CE Marking of Structural Steelwork

Stakeholder Responsibilities

Gerry McCarthy
International Welding Engineer
BEng, MSc, IWE, CEng, MIEI, MWeldI

Welding Quality Management Services Ltd
CE Marking of Structural Steelwork

Gerry McCarthy
International Welding Engineer
BEng, MSc, IWE, CEng, MIEI, MWeldI

• 30 years structural steelwork experience in various sectors.
• Experience profile extends to construction, design, welding, quality and CE marking requirements.
• Set up WQMS in July 2012 to offer welding quality management services to the structural steelwork sector.
• Clients include fabricators, consulting engineers and main contractors.
• BEng degree from the UL, an MSc degree from the University of Strathclyde and an IWE diploma from the GSI SLV in Duisburg.
• Lead quality auditor for ISO 9001.
• Chartered Engineer and a Chartered Member of the Welding Institute.
CE Marking of Structural Steelwork

CE Marking of structural steelwork will become a legal requirement in Ireland on 1st July 2014.
The harmonised European standard that applies to structural steelwork is **IS EN 1090-1** and it will be an **offence** to supply structural steelwork after the **1st of July 2014** unless it conforms to this standard and carries a legitimate CE mark.

CE Marking is regulated by criminal law and the penalties for not CE Marking or incorrect CE Marking, if found guilty, are a fine, imprisonment or both.
The requirement for fabricated steelwork to be CE marked represents a major development for

**Designers & Specifiers**

**Steelwork Contractors**

**Clients & Main Contractors**

and demands careful attention to the new obligations imposed.
Since the implementation of the Structural Eurocodes in Ireland in March 2010, Eurocode 3 (IS EN 1993) became the relevant code for the design of building works using structural steel.

Part A (Amendment) of the Building Regulations has also commenced since 1 July 2013. Technical Guidance Document A 2013 makes reference to the Eurocodes. Where works are carried out in accordance with this guidance, this will, prima facie, indicate compliance with Part A of the Building Regulations.

Conflicting standards with the same scope and field of application, e.g. BS 5950 and BS 5400 were withdrawn by the relevant standards body on that date.
In order to help secure the safety of the designed structure using the Eurocodes, designers are also required to follow the execution code which specifies the requirements for all activities performed for the physical completion of the works, i.e. procurement, fabrication, welding, mechanical fastening, transportation, erection, surface treatment and the inspection and documentation thereof.

The relevant execution standard covering fabricated structural steelwork is;

IS EN 1090 - Execution of steel structures and aluminium structures.
Responsibilities for: Designers / Specifiers

For any project, the required quality of fabrication or Execution Class must be specified.

IS EN 1090-2 requires the Execution Class to be specified for the works as a whole, an individual component and a detail of a component.

In some cases, the Execution Class for the structure, the components and the details will be the same while in other cases the Execution Class for the component and the details may be different to that for the whole structure.
Execution Class

There are 4 Execution Classes (EXC) which range from Execution Class 1 which is the least onerous through to Execution Class 4 which is the most onerous.

It is down to the designer / specifier to select the EXC required for the structure, an individual component or a particular detail of a component.

The EXC is derived by determining

Consequence Class (CC)
and defining the
Service Category (SC)
and the
Production Category (PC).
The purpose of categorising the Consequence Class is to ensure that the buildings/structures are constructed with the appropriate level of quality control within the fabrication process.

<table>
<thead>
<tr>
<th>Consequence classes</th>
<th>Description</th>
<th>Examples of buildings and civil engineering works</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC3</td>
<td><strong>High</strong> consequence for loss of human life, or economic, social or environmental consequences <strong>very great</strong></td>
<td>Grandstands, public buildings where consequences of failure are high (e.g. a concert hall)</td>
</tr>
<tr>
<td>CC2</td>
<td><strong>Medium</strong> consequences for loss of human life, economic, social or environmental consequences <strong>considerable</strong></td>
<td>Residential and office buildings, public buildings where consequences of failure are medium (e.g. an office building)</td>
</tr>
<tr>
<td>CC1</td>
<td><strong>Low</strong> consequences for loss of human life, and economic, social or environmental consequences <strong>small or negligible</strong></td>
<td>Agricultural buildings where people do not normally enter (e.g. storage buildings), greenhouses</td>
</tr>
</tbody>
</table>
Define the Service Category

Service categories are the method used in EN 1090-2 to consider the risk from the actions to which the structure and its parts are likely to be exposed to during erection and use, such as fatigue and likelihood of seismic actions.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| SC1        | Structures and components designed for quasi static actions only (Example: Buildings)  
Structures and components with their connections designed for seismic actions in regions with low seismic activity and in DCL*  
Structures and components designed for fatigue actions from cranes (class S₀)** |
| SC2        | Structures and components designed for fatigue actions according to EN 1993. (Examples: Road and railway bridges, cranes (class S₁ to S₉)**, structures susceptible to vibrations induced by wind, crowd or rotating machinery)  
Structures and components with their connections designed for seismic actions in regions with medium or high seismic activity and in DCM* and DCH* |
Define the Production Category

Production categories are the method used in EN 1090-2 to consider the risk from the complexity of the fabrication of the structure and its components, e.g. application of particular techniques, procedures and controls.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PC1</strong></td>
<td>Non welded components manufactured from any steel grade products</td>
</tr>
<tr>
<td></td>
<td>Welded components manufactured from any steel grade products below S355</td>
</tr>
<tr>
<td><strong>PC2</strong></td>
<td>Welded components manufactured from any steel grade products from S355 and above</td>
</tr>
<tr>
<td></td>
<td>Components essential for structural integrity that are assembled by welding on construction site</td>
</tr>
<tr>
<td></td>
<td>Components with hot forming manufacturing or receiving thermic treatment during manufacturing</td>
</tr>
<tr>
<td></td>
<td>Components of CHS lattice girders requiring end profile cuts</td>
</tr>
</tbody>
</table>
Derive the Execution Class

<table>
<thead>
<tr>
<th>Consequence Class</th>
<th>CC1</th>
<th>CC2</th>
<th>CC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Categories</td>
<td>SC1</td>
<td>SC2</td>
<td>SC1</td>
</tr>
<tr>
<td>Production Categories</td>
<td>PC1</td>
<td>EXC1</td>
<td>EXC2</td>
</tr>
<tr>
<td></td>
<td>PC2</td>
<td>EXC2</td>
<td>EXC2</td>
</tr>
</tbody>
</table>

- Farm Buildings
- Small Industrial Buildings
- High Rise Buildings
- Long Span Bridges
- Industrial Buildings
Whilst each building needs to be considered on its own merits, Execution Class 2 (EXC2) will be appropriate for the majority of buildings constructed in Ireland. If the Execution Class is not specified on a project, Clause 4.1.2 of IS EN 1090-2 states that EXC2 shall apply.

<table>
<thead>
<tr>
<th>Consequence Class</th>
<th>CC1</th>
<th>CC2</th>
<th>CC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Categories</td>
<td>SC1</td>
<td>SC2</td>
<td>SC1</td>
</tr>
<tr>
<td>Production Categories</td>
<td>PC1</td>
<td>EXC1</td>
<td>EXC2</td>
</tr>
<tr>
<td></td>
<td>PC2</td>
<td>EXC2</td>
<td>EXC2</td>
</tr>
</tbody>
</table>
Responsibilities for:
Steelwork Contractors

From 1\textsuperscript{st} July 2013 all products used in steelwork fabrication have to be CE marked.

This includes, steel beams, plates, welding wire, bolts etc.

From the 1\textsuperscript{st} July 2014, it will be a legal requirement for all fabricated structural steelwork delivered to site to be CE Marked.

This includes all constructional steelwork from sheds and farm buildings up to bridges and stadia.
The basis for CE marking is that the manufacturer declares that its products meet specified performance characteristics that are defined as essential to the application of the products in the field of construction.

In order for a manufacturer to CE mark their products, they will require to be certified by a notified body. This means that they will have to set up a Factory Production Control system.
Factory Production Control

EN ISO 3834

EN ISO 9001

NCP

Fab / Inspect

Purchasing / Mat control

Personnel / Equipment

Structural Design
According to the Execution Class, the following parts of EN ISO 3834 apply:

- **EXC1** Part 4  “Elementary quality requirements”
- **EXC2** Part 3  “Standard quality requirements”
- **EXC3 & EXC4** Part 2  “Comprehensive quality requirements”
Welding Quality Management System – EN ISO 3834

- Contract / Technical Review
- Traceability / Quality Records
- Material Control
- Welding
- Welding Personnel
- Subcontracted Work
- Inspection
- Equipment

Responsible Welding Coordinator

EN ISO 14731
According to EN ISO 14731 the following levels of technical knowledge are defined as:

- **B** - Basic technical knowledge - International Welding Specialist
- **S** - Specific technical knowledge - International Welding Technologist
- **C** - Comprehensive technical knowledge - International Welding Engineer
### Table 14, IS EN 1090-2 – Technical knowledge of the coordination personnel Structural carbon steels

<table>
<thead>
<tr>
<th>EXC</th>
<th>Steels (steel group)</th>
<th>Reference Standards</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>t ≤ 25(^a)</td>
</tr>
<tr>
<td>EXC2</td>
<td>S235 to S355 (1.1, 1.2 &amp; 1.4)</td>
<td>EN 10025-2, EN 10025-3, EN 10025-4, EN 10025-5, EN 10149-2, EN 10149-3, EN 10210-1, EN 10219-1</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>S420 to S700 (1.2, 2 &amp; 3)</td>
<td>EN 10025-2, EN 10025-3, EN 10025-4, EN 10025-5, EN 10149-2, EN 10149-3, EN 10210-1, EN 10219-1</td>
<td>S</td>
</tr>
<tr>
<td>EXC3</td>
<td>S235 to S355 (1.1, 1.2 &amp; 1.4)</td>
<td>EN 10025-2, EN 10025-3, EN 10025-4, EN 10025-5, EN 10149-2, EN 10149-3, EN 10210-1, EN 10219-1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>S420 to S700 (1.2, 2 &amp; 3)</td>
<td>EN 10025-2, EN 10025-3, EN 10025-4, EN 10025-5, EN 10149-2, EN 10149-3, EN 10210-1, EN 10219-1</td>
<td>C</td>
</tr>
<tr>
<td>EXC4</td>
<td>All</td>
<td>All</td>
<td>C</td>
</tr>
</tbody>
</table>

- \(^a\) Column base plates and end plates ≤ 50mm
- \(^b\) Column base plates and end plates ≤ 75mm
- \(^c\) For steels up to and including S275, level S is sufficient
- \(^d\) For steels N, NL, M and ML, level S is sufficient
Clients or main contractors who engage a steelwork contractor should carry out due diligence and should only appoint a steelwork contractor certified with an Execution Class equal to that for the project as determined by the designer through IS EN 1090-2.

From the 1st July 2014, it will be a legal requirement for all fabricated structural steelwork delivered to site to be CE Marked.
Responsibilities for:
Clients / Main Contractors

In order for a steelwork contractor to demonstrate their right to CE Mark their products, they must provide the following three documents:

- Factory Production Control Certificate
- Welding Certificate
- Declaration of Performance
EC Certificate of Factory Production Control (FPC)

2273 – CPR – 0046

In compliance with Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 (the Construction Products Regulation or CPR) it has been stated that the construction product:

Structural Components for Steel Structures

<table>
<thead>
<tr>
<th>Harmonised</th>
<th>Type / Execution Class of the Construction Product</th>
<th>Declaration Method</th>
</tr>
</thead>
</table>

placed on the market by

Jamestown Cladding and Profiling Ltd

and produced in the factory(ies)

Unit 20, Newbridge Ind Estate, Newbridge, County Kildare, Ireland

is submitted by the manufacturer to the initial type-testing of the product, a factory production control and to the further testing of samples taken at the factory in accordance with a prescribed test plan and that the notified body No. 2273 – Steel Construction Certification Scheme Ltd. has performed the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

Attestation

This certificate attests that all provisions concerning the attestation of factory production control described in Annex ZA of the standard: BS EN 1090-1: 2009 + A1:2011 were applied.

Date of first issue

May 2013

Date of this issue

20th May 2013

Date of next Surveillance

by 30th April 2014

Validity Period

This certificate remains valid as long as the conditions laid down in the harmonised standard in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Chairman: O’Woodward

Scheme Manager: J Carmichael
Welding Certificate

2273 – CPR – 0046 – WC

In compliance with BS EN 1090-1:2009+A1:2011, the following has been stated:

This Welding Certificate is an annex to the EC-Certificate of the Factory Production Control (FPC) 2273 – CPR – 0046. This Welding Certificate is only valid in conjunction with the aforementioned EC-Certificate in the scope of the Construction Products Regulation or CPR.

Manufacturer
Jamestown Cladding and Profiling Ltd

Facilities of the Manufacturer
Unit 20 Newbridge Industrial Estate
Newbridge
Co Kildare

Standard

Execution Class
up to EXC 4 according BS EN 1090-2:2008+A1:2011

Welding Process(es)
121 – Submerged Arc Welding with one wire electrode
123 – Submerged Arc Welding with multiple wire electrodes
135 – Metal Active Gas Welding

Base Material(s)
Up to and including S355K2 according BS EN 10025-2

Responsible Welding Coordinator
Gerry McCarthy IWE

Alternate
Niall Fortune (BCSA)
Tara Keaveney (BCSA)

Attestation
This certificate attests that all procedures for the execution and surveillance of welding works (in connection with BS EN 1090-1:2009+A1:2011) are implemented.

Date of first issue
May 2013

Date of this issue
20th May 2013

Date of next Surveillance
by 30th April 2014

Validity Period
This certificate remains valid as long as the conditions laid down in the harmonised standard in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Chairman:
D. Woodward

Scheme Manager:
J. Carmichael
Declaration of Performance (DoP) Certificate

**Declaration of Performance**

**Contract Name**

Welded steel components in accordance with component specification No. 124384-YTR-ECV-SPE, Rev 0 & Drawing No 124384-YTR-ECV-DRG-115, Rev 0.

**Type:**

Steel structures or composite steel and concrete structures where the components can be made from hot rolled, cold-formed steel. Steel material from which components are made can be in various shapes/profiles e.g. plates, sheet, strip, bars, castings or forgings.

**Intended use/s:**

Steel structures or composite steel and concrete structures where the components can be made from hot rolled, cold-formed steel. Steel material from which components are made can be in various shapes/profiles e.g. plates, sheet, strip, bars, castings or forgings.

**Manufacturer:**

Jamestown Cladding and Profiling Ltd
Unit 20 Newbridge Ind. Est.,
Newbridge, Co. Kildare, Ireland.

**System of assessment and verification of constancy of performance:**

System 2+

**Notified Body:**

Steel Construction Certification Scheme
4, Whitehall Court. Westminster
London, SW1A 2ES

**Notified Body No:**

2773

Steel Construction Certificate Scheme has performed (i) initial inspection of the manufacturing plant and factory product control and (ii) continuous surveillance, assessment and evaluation of factory production control and issued Factory Production Control certificate 2773-CPR-0046 and Welding certificate 2773-CPR-0046-WC.

**Essential characteristics | Performance | Harmonised technical specification**

| Tolerances on dimensions and shape | EN 1090-2, tolerance class 1 | EN 1090-1:2009 + A1:2011 |
| Reaction to fire | Class A1 (steel only) | EN 1090-1:2009 + A1:2011 |

1 These characteristics should be interpreted in accordance with Component Specification No. 124384-YTR-ECV-SPE, Rev 0 & Drawing No 124384-YTR-ECV-DRG-115, Rev 0.

The performance of the product identified above is in conformity with the declared performance identified in the table.

Signed for and on behalf of Jamestown Cladding and Profiling Ltd by:

**Responsible Welding Coordinator**

Jamestown Cladding and Profiling Ltd
Unit 20 Newbridge Ind. Est.,
Newbridge, Co. Kildare, Ireland.

**Date:** 18th June 2013
Current Situation
Designers / Specifiers

Project specifications for steelwork do not always refer to EN 1090-2.

Designers / Specifiers do not usually audit steelwork contractors to ensure compliance with specifications.

Some steelwork projects do not have a steelwork specification.

There is a significant gap in the knowledge of the standard EN 1090-2 within the consulting engineering sector.
Currently only 2 from approximately 75 steelwork contractors are certified to CE mark their steelwork.

It takes 6 to 12 months to implement a Factory Production Control system to IS EN 1090-1 and have it certified by a notified body.

There is no Irish notified body for the standard IS EN 1090-1 and as the number of UK & European notified bodies is limited, it is likely to become more difficult to book a certification audit as the deadline approaches.
Current Situation

Clients / Main Contractors

Clients & Main Contractors tend to select the steelwork contractor based on price.

Clients & Main Contractors do not always have the technical knowledge to ensure the steelwork contractor is working to the specification / standard.

Clients & Main Contractors seldom audit steelwork contractors to ensure compliance or competence with the requirements of the project.
Summary

From the 1\textsuperscript{st} July 2014, it will be a legal requirement for all fabricated structural steelwork delivered to site to be CE Marked.

Designers and specifiers need to amend their specifications to include references to the new standards.

Designers and specifiers need to ensure that the requirements of the specification are adhered to for all aspects of the project.

Steelwork contractors need to implement FPC systems and become certified to IS EN 1090-1 for CE Marking.

Clients and main contractors should only consider steelwork contractors certified with an Execution Class equal to that required for the project.
Thank you

Gerry McCarthy
International Welding Engineer
BEng, MSc, IWE, CEng, MIEI, MWeldI

Welding Quality Management Services Ltd

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Website: wqms.ie
Mobile: 087 2955335