CYS National Annex
to CYS EN 1993-5:2007

Eurocode 3:
Design of steel
structures

Part 5: Piling

Prepared by
Eurocodes Committee, Scientific and Technical
Chamber of Cyprus under a Ministry of Interior’s Programme
NATIONAL ANNEX

TO

Part 5: Piling

This National Annex has been approved by the Board of Governors of the Cyprus Organisation for Standardisation on 11/06/2010.
INTRODUCTION
This National Annex has been prepared by the Eurocodes Committee of the Technical Chamber of Cyprus which was commissioned by the Ministry of Interior of the Republic of Cyprus.

NA 1 SCOPE
This National Annex is to be used together with CYS EN 1993-5:2007
This National Annex gives:
(a) Nationally determined parameters for the following clauses of CYS EN 1993-5:2007 where National choice is allowed (see Section NA 2)
   - 3.7(1)
   - 3.9(1)P
   - 4.4(1)
   - 5.1.1(4)
   - 5.2.2(2)
   - 5.2.2(13)
   - 5.2.5(7)
   - 5.5.4(2)
   - 6.4(3)
   - 7.1(4)
   - 7.2.3(2)
   - 7.4.2(4)
   - A.3.1(3)
   - B.5.4(1)
   - D.2.2(5)
(b) Decisions on the use of the Informative Annexes B, C and D (see Section NA 3)
(c) References to non-contradictory complementary information to assist the user to apply CYS EN 1993-5:2007 (see Section NA 4)

NA 2 NATIONALLY DETERMINED PARAMETERS

NA 2.1 Clause 3.7 (1) Steel members used for anchors
The value \( f_{y,\text{spec}} \) is specified as 500 N/mm².

NA 2.2 Clause 3.9 (1)P Fracture toughness

NA 2.3 Clause 4.4 (1) Corrosion rates for design
Suitable values for corrosion rates are given in Table 4-1 (CYS) and Table 4-2 (CYS).
Table 4-1 (CYS) : Value for the loss of thickness [mm] due to corrosion for piles and sheet piles in soils, with or without groundwater

<table>
<thead>
<tr>
<th>Required design working life</th>
<th>5 years</th>
<th>25 years</th>
<th>50 years</th>
<th>75 years</th>
<th>100 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undisturbed natural soils (sand, silt, clay, schist, ....)</td>
<td>0,00</td>
<td>0,30</td>
<td>0,60</td>
<td>0,90</td>
<td>1,20</td>
</tr>
<tr>
<td>Polluted natural soils and industrial sites</td>
<td>0,15</td>
<td>0,75</td>
<td>1,50</td>
<td>2,25</td>
<td>3,00</td>
</tr>
<tr>
<td>Aggressive natural soils (swamp, marsh, peat, ...)</td>
<td>0,20</td>
<td>1,00</td>
<td>1,75</td>
<td>2,50</td>
<td>3,25</td>
</tr>
<tr>
<td>Non-compacted and non-aggressive fills (clay, schist, sand, silt, ....)</td>
<td>0,18</td>
<td>0,70</td>
<td>1,20</td>
<td>1,70</td>
<td>2,20</td>
</tr>
<tr>
<td>Non-compacted and aggressive fills (ashes, slag, ....)</td>
<td>0,50</td>
<td>2,00</td>
<td>3,25</td>
<td>4,50</td>
<td>5,75</td>
</tr>
</tbody>
</table>

Notes:
1) Corrosion rates in compacted fills are lower than those in non-compacted ones. In compacted fills the figures in the table should be divided by two.
2) The values given for 5 and 25 years are based on measurements, whereas the other values are extrapolated.

Table 4-2 (CYS) : Value for the loss of thickness [mm] due to corrosion for piles and sheet piles in fresh water or in sea water

<table>
<thead>
<tr>
<th>Required design working life</th>
<th>5 years</th>
<th>25 years</th>
<th>50 years</th>
<th>75 years</th>
<th>100 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common fresh water (river, ship canal, ....) in the zone of high attack (water line)</td>
<td>0,15</td>
<td>0,55</td>
<td>0,90</td>
<td>1,15</td>
<td>1,40</td>
</tr>
<tr>
<td>Very polluted fresh water (sewage, industrial effluent, ....) in the zone of high attack (water line)</td>
<td>0,30</td>
<td>1,30</td>
<td>2,30</td>
<td>3,30</td>
<td>4,30</td>
</tr>
<tr>
<td>Sea water in temperate climate in the zone of high attack (low water and splash zones)</td>
<td>0,55</td>
<td>1,90</td>
<td>3,75</td>
<td>5,60</td>
<td>7,50</td>
</tr>
<tr>
<td>Sea water in temperate climate in the zone of permanent immersion or in the intertidal zone</td>
<td>0,25</td>
<td>0,90</td>
<td>1,75</td>
<td>2,60</td>
<td>3,50</td>
</tr>
</tbody>
</table>

Notes:
1) The highest corrosion rate is usually found in the splash zone or at the low water level in tidal waters. However, in most cases, the highest bending stresses occur in the permanent immersion zone, see figure 4-1.
2) The values given for 5 and 25 years are based on measurements, whereas the other values are extrapolated.
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NOTE: Corrosion rate distribution and zones of sea water aggressivity may vary considerably from the example shown in Figure 4

Figure 2-1, dependant upon the conditions prevailing at the location of the structure.

Figure 2-1 (CYS): Example of corrosion rate distribution

NA 2.4 Clause 5.1.1 (4) Ultimate limit states - General
The values for the partial factors $\gamma_{M0}$, $\gamma_{M1}$ and $\gamma_{M2}$ for piling are specified as $\gamma_{M0} = 1,00$; $\gamma_{M1} = 1,10$ and $\gamma_{M2} = 1,25$.

NA 2.5 Clause 5.2.2 (2) Sheet piling in bending and shear
The numerical value for $\beta_B$ for single and double U-piles is specified as 1,00.

NA 2.6 Clause 5.2.2 (13) Sheet piling in bending and shear
The value $l$ is specified as 500 mm.

NA 2.7 Clause 5.2.5 (7) Straight web steel sheet piles
The recommended value $\beta_R = 0,8$ shall be used.
NA 2.8 Clause 5.5.4 (2) Primary elements
The recommended value \( h = 5 \text{ m} \) shall be used.

NA 2.9 Clause 6.4 (3) Structural aspects of steel sheet piling
The numerical value for \( \beta_D \) is specified as 1,00.

NA 2.10 Clause 7.1 Anchors, walings, bracing and connections - General
The recommended values for the partial factors \( \gamma_{M_b} = 1,25 \) and \( \gamma_{M_t,ser} = 1,10 \) shall be used.

NA 2.11 Clause 7.2.3 (2) Anchorages - Ultimate limit state verification
The recommended value \( k_t = 0,9 \) shall be used.

NA 2.12 Clause 7.4.2.(4) Bearing piles
No further information on the design procedure for pile couplers is provided in this National Annex.

NA 2.13 Clause A.3.1(3) Material properties
The following recommended limiting values shall be used:
- \( f_u / f_y \geq 1,1 \);
- elongation at failure \( \geq 15 \% \);
- \( \varepsilon_u \geq 15 \varepsilon_y \);
- where \( \varepsilon_y \) corresponds to the yield strength \( f_y \);

NA 2.14 Clause B.5.4.1 Design values
The recommended value \( \eta_{sys} = 1,0 \) shall be used for the well defined standard testing procedures given in B.2, B.3 and B.4.

NA 2.15 Clause D.2.2.2 (5)
No further information concerning the required density is provided in this National Annex.

NA 3 DECISION ON THE USE OF INFORMATIVE ANNEXES

NA 3.1 Annex B
Annex B may be used.

NA 3.2 Annex C
Annex C may be used.

NA 3.3 Annex D
Annex D may be used.

NA 4 REFERENCES TO NON-CONTRADICTORY COMPLEMENTARY INFORMATION
None