

Specification for

Large aluminium alloy rivets ($\frac{1}{2}$ in. to 1 in. nominal diameters)

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*	Institute of Marine Engineers
Air Ministry	Institute of Petroleum
Associated Offices Technical Committee	Institution of Civil Engineers*
Association of Consulting Engineers	Institution of Gas Engineers
(Incorporated)	Institution of Heating and Ventilating
British Chemical Plant Manufacturers'	Engineers
Association	Institution of Mechanical Engineers
British Compressed Air Society	Institution of Mechanical Engineers
British Electrical and Allied Manufacturers'	(Automobile Division)
Association	Institution of Production Engineers
British Electricity Authority and Area Boards	Locomotive Manufacturers' Association
British Engineers' Association	Machine Tool Trades' Association
British Internal Combustion Engine	Ministry of Fuel and Power
Manufacturers' Association	Ministry of Labour and National Service
British Iron and Steel Federation	(Factory Department)
British Railways, The Railway Executive	Ministry of Supply
Crown Agents for the Colonies	Ministry of Transport*
D.S.I.R. — Mechanical Engineering Research	Ministry of Works
Organization	National Physical Laboratory
Engineering Equipment Users' Association	War Office
High Commission of India	

The Government departments and scientific and industrial organization 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:—

Aluminium Development Association	London County Council
British Constructional Steelwork Association	Railway Carriage & Wagon Building
British Rivet Association	Association
Institution of Structural Engineers	Individual Manufacturers of Rivets
Lloyds Register of Shipping	

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 8 May 1953

© BSI 12-1999

MEE/54/1

ISBN 0 580 34144 5

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Co-operating organizations	Inside front cover
Foreword	ii
Section 1. General	
1 Scope	1
2 Definitions	1
Section 2. Materials	
3 Materials	1
4 Head-forming test on rivet stock	2
5 Dimensions of rivet stock	2
6 Shear test on rivet stock	2
Section 3. Manufacturer of rivets	
7 Method of manufacturer	2
8 Dimensions	2
9 Shapes of rivet heads	3
10 Radius under head	3
11 Workmanship	3
12 Marking	3
Section 4. Tests on rivets	
13 Head-forming test on manufactured rivets	3
14 Shear test on manufactured rivets	4
Appendix A Method of determining ultimate shear stress of rivet stock and manufactured rivets	9
Appendix B Recommended point shapes for driven rivets	12
Figure 1A — Positions for measuring rivet shank size	3
Figure 1B — Positions for measuring rivet shank size	3
Figure 2	4
Figure 3	5
Figure 4	6
Figure 5A — flat	7
Figure 5B — rounded	7
Figure 6A — flat	8
Figure 6B — rounded	8
Figure 7 — Type A equipment — Tension type box	10
Figure 8 — Type B equipment — Compression type box	11
Figure 9 — Rivet points suitable for squeeze driving	13
Figure 10 — Rivet points suitable for hammer driving	13
Figure 11 — Dimensions of snap and rivet for forming recessed point	14
Figure 12 — Dimensions of snap and rivet for forming annular point	15
Table 1 — Dimensions of rivet shanks	2
Table 2 — Small snap head rivet	4
Table 3 — Conical head rivets	5
Table 4 — Small pan head rivets	6
Table 5 — Rounded or flat countersunk head rivets	7
Table 6 — Shallow rounded or flat countersunk head rivets	8

Foreword

This standard makes reference to the following British Standards:—

BS 1473-75, *Aluminium and aluminium alloys. Wire.*

BS 1476, *Aluminium and aluminium alloys. Bars, rods and sections.*

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee, in response to a request from the Aluminium Development Association.

It provides for large aluminium alloy rivets intended for use in the general engineering and shipbuilding industries and has been confined for the present to the range of rivet types and sizes now coming into current use.

Most of the clauses of this standard are derived from data and experience gained in the manufacture and use of cold forged rivets. Large aluminium alloy rivets are also produced regularly, however, by hot forging methods.

Hot forged rivets differ from those made by cold forging processes in that the shank is more tapered. Accordingly, it should not be expected that hot forged rivets will comply with the requirements of Clause 8 as regards dimensions at the end of the shank, as taken at measuring point “Y” (Figure 1A and Figure 1B). Nevertheless, in certain circumstances, this taper may not prove a disadvantage in any respect. Further test data are being obtained on the properties of riveted joints using hot forged rivets, and experience in their use in practice is also being accumulated. This should enable appropriate dimensional tolerances to be laid down in due course.

Two appendices have been included in this standard, one describing a method of determining ultimate shear stress of rivet stock and manufactured rivets, and the other indicating recommended point shapes for driven rivets and outlining in brief the main requirements for satisfactory driving of large aluminium rivets.

Large aluminium rivets are a recent development, and experience in their manufacture and use is rapidly increasing. For example, it may be expected that further knowledge of the characteristics of hot forged rivets and of their use will shortly be available: similarly, the methods of testing finished rivets, including the use of the shear test and possible alternatives to the head-forming test, are also being studied further.

Accordingly, arrangements are being made to review this standard in about two years’ time. Users of this edition are therefore invited to submit to the Institution any comments and suggestions they may wish to make for this revision.

Details of small aluminium rivets are given *inter alia* in BS 641 “*Dimensions of small rivets for general purposes.*”

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 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.

Section 1. General

1 Scope

This British Standard specifies the material, dimensions and head shapes of large aluminium alloy rivets of nominal sizes ranging from ½ in. to 1 in. diameters, intended for use in general engineering and shipbuilding. Two appendices have been included; one describes a method of determining ultimate shear stress of rivet stock and manufactured rivets, and the other indicates suitable point shapes for the driven rivets.

2 Definitions

For the purposes of this British Standard the following definitions shall apply:—

2.1

nominal diameter

the nominal diameter (D) of the rivet shall be that set out in Column 1 of Table 1 to Table 6

NOTE This definition is included for convenience of reference.

2.2

standard diameter

the standard diameter of the rivet shall be that set out in Column 2 of Table 1

2.3

nominal length

- i) The nominal length of a snap, conical or pan head rivet shall be the length from the under-side of the head to the extreme end of the rivet (see Figure 2, Figure 3 and Figure 4).
- ii) The nominal length of a countersunk flat head rivet shall be the overall length (see Figure 5A and Figure 6A).
- iii) The nominal length of a countersunk rounded head rivet shall be the distance from the periphery of the head to the extreme end of the rivet (see Figure 5B and Figure 6B), measured parallel to the axis of the rivet.

2.4

head

the term “head” in this standard refers only to the head on the rivet as received from the manufacturer. Thus, a pan head rivet is one with the manufactured head in the pan shape

2.5

point

the term “point” in this standard refers to the shape (pan, small pan, etc.) formed on the end of the rivet shank by the closing operation. Thus, a pan point is one formed to a pan shape in the closing operation

Section 2. Materials

3 Materials

The rivets shall be made from aluminium alloys complying with one or other of the following British Standards (but see special requirements under b):—

- a) BS 1476, “*Aluminium and aluminium alloys. Bars, rods and sections.*”

- i) Material NE4 — M *or*
- ii) Material NE5 — M *or*
- iii) Material NE6 — M *or*
- iv) Material HE10 — W *or*
- v) Material HE10 — WP

- b) BS 1473, “*Aluminium and aluminium alloys. Wire.*” Material HR13 — T.

Alloy HR13 — T shall meet the requirements of BS 1473 as regards its composition and mechanical properties only. In other respects, e.g. selection of test samples, it shall comply with BS 1476.

NOTE Symbols “M,” “W,” “WP” and “T” are defined in BS 1473.

When so specified by the rivet manufacturer, the above materials may be supplied in some other temper or condition.

4 Head-forming test on rivet stock

- a) Samples of stock for the head-forming test shall be selected in accordance with Clause 10 a) and b) of BS 1476.
- b) Specimens shall be cut from the rivet stock as manufactured, to a length and diameter equal to the full diameter of the stock. They shall be cold flattened in an axial direction until the diameter is equal to 1.6 times the original diameter, and shall not crack as a result.

5 Dimensions of rivet stock

Rivet stock shall be supplied to diameters and tolerances as agreed between rivet stock supplier and rivet manufacturer.

6 Shear test on rivet stock

- a) A shear test shall be carried out on the rivet stock and the results obtained shall be recorded. The test shall be performed in double shear. Samples of material for the shear test shall be selected in accordance with Clause 10 a) and b) of BS 1476.
This test shall be performed on equipment as prescribed in Appendix A.
- b) The minimum acceptable shear stress values of the rivet stock shall be the subject of agreement between the purchaser and the manufacturer.
- c) When required, the purchaser shall be supplied with a test certificate giving the shear stress values of the rivet stock representing his order.

NOTE The reason for specifying a shear test in this standard is to enable reliable data based on routine testing to be accumulated. When this standard is revised in approximately two years' time, these data should enable minimum acceptable shear stress values to be specified.

Section 3. Manufacture of rivets

7 Method of manufacture

The rivets shall normally be made by cold forging methods.

8 Dimensions

- a) Rivets shall be supplied to the dimensions and tolerances specified in Table 1. The permissible tolerances on the standard diameter of rivets are given in Column 3 of Table 1:—

Table 1 — Dimensions of rivet shanks^a

Nominal diameter of rivet (D)	Standard diameter of rivet	Tolerance on standard diameter
in.	in.	in.
1/2	0.500	+ 0.010 – 0
5/8	0.625	+ 0.015 – 0
3/4	0.750	+ 0.015 – 0
7/8	0.875	+ 0.015 – 0
1	1.000	+ 0.015 – 0

^a Rivets made by hot forging processes may not comply with the dimensional tolerances quoted in Column 3 at position “Y” (see Figure 1A and Figure 1B), but may be expected to comply in this respect at position “X” (see Foreword, paragraphs 3 and 4).