

# **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**  
**CYS EN 1993-5:2007 Eurocode 3: Design of steel structures**  
**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  $f_{y,spec}$  is specified as 500 N/mm<sup>2</sup> .

### NA 2.2 Clause 3.9 (1)P Fracture toughness

Refer to CYS EN1991-1-5 and its National Annex.

### 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**

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

**Notes:**

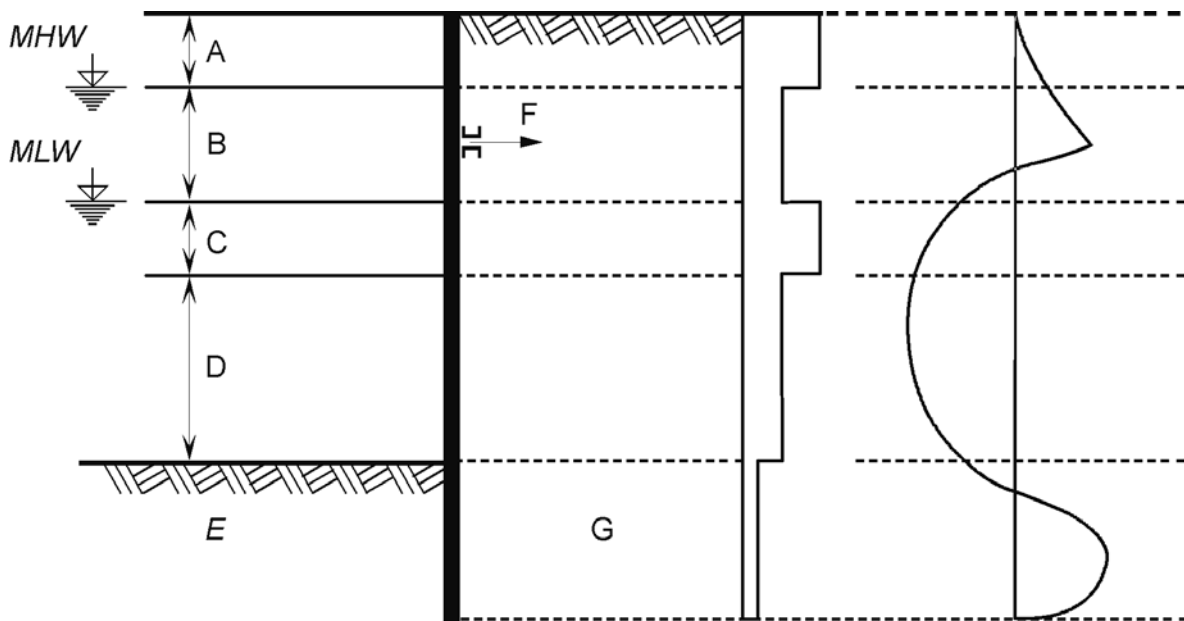
- 1) Corrosion rates in compacted fills are lower than those in non-compacted ones. In compacted fills the figures in the table should be divided by two.
- 2) The values given for 5 and 25 years are based on measurements, whereas the other values are extrapolated.

**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**

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

**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.



a) Vertical zoning of sea water aggressivity

b) Corrosion rate distribution at side exposed to sea water

c) Typical bending moment distribution

- |     |                                       |     |                           |
|-----|---------------------------------------|-----|---------------------------|
| A   | Zone of high attack (splash zone);    | B   | Intertidal zone;          |
| C   | Zone of high attack (Low water zone); | D   | Permanent immersion zone; |
| E   | Buried zone (Water side);             | F   | Anchor;                   |
| G   | Buried zone (Soil side)               |     |                           |
| MHW | Mean high water;                      | MLW | Mean low water            |

**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  $h = 5$  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  $\gamma_{Mb} = 1,25$  and  $\gamma_{Mt,ser} = 1,10$  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



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