

## 2.7 Using Pre-Galvanized Materials.

### 1. General

Components which are hot dip galvanized include fabricated steel structures, prefabricated groups of components and individually completed components. However, certain structures may be very large or particularly frail and therefore unsuitable for galvanizing in pre-fabricated sections. In these cases it makes sense to fabricate such structures using galvanized steel. In some applications, for instance where pipes are to be used in the fabrication, it is normal practice to use pre-galvanized materials. Hot dip galvanized hollow sections are available in round or square sections and in a multitude of different sizes and thicknesses, usually in lengths of six or twelve metres (Fig. 1). However, hot dip galvanizing is not only used for pre-galvanized tubular sections. It is also used to protect a large selection of sizes of hot and cold rolled steel sections.

Pre-galvanized materials are usually coated with zinc in automated to semi-automated plants which are efficient and cost effective. The high quality and uniformity of the zinc coating can be even further improved by blowing compressed air onto the sections as they are taken out of the zinc bath.

Pre-galvanized materials can be used in exactly the same way as ungalvanized steel sections. They generally come in lengths which can be joined together by suitable means such as welding, screwed fasteners, rivets, soldering or adhesives. Pin connections are also used but they require rather more work.

When subsequent fabrication work is carried out the zinc coating may often be damaged to some extent. Whether repair is needed, and the extent of the repair to the galvanized coating, will vary according to individual cases.

### 2. Requirements

"A chain is only as strong as its weakest link." This old saying is equally true when considering the corrosion protection of a fabrication using pre-galvanized material. It is only comparable with fully hot dip galvanized structures if:

- The thickness of the zinc coating is in accordance with the values laid down in BS 729: 1971 (1986) Appendix D.
- The damage to the zinc coating (especially at weld point) is properly repaired in accordance with BS 729: 1971 (1986).
- The repaired area should in general not be more than 0.5% of the surface area of the components. The largest area of repair should not exceed 100 mm<sup>2</sup>.

Careful expert repair of the damaged sites involves small additional costs but the use of pre-galvanized materials has the advantage that internal stresses which have to some extent been relieved cannot cause distortion during the galvanizing process. Expert repair of areas where galvanizing is missing requires careful cleaning or removal of surface corro-

sion products from the damaged area. Standard methods of cleaning are normally acceptable but, if angle grinders or similar hand tools are used, care should be exercised not to damage the sound galvanized coating.

Small areas of damage may be renovated either by the use of low melting point zinc alloy repair rods or powders made specifically for this purpose, or by the use of at least two coats of good quality zinc rich paint (see BS 4652 "Metallic zinc rich priming paints" for further information, or contact Galvanizers Association).

The thickness of the repair coating should be at least equal in thickness to the galvanized layer. As a general guideline zinc-rich paints should have at least 85% zinc in the pigments and the repair should be limited to the area of damage with a minimum of overlap on the area of sound coating. Unnecessarily large surface areas of repair are to be avoided (Fig. 2).



**Fig. 1: Checking delivery of hollow section pre-galvanized material.**



**Fig. 2: Repairing damage using zinc-rich paints (only small areas of damage to be repaired in this way).**



## 2.7 Using Pre-Galvanized Materials.

### 3. Treatment

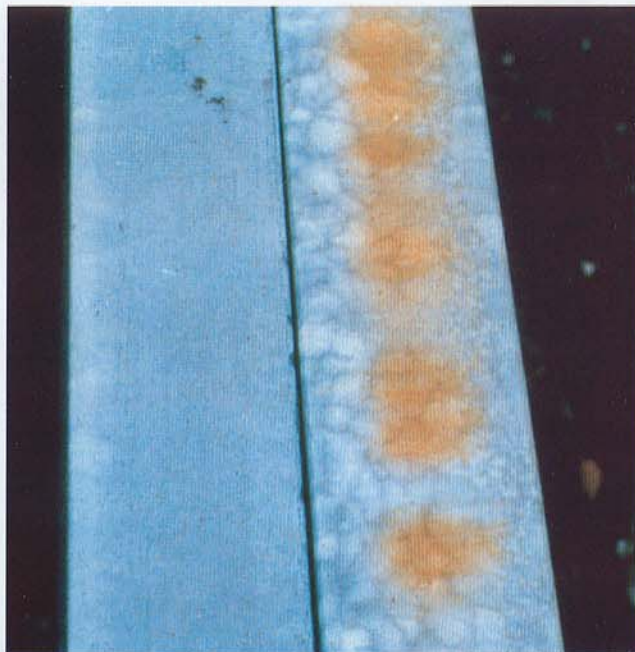
Pre-galvanized materials must be carefully stored until ready for use in order to prevent wet storage staining. If materials are stored in bundles or parcels in the open air there is always the danger that moisture can collect between the sections. Even with steel which has been freshly galvanized there can be strong effects due to moisture entrapment and unfavorable atmospheric conditions (ie high humidity, damp conditions) producing wet storage staining.

The danger of wet storage stain forming can be prevented by dry storage of the steel sections and, if possible, allowing air to circulate between the sections through the use of layers of wood dunnage. Simply covering bundles of material stored outside with plastic sheeting or tarpaulin will not avoid wet storage stain because heavy condensation can build up under the covers.

When carrying out subsequent operations such as sawing, drilling or separating of pre-galvanized sections, care must be taken that iron particles do not build up on the galvanized surface. Brown staining occurs if iron particles are deposited on the galvanized surface when moisture is also present. The effect of the moisture is to discolour the area around the iron particles with a deep reddish brown stain (Fig. 3). Swarf from drilling or sawing operations, or the remains of welding electrodes, can be removed or brushed off relatively easily. However, particles which have burned on, which may happen when the extremely hot sparks from grinding operations get on to hot dip galvanized surfaces, are a more serious problem. These hot iron particles burn deep into the zinc coating and cannot be easily removed.

Pre-galvanized materials can be used in the same way as ungalvanized steel sections but care must be taken if the materials have to be bent, edges rounded off or pressed. In such cases there may be damage to the zinc coating (Fig. 4). Small cracks or local flaking may also result.

The many applications for pre-galvanized materials where larger fabrications cannot be used can have advantages. Additional work and repair of damaged areas on the zinc coating requires a degree of additional expenditure. Which type of hot dip galvanized material should be used must be determined by each the needs of each design.



**Fig. 3: Brown staining of pre-galvanized steel sections due to rust.**



**Fig. 4: Flaking of zinc coating after a pressing operation on a tubular section.**