

Implementation of Eurocodes in Ireland

Introduction

The Eurocodes are a set of harmonised structural design codes for building and civil engineering works.

A series of experimental Eurocode standards or European Prestandards (ENVs) were published between 1992 and 1998. These ENVs were valid for a limited period and intended to provide an opportunity to apply the documents in an experimental way and to subsequently provide feedback and comments on the documents to the European Standards Organisation (CEN). CEN was responsible, on foot of a mandate from the EU Commission, for developing these standards. By 2006 CEN transposed these experimental standards into full standards. The 58 parts of the Eurocodes are published in 10 packages.

EN 1990 – Eurocode: Basis of Structural Design
EN 1991 – Eurocode 1: Actions on Structures
EN 1992 – Eurocode 2: Design of Concrete Structures
EN 1993 – Eurocode 3: Design of Steel Structures
EN 1994 – Eurocode 4: Design of Composite Steel and Concrete Structures
EN 1995 – Eurocode 5: Design of Timber Structures
EN 1996 – Eurocode 6: Design of Masonry Structures
EN 1997 – Eurocode 7: Geotechnical Design
EN 1998 – Eurocode 8: Design of Structures for Earthquake resistance
EN 1999 – Eurocode 9: Design of Aluminium

For the full list of all 58 parts see Appendix A.

The Eurocodes apply to structural design of buildings and other civil engineering works including:

- geotechnical aspects;
- structural fire design;
- situations including earthquakes, execution and temporary structures.

For the design of special construction works (e.g. nuclear installations, dams, etc) other provisions than those in the Eurocodes might be necessary.

Members of CEN (e.g. NSAI, BSI etc) are obliged to withdraw all standards e.g. Irish Standards (I.S.) and British Standards (BS) that have the same scope and field of application covered by the Eurocodes within a certain time frame. In relation to the



Eurocodes, March 2010 has been set as the date of withdrawal of all conflicting National Standards.

While the EN Eurocodes are the result of a long procedure of bringing together and harmonising the different design traditions across Europe, Member States still retain the exclusive competence and responsibility for the levels of safety of works. The differences in the environmental conditions and in the ways of life in the Member States also require flexibility in the National Application of the Eurocodes. For this reason Nationally Determined Parameters (NDPs) exist, these parameters are left open for national choice. Choices for each Part are contained in accompanying National Annexes.

A National Annex contains information to be used for the design of buildings and civil engineering works constructed in the country concerned, but is restricted to information which is left open in the Eurocodes for national choice and is within the limits cited in the Eurocode.

A National Annex generally contains:

- Values and/or classes where alternatives are given in the Eurocode
- Values to be used where a symbol only is given in the Eurocode
- Country specified data (geographical climatic etc) e.g. wind map
- Procedures to be used where alternative procedures are given in the Eurocode.
- Decisions on the use of Informative Annexes, and
- References to non-contradictory complementary information to assist the user to apply the Eurocode.

Objective of the Eurocodes

The objective of the programme is to further develop the internal market by eliminating technical obstacles to trade of products and services and to improve the competitiveness of the European construction industry and the professionals and industries connected with it. They serve as reference documents for the following purposes:

- A framework for drawing up harmonised technical specifications for construction products in the context of the Construction Products Directive, Council Directive 89/106/EEC
- A means of demonstrating compliance of building and civil engineering works with National Regulations and with the essential requirements No.1 (mechanical resistance and stability) and No. 2 (safety in case of fire) of the Construction Products Directive, Council Directive 89/106/EEC



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- A basis for specifying contracts for construction works and related engineering services.

Construction Products Directive

Structural construction products constitute an important part of the construction products market. The link between the Eurocodes and the Construction Products Directive is twofold.

In some cases, the declared values, as required by the harmonised standards, serve as inputs to the Eurocodes. For example, the compressive strength of a masonry block as defined by IS EN 771 is required as an input for designing to the Masonry Design Eurocode EN 1996.

In other cases, the harmonised technical specifications for certain products and systems involve structural design in arriving at the declared properties of the products. Eurocodes will provide the basis for design of such components, for example timber Frame or Concrete Frame Building Kits, Metal Frame Building Kits, structural metallic products and ancillaries such as trusses, metal framing, stairs, thus becoming a driver for further innovation in the industry.

In both cases, the Eurocodes should be the basis for assessing or the protocol for declaring the mechanical strength of structural construction products in the development of harmonised technical specifications under the Construction Products Directive.

The Building Regulations

The differences in structural calculation methods called up in Building Regulations across Europe hinder the movement of engineering and architectural services.

The use of Eurocodes and National Annexes to demonstrate compliance of building and civil engineering works with National Building Regulations and with the essential requirements No.1 (mechanical resistance and stability) and No. 2 (safety in case of fire) of the Construction Products Directive, Council Directive 89/106/EEC should facilitate the freedom to provide services across Europe.

The European Commission's Recommendation of 11 December 2003 on the implementation and use of Eurocodes for construction works and structural construction products states Member States should refer to Eurocodes in their National Regulations.

Public Procurement Directive

The EU Public Procurement Directive requires that technical specifications "afford equal access for tenderers" and do not create obstacles to competition.



The Eurocodes and the accompanying National Annexes will form the preferred basis for specifying contracts under the Public Procurement Directive.

It is mandatory that Member States accept designs to the Eurocodes. While, the Directive does not exclude the use of other methods, “equivalence” will need to be demonstrated by the tenderer.

These drivers will create the necessary momentum for the mainstreaming of Eurocodes and help to secure their status as the main design tools in the long term.

While the Eurocodes open the European market, the European Commission and CEN are working to disseminate them further a field also. They have been promoting Eurocodes in many third countries such as China, Russia, Thailand etc. Eurocodes have been used across the world in places such as New Zealand, Libya, Lebanon and of course across Europe.

Implementation in Ireland

The NSAI has monitored the development of the Eurocodes with the assistance of the National Eurocodes Advisory Committee (NEAC).

The NEAC is made up of Liaison Engineers (LOs), each of whom specialise in the development of a particular Eurocode, the Department of the Environment, Heritage and Local Government (DEHLG), NRA, OPW and professional bodies.

NSAI transposed all 58 Parts of the Eurocodes into National Standards that is, the I.S. ENs between 2002 and 2007. See Appendix A for details.

During this period, NSAI, in collaboration with NEAC, DEHLG, OPW, NRA and Industry set about calibrating the Eurocodes for use in Ireland. This entailed fixing the Nationally Determined Parameters and publishing the Irish National Annexes. Irish National Annexes enable the Eurocodes to be used for projects constructed in Ireland; other countries National Annexes cannot be used for these projects.

In calibrating the Eurocodes in Ireland, the objective is to secure an *optimum balance* whereby safety margins are reasonable but not excessive; that resulting capital costs are justified; and are weighed against the benefits of longer useful life (deferred replacement) and lower annual maintenance costs.

For information on the latest versions, amendments and corrigenda of Eurocodes or Irish National Annexes refer to NSAI’s standards website www.standards.ie. This website also gives information on withdrawn and superseded standards.



National Studies:

A number of national studies were carried out on various parts of the Eurocodes in order to inform the drafting of the National Annexes.

DEHLG and the Irish Concrete Federation (ICF) co-funded studies in the areas of Concrete **(IS EN 1992)** and Masonry **(IS EN 1996)**.

DEHLG, NRA and OPW co-funded a study on Wind loading **(IS EN 1991-1-4)** and DEHLG funded a study on Fire loading **(IS EN 1991-1-2)**.

The general aims of these studies were twofold, namely:

- To make a technical evaluation of the implications of particular Eurocodes in relation to current structural design practice in Ireland, and
- To draft Irish National Annexes of such Eurocodes for incorporation in the I.S. EN.

The studies required a comparative structural design to be carried out and the information subsequently used to inform the technical inputs of draft Irish National Annexes, which were produced as part of the study also. Reports on the four studies referred to above are available on the NSAI website www.nsaie.com

Other studies have been carried out on the Eurocode Parts e.g. the NRA has assessed all bridge parts of the Eurocodes for use in Ireland.

National Provisions

Another aspect of National Implementation is the modification of National Provisions (e.g. Procurement documents, Regulations etc) to enable the Eurocode to be used. The following sections explain the changes being made by NSAI, DEHLG, NRA and OPW

National Standards Authority of Ireland (NSAI):

March 2010 has been set as the date of withdrawal of all conflicting standards with Eurocodes. NSAI will be withdrawing the following standards:

- IS 326 Use of Concrete
- IS 325 Use of Masonry Parts 1 and 2
- IS 444 Structural Use of Timber
- IS 193 Timber Trussed Rafters for Roofs

Irish Standards partly covered by Eurocodes will be reviewed to delete conflicting information and re-published to reflect the changed scope. The re-published documents



may be used as non-contradictory complementary information. It is likely that the following standards will be revised in this way:

- IS 325 Use of Masonry Parts 1 and 2
- IS 444 Structural Use of Timber
- IS 193 Timber Trussed Rafters for Roofs

BSI British Standards has published a list of structural design codes it plans to withdraw in March 2010. See Appendix B.

The withdrawn Irish and British Standards will still be available and remain in respective catalogues for historical information purposes, but will no longer be maintained. That means that there is no five-year review when a committee considers the currency of a standard and decides whether to confirm, revise, or withdraw it.

For information on the latest versions, amendments and corrigenda of Eurocodes or Irish National Annexes refer to NSAI's standards website www.standards.ie. This website also gives information on withdrawn and superseded standards.

Department of Environment Heritage and Local Government (DEHLG)

The Irish Building Regulations are divided into 12 Parts (A-M) each covering a certain subject. Each Part is accompanied by a Technical Guidance Document (TGD) (A-M) which contains guidance that if followed is considered prima facie evidence of compliance with the relevant Requirements of the Regulations.

Any reference to a technical specification in the TGDs is a reference to so much of the specification as is relevant in the context in which it arises. A reference to a technical specification is to the latest edition (including any amendments, supplements or addenda) current at the date of publication of the relevant TGD. However, if this version of the technical specification is subsequently revised or updated by the issuing body, the new version may be used as a source of guidance provided that it continues to address the relevant requirements of the Regulations.

Part A of the Building Regulations deals with Structure and Part B with Fire Safety. The accompanying technical guidance documents TGD A (Structure) and TGD B (Fire Safety) already recognise the Eurocodes in principle and permit their use with Irish National Annexes. This means Eurocodes may be used once the associated Irish National Annexes are available.

The TGDs of relevant Building Regulations (Part A and B) will be updated by making specific references to the Eurocodes & Irish NAs, once available. Any references to withdrawn conflicting national standards e.g. IS 325 Masonry, IS 326 Concrete, will also be removed during this update. Once in force, designs carried out in accordance with



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the Eurocodes and accompanying Irish National Annexes will become the prima facie method of demonstrating compliance with the relevant aspects of the Building Regulations.

It should be noted the Requirements of the Building Regulations are performance based and not reliant on particular standards being used. They do not prohibit the use of alternative standards to those referred to in the TGD provided that the relevant Requirements of the Regulations are complied with. The use of withdrawn standards is however not recommended, withdrawn standards are no longer maintained or reviewed by national standards organisations e.g. NSAI, BSi etc.

In addition, designers should avoid the inappropriate mixing of I.S. ENs and withdrawn Irish or British Standards.

The Department intends to publish a draft TGD A for public consultation in the first half of 2010, subject to availability of all Irish National Annexes.

National Roads Authority – Eurocodes Policy

NRA funded schemes procured post March 2010 will require designs to be in accordance with the new structural Eurocodes and the relevant National Annexes published by NSAI.

This will require amendments to the NRA DMRB, in particular replacing previous requirements for bridge structures to be designed in accordance with BS5400. Advice on how designers will be required to implement Eurocodes in conjunction with the NRA DMRB is currently being finalised and will be published as part of a revision of Volume 1 of the NRA DMRB as soon as this is complete. In the interim, project specific guidance will be included within contract documentation for all design procured post March 2010.

During the initial stages of implementation of the Eurocodes on NRA funded schemes, one structure from each family of structures shall require a Category 3 check in accordance with NRA BD2. This requirement will be defined within the contract documents for specific projects.

The Office of Public Works - Eurocodes Policy

The Public Procurement Directive covers the design and construction of public works and those of statutory undertakers. The Eurocodes, taken with their National Annexes, will become the main design tool for projects under the Public Procurement Directive, giving a presumption of conformity with all European legal requirements for mechanical resistance, stability and fire in relation to the structure.

As a public body, the OPW will specify structural Eurocodes for the design of all its structures in Ireland after March 2010 when all Eurocodes and their Irish national annexes are published. Since February 2010 any tenders for consultancy services have stated that the design services for projects must be in accordance with Eurocodes.



Appendix A

Eurocode Part	Publication as an adopted Irish standard (I.S. EN)
Eurocode 0 - Basis of structural design	
Basis of structural design	I.S. EN 1990: 2002
Basis of structural design	I.S. EN 1990: 2002 Amendment
Eurocode 1 – Actions on structures	
Part 1-1: General actions - Densities, self-weight and imposed loads	I.S. EN 1991-1-1: 2002
Part 1-2: General actions - Actions on structures exposed to fire	I.S. EN 1991-1-2: 2002
Part 1-3: General actions - Snow loads	I.S. EN 1991-1-3: 2003
Part 1-4: General actions - Wind actions	I.S. EN 1991-1-4: 2005
Part 1-5: General actions - Thermal actions	I.S. EN 1991-1-5: 2003
Part 1-6: General actions - Actions during execution	I.S. EN 1991-1-6: 2005
Part 1-7: General actions - Accidental actions	I.S. EN 1991-1-7: 2006
Part 2: Traffic loads on bridges	I.S. EN 1991-2: 2003
Part 3: Actions induced by cranes and machinery	I.S. EN 1991-3: 2006
Part 4: Silos and tanks	I.S. EN 1991-4: 2006
Eurocode 2 – Design of concrete structures	
Part 1-1: General rules and rules for buildings	I.S. EN 1992-1-1: 2005
Part 1-2: General rules - Structural fire design	I.S. EN 1992-1-2: 2005
Part 2: Concrete bridges - Design and detailing rules	I.S. EN 1992-2: 2005
Part 3: Liquid retaining and containment structures	I.S. EN 1992-3: 2006
Eurocode 3 – Design of steel structures	
Part 1-1: General rules and rules for buildings	I.S. EN 1993-1-1: 2005
Part 1-2: GR - Structural fire design	I.S. EN 1993-1-2: 2005

Eurocode Part	Publication as an adopted Irish standard (I.S. EN)
Part 1-3: GR - Supplementary rules for cold-formed thin gauge members and sheeting	I.S. EN 1993-1-3: 2006
Part 1-4: GR - Supplementary rules for stainless steels	I.S. EN 1993-1-4: 2006
Part 1-5: Plated structural elements	I.S. EN 1993-1-5: 2006
Part 1-6: General - Strength and stability of shell structures	I.S. EN 1993-1-6: 2007
Part 1-7: General - Strength of planar plated structures loaded transversely	I.S. EN 1993-1-7: 2007
Part 1-8: Design of joints	I.S. EN 1993-1-8: 2005
Part 1-9: Fatigue strength of steel structures (will replace ENV 1993-1-1:1992)	I.S. EN 1993-1-9: 2005
Part 1-10: Material toughness and through-thickness properties	I.S. EN 1993-1-10: 2005
Part 1-11: Design of structures with prefabricated tension components	I.S. EN 1993-1-11: 2006
Part 1-12: Additional rules for the extension of EN 1993 up to grades S700	I.S. EN 1993-1-12: 2007
Part 2: Steel Bridges	I.S. EN 1993-2: 2006
Part 3-1: Towers, masts and chimneys - Towers and masts	I.S. EN 1993-3-1:2006
Part 3-2: Towers, masts and chimneys - Chimneys	I.S. EN 1993-3-2:2006
Part 4-1: Silos, tanks and pipelines - Silos	I.S. EN 1993-4-1: 2007
Part 4-2: Silos, tanks and pipelines - Tanks	I.S. EN 1993-4-2: 2007
Part 4-3: Silos, tanks and pipelines - Pipelines	
Eurocode 3 – Design of steel structures (continued)	
Part 5: Piling	I.S. EN 1993-5: 2007
Part 6: Crane supporting structures	I.S. EN 1993-6: 2007
Eurocode 4 – Design of composite steel and concrete structures	
Part 1-1: General rules and rules for buildings	I.S. EN 1994-1-1: 2005
Part 1-2: General rules - Structural fire design	I.S. EN 1994-1-2: 2005
Part 2: Bridges	I.S. EN 1994-2: 2005

Eurocode Part	Publication as an adopted Irish standard (I.S. EN)
Eurocode 5 – Design of timber structures	
Part 1-1: General - Common rules and rules for buildings	I.S. EN 1995-1-1: 2005
Part 1-2: General - Structural fire design	I.S. EN 1995-1-2: 2005
Part 2: Bridges	I.S. EN 1995-2: 2005
Eurocode 6 – Design of masonry structures	
Part 1-1: Common rules for reinforced and unreinforced masonry structures	I.S. EN 1996-1-1: 2005
Part 1-2: General rules - Structural fire design	I.S. EN 1996-1-2: 2005
Part 2: Design, Selection of materials and execution of masonry	I.S. EN 1996-2: 2006
Part 3: Simplified calculation methods and simple rules	I.S. EN 1996-3: 2006
Eurocode 7 – Geotechnical design	
Part 1: General rules	I.S. EN 1997-1: 2005
Part 2 Ground investigation and testing	I.S. EN 1997-2: 2007
Eurocode 8 – Design of structures for earthquake resistance	
Part 1: General rules, seismic actions and rules for buildings	I.S. EN 1998-1: 2005
Part 2: Bridges	I.S. EN 1998-2: 2006
Part 3: Strengthening and repair of buildings	I.S. EN 1998-3: 2005
Part 4: Silos, tanks and pipelines	I.S. EN 1998-4: 2006
Part 5: Foundations, retaining structures and geotechnical aspects	I.S. EN 1998-5: 2005
Part 6: Towers, masts and chimneys	I.S. EN 1998-6: 2005
Eurocode 9 – Design of aluminium structures	
Part 1-1: General rules	I.S. EN 1999-1-1: 2007
Part 1-2: General - Structural fire design	I.S. EN 1999-1-2: 2007
Part 1-3: Additional rules for structures susceptible to fatigue	I.S. EN 1999-1-3: 2007

Eurocode Part	Publication as an adopted Irish standard (I.S. EN)
Part 1-4: Supplementary rules for trapezoidal sheeting	I.S. EN 1999-1-4: 2007
Part 1-5: Supplementary rules for shell structures	I.S. EN 1999-1-5: 2007

Appendix B

List of Superseded British Standards that are to be withdrawn on 31 March 2010:

Loading for buildings

BS 6399-1:1996 Loading for buildings. Code of practice for dead and imposed loads

Superseded by EN 1991

BS 6399-2:1997 Loading for buildings. Code of practice for wind loads

Superseded by EN 1991

BS 6399-3:1988 Loading for buildings. Code of practice for imposed roof loads

Superseded by EN 1991

Structural use of concrete

BS 8110-1:1997 Structural use of concrete. Code of practice for design and construction

Superseded by EN 1992

BS 8110-2:1985 Structural use of concrete. Code of practice for special circumstances

Superseded by EN 1992

BS 8110-3:1985 Structural use of concrete. Design charts for singly reinforced beams, doubly reinforced beams and rectangular columns

Superseded by EN 1992

BS 8007: 1987 Code of practice for design of concrete structures for retaining aqueous liquids

Superseded by EN 1992

Structural use of steel

BS 5950-1:2000 Structural use of steelwork in building. Code of practice for design. Rolled and welded sections.

Superseded by EN 1993

BS 5950-2:2001 Structural use of steelwork in building. Specification for materials, fabrication and erection. Rolled and welded sections

Superseded by EN 1994

BS 5950-3.1:1990 Structural use of steelwork in building. Design in composite construction. Code of practice for design of simple and continuous composite beams

Superseded by EN 1994

BS 5950-4:1994 Structural use of steelwork in building. Code of practice for design of composite slabs with profiled steel sheeting

Superseded by EN 1994

BS 5950-5:1998 Structural use of steelwork in building. Code of practice for design of cold formed thin gauge sections

Superseded by EN 1993

BS 5950-6:1995 Structural use of steelwork in building. Code of practice for design of light gauge profiled steel sheeting

Superseded by EN 1993

BS 5950-7: 1992 Structural use of steelwork in building. Specification for materials and workmanship: cold formed sections

Obsolescent

BS 5950-8:2003 Structural use of steelwork in building. Code of practice for fire resistant design

Superseded by EN 1993

BS 5950-9:1994 Structural use of steelwork in building. Code of practice for stressed skin design

Superseded by EN 1993

BS 449-2: 1969 Specification for the use of structural steel in building. Metric units

Superseded by EN 1993

BS 4604-1: 1970 Specification for the use of high strength grip bolts in structural steelwork. Metric series. General grade

Superseded by EN 1993

BS 4604-2: 1970 Specification for the use of high strength grip bolts in structural steelwork. Metric series.

Higher grade (parallel shank)

Superseded by EN 1993

Structural use of timber

BS 5268-2:2002 Structural use of timber. Code of practice for permissible stress design, materials and workmanship

Superseded by EN 1995

BS 5268-3:2006 Structural use of timber. Code of practice for trussed rafter roofs

Superseded by EN 1995

BS 5268-4.1:1978 Structural use of timber. Fire resistance of timber structures. Recommendations for calculating fire resistance of timber members

Superseded by EN 1995

BS 5268-4.2:1990 Structural use of timber. Fire resistance of timber structures. Recommendations for calculating fire resistance of timber stud walls and joisted floor constructions

Superseded by EN 1995

BS 5268-5:1989 Structural use of timber. Code of practice for the preservative treatment of structural timber

Obsolescent

BS 5268-6.1:1996 Structural use of timber. Code of practice for timber frame walls. Dwellings not exceeding seven storeys

Superseded by EN 1995

BS 5268-6.2:2001 Structural use of timber. Code of practice for timber frame walls. Buildings other than dwellings not exceeding seven storeys

Superseded by EN 1995

BS 5268-7.1:1989 Structural use of timber. Recommendations for the calculation basis for span tables. Domestic floor joists

Superseded by EN 1995

BS 5268-7.2:1989 Structural use of timber. Recommendations for the calculation basis for span tables. Joists for flat roofs

Superseded by EN 1995

BS 5268-7.3:1989 Structural use of timber. Recommendations for the calculation basis for span tables. Ceiling joists

Superseded by EN 1995

BS 5268-7.4:1989 Structural use of timber. Ceiling binders

Superseded by EN 1995

BS 5268-7.5:1990 Structural use of timber. Recommendations for the calculation basis for span tables. Domestic rafters

Superseded by EN 1995

BS 5268-7.6:1990 Structural use of timber. Recommendations for the calculation basis for span tables. Purlins supporting rafters

Superseded by EN 1995

BS 5268-7.7:1990 Structural use of timber. Recommendations for the calculation basis for span tables. Purlins supporting sheeting or decking

Superseded by EN 1995

Structural use of masonry

BS 5628-1:2005 Code of practice for the use of masonry. Structural use of unreinforced masonry

Superseded by EN 1996

BS 5628-2:2005 Code of practice for use of masonry. Structural use of reinforced and prestressed masonry

Superseded by EN 1996

BS 5628-3:2005 Code of practice for use of masonry. Materials and components, design and workmanship

Superseded by EN 1996

Geotechnics

BS 8002:1994 Code of practice for earth retaining structures

Superseded by EN 1997-1

BS 8004: 1986 Code of practice for foundations

Superseded by EN 1997-1

Structural use of Aluminium

BS 8118-1:1991 Structural use of aluminium. Code of practice for design

Superseded by EN 1999

BS 8118-2:1991 Structural use of aluminium. Specification for materials, workmanship and protection

Superseded by EN 1999

Bridges

BS 5400-1:1988 Steel, concrete and composite bridges. General statement

Superseded by EN 1990, EN 1991

BS 5400-2: 2006 Steel, concrete and composite bridges. Specification for loads

Superseded by EN 1990, EN 1991

BS 5400-3:2000 Steel, concrete and composite bridges. Code of practice for design of steel bridges

Superseded by EN 1993

BS 5400-4: 1990 Steel, concrete and composite bridges. Code of practice for design of concrete bridges

Superseded by EN 1992

BS 5400-5:2005 Steel, concrete and composite bridges. Code of practice for design of composite bridges

Superseded by EN 1994

BS 5400-6: 1999 Steel, concrete and composite bridges. Specification for materials and workmanship, steel

Superseded by EN 1090-2

BS 5400-7:1978 Steel, concrete and composite bridges. Specification for materials and workmanship, concrete, reinforcement and prestressing tendons

Superseded by EN 1992

BS 5400-8: 1978 Steel, concrete and composite bridges. Recommendations for materials and workmanship, concrete, reinforcement and prestressing tendons

Superseded by EN 1992

BS 5400-9.1 and 9.2 bearings - not affected

BS 5400-10C: 1999 Steel, concrete and composite bridges. Charts for classification of details for fatigue

Towers, Masts and Chimneys

BS 8100-1:1986 Lattice towers and masts. Code of practice for loading Code of practice for loading

Superseded by EN 1993

BS 8100-2:1986 Lattice towers and masts. Guide to the background and use of Part 1 'Code of practice for loading'

Superseded by EN 1993

BS 8100-3:1999 Lattice towers and masts. Code of practice for strength assessment of members of lattice towers and masts

Superseded by EN 1993

BS 8100-4:1995 Lattice towers and masts. Code of practice for loading of guyed masts

Superseded by EN 1993

BS 4076:1989 Specification for steel chimneys

Superseded by EN 1993