British Standard

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BRITISH STANDARD

BS 4479-1: 1990

Design of articles that are to be coated —

Part 1: General recommendations

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Surface Coatings (other than Paints) Standards Policy Committee (SRC/-) to Technical Committee SRC/10, upon which the following bodies were represented:

British Anodising Association
Institute of Metal Finishing
Institute of Sheet Metal Engineering
Institute of Vitreous Enamellers
International Tin Research Institute
Metal Finishing Association
Welding Institute
Zinc Development Association

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Foreword

This Part of BS 4479 has been prepared under the direction of the Surface Coatings (other than Paints) Standards Policy Committee and is based on a draft prepared by the Institute of Metal Finishing. The BSI Technical Committee acknowledges the contribution to this revision by the Institute[1)] and by the Committee for the Promotion of Electroplating. This Part of BS 4479 is one of a series of Parts which together form a revision of BS 4479:1969. On publication of all the Parts, BS 4479:1969 will be withdrawn. This revision of BS 4479 comprises the following Parts:

— *Part 1: General recommendations;*

— *Part 2: Recommendations for electroplated and autocatalytic coatings;*

— *Part 3: Recommendations for conversion coatings;*

— *Part 4: Recommendations for paint coatings and varnish coatings;*

— *Part 5: Recommendations for anodic oxidation coatings;*

— *Part 6: Recommendations for hot-dip metal coatings;*

— *Part 7: Recommendations for thermally sprayed coatings;*

— *Part 8: Recommendations for vitreous enamel coatings;*

— *Part 9: Recommendations for low pressure and vacuum deposited coatings.*

BS 4479 is directed towards helping to maximize the benefit obtained from coating processes. There is a wide variety of coating processes, developed and established industrially, intended to enhance or transform the surfaces of manufactured articles. However, time and money are often wasted because the design of many articles is unsuitable for the coating process to be applied. Coating is only one part of the manufacturing process and should not be ignored, or viewed in isolation, when considering the overall costs and quality.

This revision of BS 4479 has been undertaken to extend the range of coating processes covered. It is not intended to cover every conceivable design detail, type of article or service condition. Adherence to the general principles described will, however, greatly assist in the achievement of the desired results. In any case of doubt or difficulty, specialist advice in the particular type of process being considered should be sought.

This Part of BS 4479 is not a specification and should not be used as such. The recommendations are intended to provide guidance towards good practice.

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 and 2, 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)] Institute of Metal Finishing.

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1 Scope

This Part of BS 4479 gives general recommendations to assist in the design of articles that are to be subsequently coated.

Detailed recommendations appropriate to specific coatings are covered in Parts 2 to 9 of this standard. Appendix A gives a selected list of British Standards relating to processes covered by BS 4479.

2 Definitions

For the purposes of this Part of BS 4479, the following definitions apply.

2.1
electroplated coating

a coating obtained by electrodeposition for the purpose of securing an adherent metallic surface with properties or dimensions different from those of the basis material

2.2
conversion coating

a coating produced by means of a conversion treatment (see **2.3**)

2.3
conversion treatment

a chemical or electrochemical process of producing a coating (conversion coating) consisting of a compound of the surface metal

2.4
anodic oxidation coating

electrolytic oxidation process in which the surface layer of a metal is converted to an oxide coating having protective, decorative or functional properties

NOTE This is widely applied to aluminium and its alloys, but also is applied to titanium, magnesium and zinc.

2.5
hot-dip metal coating

a coating obtained by dipping the workpiece into a bath of molten metal

2.6
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

3 General recommendations

There is a great need to take the characteristics of the possible finishing processes into account at an early design stage and to regard finishing as an essential part of the production process rather than as an incidental necessity after production. A design that considers essential features of the finishing process can effectively reduce the time and trouble and hence the cost of producing a good finish. Finishing processes often have a higher labour content than has work at other stages of production and, consequently, savings in material and fabrication costs may well be dissipated by an increase in the cost of finishing.

Early consideration of the product requirements and reference to the appropriate department or contractor undertaking the finishing should enable designers to ensure that products can be satisfactorily finished with serviceable coatings without any compromise of other design objectives. Appendix A lists those British Standards relating to processes covered in the various Parts of this standard.

The need for consultation and cooperation with those expert in the particular coating process is strongly emphasized. It should be appreciated that even when a finish is applied for “decoration” it should also be “protective”.

Recommendations concerning each type of coating process are dealt with in the relevant Parts of this British Standard, but the following common considerations apply to all processes, although their importance will vary according to the particular process.

a) Good quality basis metal and sound construction of the article should be used; the coating should not be relied upon to cover up flaws.

b) Sharp edges and corners, deep recesses and blind holes should be avoided.

c) Where it is necessary to use dissimilar metals requiring different methods of treatment as parts of an article, they should, if possible, be finished before assembly.

d) Crevices in parts or assemblies should be avoided wherever possible in order to minimize the seepage of processing chemicals from rolled, rivetted, spot welded, or similar joints, which can lead to subsequent corrosion or appearance problems in storage or service.

e) Ideally, clean smooth lines should be aimed for in the design of parts in order that uniform coatings may be obtained, and so that corrosive agents cannot readily accumulate in crevices, pockets, folds, etc.

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f) Some processes, particularly decorative electroplating or anodizing may require articles to be polished before carrying out the finishing operations. Such articles should be so designed that all significant surfaces may be readily treated by ordinary polishing wheels or belts. Blind holes, recesses and joint crevices where polishing compounds and metal debris can lodge should be avoided where possible. Sharp edges and protrusions will also present a hazard during the polishing operation, and may result in a high wear rate of mops, wheels and belts and, in some cases, distortion of the object due to the drag of the mop, wheel or belt. In the case of mass polishing by barrel, vibrators or high-G machines, the same recommendations apply and, additionally, the articles should be designed to withstand the possible effects of bulk processing.

Consultation at an early stage between designer, production engineer and metal finishing specialist cannot be too strongly advocated.

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Appendix A British Standards relating to processes covered by BS 4479

This list of British Standards is given for information and is not intended to be exhaustive. Those standards referred to in each Part of BS 4479 are listed under "Publications referred to" in the appropriate Parts.

BS 729, *Specification for hot dip galvanized coatings on iron and steel articles.*

BS 1224, *Specification for electroplated coatings of nickel and chromium.*

BS 1615, *Method for specifying anodic oxidation coatings on aluminium and its alloys.*

BS 1706, *Method for specifying electroplated coatings of zinc and cadmium on iron and steel.*

BS 1872, *Specification for electroplated coatings of tin.*

BS 2569, *Specification for sprayed metal coatings.*

BS 2569-1, *Protection of iron and steel by aluminium and zinc against atmospheric corrosion.*

BS 2569-2, *Protection of iron and steel against corrosion and oxidation at elevated temperatures.*

BS 2816, *Method for specifying electroplated coatings of silver and silver alloys for engineering purposes.*

BS 3189, *Specification for phosphate treatment of iron and steel.*

BS 3382, *Specification for electroplated coatings on threaded components.*

BS 3597, *Specification for electroplated coatings of 65/35 tin/nickel alloy.*

BS 3788, *Specification for tin coated finish on culinary utensils.*

BS 3987, *Specification for anodic oxide coatings on wrought aluminium for external architectural applications.*

BS 4290, *Method for specifying electroplated coatings of silver and silver alloys for decorative and protective purposes.*

BS 4292, *Method for specifying electroplated coatings of gold and gold alloys.*

BS 4641, *Method for specifying electroplated coatings of chromium for engineering purposes.*

BS 4758, *Method for specifying electroplated coatings of nickel for engineering purposes.*

BS 5493, *Code of practice for protective coating of iron and steel structures against corrosion.*

BS 5599, *Specification for hard anodic oxide coatings on aluminium for engineering purposes.*

BS 6137, *Specification for electroplated coatings of tin/lead alloys.*

BS 6338, *Specification for chromate conversion coatings on electroplated zinc and cadmium coatings.*

CP 3012, *Code of practice for cleaning and preparation of metal surfaces.*

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