

"The way forward for the Eurocodes implementation in the Balkans"

10-11 October 2018, Tirana

Country report: **Turkey**

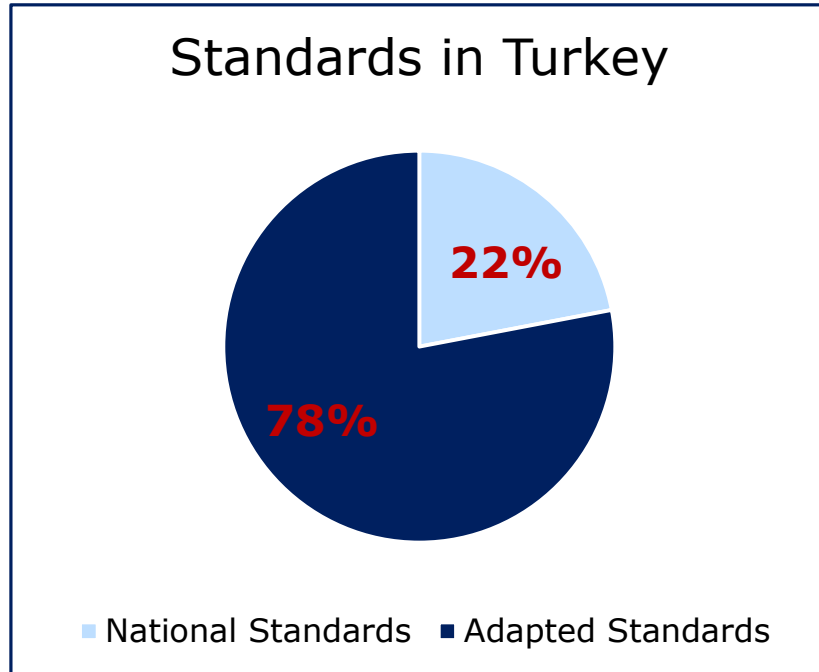
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Standardization and Code Development in Turkey

- **Turkish Standardization Institute** (TSE) is the sole authorized body for standardization in Turkey. TSE is a member of ISO/IEC since 1956 and of CEN/CENELEC since 2012.
- In accordance with terms of CEN membership, TSE adopts European Standards. If required, European standards are translated in Turkish. TSE established a professional department; translation committee, for this work. This committee uses CAT (computer-assisted translation) tools.
- As the main authority, **The Ministry of Environment and Urbanisation** (MoEU) is responsible for Construction Products Regulation (CPR 305/2011) and also manages the national policy for some design and construction codes, specifications etc.

Standardization in Turkey

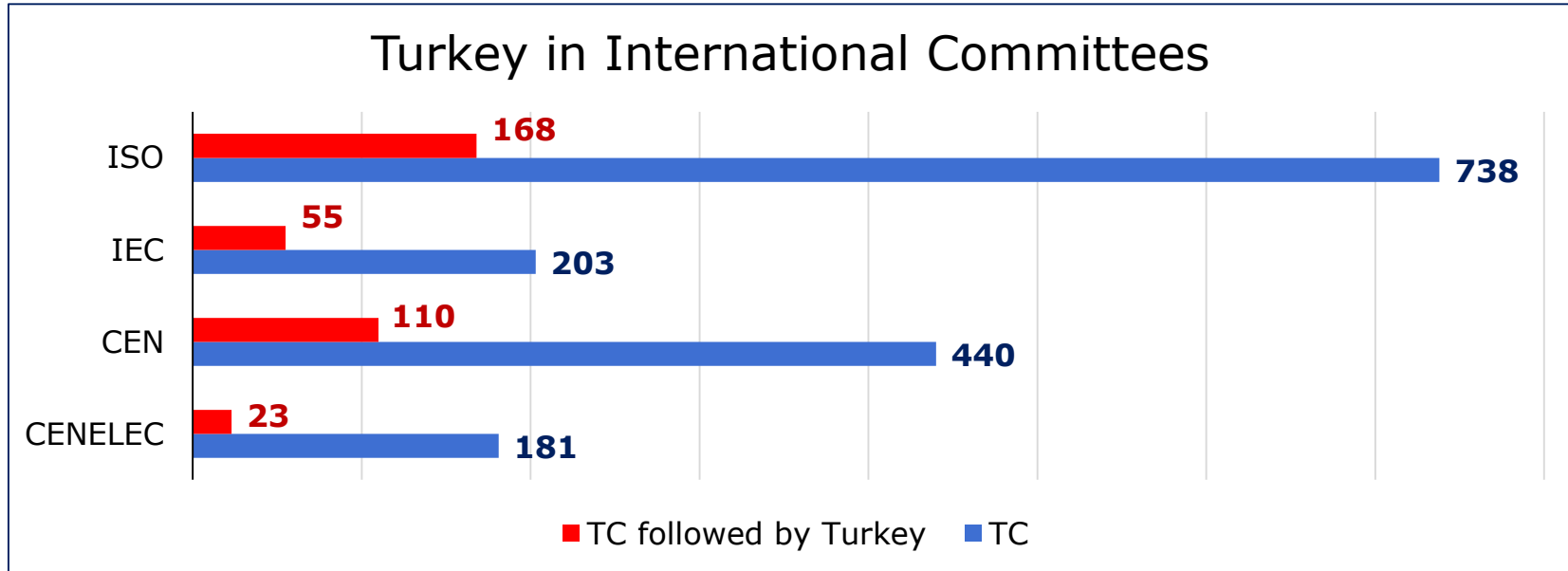
Nearly 37000 standards in total



- **National standards** (e.g. *TS 500*) are developed by **technical committees in TSE** and drafts are sent to stakeholders for their comments.
- **International standards** (e.g. *TS EN 1990*) are developed by ISO/IEC or CEN/CENELEC committees and Turkey follows and joins their work with **national mirror technical committees**.

National Mirror Technical Committees

129 national mirror technical committees (more than 1800 experts)
e.g. MTC 110 >> CEN TC/250 Structural Eurocodes



Current status of Eurocodes in Turkey

- 100% of Eurocodes are adapted.
- 44% of Eurocodes are translated in Turkish.
- EN 1992-4 has recently been published by CEN. It is on work programme of TSE for adoption. It is translated in Turkish. Turkish version is ready now.
- 1 National Annex : EN 1993-1-1

Influence of Eurocodes to the Turkish design practice and codes

- The construction engineering practices in Turkey is largely governed by the provisions in the Turkish Building Earthquake Code (TBEC).
- TBEC had its latest version approved and published in March 2018 and will be in force after 1st of January 2019.
- Almost 120 experts contributed to the whole document and all activities were coordinated by a code committee consisting of 15 members. The new TBEC is a comprehensive revision of the previous one dated 2007.
- TBEC is not a standard, but a design code. In Turkey standards are voluntary documents, unless the authority having jurisdiction put them into force.

TBEC - 2019

- The new code consists of 17 chapters. Most of them are revised where there are new chapters on high-rise, seismically isolated, cold-formed steel and wooden buildings within the code.
- Some parts of the Eurocodes are incorporated to TBEC. Especially new parts have benefited from Eurocodes.

TBEC - Chapter 1: Basis of design

In the case of using testing as a tool for design, material and product properties shall be determined according to EN 1990 Annex D

EN 1990:2002 (E)

Annex D (informative) Design assisted by testing

D1 Scope and field of application

- (1) This annex provides guidance on 3.4, 4.2 and 5.2.
- (2) This annex is not intended to replace acceptance rules given in harmonised European product specifications, other product specifications or execution standards.

TBEC- Chapter 7: Design of reinforced concrete structures

If the concrete strength class is C50 and above, use EN 1992-1 modelling approach.

TS 500: Standard for reinforced concrete structures

$$\lambda = 0,8 \quad \text{for } f_{ck} \leq 50 \text{ MPa} \quad (3.19)$$

$$\lambda = 0,8 - (f_{ck} - 50)/400 \quad \text{for } 50 < f_{ck} \leq 90 \text{ MPa} \quad (3.20)$$

and

$$\eta = 1,0 \quad \text{for } f_{ck} \leq 50 \text{ MPa} \quad (3.21)$$

$$\eta = 1,0 - (f_{ck} - 50)/200 \quad \text{for } 50 < f_{ck} \leq 90 \text{ MPa} \quad (3.22)$$

Note: If the width of the compression zone decreases in the direction of the extreme compression fibre, the value ηf_{cd} should be reduced by 10%.

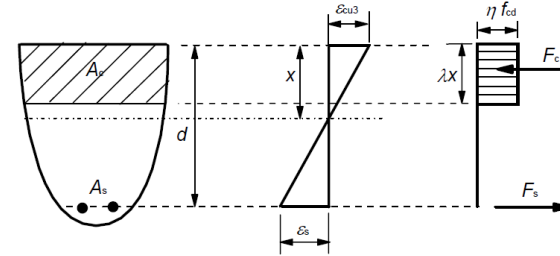


Figure 3.5: Rectangular stress distribution

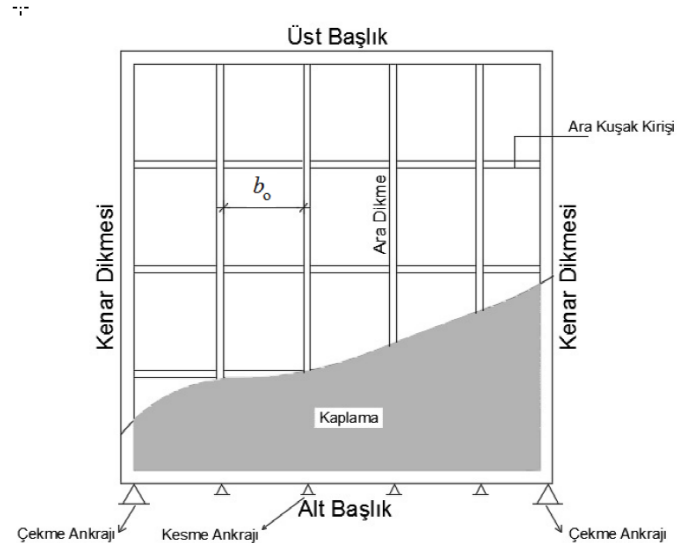
TBEC- Chapter 10: Design of steel structures - cold-formed members and sheeting

Use EN 1993-1-3 approach for some design aspects referring to subsection «5.5 Local and distortional buckling»



TBEC- Chapter 12: Design of wooden structures

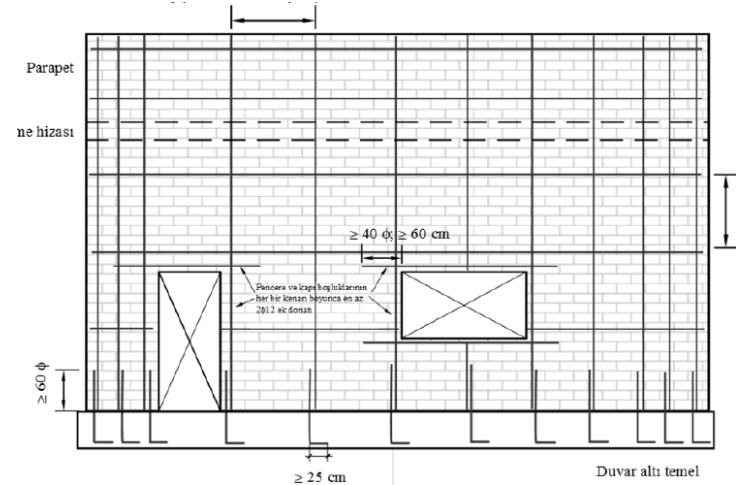
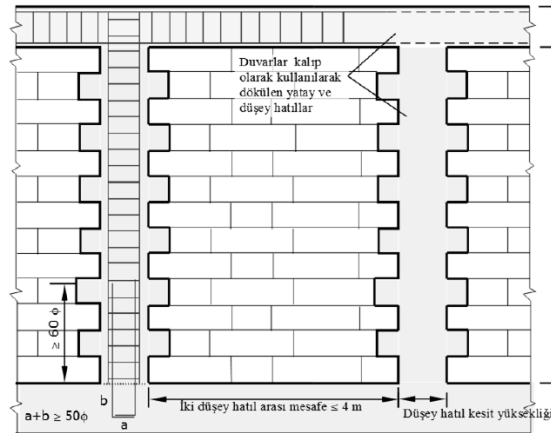
The chapter requires to follow EN 1995 for most of design aspects and gives some special provisions for sheet type bearing walls.



Şekil 12.1

TBEC - Chapter 11: Design of masonry structures

- The chapter is mostly based on EN 1996-1 and may be traced as non-contradictory complementary information.
- Two new systems are introduced which are not in practice in Turkey: Confined masonry & reinforced masonry



TBEC- Chapter 14: Design of seismically isolated structures

The chapter gives design rules and requires prototype and acceptance tests for anti-seismic devices according to EN 15129

Practice: In high seismic regions, publicly owned hospitals with bed capacity more than 100 are required to be built with isolating devices since 2013. Now there are nearly 60 buildings.

TBEC- Chapter 15: Design of high-rise buildings



Practice: For both type of buildings «peer review» is required. It is a new tool for Turkish practice.

TBEC- Chapter 16: Foundations and geotechnical design

- The chapter introduces ultimate limit state design based on EN 1997.
- ULSD is a not a common method among engineers in Turkey.

Table A.5 - Partial resistance factors (γ_R) for spread foundations

Resistance	Symbol	Set		
		R1	R2	R3
Bearing	$\gamma_{R,v}$	1,0	1,4	1,0
Sliding	$\gamma_{R,h}$	1,0	1,1	1,0

Tablo 16.2. Yüzeysel Temeller İçin Dayanım Katsayıları

Dayanımın Türü	Dayanım Katsayısı Simgesi	Dayanım Katsayısı Değeri
Temel Taşıma Gücü	γ_{Rv}	1.4
Sürtünme Direnci	γ_{Rh}	1.1
Pasif Direnç	γ_{Rp}	1.4

New code for design of steel structures

- A new code was published in February 2016 and now in force.
- It is based on ANSI/AISC 360-10 (Specification for Structural Steel Buildings) and **not compatible** with EN 1993.
- However it makes some references to EN 1991 (Loads) and fully follows EN 1090 (Execution).
- It gives two alternatives to the designer:
 - Load and Resistance Factor Design (LRFD)
 - Allowable Strength Design (ASD)
- ASD is the design method historically used in Turkey, and it is concluded by the committee that a transition period is needed to adopt LRFD.

Last words

- *There are some other issues that Eurocodes are taken as reference document through TBEC or at least checked for compatibility.*
- *It is believed that engineers in Turkey will become more familiar with Eurocodes while using TBEC.*

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Thank you for your attention!

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Stay in touch



<http://eurocodes.jrc.ec.europa.eu/>