The first service pack for **ADVANCE Design 2017 R2** offers solutions for the structural analysis and design of Reinforced Concrete, Steel and Timber structures in accordance with the Slovak National Annex **STN EN** for Eurocode norms.

The annex is present as a new entry in the combo for EN Annex, found in **Localization configuration** dialog:

- Combinations / EC0 - Slovak National Annex **STN EN1990/NA1** and **STN EN1990/A1/NA**
- Seismic / EC8 - Slovak National Annex **STN EN1998-1/NA**
- Reinforced Concrete / EC2 - Slovak National Annex **STN EN1992-1-1+A1/NA**
- Steelwork / EC3 - Slovak National Annex **STN EN1993-1-1/NA**
- Timber / EC5 - Slovak National Annex **STN EN1995-1-1/NA**
SNOW LOADS ACCORDING TO STN EN1991-1-3/NA1

For generating snow loads, recommended EC1 values and methods are used, except for the changes mentioned in accordance with STN EN1991-1-3/NA1.

NA.2.1 / Article 1.1(2) - Note 1: Subject of the standard
For altitudes above 1500 m a.s.l., the snow load must be stated by the Slovak hydrometeorology office.

NA.2.2 / Article 1.1(3) - Note: Subject of the standard
For Slovakia, all cases from Annex A, Table A1 are considered:
- Normal conditions A are used for the whole area of Slovakia, according to NA.2.8
- Exceptional conditions B2 are applied in the whole area of Slovakia, for the roof shapes described in Appendix B.
- Exceptional condition B3 is applied in region 4 of exceptional snow loads, according to NA.2.11, and for the roof shapes described in Appendix B.

NA.2.8 / Article 4.1(1) - Note 1: Characteristic values
The characteristic value of snow load on the ground is calculated in the following way:

$$ s_k = \frac{a}{b} \text{ [kN/m}^2\text{]} $$

- $a, b$ - according to table NA.1:

<table>
<thead>
<tr>
<th>Zóna</th>
<th>1 a 3</th>
<th>2</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a$</td>
<td>0,454</td>
<td>0,425</td>
<td>0,716</td>
<td>0,934</td>
</tr>
<tr>
<td>$b$</td>
<td>970</td>
<td>505</td>
<td>430</td>
<td>315</td>
</tr>
</tbody>
</table>
Regions 1–5 of characteristic snow load on the ground surface are defined on the map supplied by C.14/NA:

NA.2.10 / Article 4.2(1): Other representative values

- Coefficient $\psi_0$ defined according to Table NA.2 for altitudes above and below 1000 m a.s.l.

\[
\begin{array}{|c|c|}
\hline
\text{Oblasti na Slovensku} & \psi_0 \\
\hline
\text{Středoevropský oblasti s nadmořskou výškou } H > 1000 \text{ m nad morrem} & 0,70 \\
\text{Středoevropský oblasti s nadmořskou výškou } H \leq 1000 \text{ m nad morrem} & 0,50 \\
\hline
\end{array}
\]

- Coefficient $\psi_1$, for the frequent value of the snow load is calculated using the following formula for altitude, $A \leq 1500$ m a.s.l.:

\[
\psi_1 = 0,5 \sqrt{1 - \left(1500 - A\right)^2 / 1500^2} \leq 0,50
\]

- Coefficient $\psi_2$, for the quasi-permanent value of the snow load is calculated using the following formula for altitude, $A \leq 1500$ m a.s.l.:

\[
\psi_2 = 0,012 \sqrt{A / 15} - 1 \leq 0,12
\]
NA.2.11 / Article 4.3(1): Exceptional snow loads, Note

For coefficient \( C_{esl} \), use the values from Table NA.3 for the selected region with exceptional snow load on the ground surface.

### Tabulka NA.3 Odporúčané hodnoty súčiniteľa \( C_{esl} \)

<table>
<thead>
<tr>
<th>Región</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_{esl} )</td>
<td>2.1</td>
<td>2.2</td>
<td>2.5</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Regions with exceptional snow load are pictured on Map C.15-NA.

Regions 1–4 with exceptional snow loads on the ground surface are defined in the map supplied by Map C.15-NA:
For generating wind loads, the recommended EC1 values and methods are used, except for the changes mentioned in accordance with STN EN1991-1-4/NA1.

Each region has its own wind pressure and speed coefficients. The wind regions map allows the selection of the corresponding region, in accordance with NA.2.3 / Article 4.2(1)P - Note 2. The map NB 1 can be used for altitudes up to 700 m a.s.l.
According to NA.2.4 / Article 4.2(2)P - Note 1: Basic wind speed, the influence of the altitude on the basic wind speed for areas with altitude above 700 m a.s.l. is considered as written in Table NB1:

<table>
<thead>
<tr>
<th>Oblasti</th>
<th>vb,0 = 24 m/s</th>
<th>vb,0 = 26 m/s</th>
<th>vb,0 = 30 m/s</th>
<th>vb,0 = 33 m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. podla mapy na obrázku NB1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. podla mapy na obrázku NB1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. pre 700 m n.m až 1 300 m n.m.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre horske oblasti nad 1 300 m n.m.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The mean wind velocity \( v_m(z) \) for different terrain categories and basic wind speeds \( v_b = 24 \) m/s and \( v_b = 26 \) m/s can be found in tables NB2 and NB3, in accordance with NA.2.9 / Article 4.3.1(1) - Note 2: Mean wind velocity.

The mean wind velocity \( v_m(z) \) at a height \( z \) above the terrain depends on the terrain roughness and orography and on the basic wind velocity, \( v_b \), and should be determined using Expression (4.3), in accordance with EN 1991-1-4:

\[
v_m(z) = c_t(z) \cdot c_o(z) \cdot v_b
\]
NA.2.16 / Article 4.5(1) - Note 1: Peak velocity pressure

Values of peak velocity pressure \( q_p(z) \) at height \( z \) above the terrain for different terrain categories and for basic wind speeds \( v_b = 24 \text{ ms}^{-1} \) and \( v_b = 26 \text{ ms}^{-1} \) are mentioned in Tables NB2 and NB3 (see above) and illustrated in graphs on Figure NB2 and NB3.

The recommended rule is given in Expression (4.8), in accordance with EN 1991-1-4:

\[
q_p(z) = \left[1 + 7 \cdot I_v(z)\right] \cdot \frac{1}{2} \cdot \rho \cdot \nu_{R}^{2}(z) = \sigma_t(z) \cdot q_d
\]

SEISMIC LOADS ACCORDING TO STN EN1998-1/NA

NA.2.5 / Article 3.1.2(1): Ground classification scheme accounting for deep geology, including values of parameters \( S, T_B, T_C \) and \( T_D \) defining horizontal and vertical elastic response spectra in accordance with 3.2.2.2 and 3.2.2.3.

Ground types, described by the stratigraphic profiles and parameters given in Table 3.1 from EN1998-1, may be used to account for the influence of local ground conditions on the seismic action. Also to specify the parameters \( S, T_B, T_C \) and \( T_D \), Figure NB.5.1 - NB.5.5 and Table NB 5.1 from appendix NB.5 - Horizontal elastic response spectra for ground types A - E on are used.
NA.2.6 / Article 3.2.1(1)P, (2), (3): Maps of seismic zones and reference values of seismic acceleration

To use the map of seismic zones from Picture NB.6.1 according to STN EN1998-1/NA/2:

NA.2.9 / Article 3.2.2.1(4), 3.2.2.2(1)P: Parameters $S$, $T_B$, $T_C$ and $T_D$ to define the shape of horizontal elastic response spectra

For category E, the spectra is considered the same as for category B, multiplied by coefficient 1.2, in accordance with Table NB.5.1.
CONCRETE DESIGN ACCORDING TO STN EN1992-1-1+A1/NA

For reinforced concrete design, the recommended EC2 values and methods are used, except changes which are mentioned in accordance with STN EN1992-1-1+A1/NA.

According to the Slovak National Annex STN EN1992-1-1+A1/NA:

| Parameter | EN 1992-1-1 | STN EN1992-1-1+A1/NA | \( k_1 = 1.5 \text{ mm} \)  \
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.2(2) NA.2.76</td>
<td>k_2 = 5.0 \text{ mm}</td>
<td></td>
</tr>
<tr>
<td>( \beta_1 = 0.25 )</td>
<td>9.2.1.2(1) NA.2.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( s_{l,\text{max}} \leq 400 \text{ mm} )</td>
<td>9.2.2(6) NA.2.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for main reinforcement: ( s_{\text{max,slabs}} = 2h \leq 400 \text{ mm} ) for secondary reinforcement ( s_{\text{max,slabs}} = 3h \leq 400 \text{ mm} )</td>
<td>9.3.1.1(3) NA.2.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \phi_{\text{min}} = 10 \text{ mm} )</td>
<td>9.5.2(1) NA.2.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( s_{g,\text{max}} = \text{min} { 15 \times \text{smallest longitudinal bars diameter; smallest column dimension; } 300 \text{ mm} } )</td>
<td>9.5.3(3) NA.2.93</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NA.2.19 / Article 4.4.1.2(5): Minimum cover \( c_{\text{min}} \)

The recommended modifications to the structural class, in accordance with STN EN1992-1-1+A1/NA, are given in Table 4.3N:
The recommended values of indicative strength classes may be found in Table E.1SK.

<table>
<thead>
<tr>
<th>Indikatívna pevnosťná trieda</th>
<th>X0</th>
<th>XF1</th>
<th>XF2</th>
<th>XF3</th>
<th>XF4</th>
<th>XA1</th>
<th>XA2</th>
<th>XA3</th>
</tr>
</thead>
<tbody>
<tr>
<td>C12/15</td>
<td>C25/30</td>
<td>C25/30</td>
<td>C25/30</td>
<td>C30/37</td>
<td>C30/37</td>
<td>C30/37</td>
<td>C35/45</td>
<td></td>
</tr>
</tbody>
</table>

**Additional requirements for concrete design**

The calculation of effective height is done with the following relation: \( d = h - e_{bz} \).
TIMBER DESIGN ACCORDING TO STN EN1995-1-1/NA

For timber design, the recommended EC5 values and methods are used, except for the changes mentioned in accordance with STN EN1995-1-1/NA. For fire design of timber elements, no changes are required according to STN EN 1995-1-2/NA.

NA.2.1 / Article 2.3.1.2(2)P: Actions shall be assigned to one of the load-duration classes

Examples of load-duration assignment are given in Table 2.2. Since climatic loads (snow, wind) vary between countries, the assignment of load-duration classes may be specified in the National annex.

In accordance with STN EN1995-1-1/NA, Table 2.2, snow is not present for short-term load.

<table>
<thead>
<tr>
<th>Triedy trvania zťaženia</th>
<th>Príklady zťaženia</th>
</tr>
</thead>
<tbody>
<tr>
<td>stále</td>
<td>vlastná tiaž</td>
</tr>
<tr>
<td>dlhodobé</td>
<td>skladované materiály</td>
</tr>
<tr>
<td>strednodobé</td>
<td>úžitkové zťaženia, sneh</td>
</tr>
<tr>
<td>krátkodobé</td>
<td>vietor</td>
</tr>
<tr>
<td>okamžité</td>
<td>vietor a mimoriadné zťaženia</td>
</tr>
</tbody>
</table>

NA.2.5 / Article 7.2(2): Limiting values for deflections of beams

The recommended range of limiting values of deflections for beams with span is given in Table 7.2 depending upon the level of deformation deemed to be acceptable.