

## 3.1 BS 729 – Hot Dip Galvanized Coatings on Iron and Steel Articles

### Introduction

This Datasheet provides information on the content, interpretation and use of the British Standard for Hot Dip Galvanized Coatings on Iron and Steel Articles – BS 729: 1971 (1986). This is the basic standard relating to the provision of batch hot dip galvanized steel in the UK. All members of Galvanizers Association are required to supply to this standard.

In addition, many members are accredited to BS 5750/ISO 9000/EN 29000 series of Quality Assurance standards, with more intending to do so.

A European standard for hot dip galvanizing is currently being developed. This standard will be known as BS EN 21461 when it is completed, and will replace BS 729 in accordance with the European standards development policy.

Whilst individual product specifications or project tender documents may make alternative and/or additional requirements on the supply of the galvanized components, the basic standard provides a reference for those aspects of the component supply which may not be clear in the contract agreements.

This is particularly relevant in the case of large civil engineering projects.

In order to help cross reference between this Datasheet and the standard, the same subdivisions have been used to introduce a section of information.

### 1. Scope

BS 729: 1971 (1986) specifies the requirements for hot dip galvanized coatings on steel articles galvanized after fabrication and on grey or malleable iron components after casting.

Requirements relating to the galvanized coating produced on the components focus largely on the continuity of the coating and the achievement of a minimum average coating weight per unit area.

This standard does not apply to other hot dip galvanizing processes such as those used to produce continuous strip, wire and tube, which are covered by their own standards.

### 2. Definition

A Hot Dip Galvanized coating is defined as "A coating of zinc, and zinc-iron alloy layers, obtained by dipping prepared iron or steel articles in molten zinc". Further details of the process of hot dip galvanizing can be found in Datasheet 1.2 earlier in this series. See also Figure 1.

This is a very important definition which should be borne in mind when specifying, as there are other zinc coating systems which are often confused with hot dip galvanizing, which exhibit lower levels of corrosion protection in service. Product standards will take precedence over this basic standard, defining their own individual requirements, however in their absence this general standard will apply.

When specifying, ask for "Hot Dip Galvanizing to BS 729: 1971 (1986)" and state in the specification "To be galvanized by a member of Galvanizers Association, or your national Association".

### 3. Information to be supplied by the purchaser to the galvanizer

To obtain best results from the galvanizing operation, where appropriate, the following information is required from the purchaser;

- 1 Standard for supply, e.g. BS 729: 1971 (1986)
- 2 Nature of material to be galvanized
- 3 Method of sampling to be adopted
- 4 Details of required post-treatments
- 5 Details of special requirements

This will help the galvanizer to determine the most efficient way of providing the standard of supply required, and highlight any improvements to the condition of the incoming stock of material which may be necessary to achieve good results.

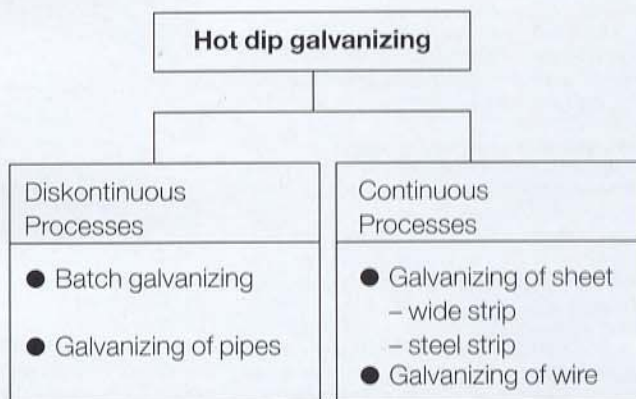


Fig. 1: The different types of hot dip galvanizing processes.



Fig. 2: The hot dip galvanizing of mechanical fasteners, e.g. nuts and bolts, falls within the scope of this standard.

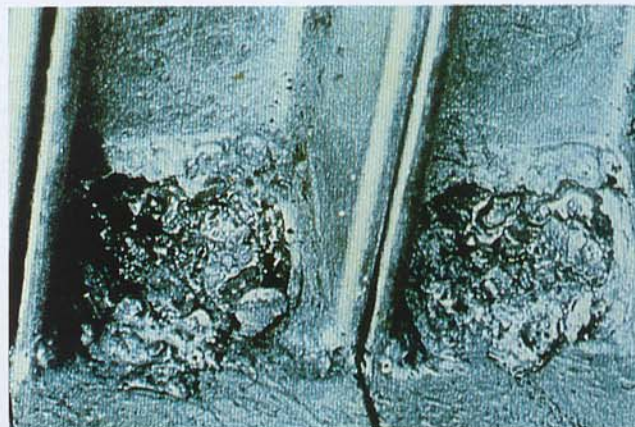


Fig. 3: Pooling of zinc caused by inadequate drainage.

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### 4. Basis metal

To achieve the best possible corrosion protection performance from the hot dip galvanized article, it is necessary to take into account, at an early stage, several fundamental factors which influence the quality of the coated product.

To produce a sound galvanized coating, to the supply standard, it is necessary for the pretreatment fluids to reach all parts of the component or structure. Equally, it is necessary for the zinc to gain access to, and drainage from, all parts of the component or structure. Similarly, for reasons of safety, adequate release of entrapped air and pretreatment solution is required to avoid explosions upon immersion of the component in the molten zinc. Adequate drainage also assists economic use of the zinc in the bath (see Figure 3).

The standard requires that holes for adequate filling, venting and draining be created in the component (in consultation with the galvanizer), unless the purchaser gives written permission for the galvanizer to carry out the necessary work. Further details of these component design aspects can be found in Data-sheets 2.3 to 2.6.

In the introduction to the standard it is pointed out that mild and low alloy steels are particularly suitable for galvanizing. In cases where the purchaser is unsure that the material is suitable for galvanizing, the galvanizer should be contacted. A test sample should be produced on agreement.

The introduction also points out that the surfaces to be galvanized should be free from contamination (paint, oil, grease, welding slag for example) that will not be removed by the



Fig. 5: Paint markings showing through the galvanized coating.

pretreatment process, e.g. chemical cleaning (see Figure 5 and Datasheet 2.1). It advises that water soluble paints should be used for identification purposes during fabrication. Any permanent identification markings should be deeply punched or embossed.

The surface characteristics of the pretreated steel or iron will have an effect on the quality of galvanized coating achieved. The introduction continues by giving examples of such surface defects and artifacts often found on components (see Figure 6 and Datasheet 2.1). In particular, laps, seams and rolled in impurities can affect the appearance of the coating formed.

Information is provided regarding the effects of surface roughness on the thickness of galvanized coating achieved. This effect can be turned to advantage by deliberately roughening the surface of a component prior to galvanizing to generate a thicker, and therefore longer lasting, coating. In practice, the maximum uplift in coating weight achieved by this technique is around 50 % compared to a coating formed on a smooth component of similar geometry and surface chemical reactivity.

The effects of steel surface chemistry are illustrated, with particular reference to the reaction between silicon in the steel and the molten zinc.

Changes to the mechanical properties of components galvanized are usually very slight and of no significance to the performance of the component during its design life. Indeed, galvanizing the component prevents subsequent damage caused by aggressive corrosion environments and considerably extend its useful life.

The standard points out that the responsibility for changes in the mechanical properties of the component due to galvanizing, resides



6. Old and new steel welded together and then galvanized. The corrosion pits are still visible.

with the purchaser, unless of course, the changes can be shown to be due to faulty processing.

Continued in Data Sheet 3.2

Fig. 4: The yield limit of the steel is changed by the increase in temperature in the zinc bath.

