EU MS Case study 2: Belgium & Luxembourg

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Why NATIONAL ANNEXES?

In a Eurocode Part (= EN standard), there are **procedures, values, or classes recommendations**, for which an agreement could not be reached within CEN TC250 sub-committees.

These are **Nationally Determined Parameters (NDP)**

For each of them, a **NOTE in the EN standard**:  
- indicates that a **National choice** should be given in a **NATIONAL ANNEX** to this Eurocode Part and  
- gives a **recommendation for a National choice** that provides an acceptable level of reliability.
Nationally Determined Parameters

Number: 1504 (all EUROCODES Parts)

Percentage of NDPs

<table>
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</tbody>
</table>
National Annexes may only contain information on those NDPs which are left open for national choice:

- **Values and/or classes** where alternatives are given

- **Values to be used** where a **symbol** only is given

- **Country specific data** (geographical, climatic, etc.)

- **Procedures to be used** where alternatives are given
Values and/or classes where alternatives are given

Example from EN 1991-1-1 "Imposed loads"

<table>
<thead>
<tr>
<th>Categories of loaded areas</th>
<th>( Q_k ) [kN/m²]</th>
<th>( Q_i ) [kN]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Floors</td>
<td>1.5 to 2.0</td>
<td>2.0 to 3.0</td>
</tr>
<tr>
<td>- Stairs</td>
<td>2.0 to 4.0</td>
<td>2.0 to 4.0</td>
</tr>
<tr>
<td>- Balconies</td>
<td>2.5 to 4.0</td>
<td>2.0 to 3.0</td>
</tr>
<tr>
<td><strong>Category B</strong></td>
<td>2.0 to 3.0</td>
<td>1.5 to 4.5</td>
</tr>
<tr>
<td><strong>Category C</strong></td>
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</tr>
<tr>
<td>- C1</td>
<td>2.0 to 3.0</td>
<td>3.0 to 4.0</td>
</tr>
<tr>
<td>- C2</td>
<td>3.0 to 4.0</td>
<td>2.5 to 7.0 (4.0)</td>
</tr>
<tr>
<td>- C3</td>
<td>3.0 to 5.0</td>
<td>4.0 to 7.0</td>
</tr>
<tr>
<td>- C4</td>
<td>4.5 to 5.0</td>
<td>3.5 to 7.0</td>
</tr>
<tr>
<td>- C5</td>
<td>5.0 to 7.5</td>
<td>3.5 to 4.5</td>
</tr>
<tr>
<td><strong>Category D</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- D1</td>
<td>4.0 to 5.0</td>
<td>3.5 to 7.0 (4.0)</td>
</tr>
<tr>
<td>- D2</td>
<td>4.0 to 5.0</td>
<td>3.5 to 7.0</td>
</tr>
</tbody>
</table>
Values to be used where a symbol only is given

Example from EN 1991-1-5 “Thermal actions”:

6.1.5 Simultaneity of uniform and temperature difference components

(1) If it is necessary to take into account both the temperature difference $\Delta T_{M,\text{heat}}$ (or $\Delta T_{M,\text{cool}}$) and the maximum range of uniform bridge temperature component $\Delta T_{N,\exp}$ (or $\Delta T_{N,\text{con}}$) assuming simultaneity (e.g. in case of frame structures) the following expression may be used (which should be interpreted as load combinations):

$$\Delta T_{M,\text{heat}} \text{ (or } \Delta T_{M,\text{cool}}\text{)} + \omega_N \Delta T_{N,\exp} \text{ (or } \Delta T_{N,\text{con}}\text{)} \quad (6.3)$$

or

$$\omega_M \Delta T_{M,\text{heat}} \text{ (or } \Delta T_{M,\text{cool}}\text{)} + \Delta T_{N,\exp} \text{ (or } \Delta T_{N,\text{con}}\text{)} \quad (6.4)$$

where the most adverse effect should be chosen.

NOTE 1: The National annex may specify numerical values of $\omega_N$ and $\omega_M$. If no other information is available, the recommended values for $\omega_N$ and $\omega_M$ are:

$$\omega_N = 0.35$$

$$\omega_M = 0.75$$
Country specific data: Belgian National Annex to EN 1991-1-4 (wind)

- $\nu_{b,0} = 26 \text{ m/sec}$
- $\nu_{b,0} = 25 \text{ m/sec}$
- $\nu_{b,0} = 24 \text{ m/sec}$
- $\nu_{b,0} = 23 \text{ m/sec}$

Vitesse de référence du vent $\nu_{b,0} [\text{m/sec}]$
Procedures to be used where alternatives are given

Example from EN 1991-1-2 “Actions on structures exposed to fire”:

Figure 1 — Alternative design procedures
NBN (Belgian Bureau of Standards):

- 58 Working Groups to draft the Belgian National Annexes (ANB)
- Projects in Flemish and French submitted to public enquiry (6 month)
- National Annexes published as NBN standards (December 2011)
<table>
<thead>
<tr>
<th>ANB EUROCODES</th>
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### Belgian National Annexes: dashboard

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### Eurocodes Implementation in the Balkans, 10-11 October 2018, Tirana

**EUROCODES**

“The way forward for the Eurocodes implementation in the Balkans”, 10-11 October 2018, Tirana
Luxembourg National Annexes (ILNAS)

Based on the Belgian National Annexes

- One Working Group of 6 Experts to draft the 58 projects for Luxembourg (Dec. 2009 – March 2010):
  2 Belgians (reporters) from NBN/SECO
  4 Experts from Luxembourg

- Public enquiry (June 2010-March 2011)

- Projects commented to be revised by working groups including the authors of comments (May-August 2011)

- Publication as ILNAS standards (December 2011)
The projects of Luxembourg National Annexes have been notified to the European Commission.

The 58 projects may be freely downloaded in the 22 languages of the European Union on:


Year: 2010
Country: Luxembourg
Product type: B00: Construction
### Example of AN-LU: EN 1991-1-3 « Snow loads »

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Parameters defined at the national level</th>
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</thead>
<tbody>
<tr>
<td>1.1(2) NOTE 1</td>
<td>Not applicable: the various altitudes within Luxembourg do not exceed 600 m.</td>
</tr>
<tr>
<td>1.1(3) NOTE 2</td>
<td>Case A contained in table A.1 of Annex A shall apply. The loads are not differentiated based on the applicable site conditions.</td>
</tr>
<tr>
<td>1.1(4) NOTE 3</td>
<td>Annex B shall not apply.</td>
</tr>
<tr>
<td>2(3) NOTE</td>
<td>Exceptional snow loads shall not apply.</td>
</tr>
<tr>
<td>2(4) NOTE</td>
<td>Exceptional accumulations of snow shall not apply.</td>
</tr>
<tr>
<td>3.3(1) NOTE 2</td>
<td>None of the project locations requires the application of exceptional conditions.</td>
</tr>
<tr>
<td>3.3(3) NOTE 2</td>
<td>None of the project locations requires the application of exceptional conditions.</td>
</tr>
</tbody>
</table>
| 4.1(1) NOTE 1 | The characteristic value \( s_k \) (in kN/m²) of the ground snow load is defined by the expression (4.2 AN-LU) which is based on altitude \( A \) (in m):

\[
s_k = 0.41 + \frac{A}{966} \quad [\text{kN/m}^2]
\]  

**NON-CONTRADICTORY COMPLEMENTARY INFORMATION:**

*The characteristic value \( s_k \) corresponds to a probability of 0.02, i.e. a return period of 50 years.*
National Annexes may also contain:

- Decisions on the application of informative annexes of a Eurocode Part
  - to be normative,
  - to remain informative or
  - not to be applied

- References to non-contradictory complementary information to assist the user to apply the Eurocode Part
Torsional vibrations of TACOMA bridge (1940)
Aeroelastic instabilities – critical velocities

E.2 Galloping

\[ v_{CG} = \frac{2 \cdot Sc}{a_G} \cdot n_{1,y} \cdot b \] (E.18)

\( a_G \) is the factor of galloping instability (Table E.7)

E.4.4.4 AN-LU Instability of bridges under pure torsion

\[ v_{CT} = n_{1,t} \cdot d \cdot \tau \] (E.32 AN-LU)

\( \tau \) is the instability coefficient under torsion of the bridge

E.4.4.5 AN-LU Instability of bridges under both bending and torsion

\[ v_{C\beta} = \pi n_{r,t} \cdot d \cdot \beta \cdot \eta \] (E.33 AN-LU)

\( \beta \) is the instability coefficient under both bending and torsion of a flat sheet parallel to the wind direction.

\( \eta \) is the ratio between the critical speed of the deck section and the critical speed of a plate which is parallel to the wind direction. It is given in figure E.15 AN-LU based on \( \varepsilon = n_{1,t} / n_{r,t} \) as well as on the cross-section type of the bridge deck.
National Calibration Period (summary)

1990-1999: drafting of pre-standards (ENV)

2002-2007: publication of the 58 Eurocode Parts (ENs) – first edition

2007-2011: drafting of the NATIONAL ANNEXES by the National Standardization Bodies
- Comparison with National Standards & Regulations
- Examples of applications: buildings, bridges, etc.
- Non-contradictory complementary information for items not covered by the Eurocodes

2014: five years review

2016: starting of ENs revision - second edition

2020: second generation of Eurocodes available
REQUIREMENTS ↔ PERFORMANCES
CONSTRUCTION PRODUCTS REGULATION

**jurisdiction**

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CONSTRUCTION WORKS

Requirements (CPD interpretative documents)  \downarrow\  \uparrow  Performances (CE marking)

CONSTRUCTION PRODUCTS

European Union

National
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“The way forward for the Eurocodes implementation in the Balkans”, 10-11 October 2018, Tirana
Code of Hammurabi (1760 BC)

“If a builder builds a house for someone, and does not construct it properly, and the house which he built collapses and kills its owner, then that builder shall be put to death.”

(Art. 229)

“If it ruins goods, he shall make compensation for all that has been ruined, and in as much as he did not construct properly this house which he built and it fell, he shall re-erect the house from his own means.”

(Art. 232)
"If the edifice, built at a set price, perish in whole or in part by defect in its construction, even by defect in the foundation, the architect and the contractor are responsible therefore for ten years."

(Art. 1792)
## APPLICABILITY OF STANDARDS

<table>
<thead>
<tr>
<th>Source</th>
<th>CIVIL CODE</th>
<th>LAW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical requirements</td>
<td>JURISPRUDENCE of the COURTS</td>
<td>REGULATIONS</td>
</tr>
<tr>
<td>Application</td>
<td>a posteriori</td>
<td>a priori</td>
</tr>
<tr>
<td>Standards (e.g. Eurocodes)</td>
<td>Referenced good practice but not compulsory</td>
<td>Compulsory only if imposed by regulation</td>
</tr>
</tbody>
</table>
Thank you for your attention!

Stay in touch

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

www.cenorm.be

www.seco.be