

Method for specifying

Electroplated coatings of gold and gold alloys —

Part 1: Gold and gold alloys for
engineering purposes

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- British Coal Corporation
- British Jewellers' Association
- British Metal Finishing Suppliers' Association
- British Telecommunications plc
- Cutlery and Silverware Association
- Electronic Engineering Association
- Institute of Metal Finishing
- Institution of Corrosion Science and Technology
- Joint Committee of Assay Offices of Great Britain
- Metal Finishing Association
- Ministry of Defence
- National Association of Goldsmiths of Great Britain and Ireland
- Telecommunication Engineering and Manufacturing Association (TEMA)

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Foreword

This Part of BS 4292 has been prepared under the direction of the Surface Coatings (other than Paints) Standards Policy Committee. It is based on ISO 4523 "*Electrodeposited coatings of gold and gold alloys for engineering purposes*", which was prepared with the active participation and approval of the United Kingdom by Subcommittee 3, Electrodeposited coatings and related finishes, of Technical Committee 107, Metallic and other inorganic coatings, of the International Organization for Standardization (ISO).

BS 4292 was first published in 1968. This revision differs from the previous edition in that it has been drafted as a method for specifying requirements for electroplated gold and gold alloy coatings, i.e. it is based on requirements to be agreed between the interested parties. It is not intended to replace the requirements specified in British Standards for particular articles. It brings the technical content up to date and into line with that of ISO 4523, and also differs from the previous edition in that coatings for engineering and for decorative purposes are dealt with in separate Parts. It no longer describes methods of test, previously included in appendices, which are now published separately together with additional tests as BS 6670-1 to BS 6670-6. This Part of BS 4292 together with Part 2, which covers coatings of gold and gold alloys for decorative and protective purposes and is published simultaneously, supersede BS 4292:1968, which is withdrawn.

As this standard is based on requirements to be agreed between the interested parties, it is not appropriate for any claim to be made that a coating complies with BS 4292-1.

This Part of BS 4292 describes a method for specifying electroplated coatings of gold, including gold alloys, for electrical, electronic and other engineering purposes. Engineering purposes are those for which the coating has to fulfil primarily non-decorative functional tasks, while decorative purposes are those for which the appearance of the finished article is of prime importance, although protection against corrosion may be a requirement in both cases.

Gold coatings are used in engineering applications for their corrosion and tarnish resistance, solderability, wear resistance, bondability, low and stable electrical contact resistance and infra-red reflectivity. Attention is drawn to the fact that coatings produced from cyanide-free electrolytes based on complex sulphite ions, and coatings with hardnesses less than 90 HK 0.025 produced from cyanide electrolytes, show a pronounced tendency to cold-weld or gall. The use of such deposits on both surfaces forming mating connections or sliding contacts should therefore be avoided. Gold coatings containing less than 99.0 % by mass of gold can cause electrical resistance problems in high-reliability low electrical impedance and low voltage static contacts.

No distinction is made in this Part of BS 4292 between gold and gold alloy coatings, but where gold alloys are to be specified they contain a minimum of 58.5 % pure gold and, in the case of multilayer coatings, a minimum of 58.5 % pure gold in each layer.

Attention is drawn to the expression in certain contexts of gold contents in terms of parts per thousand (by mass), also known as "thousandths" (millièmes) or "fineness". In this standard, percentages by mass to one decimal place are used.

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 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.

1 Scope

This Part of BS 4292 describes a method for specifying requirements for electrodeposited coatings (single-layer, double-layer or multilayer) of gold and its alloys on metallic and non-metallic materials for electrical, electronic and other engineering purposes.

This standard is not applicable to:

- a) coatings on screw threads;
- b) coatings applied on sheet or strip in the unfabricated form;
- c) gold alloy coatings containing less than 58.5 % by mass of pure gold; or
- d) coatings containing less than 1 mg of gold per square centimetre of surface area.

In the case of double-layer and multilayer coatings, the thickness requirements apply to the total gold coating, but the requirements for gold content apply to each layer (see 7.1).

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

2 Definitions

For the purposes of this Part of BS 4292, the definitions given in BS 5411-1 apply together with the following.

2.1

significant surface

the part of the article covered or to be covered by the coating and for which the coating is essential for serviceability and/or appearance

2.2

gold or gold alloy coating

an electrodeposited coating of gold or gold alloy containing at least 1 mg of gold per square centimetre of surface area and, in addition, a pure gold content not less than 58.5 % by mass

NOTE The minimum thickness of a pure gold coating satisfying this requirement is 0.5 μm . To meet this minimum mass per unit area, single-layer gold alloy coatings will be necessarily thicker than 0.5 μm . This minimum thickness applies only to gold electrodeposits of greater than 98 % gold content by mass.

2.3

double-layer gold or gold alloy coating

a gold or gold alloy coating consisting of two discrete layers of differing gold content, both of which have a gold content not less than 58.5 % by mass with a combined minimum mass of 1 mg of gold per square centimetre of surface area (see 7.1)

2.4

multilayer gold or gold alloy coating

a gold or gold alloy coating consisting of more than two discrete layers of differing gold content, each of which has a gold content not less than 58.5 % by mass and which together give a total minimum mass of 1 mg of gold per square centimetre of surface area (see 7.1)

3 Information to be supplied by the purchaser to the electroplater

NOTE A summary of clause references pertaining to this information is given in Table 1.

3.1 Essential information

The information listed in a) to f) shall be supplied by the purchaser to the electroplater.

- a) The number of this British Standard, i.e. BS 4292-1.
- b) A detailed indication of the significant surface, e.g. by drawings or by the provision of suitably marked samples and, in addition, the relevant details if the requirements for the finish differ for various parts of the significant surface (see 7.2).
- c) The classification code of the coating required (see clause 5) and the method to be used to determine the gold coating thickness as agreed between the purchaser and the electroplater (see 7.3).

NOTE The required gold coating thickness is contained within the coating classification code.

- d) The type (bright, matt, etc.) and colour of the surface finish required indicated, for example, by the provision of a preliminary sample having the required colour and finish supplied by the electroplater for approval by the purchaser (see 7.2).

NOTE The final surface finish will be dependent on the initial surface roughness of the basis material (see clause 4).

- e) The method(s) of the test for adhesion to be employed (see 7.6).
- f) The sampling procedure, selected from BS 6001 or BS 6041, and the sampling and acceptable quality levels (AQLs) required.

NOTE This Part of BS 4292 does not specify sampling or AQLs.

3.2 Additional information

The additional information listed in a) to o), as applicable, shall be supplied by the purchaser to the electroplater, if necessary in consultation with the electroplater.

- a) The minimum gold content of the coating and the method to be used to determine the gold content as agreed between the purchaser and the electroplater (see 7.5).