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Specification for

Fixed centres for use on machine tools and in other applications

Co-operating organizations

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

Associated Offices' Technical Committee	Institute of Marine Engineers
Association of Consulting Engineers	Institution of Civil Engineers
Association of Mining Electrical and Mechanical Engineers	Institution of Gas Engineers
Board of Trade	Institution of Heating and Ventilating Engineers
British Chemical Plant Manufacturers' Association	Institution of Mechanical Engineers*
British Compressed Air Society	Institution of Mechanical Engineers (Automobile Division)
British Electrical and Allied Manufacturers' Association*	Institution of Production Engineers*
British Gear Manufacturers' Association	Locomotive and Allied Manufacturers' Association of Great Britain
British Internal Combustion Engine Manufacturers' Association	London Transport Board
British Mechanical Engineering Federation	Machine Tool Trades Association*
British Pump Manufacturers' Association	Ministry of Defence
British Steel Industry*	Ministry of Defence, Army Department*
Crown Agents for Oversea Governments and Administrations	Ministry of Power
Department of Employment and Productivity (H.M. Factory Inspectorate)	Ministry of Public Building and Works*
Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales	Ministry of Technology*
Engineering Equipment Users' Association	Ministry of Technology — National Engineering Laboratory
Gas Council	Ministry of Transport
	National Coal Board
	National Physical laboratory (Ministry of Technology)
	Royal Institute of British Architects

The Government departments and scientific 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 Supervisory Staffs, Executives and Technicians	North East Coast Institution of Engineers and Shipbuilders
Gauge and Toolmakers' Association	Production Engineering Research Association
Machine Tool Industry Research Association	Society of Motor Manufacturers and Traders Ltd.
Ministry of Defence, Air Force Department	Trades Union Congress
Ministry of Defence, Navy Department	
Ministry of Technology	
National Federation of Engineers' Tool Manufacturers	

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Foreword

This standard makes reference to the following British Standards:

BS 891, *Method for Rockwell hardness test — Part 1: Testing of metals.*

BS 970, *Wrought steels in the form of blooms, billets, bars and forgings — Part 1: Carbon and carbon manganese steels including free cutting steels — Part 2: Direct hardening alloy steels including alloy steels capable of surface hardening by nitriding.*

BS 1134, *Centre-line-average height method for the assessment of surface texture.*

BS 1660, *Machine tapers — Part 1: Self-holding tapers and gauges for self-holding tapers.*

BS 3730, *Methods for the assessment of departures from roundness.*

BS 4276, *Hard metal for wire, bar and tube drawing dies.*

BS 4659, *Tool steels.*

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee. It is based on proposals submitted by the Machine Tool Trades Association and is a revision of BS 426:1931, “*Lathe centres*”. The present title reflects the wider applications to which the centres which are the subject of this standard are put.

This standard specifies three quite distinct but interchangeable series of fixed centres:

Type 1. Fixed centre, long series, standard Morse taper shank.

Type 2. Fixed centre, short series, standard Morse taper shank.

Type 3. Half centre, long series, standard Morse taper shank.

In compiling this standard, due consideration has been given to the need for regrinding of the nose cone to take account of breakage, wear, etc.

NOTE For certain applications, a short series centre is required with a Morse taper shank shorter than the Type 2. This is often referred to as a “stub” centre, the only difference being in the length of the Morse taper shank rearward of the gauge plane, the diameter at gauge plane and rate of taper being identical to the standard Morse taper as used for all standard centres. Details of stub centres are not quoted in 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 8 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 British Standard relates to fixed centres for use on machine tools and their auxiliary equipment, and in any other suitable circumstances such as on inspection or gauging equipment, etc.

1.2 The fixed centres specified in this standard fall into the following three series:

Type 1. Fixed centre, long series, standard Morse taper shank. This type utilizes the Morse taper shank details, and conforms to relevant dimensions contained in ISO/R 296¹⁾, ISO/R 298²⁾ and BS 1660-1³⁾. The section forward of the gauge plane includes a parallel cylindrical portion (see Figure 1). When this type is fitted with a tungsten carbide tipped nose cone the amount of regrinding of the tip is strictly limited. Details showing the extent of regrinding are given in Figure 5.

Type 2. Fixed centre, short series, standard Morse taper shank. This type conforms to Type 1 in respect of the dimensions rearward of the gauge plane. The section forward of the gauge plane conforms in part to Type 1, but it is arbitrary whether a parallel cylindrical portion is included forward of the gauge plane or whether the Morse taper is extended (see Figure 2).

Type 3. Half centre, long series, standard Morse taper shank. This type utilizes the same basic dimensions as Type 1 with the exception that a portion of the centre forward of the gauge plane is cut away parallel to the axis of the centre (see Figure 3).

NOTE The dimensions of the cutaway area align with those of DIN 806, "Lathe centres (60°)".

2 Materials

2.1 The fixed centre shall be manufactured from steel 535 A99 conforming to BS 970-2 or from steel having equivalent mechanical properties.

2.2 It shall be heat treated in accordance with standard practice in order to obtain a hardness value of 60 to 63 HRC⁴⁾.

2.3 Alternatively the fixed centre shall, according to the Morse taper shank size, be manufactured from the following materials:

0 and 1 Morse taper shank. High speed steel, Grade BTI, BS 4659⁵⁾, or high speed steel having equivalent mechanical properties.

2, 3, 4, 5 and 6 Morse taper shank. High speed steel cone, Grade BTI, BS 4659⁵⁾, suitably affixed to a shank manufactured from steel 080 M40⁶⁾ BS 970-1⁷⁾ or from materials having equivalent mechanical properties.

The shank shall be heat treated in accordance with standard practice in order to obtain a hardness value of 50 to 55 HRC⁴⁾.

2.4 Hard metal tipped centres

2.4.1 When the fixed centre incorporates a tungsten carbide tipped nose cone, it shall be suitably affixed to a shank manufactured from steel 080M40⁶⁾ BS 970-1 steel or from steel having equivalent or superior mechanical properties, and all finished dimensions shall conform to those shown in Table 1 and Table 2.

2.4.2 When a Type 1 fixed centre incorporates a tungsten carbide tipped nose cone, regrinding of the cone is limited. Details of the limiting dimensions are given in Table 5. Dimension A in Table 5 relates to the depth to which the tungsten carbide tips are embedded and the manufacturer shall ensure that the values quoted are maintained. Maximum regrinding allows the depth of tungsten carbide tip insert remaining embedded to be approximately 0.5 times the diameter of the insert. Regrinding of the 60° nose cone shall be discontinued once the groove shown in Figure 5 has been reached.

2.5 Hard metal material. The composition and hardness of a hard metal grade shall be suitable for the duty it has to perform.

2.5.1 Impurities. These shall not exceed the values stated in Clause 8 of BS 4276:1968⁸⁾.

2.5.2 Porosity. The hard metal inserts shall be free from inherent porosity which would affect performance during their useful life.

¹⁾ ISO/R 296, "Self-holding tapers for tool shanks".

²⁾ ISO/R 298, "Lathe centres. Sizes for interchangeability".

³⁾ BS 1660, "Machine tapers", Part 1, "Self-holding tapers and gauges for self-holding tapers".

⁴⁾ BS 891, "Method for Rockwell hardness test", Part 1, "Testing of metals".

⁵⁾ BS 4659, "Tool steels".

⁶⁾ Steel EN 8 of BS 970:1955.

⁷⁾ BS 970, "Wrought steels in the form of blooms, billets, bars and forgings" Part 1, "Carbon and carbon manganese steels including free Cutting steels".

⁸⁾ BS 4276, "Hard metal for wire, bar and tube drawing dies".