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Specification for

Keys and keyways

UDC 621.886.8

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:—

| | |
|---|---|
| Admiralty* | High Commission of India* |
| Air Ministry | Institute of Marine Engineers |
| Associated Officers' Technical Committee | Institute of Petroleum |
| Association of Consulting Engineers (Incorporated) | Institution of Civil Engineers |
| British Chemical Plant Manufacturers' Association | 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 Engineers' Association* | Institution of Mechanical Engineers (Automobile Division) |
| British Gear Manufacturers' Association* | Institution of Production Engineers* |
| British Internal Combustion Engine Manufacturers' Association* | Locomotive and Allied Manufacturers' Association of Great Britain* |
| British Iron and Steel Federation* | Machine Tool Trades Association* |
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| | Radio Industry Council |
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The 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 standard:—

| | |
|--|---|
| Association of Crane Makers | Keymakers' Association |
| Bright Steel Bar Association | Milling Cutter and Reamer Association |
| British Cycle and Motor Cycle Industries' Association | North East Coast Institution of Engineers and Shipbuilders |
| British Internal Combustion Engine Research Association | Society of British Aircraft Constructors |
| British Shipbuilding Research Association | Steelworks Plant Association |
| Gauge and Tool Makers' Association | Taper Pin Manufacturers' Association |
| Institution of Engineers and Shipbuilders in Scotland | |

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Contents

| | Page |
|---|--------------------|
| Co-operating organizations | Inside front cover |
| Foreword | ii |
| <hr/> | |
| 1 Scope | 1 |
| 2 Materials | 1 |
| 3 The application of keys and keyways | 1 |
| a) Parallel keys | 1 |
| b) Taper keys | 1 |
| c) Tangential keys | 2 |
| d) Woodruff keys | 2 |
| 4 Dimensions and tolerances of parallel and taper keys and keyways | 2 |
| 5 Dimensions and tolerances of Woodruff keys and keyways | 3 |
| 6 Dimensions of tangential keys and keyways | 16 |
| 7 Dimensions of keys and keyways for marine tailshafts | 17 |
| 8 Keys and keyways for tapered shaft ends | 19 |
| <hr/> | |
| Appendix A Preferred lengths of keys | 20 |
| Appendix B Approximate equivalents of metric and inch units | 22 |
| <hr/> | |
| Figure 1 — Variation in keyway depth in taper shaft | 19 |
| Figure 2 — Types of key and position of keyway in shaft | 18 |
| <hr/> | |
| Table 1 — Rectangular parallel keys, keyways and keybars | 4 |
| Table 2 — Square parallel keys, keyways and keybars | 6 |
| Table 3 — Rectangular taper keys and keyways, gib-head or plain | 9 |
| Table 4 — Square taper keys and keyways, gib-head or plain | 10 |
| Table 5 — Woodruff keys and keyways | 12 |
| Table 6 — Comparison of Woodruff key numbers (Whitney, British and American) | 14 |
| Table 7 — Tangential keys | 16 |
| Table 8 — Rectangular parallel keys for marine tailshafts | 17 |
| Table 9 — Preferred lengths of plain keys, rectangular or square section, parallel or taper | 20 |
| Table 10 — Preferred lengths of gib-head keys rectangular or square section | 21 |
| <hr/> | |

Foreword

This standard makes reference to the following British Standards:

BS 308, *Engineering drawing practice*.

BS 350, *Conversion factors and tables*.

BS 970, *Wrought steels*.

BS 1916, *Limits and fits for engineering*.

The standardization of keys and keyways was first considered by the Engineering Standards Committee (the original name and form of the present BSI). As a result Standard Specification No. 46, dealing only with rectangular parallel keys, keybars and keyways, was published in 1909.

In subsequent revisions, other types of keys were added to the standard and Parts 2 and 3 of BS 46 were prepared for parallel splines and taper pins respectively. Parts 2 and 3 have since been further revised and Part 2 has been published as BS 2059.

This revision of BS 46-1 for Keys and keyways has been prepared under the authority of The Mechanical Engineering Industry Standards Committee in response to requests for larger manufacturing tolerances. The various types of keys and keyways now have consistent dimensions and tolerances for each size as far as possible, and this will enable a standard range of cutters to be used for the machining of the various types of keyways. The increased tolerances recommended in this standard may entail more fitting of keys into keyways than was envisaged in the 1953 edition. This is inevitable with an increase in tolerance on the keys and keyways. Careful consideration has been given to various requests for increases in tolerances and also for decreases in tolerances but the Committee have come to the conclusion that the tolerances now given are those most acceptable to industry at the present time.

The Committee responsible for this revision of BS 46-1, gave earnest consideration to the specification of limits and fits to BS 1916 for the keys and keyways specified. It was decided not to introduce these limits and fits as the key and keyway standard does not represent finished articles for prescribed conditions of assembly. It recommends dimensions and tolerances from which required fits can be obtained by fitting to meet most design requirements. The Committee was influenced in reaching this decision by the absence of a standard range of cutters for machining to BS 1916 and the non-availability of keybar to these limits at the time the revision of this standard was being prepared. This decision will be reviewed in the light of circumstances existing when further revision is contemplated.

The principle of the dimensions and tolerances recommended is to provide for each key to be retained in the shaft rather more securely than in the mating hub but this can be varied to meet special applications within the dimensional limits recommended in this standard.

The tables of preferred key lengths given in Appendix A have been revised to conform with present-day requirements and the key sizes have been brought into accord with Table 1, Table 2, Table 3 and Table 4.

Whilst the details of radii and chamfers are not a mandatory part of this specification the recommendations shown are in graduated steps of nominal value instead of by formulae, as with the formulae of former issues a special cutter radius was required for each size of keyway. Each radius recommended now applies to a range of keyway sizes.

Owing to the difficulties of obtaining keybar in thirty-seconds of inch, keys formerly of these sizes have been replaced by those which are more readily available. Minor changes in the range of shaft sizes have been made to accommodate this.

The revised table for keys and keyways for marine tailshafts has been compiled by the British Shipbuilding Research Association from a survey of the current practice of British shipbuilding and marine engineering firms and from theoretical and experimental studies.

The table of Woodruff keys and keyways has been extended into the range of smaller sizes to meet requirements for instrument and similar purposes. To facilitate the changeover to the recommended Woodruff key designation as shown in Table 5, the obsolete key and cutter numbers have been given in Table 6.

The notes relating to keys and keyways for tapered shaft ends have been retained unaltered.

A requirement has been stated for tangential keys and the Type A tangential key of the 1929 issue of BS 46 has been reinserted in this revision.

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 to iv, pages 1 to 24, 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 relates to the following:

- a) Rectangular parallel keys and keyways.
- b) Square parallel keys and keyways.
- c) Rectangular taper keys and keyways, plain and gib-head.
- d) Square taper keys and keyways, plain and gib-head.
- e) Woodruff keys and keyways.
- f) Tangential keys and keyways.
- g) Keys and keyways for marine tailshafts.
- h) Keys and keyways for tapered shaft ends.

Decimal values in the tables have been rounded off to three significant figures.

NOTE This specification is based on British units. For the convenience of users approximate equivalents in metric units are given in Appendix B. More accurate conversions should be obtained from the tables in BS 350 "Conversion factors and tables".

2 Materials

- a) Keys and keybar complying with Table 1 to Table 7 of this British Standard shall be manufactured from steel to En 6A, En 8 or En 9 of BS 970, "Wrought Steels," and those complying with Table 8 from steel to En 4 or En 5. It is recommended that En 6A and En 8 steels should be cold drawn for keys in sections up to 2 in. square and hot rolled [En 8 in condition NGC 1 (Normalized)] for larger sections, and that En 9 steels should not be cold drawn for keys of sections larger than $\frac{3}{4}$ in. square.
- b) Bright keybar is not normally available in sections over 1½ in.

3 The application of keys and keyways

As it is not possible to foresee the combination of design considerations for any given application, the selection of the proper type of key must rest with the design authority. The following are general recommendations for use when circumstances permit and when keying is preferred to other methods of transmitting torque (e.g. splines).

- a) *Parallel keys*. For use for transmitting unidirectional torques on transmissions not subject to heavy starting loads and where periodic withdrawal or sliding of the hub member may be required. In many instances, particularly couplings, a gib-head cannot be accommodated, and there is insufficient room to drift out the key from behind. In these cases it is necessary to withdraw the component over the key and a parallel key is essential. Parallel square and rectangular keys are normally side fitting with top clearance and are usually retained in the shaft rather more securely than in the hub.
 - i) *Rectangular*. The general purpose key for shafts greater than 1 in. diameter.
 - ii) *Square*. For use with shafts up to and including 1 in. diameter or for shafts up to 6 in. diameter where it is desirable to have a greater key depth than is provided by rectangular keys.

In cases of stepped shafts the larger diameters are usually required by considerations other than torque e.g. resistance to bending. Where components such as fans, gears, impellers etc., are attached to the larger shaft diameter, the use of a key smaller than standard for that diameter may be permissible. As this results in unequal disposition of the key in the shaft and its related hub the dimensions H and h must be recalculated to maintain the T/2 relationship.

- b) *Taper keys*. For transmitting heavy unidirectional, reversing or vibrating torques and in applications where periodic withdrawal of the key may be a necessity.

For transmitting unidirectional torques taper keys are top fitting, but may be top and side fitting where required.

For transmitting reversing or vibratory torques taper keys may be top and side fitting where required. In this case the keyway in the hub should have the same width value as the keyway in the shaft (i.e., Columns 8 and 9 of Table 3 and Table 4).

Taper keys cannot be used in applications requiring a sliding hub member.

i) *Rectangular and square*. Taper keys of rectangular section are for general purposes and are of less depth than square keys.

Taper keys of square section are for use with shafts up to and including 1 in. diameter or for shafts up to 6 in. diameter where it is desirable to have greater key depth.

ii) *Gib-head*. Gib-heads are provided to facilitate the withdrawal of keys.

iii) *Plain*. Where little or no protuberance is permissible.

c) *Tangential keys*. For the transmission of reversing torque, usually under conditions of heavy loading.

d) *Woodruff keys*. For light applications, or angular location of associated parts on tapered shaft ends.

These keys are not recommended for other applications, but if so used corner radii in the shaft and hub keyways are advisable to reduce stress concentration.

4 Dimensions and tolerances of parallel and taper keys and keyways

The dimensions and tolerances for key and keyway widths given in Table 1, Table 2, Table 3 and Table 4 are based on the width of the key W and provide a fitting allowance. The fitting allowance is designed to permit an interference between the key and the shaft keyway and a slightly easier condition between the key and the hub keyway.

The maximum and minimum values in Table 1, Table 2, Table 3 and Table 4 are based on the following:

Width of key and keybar, W = Nominal size with a plus tolerance.

Width of keyway in shaft, W_s = Nominal size with a minus tolerance.

Width of keyway in hub, W_h = Nominal size with a plus tolerance.

Minimum width of key = Maximum width of keyway in shaft.

a) *Parallel keys and keyways*.

i) The dimensions and tolerances for side-fitting keys of rectangular parallel section, and for the appropriate keybar and keyways shall be as given in Table 1.

ii) The dimensions and tolerances for side-fitting keys of square parallel section and for the appropriate keybar and keyways shall be as given in Table 2.

b) *Taper keys and keyways*.

i) The dimensions and tolerances for taper keys of rectangular section with or without gib-heads shall be as given in Table 3. [See also Clause 3 b)].

ii) The dimensions and tolerances for taper keys of square section with or without gib-heads shall be as given in Table 4. (See also Clause 3 b)].

iii) The basic taper for all taper keys and keyways in hubs shall be 1 in 100.

c) *Depth of keyways*. The depth of the keyway shall be obtained by measuring from the circumference of the shaft diametrically opposite, or from the bore of the hub to the root of the keyway along the centre line diametrically opposite and shall not be measured from the side corner. The method of dimensioning keyways in shafts and hubs on drawings should conform to the recommendations of BS 308, "Engineering drawing practice." To obtain the dimensions for recording on the drawing, the keyway depths and tolerances shall be applied to the basic shaft diameter.

d) *Radii and chamfers*. Corner radii are recommended for keyways, as stress concentration in corners may lead to failure. Keys and keybar are not normally chamfered or radiused in the condition as supplied, but this may be done at the time of fitting, or, by arrangement between the purchaser and the manufacturer, during manufacture.

Radii and chamfers are shown as nominal values in columns of Table 1, Table 2, Table 3 and Table 4. The chamfer on the key should in each case be of the minimum value to clear the actual radius in the keyway.

NOTE In the case of shrink and heavy force fits it may be found necessary to depart from the width and depth tolerances laid down for keys and keyways.

Any variation in the width of keyway must be such that the greatest width is at the end from which the key enters.

Any variation in the depth of keyway must be such that the greatest depth is at the end from which the key enters.

Any variation in the thickness of the key must be such that the greatest thickness is at the end from which the key is driven.

This specification does not take account of misalignment and or offset greater than that provided for in the size tolerance. In the case of shrink and heavy force fits, true alignment must be ensured.

5 Dimensions and tolerances of woodruff keys and keyways

The dimensions and limits of tolerances for British Standard Woodruff keys and keyways shall be as shown in Table 5. Provision is made in Table 5 for an optional alternative design of Woodruff key which differs from the normal form in its depth as shown at H in the sketch and Table.

a) *The designation of Woodruff key numbers.* The following system is applied to Woodruff keys and Woodruff key cutters. The British and American designations are identical. Each key is designated by three or more significant digits. The last two digits give the nominal diameter in eighths of an inch. The digit or digits preceding the last two give the nominal width (thickness) in thirty-seconds of an inch.

Thus No. 204 refers to a key $\frac{2}{32} \times \frac{4}{8}$ in., or $\frac{1}{16}$ in. thick $\times \frac{1}{2}$ in. diameter, similarly, 1210 refers to a key $\frac{12}{32} \times \frac{10}{8}$ in., or $\frac{3}{8}$ in. thick $\times 1\frac{1}{4}$ in. diameter.

b) *Depth of keyway.* The depth of a Woodruff keyway shall be measured along the centre line from the periphery of the shaft, or the circumference of the hub bore, to the root of the keyway. The depth of the keyway in a tapered shaft shall be measured normal to the shaft surface. (This is illustrated in BS 308, "Engineering drawing practice").

Note on keys for larger shafts

The sizes of shafts shown in Table 1, Table 2, Table 3 and Table 4 of this standard are those for which the respective types of keys are considered to be normally appropriate. For larger shafts, it is considered that tangential keys, multiple keys or splines would be more appropriate.

However, if it is decided to use single parallel keys on shafts larger than those considered normal for such keys in this standard, the following formulae may be applied to establish (nominal) values related to the shaft diameter "d". (For the purposes of the tables, "d" is the diameter of the largest shaft for each key size i.e. "d" corresponds to column 2 of the tables. For intermediate shaft diameters or shaft diameters larger than those of the tables, H should, of course, be calculated from (iii), using for "d" the nominal shaft diameter.)

i) Key width $W = \frac{d}{4}$

ii) Key thickness $T = \frac{d}{6}$ for Table 1 and Table 3

or $= \frac{d}{4}$ for Table 2 and Table 4

(In Table 1 and Table 3, T has in some sizes been rounded off to maintain the inch fractional sizes.)

iii) Keyway depth in shaft $H = \frac{T}{2} + \frac{d}{2} - \sqrt{\frac{d^2}{4} - \frac{W^2}{4}}$

iv) For parallel keys, keyway depth in hub $h = (T - H) + X$

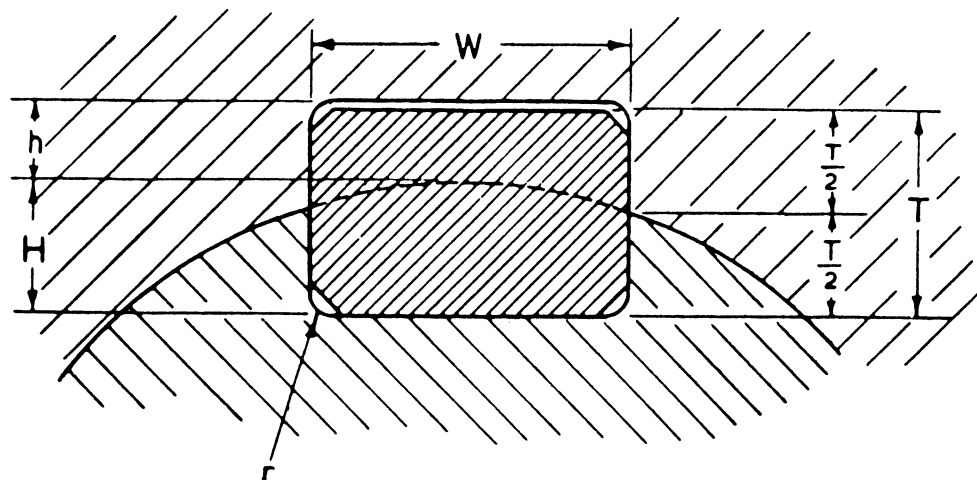
where X is a clearance such that

$$X \text{ min.} = H \text{ min.} + h \text{ min.} - T \text{ max.}$$

$$X \text{ max.} = H \text{ max.} + h \text{ max.} - T \text{ min.}$$

The incremental pattern by which the tolerances (and clearance X) increase with shaft size may be seen from an inspection of the tables, but it should be noted that a point will be reached at which any further increase in tolerance (with increase in shaft size) would be neither necessary in manufacture nor acceptable in use.

Table 1 — Rectangular parallel keys, keyways and keybars



All dimensions are in inches.

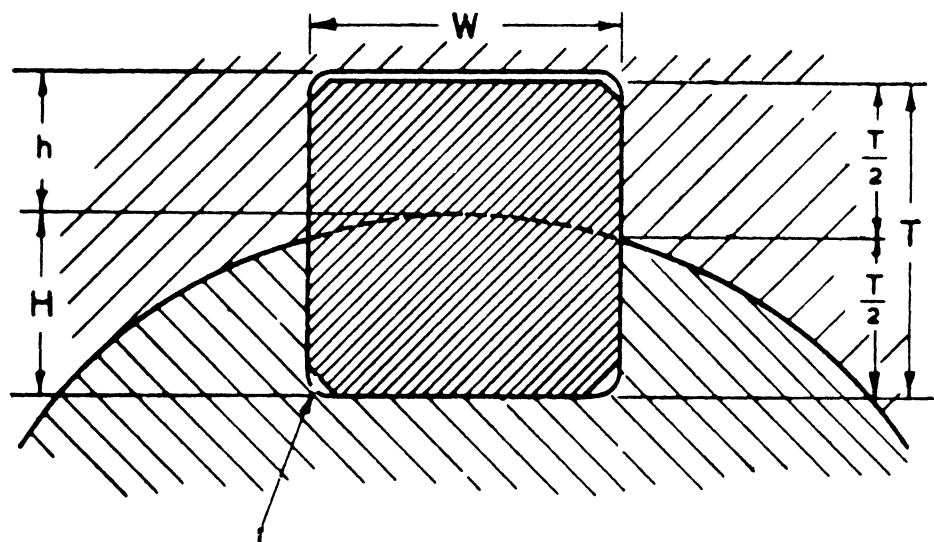
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------------------|---------------------|-------------------|---------|-------|-------------|-------|----------------------|-------|---------|-------|----------------------|-------|---------|-------|--|---------|-------|-------------|-------|
| Diameter of shaft | | Key size W × T | Key | | | | Keyway in shaft | | | | Keyway in hub | | | | Nominal Keyway radius & key chamfer r ^a | Keybar | | | |
| Over | Up to and including | | Width W | | Thickness T | | Width W _s | | Depth H | | Width W _h | | Depth h | | | Width W | | Thickness T | |
| | | | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | Max. | Min. | Max. | Min. |
| 1 | 1 1/4 | 5/16 × 1/4 | 0.314 | 0.312 | 0.253 | 0.250 | 0.311 | 0.312 | 0.146 | 0.152 | 0.312 | 0.313 | 0.112 | 0.118 | 0.010 | 0.314 | 0.312 | 0.253 | 0.250 |
| 1 1/4 | 1 1/2 | 3/8 × 1/4 | 0.377 | 0.375 | 0.253 | 0.250 | 0.374 | 0.375 | 0.150 | 0.156 | 0.375 | 0.376 | 0.108 | 0.114 | 0.010 | 0.377 | 0.375 | 0.253 | 0.250 |
| 1 1/2 | 1 3/4 | 7/16 × 5/16 | 0.440 | 0.438 | 0.315 | 0.312 | 0.437 | 0.438 | 0.186 | 0.192 | 0.438 | 0.439 | 0.135 | 0.141 | 0.020 | 0.440 | 0.438 | 0.315 | 0.312 |
| 1 3/4 | 2 | 1/2 × 5/16 | 0.502 | 0.500 | 0.315 | 0.312 | 0.499 | 0.500 | 0.190 | 0.196 | 0.500 | 0.501 | 0.131 | 0.137 | 0.020 | 0.502 | 0.500 | 0.315 | 0.312 |
| 2 | 2 1/2 | 5/8 × 7/16 | 0.627 | 0.625 | 0.441 | 0.438 | 0.624 | 0.625 | 0.260 | 0.266 | 0.625 | 0.626 | 0.185 | 0.191 | 0.020 | 0.627 | 0.625 | 0.441 | 0.438 |
| 2 1/2 | 3 | 3/4 × 1/2 | 0.752 | 0.750 | 0.503 | 0.500 | 0.749 | 0.750 | 0.299 | 0.305 | 0.750 | 0.751 | 0.209 | 0.215 | 0.020 | 0.752 | 0.750 | 0.503 | 0.500 |
| 3 | 3 1/2 | 7/8 × 5/8 | 0.877 | 0.875 | 0.629 | 0.625 | 0.874 | 0.875 | 0.370 | 0.376 | 0.875 | 0.876 | 0.264 | 0.270 | 0.062 | 0.877 | 0.875 | 0.629 | 0.625 |
| 3 1/2 | 4 | 1 × 3/4 | 1.003 | 1.000 | 0.754 | 0.750 | 0.999 | 1.000 | 0.441 | 0.447 | 1.000 | 1.001 | 0.318 | 0.324 | 0.062 | 1.003 | 1.000 | 0.754 | 0.750 |
| 4 | 5 | 1 1/4 × 7/8 | 1.253 | 1.250 | 0.879 | 0.875 | 1.248 | 1.250 | 0.518 | 0.524 | 1.250 | 1.252 | 0.366 | 0.372 | 0.062 | 1.253 | 1.250 | 0.879 | 0.875 |

Table 1 — Rectangular parallel keys, keyways and keybars

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------------------|---------------------|-------------------|---------|-------|-------------|-------|----------------------|-------|---------|-------|----------------------|-------|---------|-------|--|--|-------|-------------|-------|
| Diameter of shaft | | Key size W × T | Key | | | | Keyway in shaft | | | | Keyway in hub | | | | Nominal Keyway radius & key chamfer r ^a | Keybar | | | |
| Over | Up to and including | | Width W | | Thickness T | | Width W _s | | Depth H | | Width W _h | | Depth h | | | Width W | | Thickness T | |
| | | | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | Max. | Min. | Max. | Min. |
| 5 | 6 | 1½ × 1 | 1.504 | 1.500 | 1.006 | 1.000 | 1.498 | 1.500 | 0.599 | 0.605 | 1.500 | 1.502 | 0.412 | 0.418 | 0.062 | 1.504 | 1.500 | 1.006 | 1.000 |
| 6 | 7 | 1¾ × 1¼ | 1.754 | 1.750 | 1.256 | 1.250 | 1.748 | 1.750 | 0.740 | 0.746 | 1.750 | 1.752 | 0.526 | 0.532 | 0.125 | Bright keybar is not normally available in sections larger than the above. | | | |
| 7 | 8 | 2 × 1¾ | 2.005 | 2.000 | 1.381 | 1.375 | 1.998 | 2.000 | 0.818 | 0.824 | 2.000 | 2.002 | 0.573 | 0.579 | 0.125 | | | | |
| 8 | 9 | 2¼ × 1½ | 2.255 | 2.250 | 1.506 | 1.500 | 2.248 | 2.250 | 0.897 | 0.905 | 2.250 | 2.252 | 0.619 | 0.627 | 0.125 | | | | |
| 9 | 10 | 2½ × 1⅝ | 2.505 | 2.500 | 1.631 | 1.625 | 2.498 | 2.500 | 0.975 | 0.983 | 2.500 | 2.502 | 0.666 | 0.674 | 0.187 | | | | |
| 10 | 11 | 2¾ × 1⅞ | 2.755 | 2.750 | 1.881 | 1.875 | 2.748 | 2.750 | 1.114 | 1.122 | 2.750 | 2.752 | 0.777 | 0.785 | 0.187 | | | | |
| 11 | 12 | 3 × 2 | 3.006 | 3.000 | 2.008 | 2.000 | 2.998 | 3.000 | 1.195 | 1.203 | 3.000 | 3.002 | 0.823 | 0.831 | 0.187 | | | | |
| 12 | 13 | 3¼ × 2⅛ | 3.256 | 3.250 | 2.133 | 2.125 | 3.248 | 3.250 | 1.273 | 1.281 | 3.250 | 3.252 | 0.870 | 0.878 | 0.187 | | | | |
| 13 | 14 | 3½ × 2⅜ | 3.506 | 3.500 | 2.383 | 2.375 | 3.498 | 3.500 | 1.413 | 1.421 | 3.500 | 3.502 | 0.980 | 0.988 | 0.250 | | | | |
| 14 | 15 | 3¾ × 2½ | 3.756 | 3.750 | 2.508 | 2.500 | 3.748 | 3.750 | 1.492 | 1.502 | 3.750 | 3.752 | 1.026 | 1.036 | 0.250 | | | | |
| 15 | 16 | 4 × 2⅝ | 4.008 | 4.000 | 2.633 | 2.625 | 3.998 | 4.000 | 1.571 | 1.581 | 4.000 | 4.002 | 1.072 | 1.082 | 0.250 | | | | |
| 16 | 17 | 4¼ × 2⅞ | 4.258 | 4.250 | 2.883 | 2.875 | 4.248 | 4.250 | 1.711 | 1.721 | 4.250 | 4.252 | 1.182 | 1.192 | 0.312 | | | | |
| 17 | 18 | 4½ × 3 | 4.508 | 4.500 | 3.010 | 3.000 | 4.498 | 4.500 | 1.791 | 1.801 | 4.500 | 4.502 | 1.229 | 1.239 | 0.312 | | | | |
| 18 | 19 | 4¾ × 3⅛ | 4.758 | 4.750 | 3.135 | 3.125 | 4.748 | 4.750 | 1.868 | 1.878 | 4.750 | 4.752 | 1.277 | 1.287 | 0.312 | | | | |
| 19 | 20 | 5 × 3⅜ | 5.008 | 5.000 | 3.385 | 3.375 | 4.998 | 5.000 | 2.010 | 2.020 | 5.000 | 5.002 | 1.385 | 1.395 | 0.312 | | | | |

^a NOTE The key chamfer shall be the minimum to clear the keyway radius. Nominal values are given. For larger shafts see the note following Clause 5.

Table 2 — Square parallel keys, keyways and keybars



All dimensions are in inches

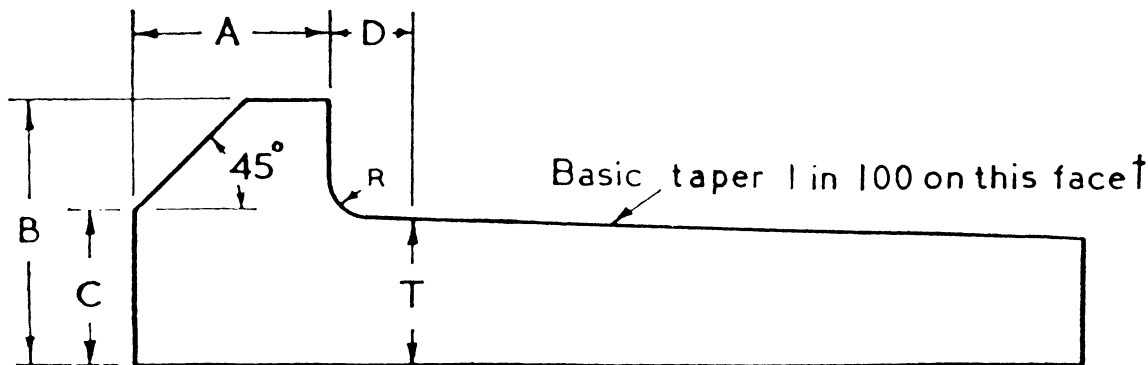
| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | | 13 | | 14 | | 15 | | 16 | |
|-------------------|---------------------|-------------------|-------|--------------------------------------|-------|----------------------|-------|---------|-------|----------------------|-------|---------|-------|--|--|--------------------------------------|-------|----|--|----|--|----|--|----|--|----|--|----|--|----|--|
| Diameter of Shaft | | Key size W × T | | Width W and Thickness T Max. Min. | | Keyway in shaft | | | | Keyway in hub | | | | Nominal Keyway radius & key chamfer r ^a | | Bright keybar | | | | | | | | | | | | | | | |
| Over | Up to and including | | | | | Width W _s | | Depth H | | Width W _h | | Depth h | | | | Width W and thickness T Max. Min. | | | | | | | | | | | | | | | |
| | | | | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | | Max. | Min. | | | | | | | | | | | | | | |
| 1/4 | 1/2 | 1/8 × 1/8 | 0.127 | 0.125 | 0.124 | 0.125 | 0.072 | 0.078 | 0.125 | 0.126 | 0.060 | 0.066 | 0.010 | | | 0.127 | 0.125 | | | | | | | | | | | | | | |
| 1/2 | 3/4 | 3/16 × 3/16 | 0.190 | 0.188 | 0.187 | 0.188 | 0.107 | 0.113 | 0.188 | 0.189 | 0.088 | 0.094 | 0.010 | | | 0.190 | 0.188 | | | | | | | | | | | | | | |
| 3/4 | 1 | 1/4 × 1/4 | 0.252 | 0.250 | 0.249 | 0.250 | 0.142 | 0.148 | 0.250 | 0.251 | 0.115 | 0.121 | 0.010 | | | 0.252 | 0.250 | | | | | | | | | | | | | | |
| 1 | 1 1/4 | 5/16 × 5/16 | 0.314 | 0.312 | 0.311 | 0.312 | 0.177 | 0.183 | 0.312 | 0.313 | 0.142 | 0.148 | 0.010 | | | 0.314 | 0.312 | | | | | | | | | | | | | | |
| 1 1/4 | 1 1/2 | 3/8 × 3/8 | 0.377 | 0.375 | 0.374 | 0.375 | 0.213 | 0.219 | 0.375 | 0.376 | 0.169 | 0.175 | 0.010 | | | 0.377 | 0.375 | | | | | | | | | | | | | | |
| 1 1/2 | 1 3/4 | 7/16 × 7/16 | 0.440 | 0.438 | 0.437 | 0.438 | 0.248 | 0.254 | 0.438 | 0.439 | 0.197 | 0.203 | 0.020 | | | 0.440 | 0.438 | | | | | | | | | | | | | | |
| 1 3/4 | 2 | 1/2 × 1/2 | 0.502 | 0.500 | 0.499 | 0.500 | 0.283 | 0.289 | 0.500 | 0.501 | 0.224 | 0.230 | 0.020 | | | 0.502 | 0.500 | | | | | | | | | | | | | | |
| 2 | 2 1/2 | 5/8 × 5/8 | 0.627 | 0.625 | 0.624 | 0.625 | 0.354 | 0.360 | 0.625 | 0.626 | 0.278 | 0.284 | 0.020 | | | 0.627 | 0.625 | | | | | | | | | | | | | | |
| 2 1/2 | 3 | 3/4 × 3/4 | 0.752 | 0.750 | 0.749 | 0.750 | 0.424 | 0.430 | 0.750 | 0.751 | 0.333 | 0.339 | 0.020 | | | 0.752 | 0.750 | | | | | | | | | | | | | | |

Table 2 — Square parallel keys, keyways and keybars

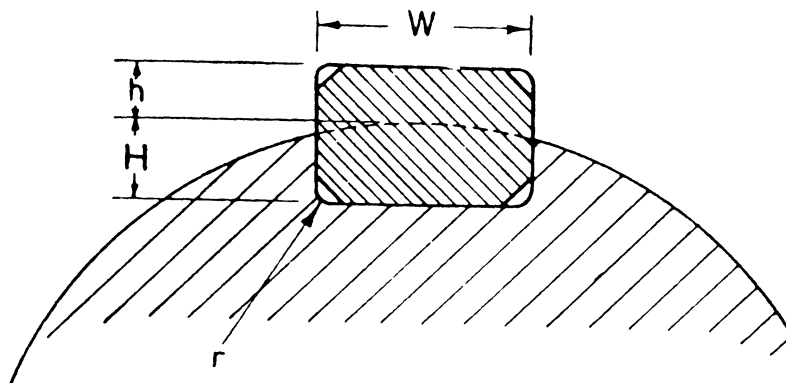
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|-------------------|---------------------|-----------------------|-------------------------|-------|----------------------|-------|---------|-------|----------------------|-------|---------|-------|--|-------------------------|-------|
| Diameter of Shaft | | Key size W × T | Width W and Thickness T | | Keyway in shaft | | | | Keyway in hub | | | | Nominal Keyway radius & key chamfer r ^a | Bright keybar | |
| Over | Up to and including | | | | Width W _s | | Depth H | | Width W _h | | Depth h | | | Width W and thickness T | |
| | | | | | Max. | Min. | Min. | Max. | Min. | Max. | Min. | Max. | | Max. | Min. |
| 3 | 3½ | 7/8 × 7/8 | 0.877 | 0.875 | 0.874 | 0.875 | 0.495 | 0.501 | 0.875 | 0.876 | 0.387 | 0.393 | 0.062 | 0.877 | 0.875 |
| 3½ | 4 | 1 × 1 | 1.003 | 1.000 | 0.999 | 1.000 | 0.566 | 0.572 | 1.000 | 1.001 | 0.442 | 0.448 | 0.062 | 1.003 | 1.000 |
| 4 | 5 | 1¼ × 1¼ | 1.253 | 1.250 | 1.248 | 1.250 | 0.707 | 0.713 | 1.250 | 1.252 | 0.551 | 0.557 | 0.062 | 1.253 | 1.250 |
| 5 | 6 | 1½ × 1½ | 1.504 | 1.500 | 1.498 | 1.500 | 0.848 | 0.854 | 1.500 | 1.502 | 0.661 | 0.667 | 0.062 | 1.504 | 1.500 |

^aNOTE The key chamfer shall be the minimum to clear the keyway radius. Nominal values are given. For larger shafts see the note following Clause 5.

Table 3 — Rectangular taper keys and keyways, gib-head or plain



Gib-head key



Section at deep end of keyway in hub

All dimensions are in inches

| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | |
|-------------------|---------------------|---------------|-------|---------|-------|-------------|-------|-------------------------|-------|---------------|------|---|--|---|--|---|--|----|--|----|--|
| Diameter of shaft | | Key size | | Key | | | | Keyway in shaft and hub | | | | | | | | | | | | | |
| Over | Up to and including | | | Width W | | Thickness T | | Keyway in shaft | | Keyway in hub | | | | | | | | | | | |
| | | | | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Max. | | | | | | | | | | |
| | | W × T | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Max. | | | | | | | | | | | |
| 1 | 1 1/4 | 5/16 × 1/4 | 0.314 | 0.312 | 0.254 | 0.249 | 0.311 | 0.312 | 0.312 | 0.313 | | | | | | | | | | | |
| 1 1/4 | 1 1/2 | 3/8 × 1/4 | 0.377 | 0.375 | 0.254 | 0.249 | 0.374 | 0.375 | 0.375 | 0.376 | | | | | | | | | | | |
| 1 1/2 | 1 3/4 | 7/16 × 5/16 | 0.440 | 0.438 | 0.316 | 0.311 | 0.437 | 0.438 | 0.438 | 0.439 | | | | | | | | | | | |
| 1 3/4 | 2 | 1/2 × 5/16 | 0.502 | 0.500 | 0.316 | 0.311 | 0.499 | 0.500 | 0.500 | 0.501 | | | | | | | | | | | |
| 2 | 2 1/2 | 5/8 × 7/16 | 0.627 | 0.625 | 0.442 | 0.437 | 0.624 | 0.625 | 0.625 | 0.626 | | | | | | | | | | | |
| 2 1/2 | 3 | 3/4 × 1/2 | 0.752 | 0.750 | 0.504 | 0.499 | 0.749 | 0.750 | 0.750 | 0.751 | | | | | | | | | | | |
| 3 | 3 1/2 | 7/8 × 5/8 | 0.877 | 0.875 | 0.630 | 0.624 | 0.874 | 0.875 | 0.875 | 0.876 | | | | | | | | | | | |
| 3 1/2 | 4 | 1 × 3/4 | 1.003 | 1.000 | 0.755 | 0.749 | 0.999 | 1.000 | 1.000 | 1.001 | | | | | | | | | | | |
| 4 | 5 | 1 1/4 × 7/8 | 1.253 | 1.250 | 0.880 | 0.874 | 1.248 | 1.250 | 1.250 | 1.252 | | | | | | | | | | | |
| 5 | 6 | 1 1/2 × 1 | 1.504 | 1.500 | 1.007 | 0.999 | 1.498 | 1.500 | 1.500 | 1.502 | | | | | | | | | | | |
| 6 | 7 | 1 3/4 × 1 1/4 | 1.754 | 1.750 | 1.257 | 1.249 | 1.748 | 1.750 | 1.750 | 1.752 | | | | | | | | | | | |
| 7 | 8 | 2 × 1 3/8 | 2.005 | 2.000 | 1.382 | 1.374 | 1.998 | 2.000 | 2.000 | 2.002 | | | | | | | | | | | |
| 8 | 9 | 2 1/4 × 1 1/2 | 2.255 | 2.250 | 1.509 | 1.499 | 2.248 | 2.250 | 2.250 | 2.252 | | | | | | | | | | | |
| 9 | 10 | 2 1/2 × 1 5/8 | 2.505 | 2.500 | 1.634 | 1.624 | 2.498 | 2.500 | 2.500 | 2.502 | | | | | | | | | | | |
| 10 | 11 | 2 3/4 × 1 7/8 | 2.755 | 2.750 | 1.884 | 1.874 | 2.748 | 2.750 | 2.750 | 2.752 | | | | | | | | | | | |
| 11 | 12 | 3 × 2 | 3.006 | 3.000 | 2.014 | 1.999 | 2.998 | 3.000 | 3.000 | 3.002 | | | | | | | | | | | |

Table 3 — Rectangular taper keys and keyways, gib-head or plain

Basic taper 1 in 100 on this facet†

Alternative design showing a parallel extension with a drilled hole to facilitate extraction

Plain taper key

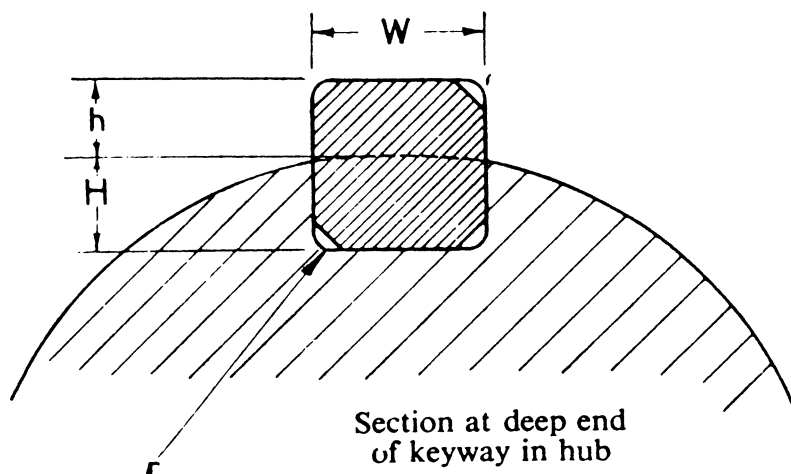
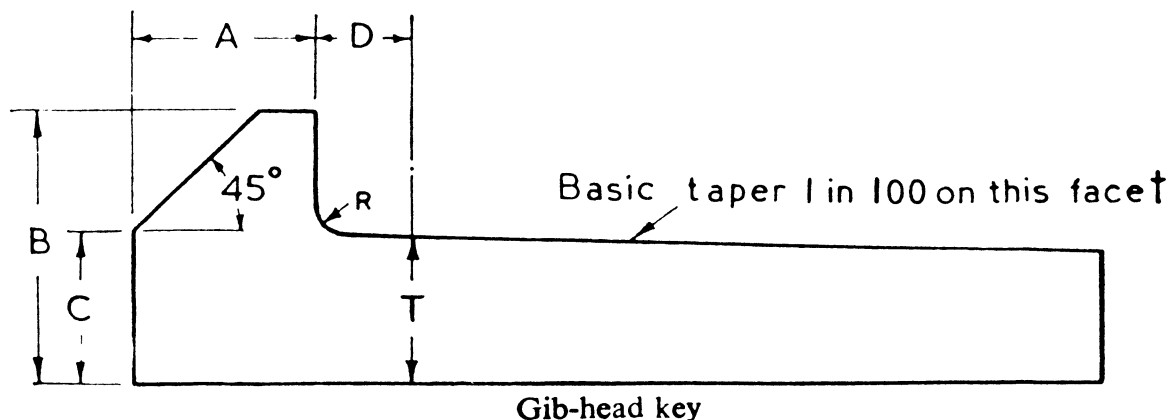
† See B.S. 308—'Engineering drawing practice' for explanation of dimensioning tapers.

All dimensions are in inches

| 12 | | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | | 19 | | 20 | | 21 | |
|-------------------------|-------|-------|-------|--------------------------------------|---------|-------|---------|--|----------|----|---|----|---|----|---|----|----------|----|--|
| Keyway in shaft and hub | | | | | | | | Nominal keyway radius and key chamfer r ^a | Gib-head | | | | | | | | | | |
| Depth in shaft H | | | | Depth in hub at deep end of keyway h | | | | | | | | | | | | | | | |
| Min. | | Max. | | Min. | | Max. | | | A | | B | | C | | D | | Radius R | | |
| 0.146 | 0.152 | 0.090 | 0.096 | 0.010 | 3/8 | 7/16 | 1/4 | 0.3 | 1/16 | | | | | | | | | | |
| 0.150 | 0.156 | 0.086 | 0.092 | 0.010 | 7/16 | 7/16 | 9/32 | 0.3 | 1/16 | | | | | | | | | | |
| 0.186 | 0.192 | 0.112 | 0.118 | 0.020 | 1/2 | 9/16 | 5/16 | 0.4 | 1/16 | | | | | | | | | | |
| 0.190 | 0.196 | 0.108 | 0.114 | 0.020 | 9/16 | 5/8 | 3/8 | 0.4 | 1/16 | | | | | | | | | | |
| 0.260 | 0.266 | 0.162 | 0.168 | 0.020 | 11/16 | 3/4 | 7/16 | 0.5 | 1/8 | | | | | | | | | | |
| 0.299 | 0.305 | 0.185 | 0.191 | 0.020 | 13/16 | 7/8 | 17/32 | 0.5 | 1/8 | | | | | | | | | | |
| 0.370 | 0.376 | 0.239 | 0.245 | 0.062 | 15/16 | 1 | 21/32 | 0.6 | 1/8 | | | | | | | | | | |
| 0.441 | 0.447 | 0.293 | 0.299 | 0.062 | 1 1/16 | 1 1/4 | 23/32 | 0.6 | 1/8 | | | | | | | | | | |
| 0.518 | 0.524 | 0.340 | 0.346 | 0.062 | 1 5/16 | 1 1/2 | 27/32 | 0.7 | 1/4 | | | | | | | | | | |
| 0.599 | 0.605 | 0.384 | 0.390 | 0.062 | 1 9/16 | 1 5/8 | 1 1/32 | 0.7 | 1/4 | | | | | | | | | | |
| 0.740 | 0.746 | 0.493 | 0.499 | 0.125 | 1 13/16 | 2 | 1 7/32 | 0.8 | 1/4 | | | | | | | | | | |
| 0.818 | 0.824 | 0.539 | 0.545 | 0.125 | 2 1/16 | 2 1/4 | 1 13/32 | 0.8 | 1/4 | | | | | | | | | | |
| 0.897 | 0.905 | 0.581 | 0.589 | 0.125 | 2 5/16 | 2 1/2 | 1 9/16 | 0.9 | 3/8 | | | | | | | | | | |
| 0.975 | 0.983 | 0.628 | 0.636 | 0.187 | 2 9/16 | 2 3/4 | 1 11/16 | 0.9 | 3/8 | | | | | | | | | | |
| 1.114 | 1.122 | 0.738 | 0.746 | 0.187 | 2 13/16 | 3 | 1 15/16 | 1.0 | 3/8 | | | | | | | | | | |
| 1.195 | 1.203 | 0.782 | 0.790 | 0.187 | 3 1/16 | 3 1/4 | 2 1/16 | 1.0 | 3/8 | | | | | | | | | | |

^a NOTE The key chamfer shall be the minimum to clear the keyway radius. Nominal values shall be given. For plain keys Columns 17 to 21 do not apply.

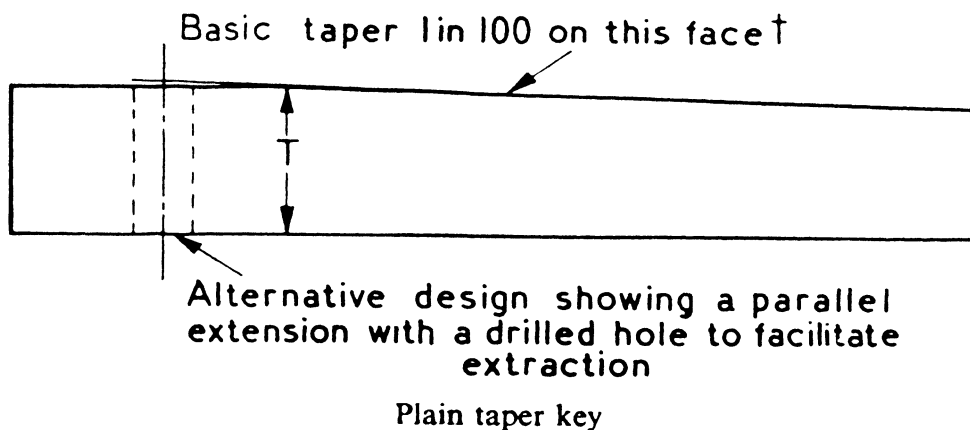
Table 4 — Square taper keys and keyways, gib-head or plain



All dimensions are in inches

| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | |
|-------------------|---------------------|---------------|-------|---------|-------|-------------|-------|-------------------------|-------|---------------|--|---|--|---|--|---|--|----|--|----|--|
| Diameter of shaft | | Key size | | Key | | | | Keyway in shaft and hub | | | | | | | | | | | | | |
| Over | Up to and including | | | Width W | | Thickness T | | Keyway in shaft | | Keyway in hub | | | | | | | | | | | |
| | | W × T | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Max. | | | | | | | | | | | |
| 1/4 | 1/2 | 1/8 × 1/8 | 0.127 | 0.125 | 0.129 | 0.124 | 0.124 | 0.125 | 0.125 | 0.126 | | | | | | | | | | | |
| 1/2 | 3/4 | 3/16 × 3/16 | 0.190 | 0.188 | 0.192 | 0.187 | 0.187 | 0.188 | 0.188 | 0.189 | | | | | | | | | | | |
| 3/4 | 1 | 1/4 × 1/4 | 0.252 | 0.250 | 0.254 | 0.249 | 0.249 | 0.250 | 0.250 | 0.251 | | | | | | | | | | | |
| 1 | 1 1/4 | 5/16 × 5/16 | 0.314 | 0.312 | 0.316 | 0.311 | 0.311 | 0.312 | 0.312 | 0.313 | | | | | | | | | | | |
| 1 1/4 | 1 1/2 | 3/8 × 3/8 | 0.377 | 0.375 | 0.379 | 0.374 | 0.374 | 0.375 | 0.375 | 0.376 | | | | | | | | | | | |
| 1 1/2 | 1 3/4 | 7/16 × 7/16 | 0.440 | 0.438 | 0.442 | 0.437 | 0.437 | 0.438 | 0.438 | 0.439 | | | | | | | | | | | |
| 1 3/4 | 2 | 1/2 × 1/2 | 0.502 | 0.500 | 0.504 | 0.499 | 0.499 | 0.500 | 0.500 | 0.501 | | | | | | | | | | | |
| 2 | 2 1/2 | 5/8 × 5/8 | 0.627 | 0.625 | 0.630 | 0.624 | 0.624 | 0.625 | 0.625 | 0.626 | | | | | | | | | | | |
| 2 1/2 | 3 | 3/4 × 3/4 | 0.752 | 0.750 | 0.755 | 0.749 | 0.749 | 0.750 | 0.750 | 0.751 | | | | | | | | | | | |
| 3 | 3 1/2 | 7/8 × 7/8 | 0.877 | 0.875 | 0.880 | 0.874 | 0.874 | 0.875 | 0.875 | 0.876 | | | | | | | | | | | |
| 3 1/2 | 4 | 1 × 1 | 1.003 | 1.000 | 1.007 | 0.999 | 0.999 | 1.000 | 1.000 | 1.001 | | | | | | | | | | | |
| 4 | 5 | 1 1/4 × 1 1/4 | 1.253 | 1.250 | 1.257 | 1.249 | 1.248 | 1.250 | 1.250 | 1.252 | | | | | | | | | | | |
| 5 | 6 | 1 1/2 × 1 1/2 | 1.504 | 1.500 | 1.509 | 1.499 | 1.498 | 1.500 | 1.500 | 1.502 | | | | | | | | | | | |

Table 4 — Square taper keys and keyways, gib-head or plain



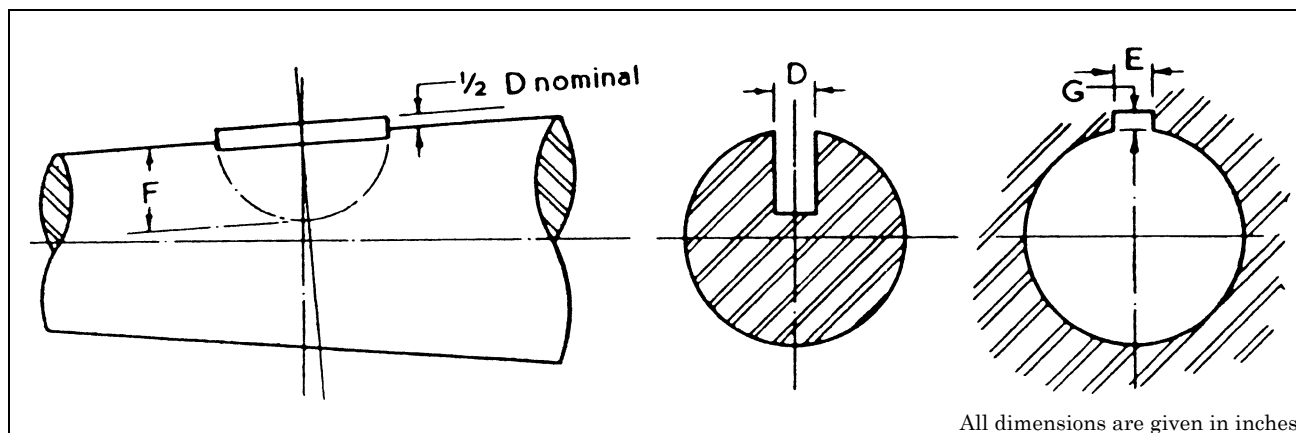
† See B.S. 308—'Engineering drawing practice' for explanation of dimensioning tapers.

All dimensions are in inches

| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|-------------------------|-------|--------------------------------------|-------|---|-----------------|----------------|------------------|-----|----------------|
| Keyway in shaft and hub | | | | Nominal keyway radius and key chamfer r^a | Gib-head | | | | |
| Depth in shaft H | | Depth in hub at deep end of keyway h | | | A | B | C | D | Radius R |
| Min. | Max. | Min. | Max. | | | | | | |
| 0.072 | 0.078 | 0.039 | 0.045 | 0.010 | $\frac{3}{16}$ | $\frac{1}{4}$ | $\frac{5}{32}$ | 0.1 | $\frac{1}{32}$ |
| 0.107 | 0.113 | 0.067 | 0.073 | 0.010 | $\frac{1}{4}$ | $\frac{3}{8}$ | $\frac{7}{32}$ | 0.2 | $\frac{1}{32}$ |
| 0.142 | 0.148 | 0.094 | 0.100 | 0.010 | $\frac{5}{16}$ | $\frac{7}{16}$ | $\frac{9}{32}$ | 0.2 | $\frac{1}{16}$ |
| 0.177 | 0.183 | 0.121 | 0.127 | 0.010 | $\frac{3}{8}$ | $\frac{9}{16}$ | $\frac{11}{32}$ | 0.3 | $\frac{1}{16}$ |
| 0.213 | 0.219 | 0.148 | 0.154 | 0.010 | $\frac{7}{16}$ | $\frac{5}{8}$ | $\frac{13}{32}$ | 0.3 | $\frac{1}{16}$ |
| 0.248 | 0.254 | 0.175 | 0.181 | 0.020 | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{15}{32}$ | 0.4 | $\frac{1}{16}$ |
| 0.283 | 0.289 | 0.202 | 0.208 | 0.020 | $\frac{9}{16}$ | $\frac{7}{8}$ | $\frac{17}{32}$ | 0.4 | $\frac{1}{16}$ |
| 0.354 | 0.360 | 0.256 | 0.262 | 0.020 | $\frac{11}{16}$ | 1 | $\frac{21}{32}$ | 0.5 | $\frac{1}{8}$ |
| 0.424 | 0.430 | 0.310 | 0.316 | 0.020 | $\frac{13}{16}$ | $1\frac{1}{4}$ | $\frac{25}{32}$ | 0.5 | $\frac{1}{8}$ |
| 0.495 | 0.501 | 0.364 | 0.370 | 0.062 | $\frac{15}{16}$ | $1\frac{3}{8}$ | $\frac{29}{32}$ | 0.6 | $\frac{1}{8}$ |
| 0.566 | 0.572 | 0.418 | 0.424 | 0.062 | $1\frac{1}{16}$ | $1\frac{5}{8}$ | $1\frac{1}{32}$ | 0.6 | $\frac{1}{8}$ |
| 0.707 | 0.713 | 0.526 | 0.532 | 0.062 | $1\frac{5}{16}$ | 2 | $1\frac{9}{32}$ | 0.7 | $\frac{1}{4}$ |
| 0.848 | 0.854 | 0.635 | 0.641 | 0.062 | $1\frac{9}{16}$ | $2\frac{1}{2}$ | $1\frac{17}{32}$ | 0.7 | $\frac{1}{4}$ |

^a NOTE The key chamfer shall be the minimum to clear the keyway radius. Nominal values are given. For plain keys Columns 17 to 21 do not apply.

Table 5 — Woodruff keys and keyways



All dimensions are given in inches

| 1 Key and cutter No. | 2 Nominal fractional size of key | | 3 Diameter of key | | 4 Depth of key | | 5 Thickness of key | | 6 Width of keyway in shaft | |
|-------------------------------|--|-----------|----------------------|-------|-------------------|-------|-----------------------|-------|----------------------------------|-------|
| | 7 Width | 8 Dia. | 9 A | | 10 B | | 11 C | | 12 D | |
| | | | Max. | Min. | Max. | Min. | Max. | Min. | Min. | Max. |
| 203 | 1/16 | 3/8 | 0.375 | 0.370 | 0.171 | 0.166 | 0.063 | 0.062 | 0.061 | 0.063 |
| 303 | 3/32 | 3/8 | 0.375 | 0.370 | 0.171 | 0.166 | 0.095 | 0.094 | 0.093 | 0.095 |
| 403 | 1/8 | 3/8 | 0.375 | 0.370 | 0.171 | 0.166 | 0.126 | 0.125 | 0.124 | 0.126 |
| 204 | 1/16 | 1/2 | 0.500 | 0.490 | 0.203 | 0.198 | 0.063 | 0.062 | 0.061 | 0.063 |
| 304 | 3/32 | 1/2 | 0.500 | 0.490 | 0.203 | 0.198 | 0.095 | 0.094 | 0.093 | 0.095 |
| 404 | 1/8 | 1/2 | 0.500 | 0.490 | 0.203 | 0.198 | 0.126 | 0.125 | 0.124 | 0.126 |
| 305 | 3/32 | 5/8 | 0.625 | 0.615 | 0.250 | 0.245 | 0.095 | 0.094 | 0.093 | 0.095 |
| 405 | 1/8 | 5/8 | 0.625 | 0.615 | 0.250 | 0.245 | 0.126 | 0.125 | 0.124 | 0.126 |
| 505 | 5/32 | 5/8 | 0.625 | 0.615 | 0.250 | 0.245 | 0.157 | 0.156 | 0.155 | 0.157 |
| 406 | 1/8 | 3/4 | 0.750 | 0.740 | 0.313 | 0.308 | 0.126 | 0.125 | 0.124 | 0.126 |
| 506 | 5/32 | 3/4 | 0.750 | 0.740 | 0.313 | 0.308 | 0.157 | 0.156 | 0.155 | 0.157 |
| 606 | 3/16 | 3/4 | 0.750 | 0.740 | 0.313 | 0.308 | 0.189 | 0.188 | 0.187 | 0.189 |
| 507 | 5/32 | 7/8 | 0.875 | 0.865 | 0.375 | 0.370 | 0.157 | 0.156 | 0.155 | 0.157 |
| 607 | 3/16 | 7/8 | 0.875 | 0.865 | 0.375 | 0.370 | 0.189 | 0.188 | 0.187 | 0.189 |
| 807 | 1/4 | 7/8 | 0.875 | 0.865 | 0.375 | 0.370 | 0.251 | 0.250 | 0.249 | 0.251 |
| 608 | 3/16 | 1 | 1.000 | 0.990 | 0.438 | 0.433 | 0.189 | 0.188 | 0.187 | 0.189 |
| 808 | 1/4 | 1 | 1.000 | 0.990 | 0.438 | 0.433 | 0.251 | 0.250 | 0.249 | 0.251 |
| 1008 | 5/16 | 1 | 1.000 | 0.990 | 0.438 | 0.433 | 0.313 | 0.312 | 0.311 | 0.313 |
| 609 | 3/16 | 1 1/8 | 1.125 | 1.115 | 0.484 | 0.479 | 0.189 | 0.188 | 0.187 | 0.189 |
| 809 | 1/4 | 1 1/8 | 1.125 | 1.115 | 0.484 | 0.479 | 0.251 | 0.250 | 0.249 | 0.251 |
| 1009 | 5/16 | 1 1/8 | 1.125 | 1.115 | 0.484 | 0.479 | 0.313 | 0.312 | 0.311 | 0.313 |
| 810 | 1/4 | 1 1/4 | 1.250 | 1.240 | 0.547 | 0.542 | 0.251 | 0.250 | 0.249 | 0.251 |
| 1010 | 5/16 | 1 1/4 | 1.250 | 1.240 | 0.547 | 0.542 | 0.313 | 0.312 | 0.311 | 0.313 |
| 1210 | 3/8 | 1 1/4 | 1.250 | 1.240 | 0.547 | 0.542 | 0.376 | 0.375 | 0.374 | 0.376 |
| 1011 | 5/16 | 1 3/8 | 1.375 | 1.365 | 0.594 | 0.589 | 0.313 | 0.312 | 0.311 | 0.313 |
| 1211 | 3/8 | 1 3/8 | 1.375 | 1.365 | 0.594 | 0.589 | 0.376 | 0.375 | 0.374 | 0.376 |
| 812 | 1/4 | 1 1/2 | 1.500 | 1.490 | 0.641 | 0.636 | 0.251 | 0.250 | 0.249 | 0.251 |
| 1012 | 5/16 | 1 1/2 | 1.500 | 1.490 | 0.641 | 0.636 | 0.313 | 0.312 | 0.311 | 0.313 |
| 1212 | 3/8 | 1 1/2 | 1.500 | 1.490 | 0.641 | 0.636 | 0.376 | 0.375 | 0.374 | 0.376 |

Table 5 — Woodruff keys and keyways

| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|----------------------------------|-------|----------------------------|-------|---|-------|----------------------------------|-------|-------------|
| Width of keyway in hub or boss E | | Depth of keyway in shaft F | | Depth of keyway in hub at centre line G | | Depth of key (optional design) H | | Dimension J |
| Min. | Max. | Min. | Max. | Min. | Max. | Max. | Min. | Nom. |
| 0.063 | 0.065 | 0.135 | 0.140 | 0.042 | 0.047 | 0.162 | 0.156 | 1/64 |
| 0.095 | 0.097 | 0.119 | 0.124 | 0.057 | 0.062 | 0.162 | 0.156 | 1/64 |
| 0.126 | 0.128 | 0.104 | 0.109 | 0.073 | 0.078 | 0.162 | 0.156 | 1/64 |
| 0.063 | 0.065 | 0.167 | 0.172 | 0.042 | 0.047 | 0.194 | 0.188 | 3/64 |
| 0.095 | 0.097 | 0.151 | 0.156 | 0.057 | 0.062 | 0.194 | 0.188 | 3/64 |
| 0.126 | 0.128 | 0.136 | 0.141 | 0.073 | 0.078 | 0.194 | 0.188 | 3/64 |
| 0.095 | 0.097 | 0.198 | 0.203 | 0.057 | 0.062 | 0.240 | 0.234 | 1/16 |
| 0.126 | 0.128 | 0.182 | 0.187 | 0.073 | 0.078 | 0.240 | 0.234 | 1/16 |
| 0.157 | 0.159 | 0.167 | 0.172 | 0.089 | 0.094 | 0.240 | 0.234 | 1/16 |
| 0.126 | 0.128 | 0.246 | 0.251 | 0.073 | 0.078 | 0.303 | 0.297 | 1/16 |
| 0.157 | 0.159 | 0.230 | 0.235 | 0.089 | 0.094 | 0.303 | 0.297 | 1/16 |
| 0.189 | 0.191 | 0.214 | 0.219 | 0.104 | 0.109 | 0.303 | 0.297 | 1/16 |
| 0.157 | 0.159 | 0.292 | 0.297 | 0.089 | 0.094 | 0.365 | 0.359 | 1/16 |
| 0.189 | 0.191 | 0.276 | 0.281 | 0.104 | 0.109 | 0.365 | 0.359 | 1/16 |
| 0.251 | 0.253 | 0.245 | 0.250 | 0.136 | 0.141 | 0.365 | 0.359 | 1/16 |
| 0.189 | 0.191 | 0.339 | 0.344 | 0.104 | 0.109 | 0.428 | 0.422 | 1/16 |
| 0.251 | 0.253 | 0.308 | 0.313 | 0.136 | 0.141 | 0.428 | 0.422 | 1/16 |
| 0.313 | 0.315 | 0.277 | 0.282 | 0.167 | 0.172 | 0.428 | 0.422 | 1/16 |
| 0.189 | 0.191 | 0.385 | 0.390 | 0.104 | 0.109 | 0.475 | 0.469 | 5/64 |
| 0.251 | 0.253 | 0.354 | 0.359 | 0.136 | 0.141 | 0.475 | 0.469 | 5/64 |
| 0.313 | 0.315 | 0.323 | 0.328 | 0.167 | 0.172 | 0.475 | 0.469 | 5/64 |
| 0.251 | 0.253 | 0.417 | 0.422 | 0.136 | 0.141 | 0.537 | 0.531 | 5/64 |
| 0.313 | 0.315 | 0.386 | 0.391 | 0.167 | 0.172 | 0.537 | 0.531 | 5/64 |
| 0.376 | 0.378 | 0.354 | 0.359 | 0.198 | 0.203 | 0.537 | 0.531 | 5/64 |
| 0.313 | 0.315 | 0.433 | 0.438 | 0.167 | 0.172 | 0.584 | 0.578 | 3/32 |
| 0.376 | 0.378 | 0.402 | 0.407 | 0.198 | 0.203 | 0.584 | 0.578 | 3/32 |
| 0.251 | 0.253 | 0.511 | 0.516 | 0.136 | 0.141 | 0.631 | 0.625 | 7/64 |
| 0.313 | 0.315 | 0.480 | 0.485 | 0.167 | 0.172 | 0.631 | 0.625 | 7/64 |
| 0.376 | 0.378 | 0.448 | 0.453 | 0.198 | 0.203 | 0.631 | 0.625 | 7/64 |

NOTE For details of obsolete Woodruff key and cutter numbers reference should be made to Table 6.

Table 6 — Comparison of woodruff key numbers (Whitney, British and American)

NOTE This table has been prepared for reference, to help readers to substitute the new numbers (column 4) for the obsolete numbers given in columns 1, 2 and 3.

It is strongly recommended that the obsolete numbers should be superseded by the key and cutter numbers designated in Table 5 of the Specification.

| 1 Original Whitney cutter and key number | 2 British Standard key number (obsolete) | 3 British Standard cutter number (obsolete) | 4 British Standard key and cutter number and American cutter number | 5 Nominal size of key | |
|---|--|---|---|---------------------------|----------------|
| | | | | Width (thickness) C | Diameter A |
| | | | | in. | in. |
| 211 | — | — | 203 | $\frac{1}{16}$ | $\frac{3}{8}$ |
| 212 | — | — | 303 | $\frac{3}{32}$ | $\frac{3}{8}$ |
| 213 | — | — | 403 | $\frac{1}{8}$ | $\frac{3}{8}$ |
| 1 | 10 | 1 | 204 | $\frac{1}{16}$ | $\frac{1}{2}$ |
| 2 | 20 | 2 | 304 | $\frac{3}{32}$ | $\frac{1}{2}$ |
| 3 | 30 | 3 | 404 | $\frac{1}{8}$ | $\frac{1}{2}$ |
| 4 | 40 | 4 | 305 | $\frac{3}{32}$ | $\frac{5}{8}$ |
| 5 | 50 | 5 | 405 | $\frac{1}{8}$ | $\frac{5}{8}$ |
| 6 | 60 | 6 | 505 | $\frac{5}{32}$ | $\frac{5}{8}$ |
| 61 | — | — | — | $\frac{3}{16}$ | $\frac{5}{8}$ |
| 7 | 70 | 7 | 406 | $\frac{1}{8}$ | $\frac{3}{4}$ |
| 8 | 80 | 8 | 506 | $\frac{5}{32}$ | $\frac{3}{4}$ |
| 9 | 90 | 9 | 606 | $\frac{3}{16}$ | $\frac{3}{4}$ |
| 91 | — | — | — | $\frac{1}{4}$ | $\frac{3}{4}$ |
| 10 | 100 | 10 | 507 | $\frac{5}{32}$ | $\frac{7}{8}$ |
| 11 | 110 | 11 | 607 | $\frac{3}{16}$ | $\frac{7}{8}$ |
| 12 | — | — | — | $\frac{7}{32}$ | $\frac{7}{8}$ |
| A | 115 | A | 807 | $\frac{1}{4}$ | $\frac{7}{8}$ |
| 13 | 130 | 13 | 608 | $\frac{3}{16}$ | 1 |
| 14 | — | — | — | $\frac{7}{32}$ | 1 |
| 15 | 150 | 15 | 808 | $\frac{1}{4}$ | 1 |
| B | 155 | B | 1008 | $\frac{5}{16}$ | 1 |
| 152 | — | — | — | $\frac{3}{8}$ | 1 |
| 141 | — | — | — | $\frac{1}{4}$ | 1 |
| 16 | 160 | 16 | 609 | $\frac{3}{16}$ | $1\frac{1}{8}$ |
| 17 | — | — | — | $\frac{7}{32}$ | $1\frac{1}{8}$ |
| 18 | 180 | 18 | 809 | $\frac{1}{4}$ | $1\frac{1}{8}$ |
| C | 185 | C | 1009 | $\frac{5}{16}$ | $1\frac{1}{8}$ |
| 161 | — | — | — | $\frac{5}{16}$ | $1\frac{1}{8}$ |
| 19 | — | — | — | $\frac{3}{16}$ | $1\frac{1}{4}$ |

Table 6 — Comparison of woodruff key numbers (Whitney, British and American)

| 1 Original Whitney cutter and key number | 2 British Standard key number (obsolete) | 3 British Standard cutter number (obsolete) | 4 British Standard key and cutter number and American cutter number | 5 Nominal size of key | |
|---|--|---|---|---------------------------|----------------|
| | | | | Width (thickness) C | Diameter A |
| | | | | in. | in. |
| 20 | — | — | — | $\frac{7}{32}$ | $1\frac{1}{4}$ |
| 21 | 210 | 21 | 810 | $\frac{1}{4}$ | $1\frac{1}{4}$ |
| D | 215 | D | 1010 | $\frac{5}{16}$ | $1\frac{1}{4}$ |
| E | 225 | E | 1210 | $\frac{3}{8}$ | $1\frac{1}{4}$ |
| 22 | — | — | — | $\frac{1}{4}$ | $1\frac{3}{8}$ |
| 23 | 230 | 23 | 1011 | $\frac{5}{16}$ | $1\frac{3}{8}$ |
| F | 235 | F | 1211 | $\frac{3}{8}$ | $1\frac{3}{8}$ |
| 24 | 240 | 24 | 812 | $\frac{1}{4}$ | $1\frac{1}{2}$ |
| 25 | 250 | 25 | 1012 | $\frac{5}{16}$ | $1\frac{1}{2}$ |
| G | 255 | G | 1212 | $\frac{3}{8}$ | $1\frac{1}{2}$ |
| 126 | — | — | — | $\frac{3}{16}$ | $2\frac{1}{8}$ |
| 127 | — | — | — | $\frac{1}{4}$ | $2\frac{1}{8}$ |
| 128 | — | — | — | $\frac{5}{16}$ | $2\frac{1}{8}$ |
| 129 | — | — | — | $\frac{3}{8}$ | $2\frac{1}{8}$ |
| 26 | — | — | — | $\frac{3}{16}$ | $2\frac{1}{8}$ |
| 27 | — | — | — | $\frac{1}{4}$ | $2\frac{1}{8}$ |
| 28 | — | — | — | $\frac{5}{16}$ | $2\frac{1}{8}$ |
| 29 | — | — | — | $\frac{3}{8}$ | $2\frac{1}{8}$ |
| RX | — | — | — | $\frac{1}{4}$ | $2\frac{3}{4}$ |
| SX | — | — | — | $\frac{5}{16}$ | $2\frac{3}{4}$ |
| TX | — | — | — | $\frac{3}{8}$ | $2\frac{3}{4}$ |
| Ux | — | — | — | $\frac{7}{16}$ | $2\frac{3}{4}$ |
| Vx | — | — | — | $\frac{1}{2}$ | $2\frac{3}{4}$ |
| R | — | — | — | $\frac{1}{4}$ | $2\frac{3}{4}$ |
| S | — | — | — | $\frac{5}{16}$ | $2\frac{3}{4}$ |
| T | — | — | — | $\frac{3}{8}$ | $2\frac{3}{4}$ |
| U | — | — | — | $\frac{7}{16}$ | $2\frac{3}{4}$ |
| V | — | — | — | $\frac{1}{2}$ | $2\frac{3}{4}$ |
| 30 | — | — | — | $\frac{3}{8}$ | $3\frac{1}{2}$ |
| 31 | — | — | — | $\frac{7}{16}$ | $3\frac{1}{2}$ |
| 32 | — | — | — | $\frac{1}{2}$ | $3\frac{1}{2}$ |
| 33 | — | — | — | $\frac{9}{16}$ | $3\frac{1}{2}$ |
| 34 | — | — | — | $\frac{5}{8}$ | $3\frac{1}{2}$ |
| 35 | — | — | — | $\frac{11}{16}$ | $3\frac{1}{2}$ |
| 36 | — | — | — | $\frac{3}{4}$ | $3\frac{1}{2}$ |

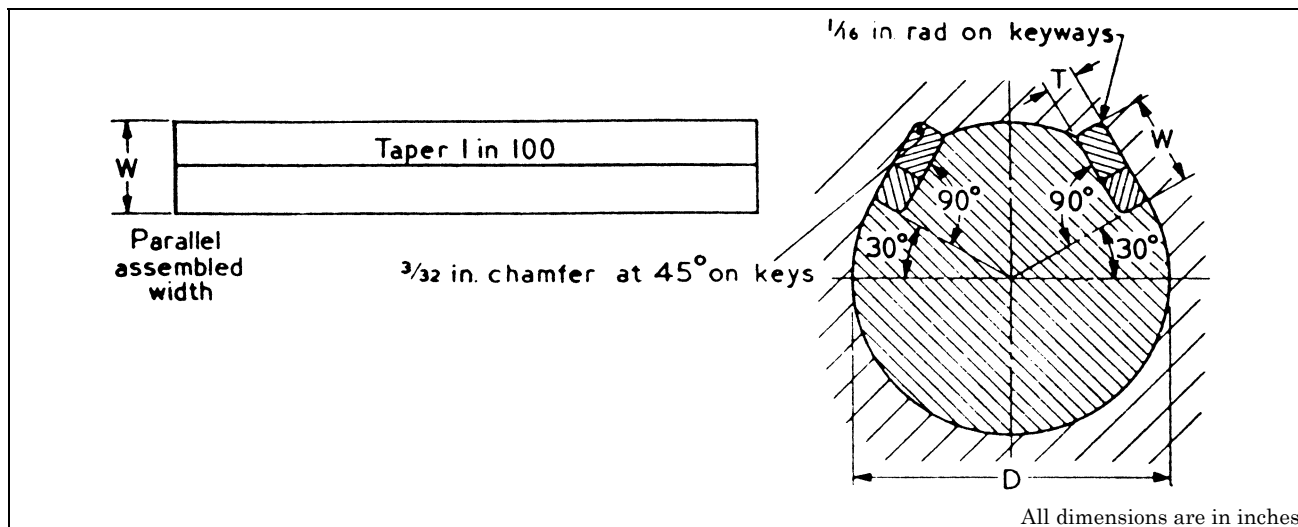
6 Dimensions of tangential keys and keyways

The dimensions of tangential keys and keyways shall be as given in Table 7.

The width of the key (W) is $\frac{3}{10}$ (0.3) of the diameter of the shaft, in which case the thickness of the key (T) becomes $\frac{1}{10}$ (0.1) of the diameter of the shaft.

Tangential keys should be provided with an extra length for driving. This should not be less than the width of the pair of keys.

Table 7 — Tangential keys



All dimensions are in inches

| Diameter of shaft D | Width of keys W | Thickness of keys T | Diameter of shaft D | Width of keys W | Thickness of keys T | Diameter of shaft D | Width of keys W | Thickness of keys T |
|---------------------|-----------------|---------------------|---------------------|-----------------|---------------------|---------------------|-----------------|---------------------|
| 4 | 1.200 | 0.400 | 9 1/2 | 2.850 | 0.950 | 21 | 6.300 | 2.100 |
| 4 1/4 | 1.275 | 0.425 | 10 | 3.000 | 1.000 | 22 | 6.600 | 2.200 |
| 4 1/2 | 1.350 | 0.450 | 10 1/2 | 3.150 | 1.050 | 23 | 6.900 | 2.300 |
| 4 3/4 | 1.425 | 0.475 | 11 | 3.300 | 1.100 | 24 | 7.200 | 2.400 |
| 5 | 1.500 | 0.500 | 11 1/2 | 3.450 | 1.150 | 25 | 7.500 | 2.500 |
| 5 1/4 | 1.575 | 0.525 | 12 | 3.600 | 1.200 | 26 | 7.800 | 2.600 |
| 5 1/2 | 1.650 | 0.550 | 12 1/2 | 3.750 | 1.250 | 27 | 8.100 | 2.700 |
| 5 3/4 | 1.725 | 0.575 | 13 | 3.900 | 1.300 | 28 | 8.400 | 2.800 |
| 6 | 1.800 | 0.600 | 13 1/2 | 4.050 | 1.350 | 29 | 8.700 | 2.900 |
| 6 1/4 | 1.875 | 0.625 | 14 | 4.200 | 1.400 | 30 | 9.000 | 3.000 |
| 6 1/2 | 1.950 | 0.650 | 14 1/2 | 4.350 | 1.450 | 31 | 9.300 | 3.100 |
| 6 3/4 | 2.025 | 0.675 | 15 | 4.500 | 1.500 | 32 | 9.600 | 3.200 |
| 7 | 2.100 | 0.700 | 16 | 4.800 | 1.600 | 33 | 9.900 | 3.300 |
| 7 1/2 | 2.250 | 0.750 | 17 | 5.100 | 1.700 | 34 | 10.200 | 3.400 |
| 8 | 2.400 | 0.800 | 18 | 5.400 | 1.800 | 35 | 10.500 | 3.500 |
| 8 1/2 | 2.550 | 0.850 | 19 | 5.700 | 1.900 | 36 | 10.800 | 3.600 |
| 9 | 2.700 | 0.900 | 20 | 6.000 | 2.000 | — | — | — |

The above dimensions are based on the formulae $W = 0.3D$ and $T = 0.1D$ but for an intermediate diameter of shaft the key section shall be the same as that for the next size larger shaft in the above list.

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7 Dimensions of keys and keyways for marine tailshafts

a) *General.* The dimensions of keys and keyways for marine tail-shafts shall be as shown in Table 8 and Figure 2.

NOTE The dimensions of keys for marine tail-shafts should be based on shaft diameters obtained by Lloyd's rule.

b) *Depth at forward end.* The keyway in the tailshaft shall be produced in such a manner that, at the forward end of the keyway, the total depth at the side is half the thickness of the key.

c) *Position on shaft.* The position of the keyway in the shaft and its relation to the position of the propeller boss shall be as shown in Figure 4.

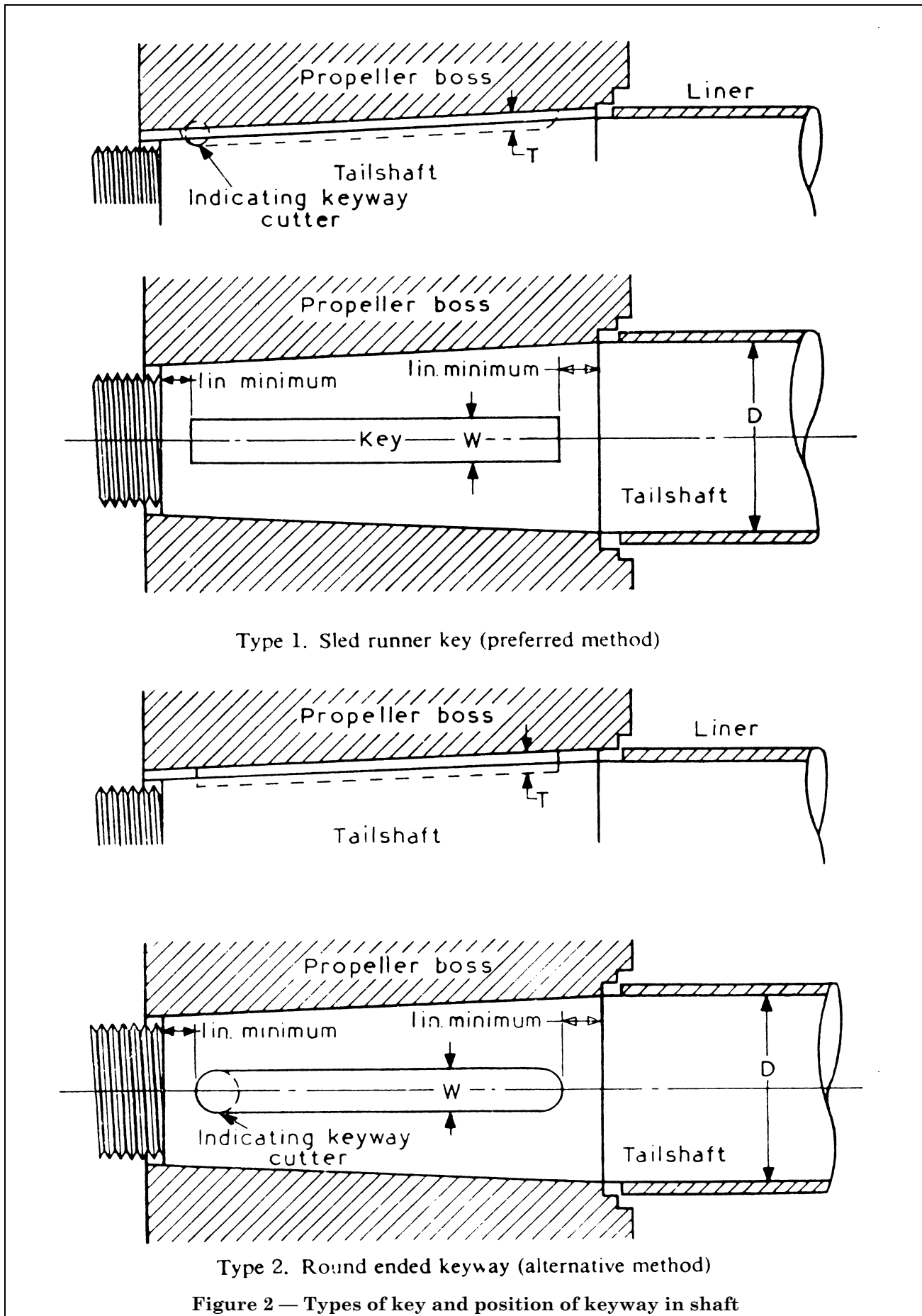
d) *Pull up on taper.* After the propeller nut has been tightened by hand the propeller shall be pulled up on the shaft taper for a distance of 0.006 in. per inch of shaft diameter if the shaft taper is 1 in 12 and 0.008 in. per inch of shaft diameter if the shaft taper is 1 in 16.

e) *Sealing arrangements.* Sealing arrangements at the forward and after ends of the propeller boss shall be sufficient to prevent ingress of corrosive materials to the tail-shaft under all conditions of service.

Table 8 — Rectangular parallel keys for marine tailshafts

(All dimensions are given in inches)

| Nominal diameter of shaft at after end on parallel portion under liner D | Nominal dimensions of key | | Fillet radius in keyway and chamfer on key R |
|---|-------------------------------|-------------------------------|---|
| | Width W | Thickness T | |
| inclusive | | | |
| 6 to 6 ⁷ / ₈ | 1 ¹ / ₂ | 1 | 1 ¹ / ₁₆ |
| 7 to 7 ⁷ / ₈ | 1 ³ / ₄ | 1 ¹ / ₈ | 1 ¹ / ₈ |
| 8 to 8 ⁷ / ₈ | 2 | 1 ¹ / ₄ | 1 ¹ / ₈ |
| 9 to 9 ⁷ / ₈ | 2 ¹ / ₄ | 1 ³ / ₈ | 1 ¹ / ₈ |
| 10 to 10 ⁷ / ₈ | 2 ¹ / ₂ | 1 ¹ / ₂ | 3 ¹ / ₁₆ |
| 11 to 11 ⁷ / ₈ | 2 ³ / ₄ | 1 ⁵ / ₈ | 3 ¹ / ₁₆ |
| 12 to 12 ⁷ / ₈ | 3 | 1 ³ / ₄ | 3 ¹ / ₁₆ |
| 13 to 13 ⁷ / ₈ | 3 ¹ / ₄ | 1 ⁷ / ₈ | 3 ¹ / ₁₆ |
| 14 to 14 ⁷ / ₈ | 3 ¹ / ₂ | 2 | 1 ¹ / ₄ |
| 15 to 15 ⁷ / ₈ | 3 ³ / ₄ | 2 ¹ / ₈ | 1 ¹ / ₄ |
| 16 to 16 ⁷ / ₈ | 4 | 2 ¹ / ₄ | 1 ¹ / ₄ |
| 17 to 17 ⁷ / ₈ | 4 ¹ / ₄ | 2 ³ / ₈ | 5 ¹ / ₁₆ |
| 18 to 18 ⁷ / ₈ | 4 ¹ / ₂ | 2 ¹ / ₂ | 5 ¹ / ₁₆ |
| 19 to 19 ⁷ / ₈ | 4 ³ / ₄ | 2 ⁵ / ₈ | 5 ¹ / ₁₆ |
| 20 to 20 ⁷ / ₈ | 5 | 2 ³ / ₄ | 5 ¹ / ₁₆ |
| 21 to 21 ⁷ / ₈ | 5 ¹ / ₄ | 2 ⁷ / ₈ | 3 ¹ / ₈ |
| 22 to 22 ⁷ / ₈ | 5 ¹ / ₂ | 3 | 3 ¹ / ₈ |
| 23 to 23 ⁷ / ₈ | 5 ³ / ₄ | 3 ¹ / ₈ | 3 ¹ / ₈ |
| 24 to 24 ⁷ / ₈ | 6 | 3 ¹ / ₄ | 7 ¹ / ₁₆ |
| 25 to 25 ⁷ / ₈ | 6 ¹ / ₄ | 3 ³ / ₈ | 7 ¹ / ₁₆ |
| 26 to 26 ⁷ / ₈ | 6 ¹ / ₂ | 3 ¹ / ₂ | 7 ¹ / ₁₆ |
| 27 to 27 ⁷ / ₈ | 6 ³ / ₄ | 3 ⁵ / ₈ | 7 ¹ / ₁₆ |
| 28 to 28 ⁷ / ₈ | 7 | 3 ³ / ₄ | 1 ¹ / ₂ |
| 29 to 30 | 7 ¹ / ₄ | 3 ⁷ / ₈ | 1 ¹ / ₂ |



8 Keys and keyways for tapered shaft ends

a) *Shaft tapers.* The taper on the diameter of the shaft shall be one of those listed below:

1 in 3.428: Where a self-releasing taper is required.

1 in 4 : Generally used for locomotive piston rods, etc.

1 in 5 : Diesel engine fuel injection pumps.

1 in 8 : Popular in automobile practice; used by the Society of Motor Manufacturers and Traders and the Society of Automotive Engineers (American).

1 in 10 : General taper of decimal form.

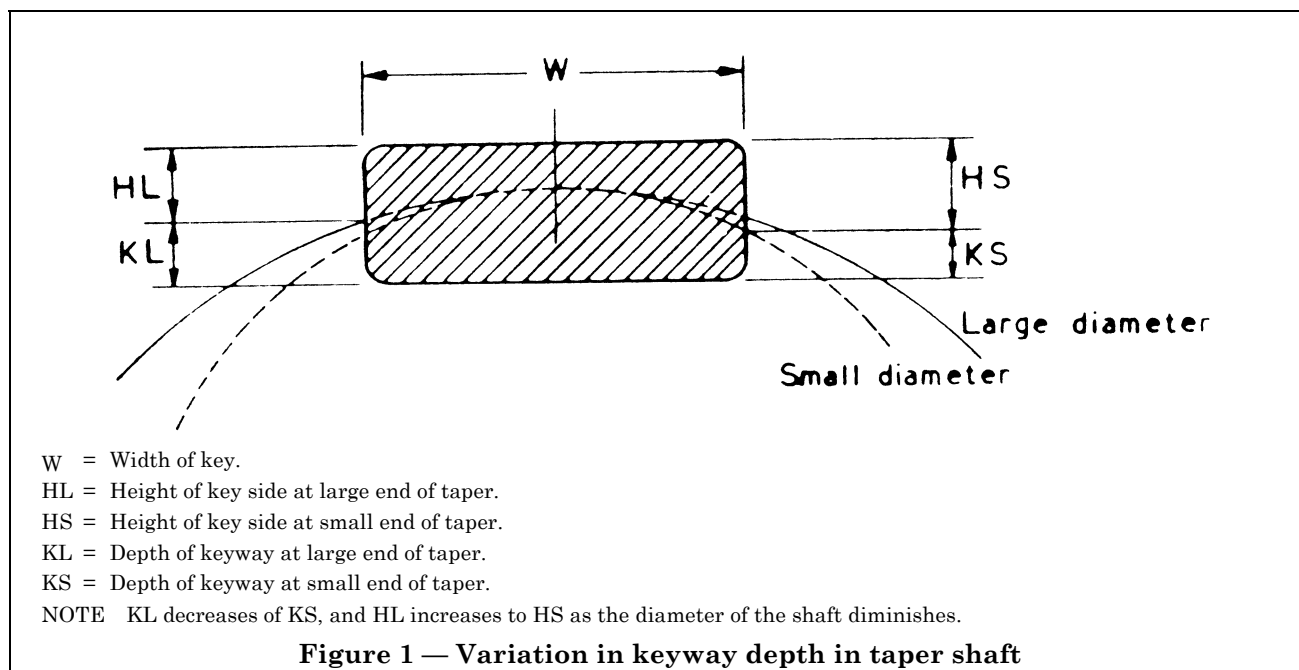
1 in 12

and } : Alternatives used for marine shafting.

1 in 16

b) *Keyways.* The keyway shall lie parallel to the side of the cone.

As a result of the change of section of the shaft along the cone, the depth of keyway at the sides will not be constant. This is illustrated diagrammatically in Figure 1. (BS 308, "Engineering drawing practice," shows the recommended method of dimensioning keyways in tapered shaft ends).



c) *Dimensions and tolerances.* For the purpose of determining the correct size of key, the nominal diameter of the shaft shall be that of the larger end of the cone.

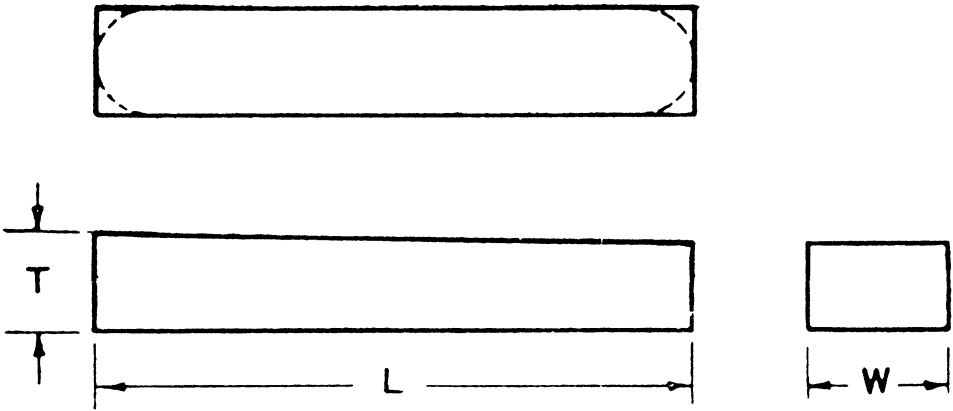
Except in the case of marine tail shaft applications, the dimensions and tolerances of the keys and keyways for coned shafts shall be as shown in Table 1 for keys and keyways of rectangular section, Table 2 for keys and keyways of square section and Table 5 for Woodruff keys and keyways.

Appendix A Preferred lengths of keys

The details of the availability and preferred lengths of plain and gib-head keys, which are given in Table 9 and Table 10, have been compiled following an investigation of manufacturing records and are included for reference purposes.

It should be noted that no lengths are included for a number of the key sizes which appear in Table 1, Table 2, Table 3 and Table 4, the reason being that such keys are not normally stocked, and are supplied to customer's requirements.

Table 9 — Preferred lengths of plain keys, rectangular or square section, parallel or taper

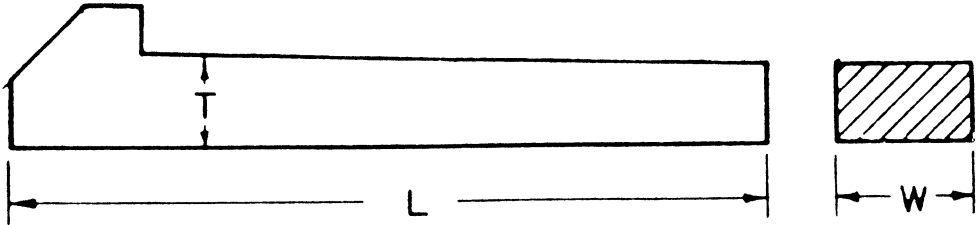


All dimensions are in inches

| Key size W × T | Overall length L | | | | | | | | | | | | | | |
|-------------------|------------------|---|-------|-------|-------|---|-------|-------|-------|---|-------|---|-------|---|---|
| | 3/4 | 1 | 1 1/4 | 1 1/2 | 1 3/4 | 2 | 2 1/4 | 2 1/2 | 2 3/4 | 3 | 3 1/2 | 4 | 4 1/2 | 5 | 6 |
| 1/8 × 1/8 | X | X | | | | | | | | | | | | | |
| 3/16 × 3/16 | X | X | X | X | X | X | | | | | | | | | |
| 1/4 × 1/4 | X | X | X | X | X | X | X | X | X | X | | | | | |
| 5/16 × 1/4 | X | X | X | X | X | X | X | X | X | X | | | | | |
| 5/16 × 5/16 | X | X | X | X | X | X | X | X | X | X | | | | | |
| 3/8 × 1/4 | | X | X | X | X | X | X | X | X | X | X | X | | | |
| 3/8 × 3/8 | | X | X | X | X | X | X | X | X | X | X | X | | | |
| 7/16 × 5/16 | | | | X | X | X | X | X | X | X | X | X | | | |
| 7/16 × 7/16 | | | | | X | X | X | X | X | X | X | X | | | |
| 1/2 × 5/16 | | | | | X | X | X | X | X | X | X | X | X | X | |
| 1/2 × 1/2 | | | | | | X | X | X | X | X | X | X | X | X | |
| 5/8 × 7/16 | | | | | | | | X | X | X | X | X | X | X | |
| 5/8 × 5/8 | | | | | | | | X | | X | X | X | X | X | X |
| 3/4 × 1/2 | | | | | | | | | | X | X | X | X | X | X |
| 3/4 × 3/4 | | | | | | | | | | | X | X | X | X | X |
| 7/8 × 5/8 | | | | | | | | | | | X | X | X | X | X |

NOTE Larger sizes than those given in this table are not generally stocked but are manufactured to customer's individual requirements.

Table 10 — Preferred lengths of gib-head keys rectangular or square section



All dimensions are in inches

| Key size W × T | Overall length L | | | | | | | | | | | | | | | | | |
|-------------------|-------------------------------|-------------------------------|---|-------------------------------|-------------------------------|-------------------------------|---|-------------------------------|---|-------------------------------|---|-------------------------------|---|-------------------------------|---|-------------------------------|---|---|
| | 1 ¹ / ₂ | 1 ³ / ₄ | 2 | 2 ¹ / ₄ | 2 ¹ / ₂ | 2 ³ / ₄ | 3 | 3 ¹ / ₂ | 4 | 4 ¹ / ₂ | 5 | 5 ¹ / ₂ | 6 | 6 ¹ / ₂ | 7 | 7 ¹ / ₂ | 8 | |
| 3/16 × 3/16 | X | X | X | X | X | | X | | | | | | | | | | | |
| 1/4 × 1/4 | X | X | X | X | X | X | X | X | X | | | | | | | | | |
| 5/16 × 1/4 | | | X | X | X | X | X | X | X | | | | | | | | | |
| 5/16 × 5/16 | | | X | X | X | X | X | X | X | X | | | | | | | | |
| 3/8 × 1/4 | | | X | X | X | X | X | X | X | X | X | | | | | | | |
| 3/8 × 3/8 | | | X | X | X | X | X | X | X | X | X | X | X | | | | | |
| 7/16 × 5/16 | | | | | X | | X | X | X | X | X | X | X | | | | | |
| 7/16 × 7/16 | | | | | X | | X | X | X | X | X | X | X | | | | | |
| 1/2 × 5/16 | | | | | X | | X | X | X | X | X | X | X | X | | | | |
| 1/2 × 1/2 | | | | | X | | X | X | X | X | X | X | X | X | X | | | |
| 5/8 × 7/16 | | | | | | X | | X | X | X | X | X | X | X | X | | | |
| 5/8 × 5/8 | | | | | | | | X | X | X | X | X | X | X | X | X | | X |
| 3/4 × 1/2 | | | | | | | | | X | X | X | X | X | X | X | X | X | X |
| 3/4 × 3/4 | | | | | | | | | X | | X | | X | | X | | X | X |
| 7/8 × 5/8 | | | | | | | | | | X | | | X | X | X | X | X | X |
| 7/8 × 7/8 | | | | | | | | | | | | | X | | X | | X | X |
| 1 × 3/4 | | | | | | | | | | | | | X | | X | X | X | X |
| 1 × 1 | | | | | | | | | | | | | X | | X | | X | X |

NOTE Larger or smaller sizes than those given in this table are not generally stocked but are manufactured to customer's individual requirements.

Appendix B Approximate equivalents of metric and inch units

| Inches | | mm | Inches | | mm |
|----------------|---------|-------|-----------------|---------|-------|
| Fractional | Decimal | | Fractional | Decimal | |
| | 0.001 | 0.025 | $\frac{5}{32}$ | 0.156 3 | 3.97 |
| | 0.002 | 0.051 | | 0.160 | 4.06 |
| | 0.003 | 0.076 | | 0.170 | 4.32 |
| | 0.004 | 0.102 | $\frac{11}{64}$ | 0.171 9 | 4.36 |
| | 0.005 | 0.127 | | 0.180 | |
| | 0.006 | 0.152 | $\frac{3}{16}$ | 0.187 5 | 4.76 |
| | 0.007 | 0.178 | | 0.190 | |
| | 0.008 | 0.203 | | 0.200 | 5.08 |
| | 0.009 | 0.229 | $\frac{13}{64}$ | 0.203 1 | 5.16 |
| | 0.010 | 0.254 | $\frac{7}{32}$ | 0.218 8 | 5.56 |
| $\frac{1}{64}$ | 0.015 6 | 0.397 | $\frac{15}{64}$ | 0.234 4 | 5.95 |
| | 0.020 0 | 0.508 | $\frac{1}{4}$ | 0.250 | 6.35 |
| | 0.030 | 0.762 | $\frac{17}{64}$ | 0.265 6 | 6.75 |
| $\frac{1}{32}$ | 0.031 3 | 0.794 | $\frac{9}{32}$ | 0.281 3 | 7.14 |
| | 0.040 | 1.016 | $\frac{19}{64}$ | 0.296 9 | 7.54 |
| $\frac{3}{64}$ | 0.046 9 | 1.191 | | 0.300 | 7.62 |
| | 0.050 | 1.27 | $\frac{5}{16}$ | 0.312 5 | 7.94 |
| | 0.060 | 1.524 | $\frac{3}{8}$ | 0.375 | 9.53 |
| $\frac{1}{16}$ | 0.062 5 | 1.588 | | 0.400 | 10.16 |
| | 0.070 | 1.778 | $\frac{7}{16}$ | 0.437 5 | 11.11 |
| $\frac{5}{64}$ | 0.078 1 | 1.984 | $\frac{1}{2}$ | 0.500 | 12.70 |
| | 0.080 | 2.032 | $\frac{9}{16}$ | 0.5625 | 14.29 |
| | 0.090 | 2.286 | | 0.600 | 15.24 |
| $\frac{3}{32}$ | 0.093 8 | 2.381 | $\frac{5}{8}$ | 0.625 | 15.88 |
| | 0.100 | 2.54 | $\frac{11}{16}$ | 0.6875 | 17.46 |
| $\frac{7}{64}$ | 0.109 4 | 2.78 | | 0.700 | 17.78 |
| | 0.110 | 2.79 | $\frac{3}{4}$ | 0.750 | 19.05 |
| | 0.120 | 3.05 | | 0.800 | 20.32 |
| $\frac{1}{8}$ | 0.125 | 3.18 | $\frac{13}{16}$ | 0.812 5 | 20.64 |
| | 0.130 | 3.30 | $\frac{7}{8}$ | 0.875 | 22.23 |
| | 0.140 | 3.56 | | 0.900 | 22.86 |
| $\frac{9}{54}$ | 0.140 6 | 3.57 | $\frac{15}{16}$ | 0.937 5 | 23.81 |
| | 0.150 | 3.81 | 1 | 1.00 | 25.4 |

| Inches | | mm |
|------------|---------|-------|
| Fractional | Decimal | |
| | 2 | 50.8 |
| | 3 | 76.2 |
| | 4 | 101.6 |
| | 5 | 127 |
| | 6 | 152 |
| | 7 | 178 |
| | 8 | 203 |
| | 9 | 229 |
| | 10 | 254 |
| | 11 | 279 |
| | 12 | 305 |
| | 13 | 330 |
| | 14 | 356 |
| | 15 | 381 |
| | 16 | 406 |
| | 17 | 432 |
| | 18 | 457 |
| | 19 | 483 |
| | 20 | 508 |
| | 21 | 533 |
| | 22 | 559 |
| | 23 | 584 |
| | 24 | 610 |
| | 25 | 635 |
| | 26 | 660 |
| | 27 | 686 |
| | 28 | 711 |
| | 29 | 737 |
| | 30 | 762 |
| | 31 | 787 |
| | 32 | 813 |
| | 33 | 838 |
| | 34 | 864 |
| | 35 | 889 |
| | 36 | 914 |

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Iron and steel

Machine tools

Mechanical engineering

Nomenclature, symbols and abbreviations

Non-ferrous metals

Packaging and containers

Paints, varnishes, paint materials and colours for paints

Personal safety equipment

Petroleum industry

Plastics

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Rubber

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