Singapore Standards Council

SS EN 1993-1-5 : 2009 (2016)
EN 1993-1-5 : 2006, IDT

(ICS 91.010.30; 91.080.10)

SINGAPORE STANDARD

Eurocode 3 : Design of steel structures

– Part 1-5 : Plated structural elements

(This national standard is the identical implementation of EN 1993-1-5 : 2006 and is adopted with permission of CEN, Avenue Marnix 17, 1000 Brussels)

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This Singapore Standard was approved by the Building and Construction Standards Committee on behalf of the Standards Council of Singapore on 6 October 2009

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		Mr Tang Pei Luen	*JTC Corporation*
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		Dr Tam Chat Tim	*Individual Capacity*

The Technical Committee on Building Structure and Sub-structure appointed by the Building and Construction Standards Committee and responsible for the preparation of this standard consists of representatives from the following organisations:

		Name	Capacity
Chairman	:	Dr Tan Guan	*Member, Building and Construction Standards Committee*
Co-Chairman	:	Er. Chew Keat Chuan	*Building and Construction Authority*
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		Er. Tang Pei Luen	*JTC Corporation*
		Assoc Prof Susanto Teng	*Nanyang Technological University*
Co-opted Members	:	Dr Tam Chat Tim	*Individual Capacity*
		Dr Tan Teng Hooi	*Individual Capacity*
		Er. Tay Yak Hong	*Individual Capacity*

The following Technical Experts contributed in their *individual capacity* to the preparation of this standard:

Prof Richard Liew Jat Yuen (Convenor)
Er. Tay Yak Hong (Co-Convenor)
Dr Chew Sing Ping (Taskforce Leader)
Er. Patrick Choy (Secretary)
Mr Chor How Choon
Er. Sze Thiam Siong
Er. K Thanabal

The organisations in which the experts are involved are:

Building and Construction Authority
Nanyang Technological University
National University of Singapore
Setsco Services Pte Ltd
The 22nd China Metallurgical Construction Corporation
TYH Consulting Engineers

National Foreword

This Singapore Standard was prepared by the Technical Committee on Building Structure and Sub-structure under the purview of the Building and Construction Standards Committee.

This SS EN is the identical implementation of EN 1993-1-5 : 2006 'Eurocode 3 : Design of steel structures – Part 1-5 : Plated structural elements' including its Corrigendum EN 1993-1-5 : 2006 / AC : 2009 and is adopted with the permission of CEN, Rue de Stassart 36, B-1050 Brussels.

Attention is drawn to the following:

– The comma has been used throughout as a decimal marker whereas in Singapore Standards, it is a practice to use a full point on the baseline as the decimal marker.

– The Singapore Standards which implement international or European publications referred to in this document may be found in the SS Electronic Catalogue at: http://www.singaporestandardseshop.sg

The EN gives values with notes indicating where national choices may be made. Where a normative part of the EN allows for national choice to be made, the range and possible choice will be given in the normative text, and a note will qualify it as a Nationally Determined Parameter (NDP). NDPs can be a specific value for a factor, a specific level or class, a particular method or a particular application rule if several are proposed in the EN.

The requirements of this SS EN 1993-1-5 : 2009 are to be read in conjunction with the Singapore National Annex (NA) to SS EN 1993-1-5 : 2009 which contains information on the Singapore Nationally Determined Parameters and is published separately.

National choice is allowed in EN 1993-1-5 through the following clauses:

– 2.2(5)	– 8(2)	– C.2(1)
– 3.3(1)	– 9.1(1)	– C.5(2)
– 4.3(6)	– 9.2.1(9)	– C.8(1)
– 5.1(2)	– 10(1)	– C.9(3)
– 6.4(2)	– 10(5)	– D.2.2(2)

At the time of publication, this standard is expected to be used as a reference in the Building and Construction Authority's 'Approved Document – Acceptable Solutions'.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*

2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*

3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1993-1-5

October 2006

ICS 91.010.30; 91.080.10

Supersedes ENV 1993-1-5:1997
Incorporating corrigendum April 2009

English Version

Eurocode 3 - Design of steel structures - Part 1-5: Plated structural elements

Eurocode 3 - Calcul des structures en acier - Partie 1-5: Plaques planes

Eurocode 3 - Bemessung und konstruktion von Stahlbauten - Teil 1-5: Plattenbeulen

This European Standard was approved by CEN on 13 January 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1993-1-5:2006: E

Content

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Foreword

This European Standard EN 1993-1-5,, Eurocode 3: Design of steel structures Part 1.5: Plated structural elements, has been prepared by Technical Committee CEN/TC250 « Structural Eurocodes », the Secretariat of which is held by BSI. CEN/TC250 is responsible for all Structural Eurocodes.

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by April 2007 and conflicting National Standards shall be withdrawn at latest by March 2010.

This Eurocode supersedes ENV 1993-1-5.

According to the CEN-CENELEC Internal Regulations, the National Standard Organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

National annex for EN 1993-1-5

This standard gives alternative procedures, values and recommendations with notes indicating where national choices may have to be made. The National Standard implementing EN 1993-1-5 should have a National Annex containing all Nationally Determined Parameters to be used for the design of steel structures to be constructed in the relevant country.

National choice is allowed in EN 1993-1-5 through:

- 2.2(5)
- 3.3(1)
- 4.3(6)
- 5.1(2)
- 6.4(2)
- 8(2)
- 9.1(1)
- 9.2.1(9)
- 10(1)
- 10(5)
- C.2(1)
- C.5(2)
- C.8(1)
- C.9(3)
- D.2.2(2)

1 Introduction

1.1 Scope

(1) EN 1993-1-5 gives design requirements of stiffened and unstiffened plates which are subject to in-plane forces.

(2) Effects due to shear lag, in-plane load introduction and plate buckling for I-section girders and box girders are covered. Also covered are plated structural components subject to in-plane loads as in tanks and silos. The effects of out-of-plane loading are outside the scope of this document.

NOTE 1: The rules in this part complement the rules for class 1, 2, 3 and 4 sections, see EN 1993-1-1.

NOTE 2: For the design of slender plates which are subject to repeated direct stress and/or shear and also fatigue due to out-of-plane bending of plate elements (breathing) see EN 1993-2 and EN 1993-6.

NOTE 3: For the effects of out-of-plane loading and for the combination of in-plane effects and out-of-plane loading effects see EN 1993-2 and EN 1993-1-7.

NOTE 4: Single plate elements may be considered as flat where the curvature radius r satisfies:

$$r \geq \frac{a^2}{t} \tag{1.1}$$

where a is the panel width

t is the plate thickness

1.2 Normative references

(1) This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1993-1-1 *Eurocode 3 :Design of steel structures: Part 1-1: General rules and rules for buildings*