BS 6635:2015

BSI Standards Publication

# Manufacture of saddle trees made from wood – Specification

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# Contents



**Summary of pages**

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 12, an inside back cover and a back cover.

# Foreword

## Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2015. It was prepared by Subcommittee SW/136/14, *Saddle trees*, under the authority of Technical Committee SW/136, *Sports, playground and other recreational equipment*. A list of organizations represented on this committee can be obtained on request to its secretary.

## Supersession

This British Standard supersedes BS 6635:2003, which is withdrawn.

## Information about this document

This is a full revision of the standard, and introduces the following principal changes to the specified:

- quality of component metals;
- quantity, type and dimensions of rivets;
- manufacturing process; and
- load test failure value.

## Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **J.1.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

## Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

# 1 Scope

This British Standard specifies constructional and dimensional requirements for the manufacture of saddle trees made from wood. It applies to horse-riding saddles for general use (jumping, showing, hacking, dressage and similar activities) but excludes saddle trees for use with racing saddles.

This standard does not give requirements for saddle trees made from synthetic materials, which are given in BS 7875.

# 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

PD 970:2005, *Wrought steels for mechanical and allied engineering purposes – Requirements for carbon, carbon manganese and alloy hot worked or cold finished steels*

BS 1203:2001, *Hot-setting phenolic and aminoplastic wood adhesives – Classification and test method*

BS 1449-1.1:1991, *Steel plate, sheet and strip – Part 1: Carbon and carbon-manganese plate, sheet and strip – General specification*

BS 3146-1, *Specification for investment castings in metal – Part 1: Carbon and low alloy steels*.

BS 3146-2, *Specification for investment castings in metal – Part 2: Corrosion and heat resisting steels, nickel and cobalt base alloys*

BS EN 1982, *Copper and copper alloys – Ingots and castings*

BS EN 10029, *Hot-rolled steel plates 3 mm thick or above – Tolerances on dimensions and shape – Specification*

BS EN 10048, *Hot rolled narrow steel strip – Tolerances on dimensions and shape*

BS EN 10051, *Specification for continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels – Tolerances on dimensions and shape*

BS EN 10088-2, *Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN 10095, *Heat resisting steels and nickel alloys*

BS EN 10111:2008, *Continuously hot-rolled low carbon steel sheet and strip for cold forming – Technical delivery conditions*

BS EN ISO 9445-1, *Continously cold-rolled stainless steel – Tolerances on dimensions and form – Narrow strip and cut lengths*

BS EN ISO 9445-2, *Continously cold-rolled stainless steel – Tolerances on dimensions and form – Wide strip and plate/sheet*

# 3 Terms and definitions

For the purposes of this British Standard, the following term and definition applies.

**3.1 saddle tree**
framework on which a riding saddle is made

# 4 Materials

## 4.1 Wood

**4.1.1** Beech or birch veneer as specified in **4.1.2** or birch plywood as specified in **4.1.3** shall be used for the manufacture of saddle trees.

**4.1.2** Beech or birch veneer of 2 mm maximum thickness shall be used and laminated using an adhesive conforming to type WBP as specified in **4.2**.

**4.1.3** Birch plywood shall be used using adhesive conforming to type WBP as specified in **4.2**.

## 4.2 Adhesives

Adhesives shall conform to BS 1203:2001, type WBP.

## 4.3 Metal

### 4.3.1 Cap and gullet plates

**4.3.1.1** Cap and gullet plates shall be made from one of the types of steel specified in **4.3.1.2**, **4.3.1.3** or **4.3.1.4**.

**4.3.1.2** Pressed steel shall conform to BS EN 10111:2008, grade DD11.

**4.3.1.3** Forged steel shall conform to PD 970:2005, grade 070M20.

**4.3.1.4** Stainless steel shall conform to type 304 HR or BS EN 10088-2.

### 4.3.2 Stirrup bars or the component parts of the bars

**4.3.2.1** Stirrup bars, or the component parts of the bars, shall be made from one of the metals specified in **4.3.2.2**, **4.3.2.3**, **4.3.2.4** or **4.3.2.5**.

**4.3.2.2** Forged steel shall conform to PD 970:2005, grade 070M20.

**4.3.2.3** Stainless steel shall conform to either type 304 HR or BS 3146-1, BS 3146-2, BS EN 10029, BS EN 10048, BS EN 10051, BS EN 10088-2, BS EN 10095, BS EN ISO 9445-1, BS EN ISO 9445-2. Thumb bit springs shall conform to type 304 S31 temper rolled.

**4.3.2.4** Aluminium bronze shall conform to BS EN 1982.

**4.3.2.5** Stirrup bars and rivets shall be deemed to comply with this standard if they pass a vertical load test of 4.5 Kn or above.

### 4.3.3 Spring steel

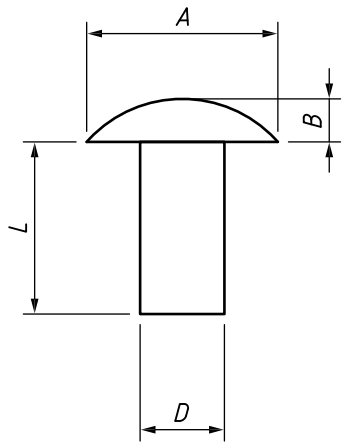
Spring steel shall be rolled to conform to either type CS 70 or CS 80 380/420 in accordance with BS 1449-1.1:1991.

### 4.3.4 Rivets

Stirrup bars shall be attached to trees using no less than 3 rivets of diameter 6.22 mm or above or 4 rivets of diameter 4.66 mm or above. Mild steel rivets conforming to the dimensions given in Figure 1 and Table 1 shall be used.

*NOTE Rivets that exceed the minimum but are in proportion to the dimensions given in Table 1 may be used.*

Figure 1 **Mild steel mushroom head rivets – proportions**




**Key**

A Diameter of head
B Depth of head
L Length of shank
D Diameter of shank

Table 1 **Mild steel solid mushroom head rivets**

| **Shank diameter** D | | | | | **Head diameter** A = 2.25 D | | **Head depth** B = 0.5 D | |
|---|---|---|---|---|---|---|---|---|
| Nominal | | | Tolerance | | | | | |
| in | | mm | in | mm | in | mm | in | mm |
| 3/16 | 0.188 | 4.76 | 0.184/0.190 | 4.66/4.81 | 0.422 | 10.72 | 0.094 | 2.38 |
| 7/32 | 0.219 | 5.56 | 0.214/0.222 | 5.43/5.63 | 0.492 | 12.50 | 0.109 | 2.78 |
| 1/4 | 0.250 | 6.35 | 0.245/0.253 | 6.22/6.43 | 0.563 | 14.29 | 0.125 | 3.18 |
| 5/16 | 0.313 | 7.94 | 0.307/0.317 | 7.79/8.04 | 0.703 | 17.86 | 0.156 | 3.97 |

*NOTE 1 Shank diameter tolerances, head diameter and depth are derived from BS 641:1951, Table 3.* [A)]
*NOTE 2 No tolerances have been specified for head diameter and depth for shank length.*
*NOTE 3 It is normal to have a radius under the head and at the periphery of the head but no dimensions specified.*
[A)]Withdrawn standard.

# 5 Angle dimensions

The angle dimensions formed at the head of the saddle tree (see Figure 2) shall be as specified in Table 2.

*NOTE 1 The manufacture of trees may have variations in the design and shape of the saddle tree head while maintaining the angle.*

*NOTE 2 Angle dimensions do not equate to width markings. Because of the variation in the shape of horses, the recognised importance of saddle fitting and the prevalence of bespoke saddles, this standard does not require trees to have a width marking.*

Figure 2 **Angle dimension for saddle trees**

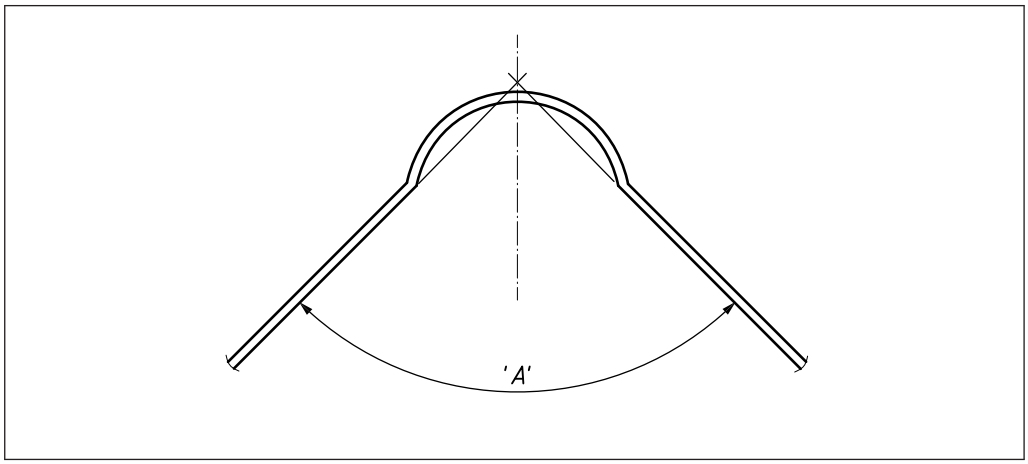



Table 2 **Angle dimensions for saddle trees**

| Fitting | Angle A |
|---|---|
| Narrow (N) | 75° to 84.9° |
| Medium (M) | 85° to 94.9° |
| Wide (W) | 95° to 104.9° |
| Extra wide (XW) | 105° and above |

# 6 Symmetry

**6.1** To ensure symmetry, measurements between datum points (as shown in Figure 3) shall be as specified in Table 3. These measurements shall be taken before the saddle maker carries out any further work.

Figure 3 **Tree datum points**

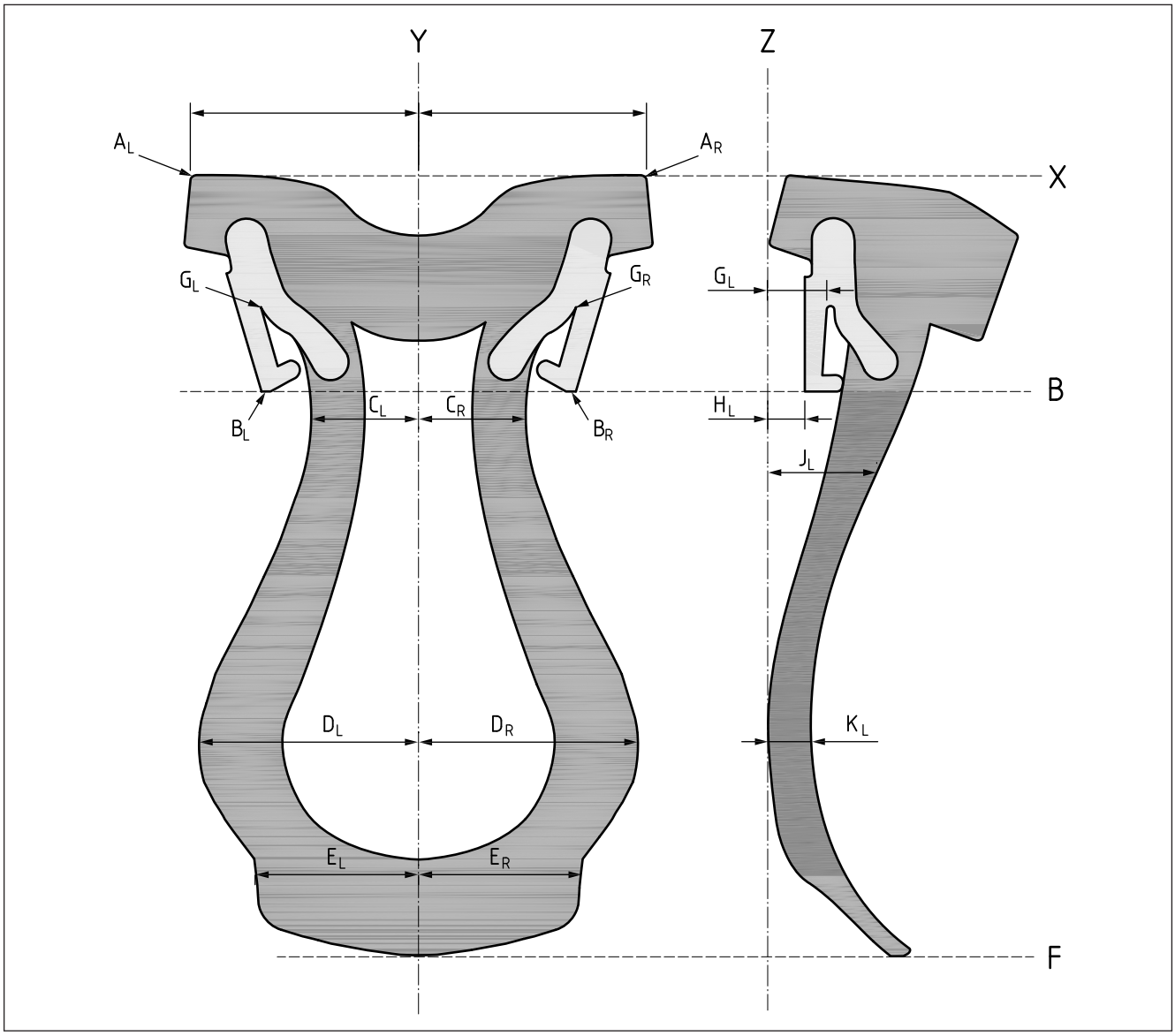


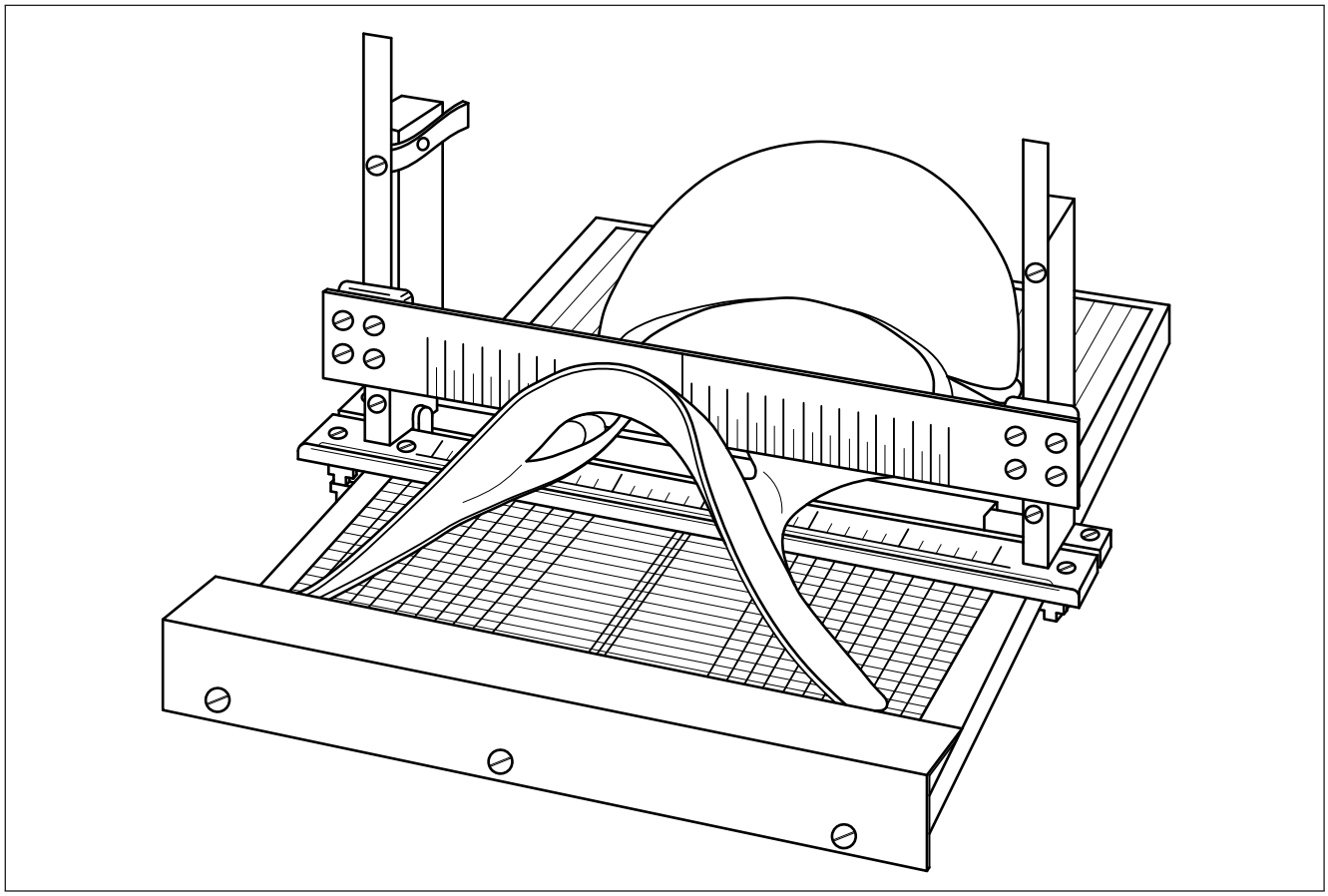

Table 3 **Measurements for the symmetry of saddle trees**

| Component symmetry | Points of reference (L = left, R = right) |
|---|---|
| Head | Y to AL = Y to AR |
| Bar position | X to BL = X to BR |
| Waist | Y to CL = Y to CR |
| Seat | Y to DL = Y to DR |
| Cantle | Y to EL = Y to ER |
| Bar pitch | Z to GL = Z to GR |
| Bar height | Z to HL = Z to HR |
| Waist height | Z to JL = Z to JR (as at C) |
| Seat rail height | Z to KL = Z to KR (as at D) |
| All measurements shall be equal within ± 2 mm. | |

**6.2** Tolerances shall be measured using any device offering sufficient accuracy (see Table 3).

*NOTE See Figure 4 for an example jig.*

Figure 4 **Example of a symmetry measuring jig**



# 7 Manufacture

**7.1** The head of the saddle tree shall consist of laminations with a total minimum thickness of 8 mm and the side bars with a minimum thickness of 7 mm.

**7.2** Gullets of pressed or stainless steel shall be lipped and not less than 2.95 mm in thickness and not less than 32 mm in width at the apex of the plate.

**7.3** The long axis of the gullet plate shall be parallel to the direction of rolling.

**7.4** Forged steel gullet plates shall be made from forging steel conforming to PD 970:2005, 070M20, with a cross-section of not less than 200 $mm^2$ at the apex of the arch.

*NOTE If forged, the gullets do not have to be lipped.*

**7.5** The number of rivets in the gullet plates between the joints of the side bars shall be not less than eight on a straight-head tree and ten on a cutback-head tree.

**7.6** Rivets shall go through both cap plate and gullet plate and shall be adequately burred over. The riveting process shall not affect the integrity of the plate. Countersunk rivets of no less than 4.66 mm diameter shall be used. The rivets shall be of mild steel rounded 90° countersunk conforming to the dimensions given in Figure 5 and Table 4.

*NOTE 1 Rivets that exceed the minimum but are in proportion to the dimensions given in Table 4 may be used.*

*NOTE 2 Any excess metal, after the rivets are burred over, should be removed to prevent injury.*

**7.7** Stirrup bars shall be attached to trees using no less than 3 rivets of diameter 6.22 mm or above or 4 rivets of diameter 4.66 mm or above.

**7.8** Cap and cantle plates shall be fitted.

**7.9** Joints at the head and cantle shall be made with an adhesive as specified in **4.2**.

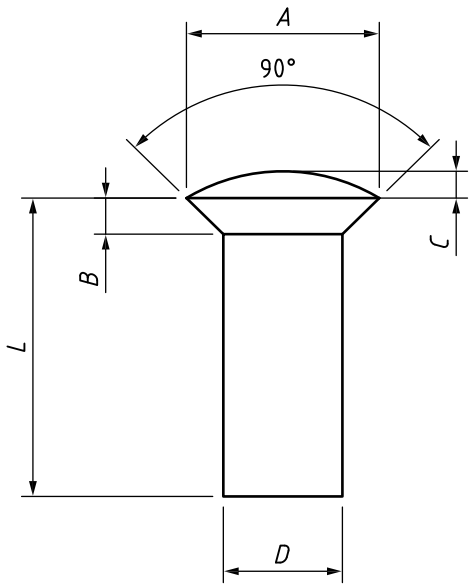
**7.10** All internal corners of gullet plates shall have minimum internal radii of 3.16 mm.

**7.11** Any finishing process shall not diminish the strength of the metal.

**7.12** To assist with moisture retention in the lamination saddle trees shall be sealed or finished.

*NOTE This can be achieved by use of scrimming or an appropriate sealant.*

Figure 5 **Mild steel rounded** 90° **countersunk head rivets – proportions**




**Key**

| | | | |
|---|---|---|---|
| A | Diameter of head | D | Diameter of shank |
| B | Depth of head | L | Length of Shank |
| C | Depth of round | | |

Table 4 **Mild steel rounded 90° countersunk head rivets**

| **Shank diameter** D | | | | | **Head diameter** A = 2.25 D | | **Head depth** B = 0.5 D | | **Depth of round** C = 0.201 D | |
|---|---|---|---|---|---|---|---|---|---|---|
| Nominal | | | Tolerance | | | | | | | |
| in | | mm | in | mm | in | mm | in | mm | in | mm |
| 3/16 | 0.188 | 4.76 | 0.184/0.190 | 4.66/4.81 | 0.309 | 7.86 | 0.061 | 1.55 | 0.038 | 0.96 |
| 7/32 | 0.563 | 5.56 | 0.214/0.222 | 5.43/5.63 | 0.361 | 9.17 | 0.071 | 1.81 | 0.044 | 1.12 |
| 1/4 | 0.625 | 6.35 | 0.245/0.253 | 6.22/6.43 | 0.413 | 10.48 | 0.081 | 2.06 | 0.050 | 1.28 |

*NOTE 1 Shank diameter tolerance is derived from withdrawn BS 641:1951, Table 3.* [A)]
*NOTE 2 No tolerances have been specified for head diameter, depth, radius and angle of countersink or shank length.*
*NOTE 3 It is normal to have a radius under the head and at the periphery of the countersink but no dimensions specified.*
[A)]Withdrawn standard.

# 8 Marking

Each saddle tree shall be marked with the following information:

a) the number and date of this British Standard, e.g. BS 6635:2015, stamped on the near side stirrup bar; and

b) the manufacturer's name, trademark or other means of identification.

# Bibliography

**Standards publications**

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 641:1951 (withdrawn), *Dimensions of small rivets for general purposes*

BS 7875, *Synthetic saddle trees – Specification*

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**BSI Group Headquarters**

389 Chiswick High Road London W4 4AL UK

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