



BS 1139: Part 2: 1982

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British Standard
Metal scaffolding

**Part 2. Specification for couplers and fittings
for use in tubular scaffolding**

Echafaudages métalliques

Partie 2. Raccords et accouplements pour échafaudages tubulaires — Spécification

Metallgerüste

Teil 2. Verbindungsstücke und Zubehör für Rohrgerüste

British Standards Institution

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Foreword

This Part of this revision of BS 1139 has been prepared under the direction of the Civil Engineering and Building Structures Standards Committee.

The requirements of this standard are not technically changed from those in sections 3 and 6 of BS 1139 : 1964. The strength requirements are now quoted in SI units, to bring the standard into line with current practice and with the codes of practice in which reference is made to fittings manufactured in accordance with BS 1139. The metric values adopted are not the precise conversion from the imperial values but for all practical purposes may be considered to be equivalent to the imperial values in BS 1139 : 1964.

Progress is being made towards the preparation of a full revision of these requirements, but it will be some time before the final text becomes available. However, as the major part of BS 1139 is now superseded by revised and separately available Parts (see below) it was felt that it would be helpful to users of BS 1139 to republish the

requirements for couplers and fittings in the new format and with all duplicated text deleted. This edition of this standard, therefore, supersedes sections three and six of BS 1139 : 1964. The publication of this standard, however, is only an interim measure, and this edition will itself be superseded when the revised requirements have been finalized.

The revision of BS 1139 : 1964 comprises the following four Parts and on publication of Part 4, BS 1139 : 1964 will be withdrawn.

Part 1 Specification for tubes for use in scaffolding

Part 2 Specification for couplers and fittings for use in tubular scaffolding

Part 3 Specification for prefabricated access and working towers

Part 4 Specification for prefabricated steel split-heads and trestles

Further Parts will be added as the need arises.

British Standard

Metal scaffolding

Part 2. Specification for couplers and fittings for use in tubular scaffolding

1. Scope

This British Standard specifies requirements for new steel and aluminium alloy couplers and fittings for use with scaffolding used as temporary structures on which persons work and which provide support for the plant and materials used in building, constructional, maintenance, repair and demolition work.

2. References

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

3. Definitions

For the purposes of this British Standard, the following definitions apply.

3.1 adjustable base plate. A base plate embodying a screw jack.

3.2 base plate. A plate for distributing the load from a standard or raker.

3.3 castor. A swivelling wheel attached to the lower end of a tubular column for the purpose of moving and supporting scaffolding.

3.4 coupler. A fitting by which a grip is applied to the external surfaces of two tubes and which thereby holds them together.

3.5 joint pin. An internal fitting for joining two tubes end to end.

3.6 putlog. A tube or other member spanning from a horizontal member bearing on the wall of a building.

3.7 putlog coupler. A coupler used for fixing a putlog or transom to a ledger.

3.8 putlog end. A specially formed end of a putlog, or a fitting for attaching to a tube, for locating the member in a joint of a wall.

3.9 reveal pin. The fitting used for tightening a tube between two opposing surfaces.

3.10 right-angle coupler. A coupler other than a putlog coupler, used for connecting tubes at right angles.

3.11 scaffolding. A temporary structure on which persons work, and which provides support for the plant and materials used in building, constructional, maintenance, repair and demolition work.

3.12 scaffold tube. Tubing which complies with BS 1139 : Part 1.

3.13 sleeve coupler. A coupler for connecting two tubes end to end.

3.14 spigot. An alternative term for a joint pin (also a part of a joint pin).

3.15 swivel coupler. A coupler for connecting two tubes at any angle where a right-angle coupler cannot be used.

3.16 toe board clip. A clip used for attaching toe boards to scaffolding members.

4. Materials

4.1 Steel fittings. Steel fittings for tubular scaffolds other than castors shall be manufactured from steel complying with BS 4360, BS 970 or BS 1449. The fittings shall be free from flaws or other defects.

Bolts and nuts shall be of steel of a quality that complies with BS 916.

4.2 Aluminium fittings. Aluminium fittings for tubular scaffolds shall be manufactured from an alloy which shall comply with clause 5 of this standard. Any steel components of such fittings shall comply with 4.1 and shall be suitably protected to prevent interaction between materials.

5. Aluminium specification

5.1 Tensile strength.

Lengths or strips cut from selected fittings shall show a 0.1 % proof stress of not less than 154 N/mm² and an elongation of not less than 8 % measured in accordance with BS 18.

NOTE. The alloys 6082-TB, 2031-TB and 2014A-TB of BS 1472 (formerly HF30-W, HF12-W and HF15-W respectively) comply with these requirements.

The 0.1 % proof stress shall not exceed 80 % of the tensile strength of the material.

5.2 Castings. Cast components formed by sand or gravity casting shall comply with LM 25TF or LM 25TB7 of BS 1490.

5.3 Hinge pins. Hinge pins in aluminium shall comply with 6082-TF of BS 1473.

6. Suitability of fittings

All fittings shall be capable of complying with this Part of this standard when used with all types of tube that comply with Part 1 of this standard, unless the supplier states that they are suitable for use only with certain stated types of tube.

7. Fittings for close-jointed tubes

Fittings which are intended for use with close-jointed tubes* and which rely upon a frictional grip on the external surface of the tube shall have a grip extending over not less than 75 % of the circumference of the tube. They shall not exert a frictional grip on the internal surface of the tube.

*Close-jointed tube is no longer included in BS 1139 : Part 1.

8. Design of fittings

All fittings shall be designed for fixing in the normal manner for service as part of a scaffold. The maximum force applied to fittings, when in use, shall not exceed 6.25 kN except where a greater load is specified by the manufacturer.

NOTE. For information on the safe working loads for specific types of coupler reference should be made to table 17 of BS 5973 : 1981.

All fittings shall be so designed that, when assembled, but before being tightened no part can become detached by accident.

9. Tests on fittings

Tests on fittings shall be carried out by fixing the fittings to be tested to tubes that comply with BS 1139 : Part 1 and which are clean, smooth and free from corrosion.

If fittings are supplied as being suitable for particular types of tube (welded, seamless, or close-jointed* steel or aluminium alloy) they shall be tested on tubes of those particular types.

For the purposes of the tests the fittings shall be properly fixed by means of the tool normally supplied for the particular type of fitting.

The fitting shall be capable of passing the necessary tests without damage which would render the fitting, or the tube or tubes with which it is tested, unserviceable for further use in scaffolding.

10. Right-angle couplers

A right angle coupler shall be capable of passing the following tests:

(a) *Test for distortion.* The coupler, connecting two tubes at right angles and suitably prevented from slipping on the vertical tube, as shown in figure 1, shall be capable of supporting, without distortion, a load of 29.8 kN applied to the horizontal tube.

(b) *Test for slip.* The coupler connecting two tubes at right angles, as shown in figure 2 shall be capable of sustaining a load of 12.4 kN applied to the horizontal tube. During this test the coupler shall not rotate through an angle exceeding 10° from the horizontal.

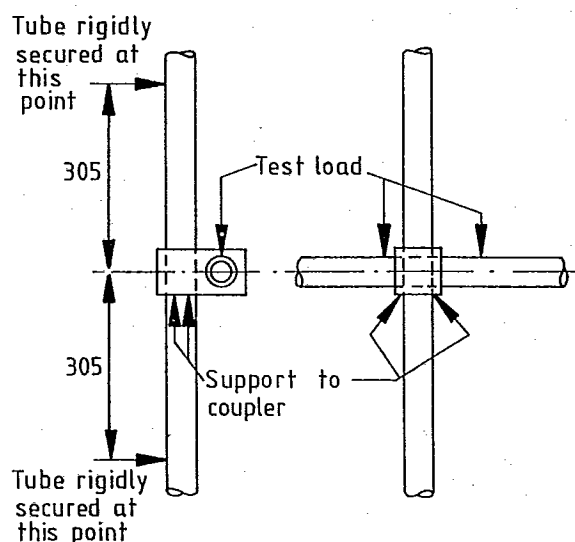
In carrying out the tests described in (a) and (b), the coupler shall be tested with each gripping surface in turn subjected to distortion and slip respectively and with the test load applied successively in reverse directions for each coupler position.

11. Swivel couplers

A swivel coupler shall be designed and constructed so that the swivelling faces are smooth and in sufficiently close contact to prevent the connecting pin being subjected to bending stresses. This requirement, however, shall not prohibit a washer of adequate bearing area being interposed between the faces of the coupler, provided it is an exact fit on the pin and the coupler is not rendered less efficient by the use of the washer. The pin connecting the two parts of a swivel coupler shall be of steel and not less than 15.9 mm in diameter.

A swivel coupler shall be capable of passing the following tests:

(a) *Test for distortion.* The coupler, connecting two tubes at 45° angle and suitably prevented from slipping



All dimensions are in millimetres.

Figure 1. Test for distortion of right-angle coupler

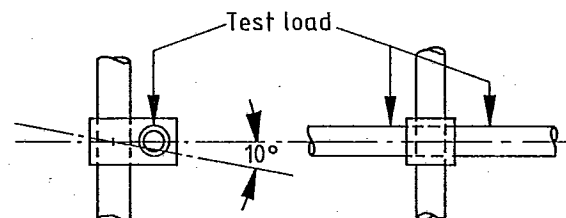


Figure 2. Test for slip of right-angle coupler

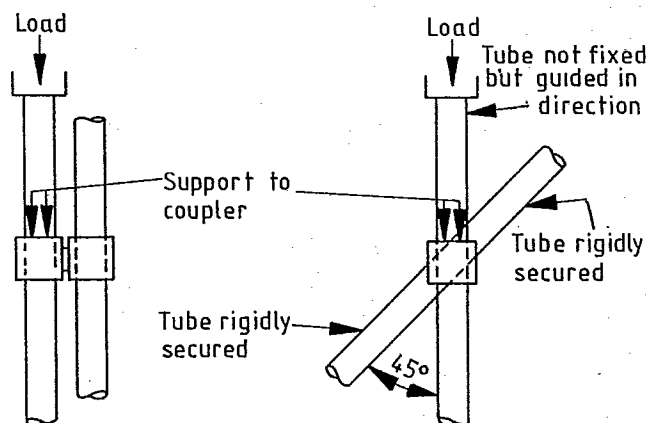


Figure 3. Test for distortion of swivel coupler

on both tubes as shown in figure 3, shall be capable of supporting, without distortion, a load of 14.9 kN.

(b) *Test for slip.* The coupler, connecting two tubes at 45° angle as shown in figure 4, shall be capable of sustaining a load of 12.4 kN applied to the horizontal tube. During this test the coupler shall not rotate through an angle greater than 10° from the horizontal.

In carrying out the tests described in (a) and (b), the coupler shall be tested with each gripping surface in turn subjected to distortion and slip respectively and with the test load applied successively in reverse directions for each coupler position.

*Close-jointed tube is no longer included in BS 1139 : Part 1.

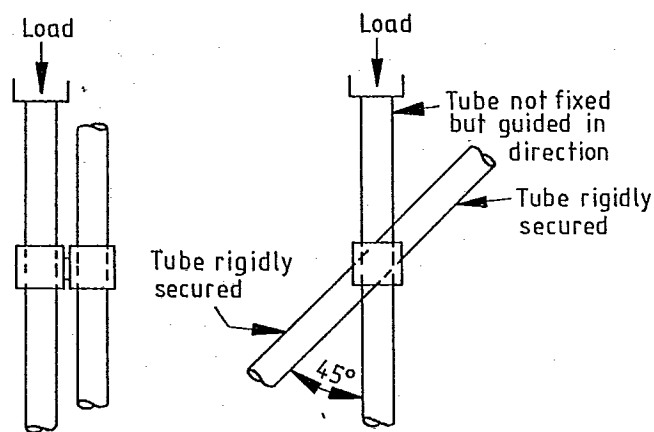


Figure 4. Test for slip of swivel coupler

12. Putlog couplers

The grip afforded by a putlog coupler shall offer adequate resistance to horizontal slip or accidental displacement of a putlog.

A putlog coupler shall be capable of passing the following test:

Test for slip. The coupler, connecting two tubes at right angles as shown in figure 5, and assembled as recommended by the manufacturer, shall be capable of sustaining a load of 1.2 kN applied to the horizontal putlog or transom.

NOTE. A putlog coupler should be of such a shape as to be readily distinguishable from a right angle coupler.

13. Joint pins

A joint pin shall be self-centring so that in both the tubes which it connects an equal length of pin shall engage with each of the tubes.

Compliance with the above requirement shall be achieved by means of an annular projection encircling the joint pin at mid-point. This projection shall provide an even bearing surface for the end of any tube which has been cut cleanly and squarely and which otherwise complies with BS 1139 : Part 1. The bearing surface shall not, under normal loading, tend to bulge or otherwise distort the end of any tube with which it is in contact.

Each spigot of a joint pin shall extend not less than 76 mm on the internal surface of any tube which complies with this standard and shall provide an effective bearing area.

Each spigot shall be capable of being expanded within a tube with which it is engaged so as to provide an adequate grip between the tube and the joint pin.

The shear strength of the joint shall not be less than 80 % of that of a steel tube complying with BS 1139 : Part 1.

NOTE. Joint pins are not intended for use in positions where they will be subject to bending stresses or axial tension.

14. Sleeve couplers

A sleeve coupler shall be self-centring when plain-ended tubes are being joined so that an equal length of the sleeve shall engage both the tubes connected by the sleeve.

It shall have, in every position, a resistance to bending at least equal to that of any tube of the types for use with which the sleeve coupler is intended to be suitable (see clause 6).

When used in tension, it shall resist, without slipping, an axial load of not less than 6.2 kN.

15. Reveal pin

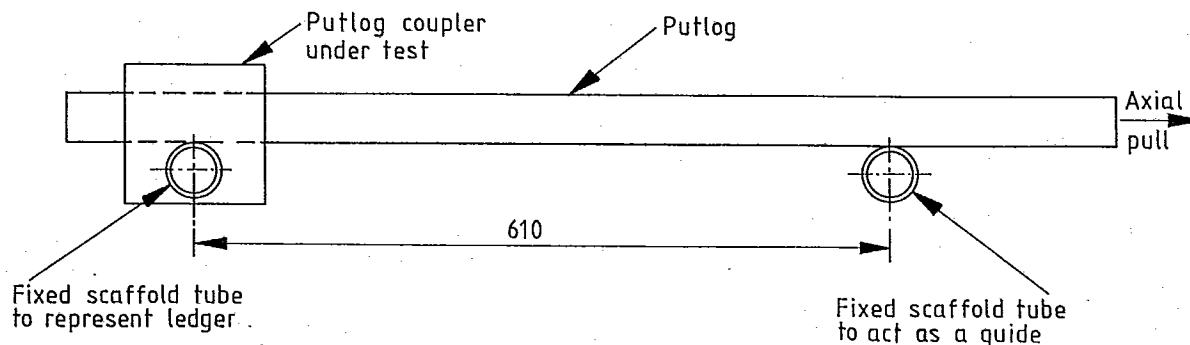
The end of the reveal pin remote from the tube shall provide a bearing surface perpendicular to and concentric with its axis and having a minimum width of 48.3 mm.

The means for varying the distance between the surface bearing against the end of a tube and the end of the reveal pin shall enable adjustments of this distance to be made readily, smoothly and with infinite variation within the limits of adjustment of the reveal pin.

The design of the adjustable portion of the reveal pin shall be such that, when under load, the adjustment cannot be altered by the action of the load or by vibration.

A reveal pin shall be capable of passing the following test:

Test for deflection and slip. A tube 1.8 mm long complying with BS 1139 : Part 1 and fitted with the reveal pin shall be placed horizontally so that it is supported solely by the frictional grip exerted upon the smooth, parallel, vertical faces of two abutments by the bearing surface of the reveal pin and the end of the tube respectively. Timber or other suitable packing material may be used against the faces of the abutments. A load of 2.4 kN shall be applied to the tube midway between the abutments and the central deflection measured. The deflection under load with the reveal pin extended to within 25 mm of its full working length shall not exceed twice the deflection under the same load with the reveal pin closed to within 25 mm of its minimum length. During the test no slip shall occur between the



The dimension is in millimetres.

Figure 5. Rig for slip tests on putlog couplers

tube or reveal pin and the abutment faces. No permanent set, distortion, or other damage shall occur which would render the tube or reveal pin unserviceable for further use in scaffolding.

16. Putlogs

A putlog shall either be constructed from tube complying with BS 1139 : Part 1 or be so designed and constructed as to provide at least equivalent resistance to bending, shear and deflection. (See also note 1 to clause 17).

A fitting, other than a putlog coupler, provided for connecting a putlog to a tube shall comply with clause 12 for putlog couplers.

17. Putlog ends

A putlog end shall have an even bearing surface at least 76 mm long and at least 50 mm wide, measured from the end of the tube.

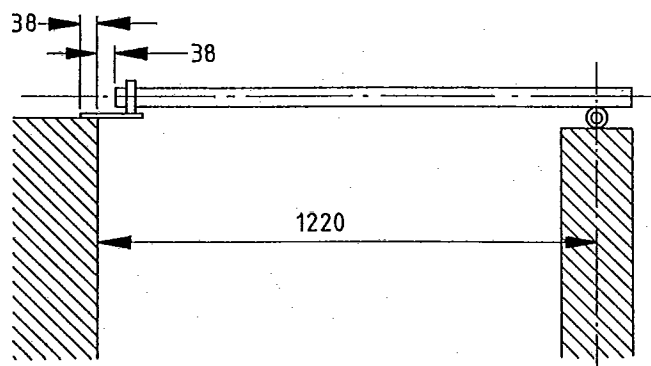
Putlog ends shall be considered to be subject to bending, bearing or shear stresses only and shall not be required to transmit axial pulls or thrusts.

Detachable putlog ends shall be provided with means of securing them to the putlog without risk of being accidentally disconnected.

A putlog end, when attached to or forming part of a putlog and supported only within 38 mm of its extremity, as shown in figure 6, shall be capable of supporting without permanent set, a maximum distributed load of 4.4 kN over a span of 1.2 m.

NOTE 1. As aluminium scaffold tube is heat-treated, heat should not be applied to them by welding, flame-cutting, etc., unless it is carried out under the controlled conditions of CP 118 since this may otherwise greatly impair the mechanical properties.

NOTE 2. Where aluminium scaffold tubes are required to be flattened at one end to form putlog ends this work should be carried out before the tubes are subjected to their final treatment. It is recommended that putlogs with flattened ends be obtained ready-made from the tube manufacturers, except where adequate heat-treatment facilities are available.



All dimensions are in millimetres.

Figure 6. Test for bending putlog end

18. Base plates

A base plate shall have a flat surface not less than 232 cm² in area, concentric with the axis of the shank, to which it shall be securely attached. The upper surface of the plate shall provide a smooth and even bearing for the end of a tube satisfying the requirements of this standard and be such as not to damage or distort the tube under load.

The shank shall be not less than 50 mm long, and shall be a loose fit to allow the insertion of the full depth of the shank inside the tube.

A base plate, if of mild steel, shall be not less than 4.75 mm thick. If of other steels they shall have a thickness sufficient to provide an equal strength. Aluminium base plates shall be not less than 6.35 mm thick.

If provided with holes they shall be 6.35 mm diameter, situated diametrically opposite each other at a distance of not less than 50 mm from the centre of the plate, and not less than 19 mm from the edge of the plate.

19. Adjustable base plates

An adjustable base plate shall satisfy the requirements of clause 18 relating to the bearing surface and clause 15 relating to the means for height adjustment.

When extended to its maximum working position the shank shall be capable of supporting a load of 59.7 kN without distortion. In applying this test the base plate shall be placed on a smooth horizontal surface and the load applied through the seating on which the scaffold tube normally rests. At the upper end the shank shall not be held in position or restrained in direction.

20. Detachable castors

Detachable castors shall be designed and constructed to provide adequate strength, rigidity and bearing surfaces for their purpose.

All castors shall be clearly marked with the safe working load they are designed to withstand. Such load shall be vertically applied on the castors when stationary on an even and level surface.

The shank or socket of all castors shall be not less than 50 mm long, provided the design allows for an adequate transfer of the load from the tube to the shank. Means shall be provided to prevent the caster unit falling out of the tube when its wheel is not under load.

The diameter of castor wheels shall be not less than 127 mm. When tyres are fitted they shall be of adequate section and securely fixed to the wheel centres.

The eccentricity of the centre line of the wheel relative to the axis of swivel shall not exceed 64 mm.

When requested by the purchaser castors shall be provided with an effective wheel brake that cannot be accidentally released.

21. Toe board clips

Toe board clips shall be suitably designed and constructed for the attachment of toe boards to tubular members and shall prevent accidental displacement of the boards. When in position they shall not project sufficiently from the surface of the board to cause a person to trip.

22. Finish

Fittings shall be supplied untreated, unless otherwise specified.

NOTE 1. For normal purposes aluminium requires no painting or other surface treatment. Care should be taken, however, to avoid prolonged contact with materials such as damp lime or wet cement, unless a suitable protective paint is applied.

NOTE 2. If fittings are stamped with a metal die the stamping should be carried out in such a manner as not to impair the efficiency of the fitting.

Publications referred to

BS 18	Methods for tensile testing of metals
BS 916	Black bolts, screws and nuts
BS 970	Wrought steels in the form of blooms, billets, bars and forgings
BS 1139	Metal scaffolding Part 1 Specification for tubes for use in scaffolding
BS 1449	Steel plate, sheet and strip
BS 1472	Wrought aluminium and aluminium alloys for general engineering purposes — forgings stock and forgings
BS 1473	Specification for wrought aluminium and aluminium alloys for general engineering purposes — rivet, bolt and screw stock
BS 1490	Specification for aluminium and aluminium alloy ingots and castings
BS 4360	Specification for weldable structural steels
BS 5973	Code of practice for access and working scaffolds and special scaffold structures in steel
CP 118	The structural use of aluminium

This British Standard, having been prepared under the direction of the Civil Engineering and Building Structures Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 September 1982.

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The following BSI references relate to the work on this standard: Committee reference CSB/46. Draft announced in *BSI News* April 1982.

Cooperating organizations

The Civil Engineering and Building Structures Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- *Aluminium Federation
- Association of Consulting Engineers
- Brick Development Association
- British Precast Concrete Federation Ltd.
- British Steel Corporation
- *British Steel Industry
- Cement and Concrete Association
- *Concrete Society Limited
- Consumer Standards Advisory Committee of BSI
- Convention of Scottish Local Authorities
- County Surveyor's Society
- *Department of the Environment (Building Research Establishment)
- Department of the Environment (Housing and Construction)
- *Department of the Environment (PSA)
- Department of the Environment (Water Engineering Division including Water Data Unit)
- Department of Transport
- *Federation of Civil Engineering Contractors
- *Health and Safety Executive
- *Institution of Civil Engineers
- *Institution of Municipal Engineers

Institution of Public Health Engineers

- *Institution of Structural Engineers
- Institution of Water Engineers and Scientists
- London Transport Executive
- Ministry of Agriculture, Fisheries and Food
- *National Federation of Building Trades Employers
- National Water Council
- Royal Institute of British Architects
- Scottish Development Department
- Timber Research and Development Association
- Trades Union Congress

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- Association of Consulting Scientists
- Confederation of British Industry
- Construction Health and Safety Group
- Construction Industry Training Board
- Electricity Supply Industry in England and Wales
- Incorporated Association of Architects and Surveyors
- National Association of Scaffolding Contractors
- Prefabricated Aluminium Scaffolding Manufacturers' Association

Amendments issued since publication

Amd. No.	Date of issue	Text affected



AMD 5533

Amendment No. 1
published and effective from 28 August 1987
to BS 1139 : Part 2 : 1982

Metal scaffolding
Part 2. Specification for couplers and fittings
for use in tubular scaffolding

Revised text

AMD 5533
August 1987

Contents

Delete the existing title against clause 5 and substitute 'Aluminium specification'.

AMD 5533
August 1987

Clause 5. Tensile strength of aluminium

Delete the existing title and substitute 'Aluminium specification'.

At the beginning of line 1 insert the new heading '5.1 Tensile strength'.

At the end of the existing text insert the following.

5.2 Castings. Cast components formed by sand or gravity casting shall comply with LM 25TF or LM 25TB7 of BS 1490.

5.3 Hinge pins. Hinge pins in aluminium shall comply with 6082-TF of BS 1473.

AMD 5533
August 1987

Publications referred to

Insert the following publications after the entry for BS 1472.

- | | |
|----------|---|
| 'BS 1473 | Specification for wrought aluminium and aluminium alloys for general engineering purposes — rivet, bolt and screw stock |
| BS 1490 | Specification for aluminium and aluminium alloy ingots and castings. |