SRI LANKA STANDARD
NA to SLS EN 1993-1-8: 2017

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SRI LANKA NATIONAL ANNEX TO EUROCODE 3: DESIGN OF STEEL STRUCTURES - PART 1-8: DESIGN OF JOINTS

SRI LANKA STANDARDS INSTITUTION

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Gr. 2

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This Standard does not purport to include all the necessary provisions of a contract.

Committee responsible for this National Annex

The preparation of this National Annex was entrusted by the Working Group on Formulation of National Annexes to Eurocode 3, Design of Steel Structures., appointed by the Sectoral Committee on Building & Construction Materials, upon which the following members were represented:

Dr.(Ms)MTP Hettiarachchi (Chairperson)	University of Moratuwa
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Eng. BVDN Chandrasiri	Road Development Authority
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National Annex (informative) to SLS EN 1993-1-8:2014, Eurocode 3: Design of Steel Structures – Part 1-8: Design of joints

Introduction

This National Annex has been prepared based on **EN 1993-1-8:2005** incorporating corrigenda December 2005 and July 2009 by the Working Group on Formulation of National Annexes to Eurocode 3, Design of Steel Structures. It is to be used in conjunction with **SLS EN 1993-1-8:2014** along with any further revision, amendment or corrigendum thereto.

This National Annex was approved by the Sectoral Committee on Building and Construction Materials and was authorized for publication as a Sri Lanka National Annex by the Council of the Sri Lanka Standards Institution on 2017-12-04.

In the preparation of this standard the assistance derived from the publications of the European Committee for Standardization (CEN) and British Standards Institution (BSI) are gratefully acknowledged.

NA.1 Scope

This National Annex gives:

a) The decisions for the National Determined Parameters described in the following sub clauses of **SLS EN 1993-1-8:2014**
   - 1.2.6
   - 2.2(2)
   - 3.1.1(3)
   - 3.4.2(1)
   - 5.2.1(2)
   - 6.2.7.2(9)

b) References to non-contradictory complementary information.

NA.2 Nationally Determined Parameters

NA.2.1 General

Decisions for the Nationally Determined Parameters decided in **SLS EN 1993-1-8:2014** are given in **NA 2.2** to **NA 2.7**

NA.2.2 Reference standards, Group 6: Rivets [SLS EN 1993-1-8: 2014, 1.2.6]

BS 4620: 1970 should be used for the dimensions, head shapes and materials for rivets. For S235 and S275 steel grades the design resistance should be limited to the yield resistance as there is no separate serviceability check.

NA.2.3 Partial safety factors γ_m for joints [SLS EN 1993-1-8: 2014, 2.2(2)]

The partial factors given in Table **NA.1** should be used.

Table NA.1 – Partial safety factors, γ_M for joints

Resistance of members and cross-section	Partial Factor	Value
Resistance of bolts	γ_{M2}	1.25
Resistance of rivets	γ_{M2}	1.25
Resistance of pins	γ_{M2}	1.25
Resistance of welds	γ_{M2}	1.25
Resistance of plates in bearing [A)]	γ_{M2}	1.25
Slip resistance		
a) At ultimate limit state (category C)	γ_{M3}	1.25
b) At serviceability limit state (category B)	$\gamma_{M3,ser}$	1.10
Bearing resistance of an injection bolt	γ_{M4}	1.00
Resistance of joints in hollow section lattice girder	γ_{M5}	1.00
Resistance of pins at serviceability limit state	$\gamma_{M6,ser}$	1.00
Preload of high strength bolts	γ_{M7}	1.10

[A)] In certain circumstances deformation at serviceability might control and a γ_{M2} = 1.50 would be more appropriate. The option for deformation control applies where it is important to avoid deformation of the bolt holes. (i.e. when a_b = 1.0 a_b is defined in Table **3.4** of **BS EN 1993-1-8**). Deformation control need only be applied to the component of the bolt force acting in the direction in which avoiding deformation is important.

NA.2.4 Exclusion of bolt class [SLS EN 1993-1-8:2014, 3.1.1(3)]

Bolts of classes 5.8 and 6.8 should be excluded. Bolt classes 4.8 may be used provided they are manufactured in accordance with **ISO 898-1** and suitable procedures to avoid hydrogen embrittlement are employed in the manufacturing process.

NA.2.5 Level of preload [SLS EN 1993-1-8:2014, 3.4.2(1)]

If the preload is not explicitly used in the design calculations then no specific level of preload is required.

NA.2.6 Additional information on classification of joints [SLS EN 1993-1-8: 2014, 5.2.1(2)]

For buildings the following guidance may be used to classify joints.

Nominally pinned joints are described as "Simple Connections" in UK practice. Connections designed in accordance with the principles given in the publication "Joints in Steel Construction – Simple connections" [1] may be classified as nominally pinned joints.

Ductile partial strength joints are described as "Ductile Connections" in UK practice. They are used in plastically designed semi-continuous frames. Braced semi-continuous frames may be designed using the principles given in the publication "Semi-continuous design of braced frames [2] with connections designed to the principles given in Section 2 of "Joints in Steel Construction – Moment connections" [3]. Unbraced semi-continuous frames (known as wind moment frames) may be designed using the principles given in the publication "Wind moment design of Low rise Frames" [4].

Until experience is gained with the numerical method of calculating rotation stiffness given in **SLS EN 1993-1-8: 2014 , 6.3** and the classification by stiffness method given in **SLS EN 1993-1-8: 2014, 5.2.2** semi-continuous elastic design should only be used where either it is supported by test evidence according to **SLS EN 1993-1-8:2014 , 5.2.2.1(2)** or where it is based on satisfactory performance in a similar situation.
Connections designed in accordance with the principles given in the publication "Joints in Steel Construction – Moment connections" [3] may be classified on the basis of the guidance given in Section 2.5 of the same publication.

NA.2.7 Information on the use of equations (6.26)on effective design tension resistance [SLS EN 1993-1-8:2014, 6.2.7.2(9)]

It is only necessary to apply Equation 6.26 when a full plastic distribution of effective design tension resistance cannot be assumed. A full plastic distribution can be assumed when either:

$$F_{tx,Rd} \leq 1.9\, F_{t,Rd}$$

or

$$t_p \leq \frac{d}{1.9}\sqrt{\frac{f_u}{f_{yp}}}$$

or

$$t_p \leq \frac{d}{1.9}\sqrt{\frac{f_u}{f_{y,tc}}}$$

Where

$F_{tx,Rd}$ is the effective design tension resistance of one of the previous bolt –rows x

$F_{t,Rd}$ is the design tension resistance of an individual bolt

t_p is the end plate thickness

t_{fc} is the column flange thickness

d is the diameter of the bolt

f_{yp} is the design strength of the end plate

$f_{y,fc}$ is the design strength of the column flange

f_u is the ultimate strength of the bolt

where the effective design tension resistance has to be reduced to satisfy equation 6.26 the surplus resistance may be redistributed to bolt rows nearer the centre of compression.

NA.3 References to non-contradictory complementary information

References cited in this National annex to non-contradictory, complementary information can be found at www.steel-ncci.co.uk. While this material is likely to be technically authoritative not all of it has been reviewed by the UK national committee, and users should satisfy themselves of its fitness for their particular purpose. In particular, they should be aware that material indicated as not having been endorsed by the committee might contain elements that are in conflict with the Eurocode.

Bibiliography

Standards publications

For dated references only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[1] BS 4620: 1970 Specification for rivets for general engineering purposes.
[2] BS EN ISO 898-1, Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs.
[3] BS EN 14399-4, High strength structural bolting assemblies for preloading – System HV-Part 4: Hexagon bolt and nut assemblies.
[4] BS EN 14399-8, High strength structural bolting assemblies for preloading – System HV-Part 8: Hexagon bolt and nut assemblies.

Other publications

[5] Joints in Steel Construction. Simple connections, BCSA, SCI publication No. P212, Jointly published by the British constructional Steelwork Association and the Steel Construction Institute 2002.
[6] Design of semi-continuous braced frames , SCI publication No. P183, The Steel Construction Institute , 1997.
[7] Joints in Steel Construction. Moment connections, BCSA, SCI publication No. P207, Jointly published by the British constructional Steelwork Association and the Steel Construction Institute 1995.
[8] Wind moment design of Low rise Frames. SCI publication No. P263, The Steel Construction Institute, 1999.

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