

Specification for

**Aluminium conductors  
and aluminium  
conductors,  
steel-reinforced —  
For overhead power  
transmission —**

**Part 2: Aluminium conductors,  
steel-reinforced**

UDC 621.315.55:669.71

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

# Co-operating organizations

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

- Aluminium Federation\*
- Institution of Production Engineers
- Association of Bronze and Brass Founders
- Institution of Structural Engineers
- Association of Consulting Engineers
- Lead Development Association
- Board of Trade
- Light Metal Founders' Association
- British Bronze and Brass Ingot Manufacturers' Association
- London Metal Exchange
- British Electrical and Allied Manufacturers' Association\*
- Magnesium industry Council
- British Lead Manufacturers' Association
- Ministry of Defence, Army Department
- British Non-ferrous Metals Federation
- Ministry of Defence, Navy Department
- British Non-ferrous Metals Federation — High Conductivity Copper Group
- National Brassfoundry Association
- British Non-ferrous Metals Research Association
- Non-ferrous Metal Stockists\*
- Copper Development Association
- Post Office\*
- Crown Agents for Overseas Governments and Administrations
- Royal Institute of British Architects
- Electric Cable Makers' Confederation\*
- Society of Motor Manufacturers and Traders Ltd.
- Institute of British Foundrymen
- Tin Research Institute
- Institute of Metals
- Zinc Development Association
- Institution of Mechanical Engineers (Automobile Division)
- Individual manufacturer
- Institution of Mining and Metallurgy

The Government department and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- British Railways Board
- Institute of iron & Steel Wire Manufacturers
- Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales
- Institute of Sheet Metal Engineering

This British Standard, having been approved by the Non-ferrous Metals Industry Standards Committee, was published under the authority of the Executive Board on 31 March 1970

© BSI 03-1999

First published, October, 1925  
First revision, January, 1930  
Second revision, March, 1934  
Third revision, December, 1956  
Fourth revision, March 1970

The following BSI references relate to the work on this standard:  
Committee reference NFE/24  
Draft for comment 68/29132

ISBN 580 05769 0

## Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
|          |      |          |
|          |      |          |
|          |      |          |
|          |      |          |
|          |      |          |

# Contents

|                                                                                                       | Page               |
|-------------------------------------------------------------------------------------------------------|--------------------|
| Co-operating organizations                                                                            | Inside front cover |
| Foreword                                                                                              | ii                 |
| 1 General                                                                                             |                    |
| 1.1 Scope                                                                                             | 1                  |
| 1.2 Definitions                                                                                       | 1                  |
| 1.3 Standards for hard-drawn aluminium wire                                                           | 1                  |
| 1.4 Standards for galvanized steel wire                                                               | 1                  |
| 2 Material                                                                                            |                    |
| 3 Dimensions and construction                                                                         |                    |
| 3.1 Standard sizes of wires                                                                           | 1                  |
| 3.2 Standard sizes of aluminium conductors, steel-reinforced                                          | 1                  |
| 3.3 Joints in wires                                                                                   | 2                  |
| 3.4 Stranding                                                                                         | 2                  |
| 3.5 Completed conductor                                                                               | 2                  |
| 4 Tests                                                                                               |                    |
| 4.1 Selection of test samples                                                                         | 3                  |
| 4.2 Place of testing                                                                                  | 3                  |
| 4.3 Tests                                                                                             | 3                  |
| 4.4 Certificate of compliance                                                                         | 3                  |
| Appendix A Notes on the calculation of Table 4                                                        | 6                  |
| Appendix B Note on modulus of elasticity and coefficient of linear expansion                          | 6                  |
| Appendix C Code names for standard aluminium conductors, steel-reinforced                             | 6                  |
| Appendix D Lay ratios and stranding constants for non-standard constructions                          | 8                  |
| Table 1 — Lay ratios for aluminium conductors, steel-reinforced                                       | 2                  |
| Table 2 — Aluminium wires used in the construction of standard aluminium conductors, steel-reinforced | 4                  |
| Table 3 — Steel wires used in the construction of standard aluminium conductors, steel-reinforced     | 4                  |
| Table 4 — Standard aluminium conductors, steel-reinforced                                             | 5                  |
| Table 5 — Stranding constants                                                                         | 6                  |

## Foreword

This British Standard was first published as BS 215-2 in 1956; previously the requirements for steel-cored aluminium conductors were included together with those for aluminium stranded conductors now covered by BS 215-1 in the one publication.

In this revision all dimensions are included in metric units and the requirements of the standard have been amended to conform substantially with those of I.E.C. Publication 209, "Aluminium conductors, steel-reinforced".

As a result there are a number of changes in the specification. Throughout the term "aluminium conductor, steel-reinforced", has been adopted in preference to the earlier "steel-cored aluminium conductor" as the former is now in more general use. Lay ratio is now defined as the ratio of the axial length of a complete turn of the helix to the external diameter of the helix instead of to the mean diameter of the helix as hitherto. The basis for calculating conductor breaking loads has also been amended, the strength of the steel component now being based on the stress at 1 % elongation of the steel wires, which has been made a requirement for the steel wires.

Values of the moduli of elasticity quoted in an Appendix are practical values obtained by test, which are considered to be of more practical significance than the calculated values formerly quoted.

In the course of metrication the sizes of standard conductors, of which the number has been restricted, have been maintained unchanged except for negligible differences due to the expression of wire diameters in millimetres. The sizes of conductors are designated by nominal aluminium areas ( $\text{mm}^2$ ) in place of the formerly used nominal copper areas ( $\text{in}^2$ ). For convenience the nominal aluminium areas have been taken as being numerically 1 000 times the previous nominal copper areas.

At the present time there is an increasing use of conductors of constructions other than those covered in this standard. To facilitate standardization of these constructions lay ratio limits and the appropriate stranding factors are included in an appendix.

Detailed requirements for aluminium and steel wires are not included in this standard but are specified in BS 2627<sup>1)</sup> and BS 4565<sup>2)</sup> respectively.

All stresses are quoted in terms of the hectobar ( $\text{hbar}$ )<sup>3)</sup>.

Other British Standards dealing with aluminium conductors for overhead lines are listed below:

BS 215, *Aluminium conductors and aluminium conductors, steel-reinforced for overhead power transmission.*

BS 215-1, *Aluminium stranded conductors.*

BS 3242, *Aluminium alloy stranded conductors for overhead power transmission.*

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 5 000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook. The BS Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 205, *Glossary of terms used in electrical engineering.*

<sup>1)</sup> BS 2627, "Wrought aluminium for electrical purposes. Wire".

<sup>2)</sup> BS 4565, "Galvanized steel wire for aluminium conductors, steel-reinforced".

<sup>3)</sup> 1 hbar = 10 MN/m<sup>2</sup> = 10 N/mm<sup>2</sup>.

BS 2627, *Wrought aluminium for electrical purposes. Wire.*

BS 4565, *Galvanized steel wire for aluminium conductors, steel-reinforced.*

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 8, 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.