DRAFT Interim Guidance
CE Marking and hot dip galvanizing of structural steelwork

Introduction

This document sets out guidance and requirements for both steelwork contractors and hot dip galvanizers. When properly applied, it should allow for the satisfactory supply of galvanized fabricated steelwork, such that the incorporated materials will continue to meet their declared performance against the essential requirements of the Construction products Directive[1] or Construction Products Regulation[2] as they had prior to galvanizing.

1 - The Construction Products Directive (CPD) and CE Marking

CE Marking of construction products was introduced in the Construction Products Directive (CPD) in 1988. The CPD is a European Directive that seeks to remove barriers to trade and applies to all construction products permanently incorporated in to 'construction works'. This includes steel products such as steel sections, bolts, welding consumables and fabricated steel components that are used in buildings, bridges, highways or other civil engineering projects.

CE Marking is a declaration by the manufacturer that the product meets certain public safety requirements. The public safety requirements are a set of Essential Characteristics that each product must satisfy and these characteristics are given in the product's harmonised standard. For steel structures the main harmonised standards are:

- Steel sections and plate – BS EN 10025-1
- Hollow sections – BS EN 10219 - 1 and BS EN 10210-1
- Pre-loadable bolts – BS EN 14399-1
- Non-preloadable bolts - BS EN 15048-1
- Fabricated steel – BS EN 1090-1

2 - The Construction Products Regulation (CPR)

Under the Construction Products Regulation (CPR), new legal obligations have been placed on manufacturers, distributors and importers of construction products used within the EU to CE Mark their products where they are covered by either a harmonised standard or European Technical Assessment (ETA). This applies not only to constituent products (such as steel beams, bolts etc.) but also to fabricated elements and systems made from CE Marked products.

The CPR requires the CE Marking of all construction products from 1 July 2013 and the CE Marking of fabricated structural steelwork from 1 July 2014.

The harmonised standard covering fabricated structural steelwork is BS EN 1090:Part 1 Execution of steel structures and aluminium structures.

[1] Construction Products Directive 89/106/EEC, OJ L40 11 February 1989, p12 (amended)
[2] Construction Products Regulation 305/2011/EC, OJ L88 4 April 2011, p5

Part 1 of EN 1090 is the Requirements for Conformity Assessment of Structural Components. It describes how manufacturers can demonstrate that the components they produce meet the declared performance characteristics (the structural characteristics which make them fit for their particular use and function).

Part 2 of EN 1090 is the Technical Requirements for Steel Structures. It specifies the requirements for the execution of steel structures to ensure adequate levels of mechanical resistance and stability, serviceability and durability. It determines the performance characteristics for components that the manufacturer must achieve and declare through the requirements of Part 1.

3 - CE Marking of Structural Steelwork

Because steel components are "safety critical", CE Marking is not allowed unless the Factory Production Control (FPC) system under which they are produced has been assessed by a suitable notified body that has been approved by the United Kingdom Accreditation Service (UKAS) or similar national accreditation organization. Having provided a suitable system of production at the steel manufacturers' works and at the steelwork contractors' works, it is important that subsequent operations applied to the steel fabrications do not undermine the essential characteristics of the work.

4 - Implications for steelwork contractors and for galvanizers

Galvanizers processing CE Marked fabricated steelwork may have their own quality control system that has been assessed by a suitable notified body that has been approved to the European Commission or they may fall under the FPC system operated by another party, e.g. the steelwork contractor. A system must be in place that demonstrates that the processing is adequately controlled in order to avoid undermining the declared performance of the CE Marked fabrication.

Below is a check list of characteristics that should be agreed or declared (monitored and checked for compliance) to ensure the continued status of the hot dip galvanized CE Marked fabricated steelwork.

<u>A - Information to be supplied by the steelwork contractor to the galvanizer</u>

The component specification and supporting documentation should provide the galvanizer with the following information for the materials used in the fabrications being sent for processing (see checklist in Annex A);

1. Confirmation that the work being sent for galvanizing complies with the European standard for Execution of steel structures[3] including for example the contents of the National Structural Steelwork Specification (NSSS) 5th edition[4] or similar national specification.

[3] EN 1090-2 : 2008 + a1 : 2011 Execution of steel structures and aluminum structures – Part 2 – Technical requirements for steel structures

[4] The National Structural Steelwork Specification for Building Construction – 5th Edition – CE Marking version, BCSA Publication No. 52/10

2. The composition and properties of the steel that might affect the hot dip galvanizing of the work, including the specification for the steel supply (e.g. EN 10025-2), the grade (e.g. S 275), the sub-grade (e.g. J2) and carbon equivalent value (CEV) for the material relevant to the execution class for the material.

   NOTE The National Structural Steelwork Specification (NSSS) calls for provision of a test certificate type 3.1, i.e. specific to the material.

3. The presence of flame-cut, laser-cut or plasma-cut surfaces on the work and where such surfaces have been introduced into the article, confirmation that such surfaces, together with re-entrant corners, copes and notches, have been ground to remove hardened surfaces and rounded off with a minimum radius of 5mm.

   NOTE – It is essential that contours in the fabricated steelwork are smooth and that notch effects are avoided. Over-cutting and weld filling of over-cut areas should also be avoided.

4. Indication of significant surfaces (e.g. identification of the surfaces of the component by drawings or the provision of suitably marked samples within which any tests for compliance against the galvanizing supply standard should be taken).

5. A drawing or other means of identification where surface unevenness would make the coated article unacceptable for its intended use (e.g. a build up of zinc on mating surfaces).

6. The steelwork contractor shall confirm with the galvanizer that the number, position and arrangements of vent holes introduced into the components are adequate for satisfactory processing of the work. Details of requirements for sealing after galvanizing shall also be agreed.

7. An indication of the presence of internally vented enclosed cavities and written confirmation that these cavities have been subject to adequate venting to allow safe and satisfactory processing of the work.

8. A sample or other means of showing the required surface finish of the hot dip galvanized component (e.g. where subsequent linishing might be required).

9. Requirements for special pre-treatments (e.g. grit blasting, shot blasting of the work prior to galvanizing or masking of specific areas of the component).

10. Requirements for special coating thicknesses (e.g. minimum average coating thicknesses that are different from EN ISO 1461 or other agreed supply specification).

11. The need for or acceptability of a centrifuged coating and associated coating thickness requirements (e.g. for smaller components such as fasteners).

12. Requirements for any after treatments or subsequent coating of the processed work (e.g. passivation treatments, painting or powder coating of the hot dip galvanized components).

13. Details of the inspection arrangements (e.g. specific areas on the components for increased level of inspection, inspection type and technique to be applied and responsibility for inspection testing).

B – Actions by the galvanizer

It is essential that communication between the steelwork contractor and the chosen galvanizer is satisfactory prior to and during the lifetime of the completion of the work programme. Assuming all actions in clause 4.A have been completed, the galvanizer can contribute to the successful completion of the work by taking the following actions. See checklist in Annex B.

1. The galvanizer shall have in place a quality management system to ISO 9001: 2008 or equivalent and comply with the requirements set out below.

   NOTE – It is recommended that the galvanizer be a member of Galvanizers Association.

2. Galvanizing procedure. Unless otherwise agreed, the work sent for galvanizing shall be processed to conform to the requirements of EN ISO 1461: 2009.

3. Zinc melt - composition in the galvanizing bath. The composition of the zinc melt in the galvanizing bath shall be in accordance with EN ISO 1461, or other agreed specification.

   NOTE – The National Structural Steelwork Specification (NSSS) sets out a default additional zinc melt control: Tin (Sn) < 0.1% and Lead (Pb) + 10.Bismuth (Bi) < 1.5% unless otherwise agreed.

   The zinc melt shall be regularly assessed for composition and records retained for future reference (for a period of ten years).

4. Post-galvanizing inspection. All galvanized articles shall be subject to post-galvanizing inspection level PGI-1 (in accordance with the NSSS Table 10.1) unless otherwise agreed. The results of all post-galvanizing inspection shall be recorded. If evidence of cracking of articles is found, affected articles shall be quarantined and the customer alerted. Similar articles that have been galvanized shall also be subject to quarantine. Similar articles that have not yet been galvanized shall not be further processed until authorisation has been granted by the steelwork contractor. Photographic records of any cracking events shall be made and retained for future reference. Unless otherwise agreed, inspection regime PGI-3 shall be implemented in order to identify the scope and origin of the cracking incident. The personnel carrying out the inspection must be suitably qualified and as a minimum must have successfully completed the GA / BCSA Post-galvanizing Inspector's course[5].

[5] GA / BCSA Post-galvanizing inspectors course – successful candidates certificated by GA & BCSA for period of three years

NOTE – Delegates passing the GA / BCSA Post-galvanizing Inspectors Course are awarded a certificate, which is valid for a period of three years, and which should be made available for review upon request.

5. Traceability of work. A suitable marking system, identifiable after galvanizing (if applied directly to the work), shall be agreed with the steel contractor prior to the work being processed.

   NOTE – The execution class for the work will set out the detailed requirements for traceability for relevant components – see clause 5.2 of EN 1090-2

6. Tolerances on work. The work sent for galvanizing shall incorporate the principles of design and fabrication set out in EN ISO 14713-2[6]. The work shall be visually assessed for signs of distortion and any distortion that is identified shall be reported to the steelwork contractor.

   NOTE - Distortion, should it occur, is however, not the responsibility of the galvanizer unless the distortion has been produced as a result of faulty processing.

7. Reaction to fire. Hot dip galvanized steel components fall within Class A1 of the European classification with respect to reaction to fire[7]. Declaration shall be maintained as 'Material Classified: A1'.

   NOTE – Commission decision states that coating iron or steel with a zinc (galvanized) coating shall be considered as Class A1.

8. Release of dangerous substances. There are currently no national legislative requirements to test construction products for release of dangerous substances under the CPD / CPR. Tests are under development for reference by product technical committee's developing standards for construction products where such tests are required but these specifically preclude application to metals and metallic coatings. Declaration shall be maintained as 'no performance declared' (NPD).

   NOTE – The hazards and risks associated with the use of chemicals relevant to the supply of hot dip galvanized structural steelwork to the market is controlled by the Registration, Evaluation, Authorization and restriction of Chemicals Regulations (REACH).

9. Radioactivity. Five isotopes of zinc are stable; two have half lives of just over 240 days and just over 46 hours respectively. Nineteen others are know; all have half lives of less than an hour and some less than a second. For all practical purposes zinc is not radioactive. Declaration shall be maintained as 'no performance declared' (NPD).

[6] EN ISO 14713 – 2 : 2009 Guidelines and recommendations for the protection against corrosion of iron and steel in structures – Zinc coatings – Part 2 – Hot dip galvanizing

[7] Commission decision 1996D0603 12.06.2003 amended by 2000/605/EC 26.09.2000 and 2003/424/EC 06.06.2003

10. Durability. The durability of the coated article is dependent upon the environment into which it is exposed. The performance of galvanized coated articles in a range of environments is given in EN ISO 14713-1[8]. The declaration shall be 'Galvanized to EN ISO 1461: 2009 (*or otherwise agreed specification*) + minimum average coating thickness of 't' microns'.

11. Records. Records related to the processing of the work shall be retained for future reference for a period of not less than ten years.

12. Safety. The relevant COSHH information shall be provided for the hot dip galvanized component upon request.

5 - Summary

By following the above requirements, it shall be possible for (previously CE Marked) fabricated articles supplied by steelwork contractors for hot dip galvanizing to be processed satisfactorily through the galvanizers' works while avoiding any adverse effects on the ability of the article to meet the essential requirements of the supply specification / CPD / CPR as declared.

6 – Further information

Further information can be found by contacting the following;

- Galvanizers Association (GA), 56 Victoria Road, Sutton Coldfield, West Midlands B72 1SY. Tele 0121 355 8838, fax 0121 355 8727, e-mail ga@hdg.org.uk, web www.galvanizing.org.uk.

- British Constructional Steelwork Association (BCSA), 4 Whitehall Court, Westminster, London SW1A 2ES. Tele 0207 839 8566, fax 0207 976 1634, e-mail postroom@steelconstruction.org, web www.steelconstruction.org.

GALVANIZERS ASSOCIATION
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[8] EN ISO 14713 – 1 : 2009 Guidelines and recommendations for the protection against corrosion of iron and steel in structures – Zinc coatings – Part 1 – General principles of design and corrosion resistance

Annex A - Steel Contractor's Checklist (tick □ when completed)

Components comply with EN 1090-2 and national specification, e.g. NSSS	□
Information on steel specification, steel grade, steel sub-grade and CEV provided relevant to execution class	□
Presence of flame cut, laser cut or plasma surface identified and hardened surfaces removed plus rounded to 5mm minimum	□
Significant surfaces identified	□
Critical areas for avoidance of surface unevenness identified	□
Venting arrangements confirmed satisfactory	□
Confirmation that if internal cavities are present they have been satisfactorily vented	□
Agreements on special pre-treatments made	□
Agreements on special coating thickness requirements made	□
Acceptability of centrifuged coatings indicated	□
Agreements made on requirements for post-galvanizing treatments made	□
Details of inspection requirements provided, including particular areas for increased inspection, inspection type and technique and responsibility for inspection testing	□

Annex B – Hot dip galvanizer's Checklist (tick □ when completed)

Member of Galvanizers Association and ISO 9001 : 2008 quality management system (or equivalent) in place	□
Components galvanized to EN ISO 1461 or otherwise agreed specification	□
Zinc melt composition conforms to EN ISO 1461, or any additional controls on zinc melt agreed as necessary and records retained for future reference (for period of ten years)	□
Post-galvanizing inspection carried out by suitably qualified personnel and results assessed (and retained as applicable) for further action if necessary	□
Traceability of work maintained in relation to the identified execution class for the components	□
Tolerances on work assessed after galvanizing and adverse indicators reported to steelwork contractor	□
Reaction to fire – Class A1 maintained	□
Release of dangerous substances – no change in requirements to report	□
Radioactivity – non-radioactive status maintained	□
Durability declared – galvanized to EN ISO 1461 (*or other agreed specification*) with minimum average coating thickness of 't' microns	□
Records of processing of the components retained (for period of ten years)	□
Relevant safety information relating to the hot dip galvanized structural steelwork supplied upon request	□