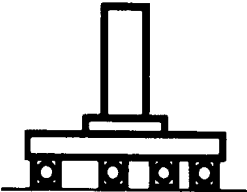
1.3 Control modes: these define the manner in which the machine or element is controlled.

1.4 Auxiliary modes: these define subfunctions which support major machining functions.

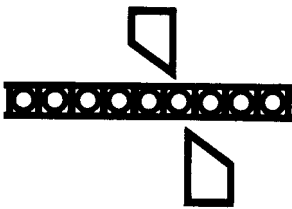
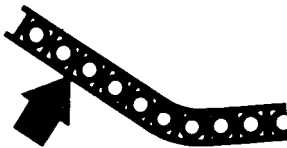
1.1 Operating modes

No.	Designation	Symbol	Remarks
1.1.15	Blow moulding		
1.1.16	External broaching		
1.1.17	Internal broaching		
1.1.18	Chain broaching		
1.1.19	External cylindrical grinding		
1.1.20	Plunge cut grinding		

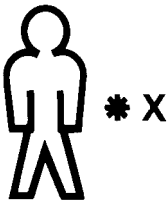
1.1 Operating modes (*continued*)

No.	Designation	Symbol	Remarks
1.1.21	Internal cylindrical grinding		
1.1.22	Cut-off grinding		
1.1.23	Face grinding		
1.1.24	Lapping		
1.1.25	Honing		

1.1 Operating modes (*continued*)

No.	Designation	Symbol	Remarks
1.1.26	Shearing/cutting		
1.1.27	Bending/folding		A particular type of tooling may be added to this basic symbol

1.3 Control modes

No.	Designation	Symbol	Remarks
1.3.29	Multi-man operation		x = number of operators
1.3.30	Step-cycle		A discrete element of a complete cycle operative in its own right Normally associated with testing or checking