Pre-Galv vs Post-Galv Specifications for Cable Containment Products

When specifying a suitable finish for cable containment products the term 'Hot-Dip Galvanised' can be ambiguous and without the correct British Standard classification has led to much confusion and debate. It is important to appreciate that both Pre-Galv and Post-Galv are Hot-Dip Galvanised finishes. There is also a common misconception that Pre-Galv punched holes and sheared edges are un-protected and will therefore corrode.

This white paper briefly describes the process and zinc coating thickness of galvanised as well as electroplated finishes and explains how these zinc coatings protect the underlying steel, the punched holes and sheared edges from corrosion. It concludes with analysis of a 'before and after' salt spray test.

Electroplated Zinc

This coating is applied by immersing clean steel parts into a bath of zinc salt solution and applying an electric current. It is generally used for small threaded items such as nuts, bolts and threaded rod. Most other manufacturers also use this method to apply a zinc coating to their basket tray.

BS EN ISO 4042	Fasteners – Electroplated Coatings
BS EN 12329	Electrodeposited Coatings of Zinc
	Average surface thickness 8 microns of zinc

Pre-Galvanised Zinc

Hot-dip galvanised sheet processed at the steel mill is punched and formed into the final product e.g. cable trunking, cable tray or cable ladder. Hence the term pre-galvanised, galvanised before manufacture. Our basket tray has a similar pre-galvanised finish for wire.

BS EN 10346	Continuously Hot-Dip Galvanised Zinc Coating
	Average surface thickness 20 microns of zinc

Post-Galvanised Zinc

The steel is punched and formed into the final product e.g. cable tray, cable ladder or basket tray and then immersed in a molten zinc bath for galvanising. Hence the term post-galvanised, galvanised after manufacture.

BS EN ISO 1461	Hot-Dip Galvanised Coating on Fabricated Steel
	Average surface thickness 35 microns of zinc

Weakest Link

In any particular environment the protective value of electroplated, pre-galv and post-galv finishes increases with the coating thickness. Therefore the 20 microns of zinc on a pre-galv product will have a serviceable life of 2.5 times the 8 microns of an electroplated zinc product. Since all commercial installations use threaded rod and fixings that are electroplated zinc the need to specify post-galv rather than pre-galv on containment products becomes irrelevant.

Once it is appreciated that the weakest link of any installation is the electroplated zinc products, there often remains the question as to whether the punched holes and sheared edges on the pre-galv products are protected against corrosion. As stated previously this is a common misconception and is easily explained once we understand the science behind how zinc protects steel.

How Zinc Protects Steel

The zinc coating provides corrosive protection in two ways.

Barrier Protection

Sacrificial Protection

Barrier Protection

The zinc barrier is the most obvious and visible way that the underlying steel is protected. It provides an impervious barrier that does not allow moisture to come in contact with the base steel, similar to adding a layer of paint.

Furthermore, this zinc barrier also reacts on contact with air and moisture to form a zinc carbonate layer on the surface. This can appear as a milky white coating and is sometimes alarmingly referred to as white rust. However, although this white layer is not aesthetically pleasing it actually gives the zinc coating an extra layer of protection and will extend its serviceable life.

Sacrificial Protection

A cell is formed when the two dissimilar metals zinc and steel come in physical contact. When immersed in an electrolyte i.e. moisture they form a galvanic couple, essentially a battery. Due to the position of zinc above steel in the galvanic series (see below) it becomes the sacrificial anode and corrodes in preference to the steel. This sacrificial action is what prevents corrosion around the punched holes and sheared edges.

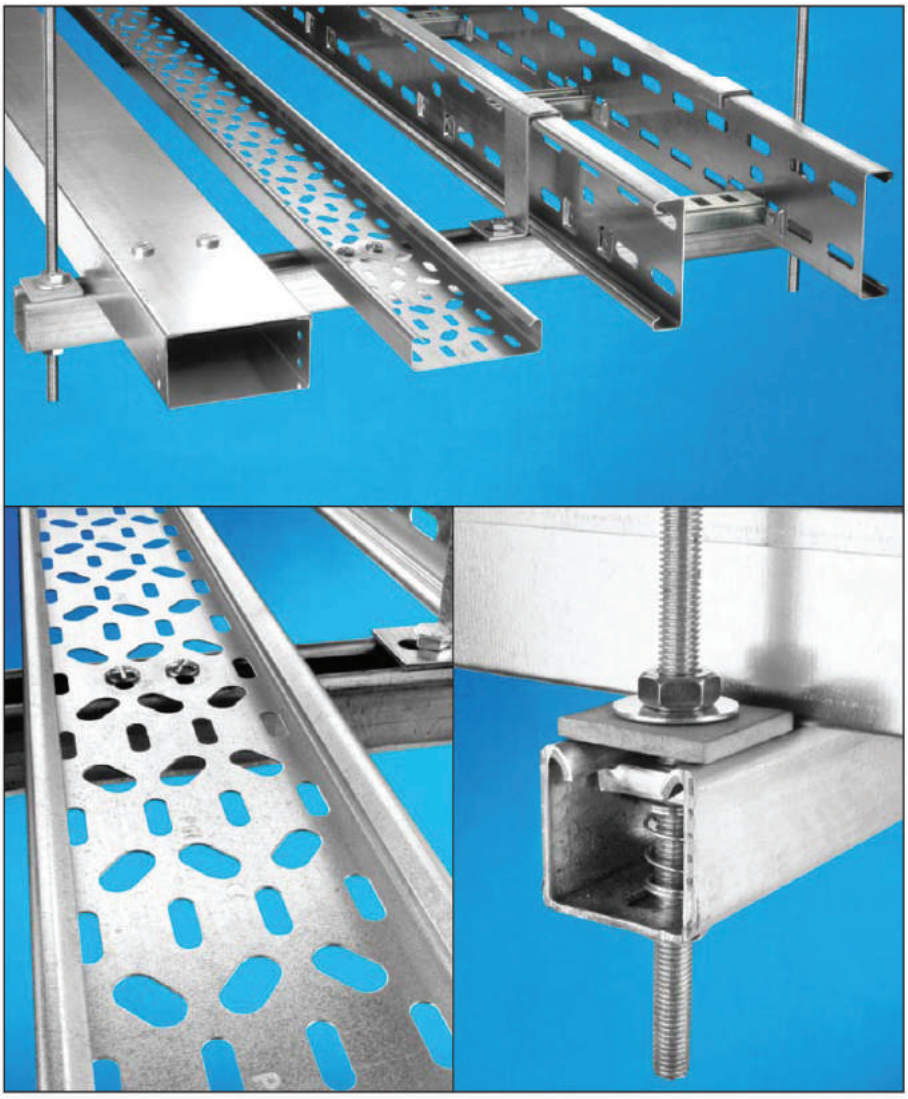
Galvanic Series of Metals and Alloys

Anode
Magnesium
Zinc
Aluminum
Mild Steel
Stainless Steels
Lead
Copper
Cathode

This science is especially used in the marine industry where ship propellers and rudders are protected from corrosion by the sea water with the addition of replaceable zinc anodes.

Containment Before Salt Spray Test

In an attempt to prove this science and its relevance to our application we carried out a salt spray test on a mock-up of a typical cable containment installation as shown below. This laboratory environment massively accelerates the corrosion process and provides an insight into the relative levels of protection.



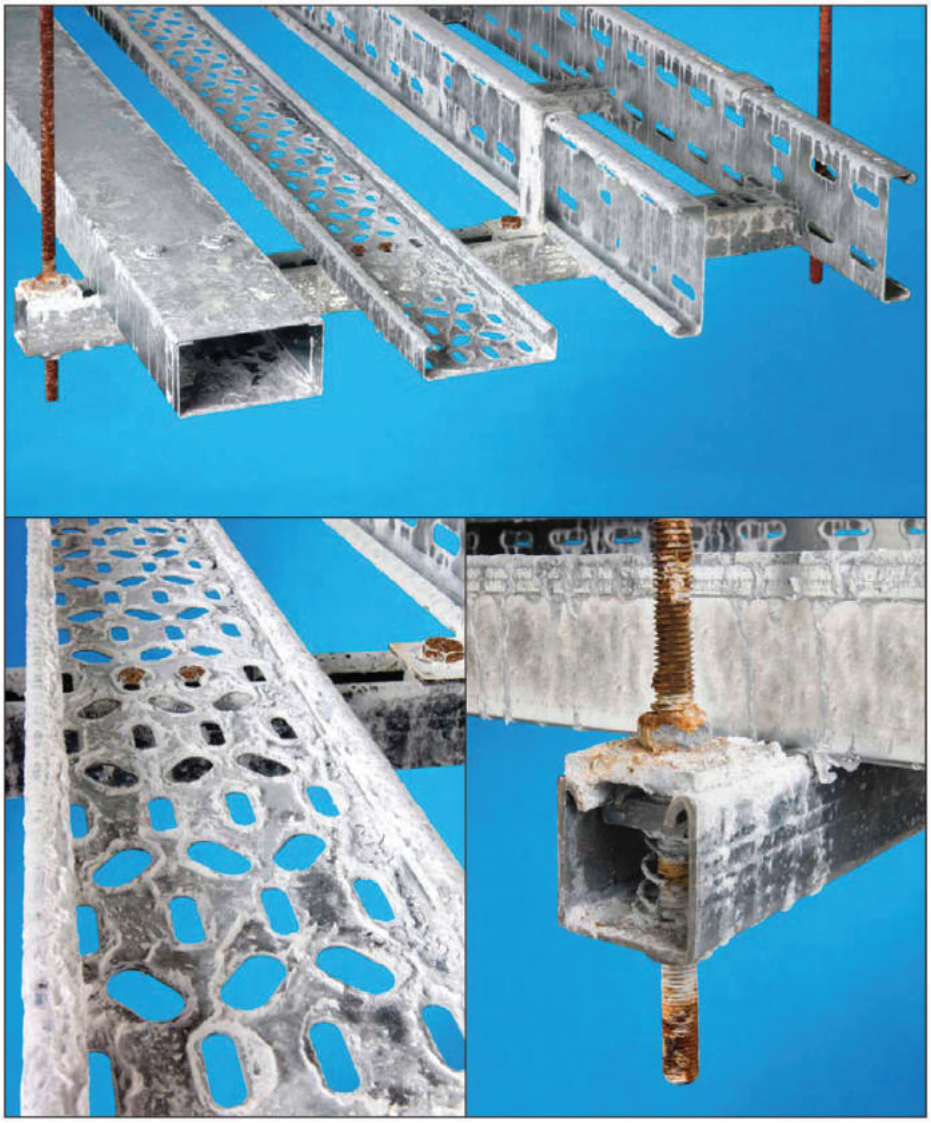
It consisted of the following components.

- Threaded rod and fixings finished in Electroplated Zinc – 8 microns of zinc
- Support Channel in a Pre-Galv finish – 20 microns of zinc
- Cable Trunking in a Pre-Galv finish – 20 microns of zinc
- Cable Tray and Cable Ladder in a Pre-Galv finish – 20 microns of zinc

This mock-up was subjected to the salt spray test environment until the first signs of red rust corrosion were visible.

Containment After Salt Spray Test

The photograph below is of the same mock-up after a duration of 120 hours in the salt spray cabinet.



The important points to highlight are as follows.

- The threaded rod and fixings in Electroplated Zinc are **covered** in red rust corrosion.
- The Cable Trunking, Cable Tray, Cable Ladder and Channel Supports in Pre-Galv finish show **no** signs of red rust corrosion.
- The punched holes and sheared edges of the Cable Trunking, Cable Tray, Cable Ladder and Channel Supports in Pre-Galv finish also show **no** signs of red rust corrosion.

Conclusions

1. Pre-Galv cable containment products can be specified without any detrimental effect to the serviceable life of the complete installation. The weakest link will always be the threaded rod and fixings electroplated zinc finish.

2. Pre-Galv cable containment products offer considerable material cost savings and shorter production times over Post-Galv products.

3. Embedded carbon in a Pre-Galv product is considerably lower than a Post-Galv. Less embodied energy used during production as well as reduced pollutant emissions result in an environmentally friendly 'Cradle to Gate' cable containment product.

4. Pre-Galv cable containment products eliminate issues of zinc whisker and zinc flake damage to data centre and high density computer installations. (Please refer to our white paper 'Specifying Cable Containment Products to Eliminate Zinc Whiskers 'for full details).

Below are suggested phrases and full specifications that could be used for each product range.

Hot-Dip Pre-Galvanised Finish

Pre-Galvanised Finish

Pre-Galvanised to BS EN 10346

Cable Tray compliant with BS EN 61537. Hot-Dip Pre-Galvanised to BS EN 10346.

Cable Ladder compliant with BS EN 61537. Hot-Dip Pre-Galvanised to BS EN 10346.

Basket Tray compliant with BS EN 61537. Hot-Dip Pre-Galvanised to BS EN 10244.

Cable Trunking compliant with BS EN 50085. Hot-Dip Pre-Galvanised to BS EN 10346.

Should you require further details or assistance with your specification please contact our Technical Department - technical@philipgrahame.co.uk