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Structural Steel & EN 1090

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CE Marking – What Happened in Europe on 1st July 2014

CE marking for structural steel to EN 1090-1 became mandatory for products sold on the EU Construction market in 2014.

Therefore anyone designing and/or manufacturing steel frame or steel components for the European market has to comply. Failure to do so will have serious consequences.

Brief Introduction to the Construction Products Regulation (CPR)

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Construction Products Regulation (CPR)

- The Construction Products Regulations (CPR) was adopted in Europe in March 2011.
- Came into force in July 2013.
- The aim of the regulation is to harmonise the safety performance of Construction Products across the EU.
- This applies to anything placed on the market, whether imported or manufactured in the EU.

Construction Products Regulation (CPR)

The CPR defines seven Basic Works Requirements (BWR's) for Construction Products:

1. Mechanical Resistance & Stability
2. Safety in Case of Fire
3. Hygiene, Health & the Environment
4. Safety in Use
5. Protection Against Noise
6. Energy Economy & Heat Retention
7. Durability and Sustainability in Use

Construction Products Regulation (CPR)

As of 1st July 2014 any “series” manufactured structural metal components or kits made either in the UK or imported, and to which a Harmonised European Standard applies, must comply with the CPR & CE marking requirements.

The Harmonised European Standard that applies to structural metalwork is EN 1090-1:2009 – “Execution of Steel Structures and Aluminium Structures”.

Three parts to this standard:

- Part 1: Requirements for Conformity Assessment of Structural Components
- Part 2: Technical Requirements for the Execution of Steel Structures
- Part 3: Technical Requirements for the Execution of Aluminium Structures

CE Marking and Harmonised Technical Specifications

There are two types of harmonised ‘technical specifications’,

1. Harmonised European Standards such as EN 1090
   - Harmonised European Standards are produced under mandate by CEN.

2. European Technical Assessment (ETA)
   - European Technical Assessments are produced by Technical Assessment Bodies, such as BM TRADA and is overseen by the European Organisation for Technical Assessments (EOTA) which is an equivalent of CEN.

CE Marking and Harmonised Technical Specifications

- ETAs are produced for construction products that are ‘bespoke’, i.e. there is no harmonised standard in place for them.

Introduction to EN 1090-1

Compliance to EN 1090-1

- Manufacturers/Organisations covered by CPR will need to show that they comply with BS EN 1090-1/2.
- This involves a number of steps that culminate in certification.
- EN 1090-1 requires a number of actions to be in place, many of which will already be standard practice in some/well-run companies. These include, but not limited to:

  - Only CE Marked sections, bolts and welding/other consumables will need to be purchased/used in fabrication
  - Designers will need to identify the Execution Class of the product, as defined in EN 1090-2. This is determined by the potential risk to the public if the component or structure fails

Compliance to EN 1090-1

- Prototypes must be produced and subjected to Initial Type Testing (ITT). Where ITT is impractical, for example on bespoke designs, calculations can be used to serve the same purpose

Structure of EN 1090-1

EN 1090 consists of the following three parts:

Part 1:

- Requirements for conformity assessment of structural components.
- This part specifies the requirements for conformity assessment of what are termed the performance characteristics of the structure.
- Essentially criteria such as toughness, fire resistance, fatigue performance etc. and requires the implementation of a factory production control (FPC) system.

Part 2:

- Technical requirements for steel structures.
- Specifies the requirements for the manufacturing of structural steelwork - this includes both bolting and welding.
- The steels covered by the specification comprise not only the conventional carbon manganese steels such as EN 10025, S275 but also high strength steels up to grade S960, ferritic, austenitic-ferritic and austenitic steels.

Structure of EN 1090-1

Part 3:

- Technical requirements for Aluminium Structures.
- Specifies the requirements for the manufacturing of Aluminium structures.

Part 2 and Part 3 support the application of Part 1 by providing the technical requirements relevant to the manufacture of steel and aluminium components respectively.

Structure of EN 1090-1

BS EN 1090 is made up of 8 Clauses and 3 Annexes as follows:

1. Scope
2. Normative References
3. Terms, definitions and abbreviations
4. Requirements
5. Evaluation Methods
6. Evaluation of Conformity
7. Classification and designation
8. Marking

Annex A
Annex B
Annex ZA

1. Scope of EN 1090-1

- EN 1090 specifies the requirements for conformity assessment of the performance characteristics for structural steel and aluminium components, as well as for kits.
- It covers both, manufacturing characteristics and structural design characteristics.
- Also covers steel components used in composite steel and concrete structures and applies to series and non series structural components including kits.
- The components can be made of hot rolled or cold formed constituent products.
- Covers components that may be produced of sections/profiles with various shapes, flat products, bars, castings, forgings, protected or unprotected against corrosion.

2. Normative References

This Clause/Section provides a list of documents that must be used in conjunction with EN 1090.

3. Terms, Definitions and Abbreviations

This Clause / Section provides a list of terms, definitions and abbreviations used within EN 1090 together with their meaning/s

4. Requirements

Clause 4 provides the requirements for the following:

- Constituent products for steel components
- Constituent products for aluminium components
- Tolerances on dimensions and shape
- Weldability
- Fracture toughness
- Load bearing capacity
- Fatigue strength
- Resistance to fire
- Reaction to fire
- Dangerous substances
- Impact resistance
- Durability

5. Evaluation Methods

- Clause 5 describes the evaluation methods that must be used to demonstrate compliance with the requirements given in Clause 4.
- These evaluation methods could include physical testing; measurements of geometry and structural calculations whether assisted or not by physical testing.

6. Evaluation of Conformity

Clause 6 is based on evaluation of conformity of the structure, component or kit with the requirements of EN 1090 and stated values.

It specifies that conformity shall be demonstrated by:

- Initial Type Testing / Calculation
- Factory Production Control

Note:

- For the purposes of testing, components or kits may be grouped into families if the selected property/properties is/are common to all components within that family.
- A family of welded steel components may be characterised by the parent material and the welding process used.

7. Classification and Designation

This Clause is about classification and designation of the component(s) or structure(s) in accordance with Execution Class(es).

8. Marking

This Clause relates to CE marking of the product.

It states that the ‘component SHALL be delivered with a mark that clearly identifies it, with reference to the component specification’.

Execution Class

- The standard employs a system for deriving reliability against failure requirements matched to the consequences of failure of a structure.
- Four execution classes are given, for which requirement level and strictness increase from EXC1 to EXC4.
- Throughout the standard these classes are used to categorise levels of significance for each requirement.
- EXC Classification is derived through a multi stage process including
  - Assessing the potential risk of economic and environmental impact and loss of human life
  - Risk from actions to which the structure is likely to be exposed to during erection and use, such as fatigue and seismic actions.
  - Production methods and steel grades.

Execution Class

The recommended procedure for the choice of Execution Class according to EN 1090-2 takes into account the fact that the design will be carried out in accordance with EN 1993 for steel structures or EN 1994 for the steel parts of composite structures.

Determination of Execution Class:

- The determination of the Execution Class should be taken by the designer and the owner of the construction works, taking national provisions into account.

- The requirements for the basis for the selection of Execution Classes are given in EN 1993-1-1:2005/A1:2014, Annex C

Factory Production Control

Factory Production Control – What is it?

- Factory Production Control (FPC) is defined as the permanent and internal control of production exercised by a Manufacturer.
- All the elements, requirements and provisions adopted by the Manufacturer must be documented in a systematic manner in the form of written policies and procedures.

Factory Production Control – Purpose

The purpose of a Factory Production Control (FPC) system is:

- To systematically control the manufacturing process, within the boundaries set by specifications, standards and/or regulations
- Maintain records of the measurements and checks carried out, carry out corrective actions when non-conformity is identified and provide traceability through the process from customer order to delivery
- The Factory Production Control system is underpinned by the Quality Plan, the effectiveness of which should be reviewed regularly and updated if shortfalls are identified.

Factory Production Control

A manufacturer/fabricator must document and implement a Factory Production Control (FPC) System that covers as minimum the following:

- Contract Review
- Purchasing of Raw Materials
- Design and Drawing Control
- Production
- Competence and Training
- Equipment/Machinery Maintenance
- Calibration
- Control of Non-conforming Product or Raw Materials
- Maintenance of Records.

If a company has ISO 9001, this covers the requirement for a FCP system, provided that it is made specific to the requirements of SS 1090.

Factory Production Control - Welding

Where welding is part of the process, a welding system that conforms to the relevant part of BS EN ISO 3834 is required.

For Execution Class 2 and above, the company should either employ, or have access to a Responsible Welding Coordinator (RWC) to control the welding quality management system.

The company will need to demonstrate competency of the RWC in accordance with EN 14731 and the relevant part of BS EN ISO 3834.

Factory Production Control – EN 1090 Requirements

Product Realisation
(Planning of product realisation; Purchasing; Approved Suppliers; Verification of purchased product; Control of production; Manufacturing instructions).

Identification and Traceability
(Process/ procedure)

Control of monitoring and measuring devices
(Calibration; maintenance)

Measurement, analysis and improvement
(Internal audits; Monitoring and measurement of processes, Monitoring and measurement of product; Control of Non-conforming product)

Factory Production Control – EN 1090 Requirements

Preservation of product
(Storage, handling and despatch)

Improvement
(Corrective action; Preventive action)

A system conforming to the requirements of EN ISO 9001 and made specific to the requirements of EN 1090 is considered to satisfy the FPC requirement. (Discussion).

Design

Structural Characteristics and Design

- EN 1090 specifies that the structural characteristics must be based on the structural design and the manufacturing characteristics of the component.

- Structural design may be carried out by structural calculations or structural testing supported by structural calculations for the component/structure.

- Structural calculations SHALL be carried out in accordance with the relevant Eurocodes, EN 1990, EN 1991 and EN 1993 for structural Steel.

Structural Characteristics and Design – Design Cat.

There are two categories by which a Manufacturer can declare design:

1. MPCS – Manufacturer Provided Component Specification.
   - Under this declaration method, the full component specification is provided by the Manufacturer.

2. PPCS – Purchaser Provided Component Specification.
   - Under this declaration method, the full component specification, including connection design, is provided by the Purchaser. The Manufacturer cannot get involved in any aspect of design, he is only allowed to carry out fabrication in accordance with the specification provided.

Structural Characteristics and Design – Design Methods

1. There are four design methods/categories that cover the specification of a product or kit in relation to its declared structural characteristics.
   - Method 1
   - Method 2
   - Method 3a
   - Method 3b
2. These categories indicate how the structural properties of the product have been derived and will appear on the CE label.

Structural Characteristics and Design

Definition of Each Method:

Method 1 (MPCS)
Design - No
Fabricator produces product/kit & declares the geometry, material properties & any other information of the component for OTHERS to perform structural evaluation & calculations.

Method 2 (MPCS)
Design – Yes
Fabricator produces product/kit & declares components based on structural design/calculations using appropriate design codes. Declare characteristics values or design values

Structural Characteristics and Design

Method 3a (PPCS)

Design – No

Fabricator produces product/kit in accordance with Purchaser's specification. Fabricator undertakes no design works. Declares characteristics values or design values.

Method 3b (MPCS)

Design – Yes

Fabricator produces product/kit based on Purchaser's or Manufacturer's design brief to meet client's order. Declare characteristics values or design values.

Structural Characteristics and Design – Design Protocol

Design Protocol - What is a ‘Design Protocol?’

- Every structural engineering design is based on an underlying design philosophy or design model and a series of design assumptions.
- This philosophy, design model and assumptions is documented in what is known as a ‘Design Protocol’.
- All structural design calculations are unique to a particular building and location and it is therefore important that the engineer undertaking the structural design of the building gives careful consideration to the Design Protocol before performing the design calculations

EN 1090-2:2018+A1:2011 - Changes

- There have been a number of changes in the 2018 version of the standard.
- Refer to Hand-out.

BREXIT – Implications to CE Marking

- Leaving the EU with a deal remains the government's top priority. This has not changed.
- The government has also accelerated 'no deal' preparations to ensure the country is prepared for every eventuality.

Before the UK Leaves the EU

- The Construction Products Regulation (CPR) lays down harmonised rules (‘standards’) for the marketing of construction products.
- Standards are developed by European standardisation bodies, (CEN), under mandate.
- These standards define the methods and the criteria for assessing the performance of the product in relation to its “essential characteristics”.
- Standards become harmonised when the reference to the standard is published in the Official Journal of the European Union (OJEU)

Before the UK Leaves the EU

- Where a harmonised standard exists for a product the CPR places obligations on manufacturers, distributors and importers, collectively known as ‘economic operators’, of that product when it is placed on the market.
- The product must have a Declaration of Performance (DoP) and have been affixed with ‘CE’ marking.
- In order to safeguard the reliability of the Declaration of Performance, the CPR provides for systems of “Assessment and Verification of Constancy of Performance” (AVCP).
- Where third party assessment of the performance of construction products is required, this assessment may only be undertaken by authorised ‘Notified Bodies’.

Before the UK Leaves the EU

- Notified Bodies are accredited.
- In the UK this is by the United Kingdom Accreditation Service (UKAS)
- Member States then formally ‘Notify’ the European Commission and other European Union Countries.
- Those Notified Bodies are listed on the EU’s database, called, The ‘New Approach Notified and Designated Organisations (NANDO).
- Where the standard requires third-party assessment, that Notified Body’s 4-digit identification number (as listed on the NANDO database) must be affixed to the product.

Before the UK Leaves the EU

- The CPR also allows manufacturers to affix CE marking to products that are not fully covered by a harmonised standard.
- This is possible by applying for a European Technical Assessment (ETA) for the product.
- ETAs are based on a ‘European Assessment Document’ (EAD), and are produced ‘Technical Assessment Bodies’ or TABs.

After the UK Leaves the EU if there's 'No Deal'

- The government laid a draft Statutory Instrument on 18 December 2018 detailing the arrangements that will apply POST BREXIT.
- All existing European Harmonised Standards will become UK 'Designated Standards'.
- This will mean that immediately following the UK's exit from the EU, 'European Harmonised Standards' and 'UK Designated Standards' will be identical.
- The Government will publish and maintain a list of UK Designated Standards.
- This will be a UK-wide approach with the standards applying at UK level.

Products on the UK Market

- Goods legitimately affixed with CE marking already on the UK market before the UK leaves the EU will be able to continue to circulate in the UK.
- Additionally, goods which are made and assessed against EU Harmonised Standards and legitimately carry the CE marking can continue to be placed on the UK market.
- It is intended that these arrangements will be for a time-limited period only, but draft legislation itself does not limit the duration of this provision.
- Products being placed on the UK market in this way must be compliant with the obligations of the EU's Construction Products Regulation.

Products on the UK Market

- This includes that they:
  - Be covered by an EU Harmonised Standard which is the same as a UK Designated Standard (as noted above, immediately following exit these will be identical)
  - Are affixed with CE marking
  - Be accompanied by a manufacturer's Declaration of Performance
  - Have been assessed by an EU-recognised Notified Body, where third party assessment is required
- Notified bodies operating under the CPR and based in the UK will be granted new UK 'Approved Body' status
- These 'Approved Bodies' will be listed on a new UK Database.
- Approved Bodies will be able to undertake conformity assessment activity for UK Designated Standards.

Products on the UK Market

- Where an Approved Body has undertaken the assessment, the manufacturer (or their authorised representative) must affix UK Marking.
- Rules around affixing the new UK conformity marking will remain the same as current CE marking.
- Details of the UK conformity marking will be published shortly.
- Where a UK notified body (which becomes a UK ‘Approved Body’ after exit day) has carried out tasks or issued certification in relation to the AVCP for that product before exit day, those tasks and/or that certification may be used to support affixing of UK marking where the product is placed on the UK market after exit day.

Products on the UK Market

- Manufacturers will not need to use the new UK mark if they have complied with the EU requirements and affixed CE marking, having had any required third-party conformity assessment activity undertaken by an EU recognised Notified Body.
- As mentioned previously, it is intended that these arrangements will be for a time time-limited period only.
- Where certificates have been transferred to an EU recognised Notified Body, the CE marking can continue to be used for the UK market for a time-limited period only.
- Where the marking is affixed without the need of Notified Body certificates then, for the UK market, during the time-limited period of on-going recognition of CE marking, manufacturers will have the choice to use either UK or CE marking, or both.
- Where marking is affixed on this basis of exporting to the EU, CE marking will be needed.

UK Manufacturers Exporting to the EU

- In a ‘no deal’ scenario it will be a matter for the European Commission to determine the arrangements for products on the EU market from the date that the UK leaves the EU.
- The European Commission published a Notice to stakeholders which states that “from the withdrawal date, UK Notified Bodies will lose their status as EU Notified Bodies and will be removed from NANDO, the Commission’s information system on Notified organisations.
- As such, UK bodies will not be in a position to perform conformity assessment tasks pursuant to Union product legislation as from the withdrawal date.

UK Manufacturers Exporting to the EU

In terms of the effect of this, the notice advised that:

- Where economic operators hold certificates issued by a UK Notified Body prior to the withdrawal date and plan to continue placing the product concerned on the EU 27 market, as from the withdrawal date, they are advised to consider either:
  - Applying for a new certificate issued by an EU 27 Notified Body or,
  - Arranging for a transfer – on the basis of a contractual arrangement between the manufacturer, the UK Notified Body, and the EU 27 Notified Body - of the file and the corresponding certificate from the UK Notified Body to an EU 27 Notified Body, which would then take over the responsibility for that certificate.

Market Surveillance

- The UK is retaining protections in domestic law which provide powers for market surveillance enforcement to ensure that unsafe and non-compliant products can swiftly be removed from the UK market.
- The government is developing UK replacements to the EU databases we will no longer have access to.
- This includes a new product safety market surveillance database to ensure we are able to quickly identify new threats, to mount coordinated and rapid responses to those threats, and to target the interception of high-risk products, including imports.

Implications

- All operators intending to place products on the UK market when or after the UK leaves the EU will want to consider the actions outlined in the next few slides.
- All manufacturers placing products on the EU market will need to take the actions outlined in the next few slides if they intend to place products on the EU market when or after the UK leaves the EU.

Manufacturers Placing Products on the UK Market

- Manufacturers placing products on the UK market should note:
  - Where the European harmonised standard and the UK designated standard are the same, if the EU requirements are met (including CE marking) the product can continue to be placed on the UK market without any need for reassessment or re-marking. This includes that any third-party conformity assessment be carried out by an EU-recognised Notified Body. This will apply for a time-limited period and sufficient notice will be given to businesses before that period ends.
  - Products that meet UK requirements and bear a UK Conformity Marking can be placed on the UK market. For those products, any third-party assessment must have been carried out by a UK recognised ‘Approved Body’.
  - UK-based Notified Bodies will become UK Approved Bodies and will be listed on a new UK Database.

Distributors Placing Products on the UK Market

- Distributors who bring products in from the EU to the UK will in most cases now be classified as ‘importers’ bringing in products to the UK from a third country.
- This change in status will bring new obligations such as a requirement for importers to label their products with their name and address.
- Other obligations of importers include:
  - They must ensure that the AVCP has been carried out by the Manufacturer;
  - Ensure that the manufacturer has drawn up the technical documentation;
  - Ensure that the product bears the conformity marking;
  - Ensure that the manufacturer has complied with their labelling obligations.

Distributors Placing Products on the UK Market

- In addition, importers must not place products on the market if they have reason to believe that the product does not comply with the applicable requirements of the CPR.
- UK economic operators should consider taking professional advice and consulting with their EU-based distributors (and customers who are retailers), where relevant.

Manufacturers Placing Products on the EU Market

- The European Commission's notice to stakeholders advised that where "operators hold certificates issued by a UK Notified Body prior to the withdrawal date and plan to continue placing the product concerned on the EU-27 market as from the withdrawal date, they are advised to consider either
  - applying for a new certificate issued by an EU27 Notified Body or
  - arrange for a transfer of the file and the corresponding certificate from the UK Notified Body to an EU27 Notified Body". Any such transfer would be on the basis of a contractual arrangement between the manufacturer, the UK Notified Body, and the EU Notified Body.

Manufacturers Placing Products on the EU Market

- In the above scenario, the product would need to be re-marked with the new EU-recognised notified body's four-digit number.
- A list of EU-recognised notified bodies can be found on the NANDO database.
- The European Commission has advised that in a no deal scenario, after the UK leaves the EU, UK-based bodies will no longer be listed on this database.
- In practice, products must be placed on the EU market by a legal entity established in the EU, and UK manufacturers will be required to work with an EU-based importer or distributor.
- Customers and/or suppliers in the EU should gain an understanding how this guidance impacts their responsibilities.

Operators Exporting to the EU

- For operators exporting to the EU, the European Commission's notice states that "As from the withdrawal date, a manufacturer or importer established in the United Kingdom will no longer be considered as an economic operator established in the Union."
- The notice also sets out the effect of this is that relevant operators "will have to comply with the specific obligations relevant to an importer, which are different from those of a distributor".
- Operators should consider taking professional advice as to how their obligations would change.

UK Approved Bodies

- If the UK leaves the EU without a deal, then existing UK notified bodies operating under the CPR will be offered conversion to UK approved body status.
- There will be no need for existing UK notified bodies to seek re-accreditation in order to benefit from UK approved body status.
- In early 2019 notified bodies established in the UK will be contacted with more details about how the process of conversion will be managed.
- Where UK notified bodies do intend to operate under the new UK framework, they will be automatically granted this status as soon as the UK leaves the EU.
- They will be listed on a UK version of the NANDO database and given a 4-digit approved body number.

UK Approved Bodies

- The current intention is that this will be the same number as the existing notified body number, to allow for identification of the relevant approved bodies responsible for CE marked products already in use or circulation on the market.
- Where UK notified bodies indicate that they do not intend to operate under the UK framework, their status as a notified body will be withdrawn when the UK leaves the EU and they will not be listed in the new UK database of Approved Bodies.
- As part of this, bodies not intending to operate will need to either transfer relevant documentation to another approved body (or the relevant government department – the Ministry of Housing, Communities and Local Government) or to retain the relevant documentation for a specified period.
- The United Kingdom Accreditation Service's (UKAS) role as the UK's national accreditation body for the CPR will remain.

UK Approved Bodies

- The current intention is that this will be the same number as the existing notified body number, to allow for identification of the relevant approved bodies responsible for CE marked products already in use or circulation on the market.
- Where UK notified bodies indicate that they do not intend to operate under the UK framework, their status as a notified body will be withdrawn when the UK leaves the EU and they will not be listed in the new UK database of Approved Bodies.
- As part of this, bodies not intending to operate will need to either transfer relevant documentation to another approved body (or the relevant government department – the Ministry of Housing, Communities and Local Government) or to retain the relevant documentation for a specified period.

BM TRADA – Post Brexit

- BM TRADA has been approved as a Notified Body by RvA in the Netherlands.
- The application for a Technical Assessment Body (TAB) is currently being processed.
- All CE certificates issued by BM TRADA will continue to be valid in the UK and EU27 irrespective of the outcome of Brexit.
- A ‘Request for Transfer’ form was sent to all certificate holders. Please make sure that this is completed and returned, if not already done, to ensure a timely transfer of your certificate in the event of a ‘no deal’ Brexit.

Thank You for Your Attention

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