Report for D-Sheet Piling 9.2

Design of Sheet Pilings
Developed by Deltares

Company:	RPS advies en ingenieurs bv
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Time of calculation:	3:57:43 PM
Filename:	O:\..\Bijlage 2 Damwandberekening\Spuihaven

Verification according to EC7 NAD from the Netherlands

1 Table of Contents

2 Summary

2.1 Overview per Stage and Test

Stage no.	Verification type	Displace-ment [mm]	Moment [kNm]	Shear force [kN]	Mob. perc. moment [%]	Mob. perc. resistance [%]	Vertical balance
1	EC7(NL)-Step 6.1		**-135,3**	**-89,4**	**0,0**	39,4	---
1	EC7(NL)-Step 6.2		-119,7	-87,0	**0,0**	**39,5**	---
1	EC7(NL)-Step 6.3		**-135,3**	**-89,4**	**0,0**	39,4	---
1	EC7(NL)-Step 6.4		-119,7	-87,0	**0,0**	**39,5**	---
1	EC7(NL)-Step 6.5	**-25,4**	-105,4	-67,7	**0,0**	28,9	---
1	EC7(NL)-Step 6.5 * 1,20		-126,5	-81,2			
2	EC7(NL)-Step 6.1		-127,6	-82,3	**0,0**	38,2	---
2	EC7(NL)-Step 6.2		-112,5	-79,6	**0,0**	38,3	---
2	EC7(NL)-Step 6.3		-127,6	-82,3	**0,0**	38,2	---
2	EC7(NL)-Step 6.4		-112,5	-79,6	**0,0**	38,3	---
2	EC7(NL)-Step 6.5	-23,2	-95,9	-58,4	**0,0**	27,6	---
2	EC7(NL)-Step 6.5 * 1,20		-115,1	-70,1			
3	EC7(NL)-Step 6.1		-127,6	-82,3	**0,0**	38,2	---
3	EC7(NL)-Step 6.2		-112,5	-79,6	**0,0**	38,3	---
3	EC7(NL)-Step 6.3		-127,6	-82,3	**0,0**	38,2	---
3	EC7(NL)-Step 6.4		-112,5	-79,6	**0,0**	38,3	---
3	EC7(NL)-Step 6.5	-25,1	-106,4	-73,4	**0,0**	28,5	---
3	EC7(NL)-Step 6.5 * 1,20		-127,7	-88,0			
Max		**-25,4**	**-135,3**	**-89,4**	**0,0**	**39,5**	---

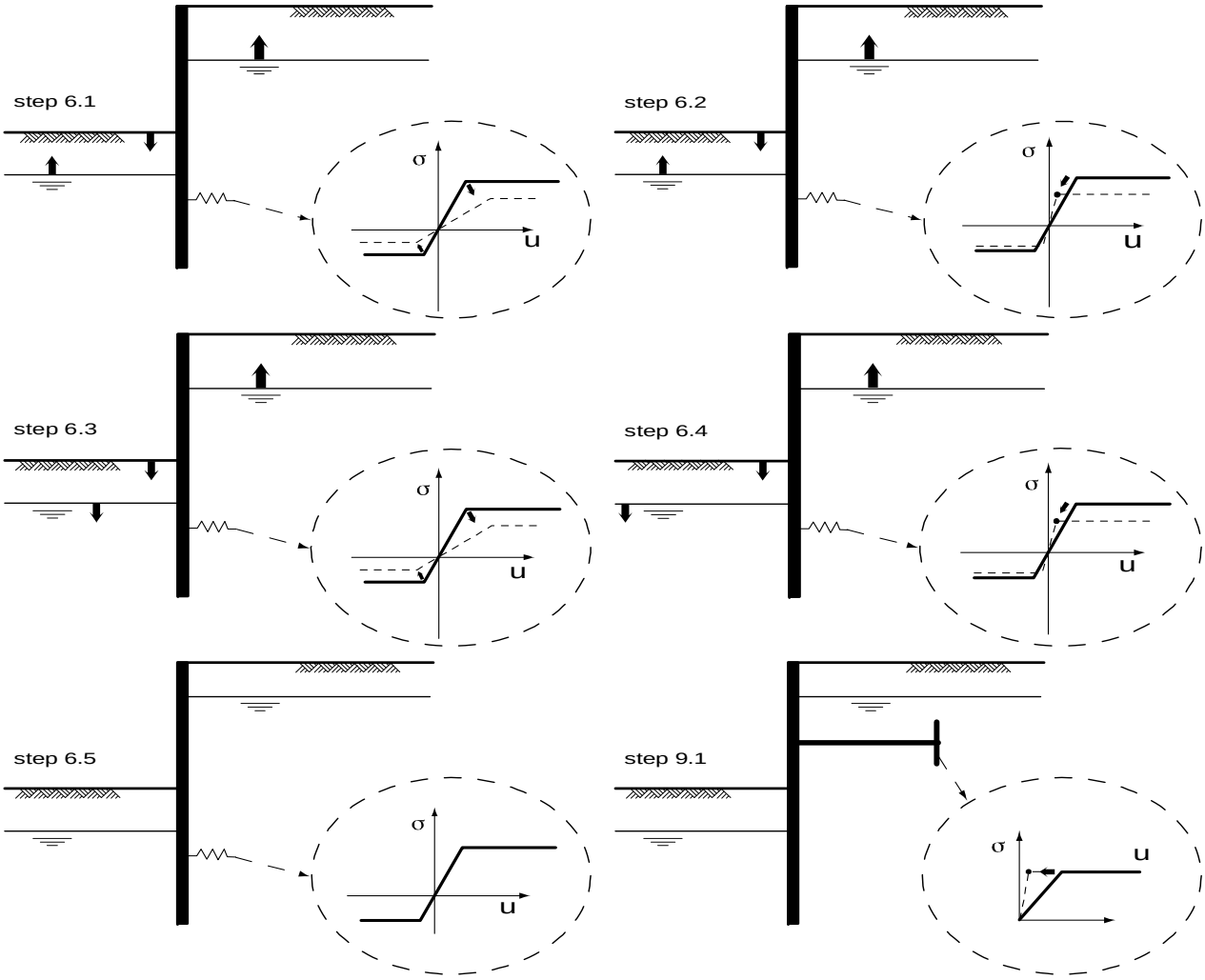
2.2 Overall Stability per Stage

Stage name	Stability factor [-]
val na hoogwater	2,19
gebruiksfase	2,42
val na hoogwate...	2,24

2.3 Warnings

Warning
In the profile(s) below, the difference between the highest and lowest phi in the materials is more then 15 degrees. According to Cur-166 article 4.5.8 a Culmann calculation with straight slip surfaces is not allowed. Either reduce your phi's or try a Ka, Ko, Kp calculation.
Profile(s):
- right

2.4 CUR Verification Steps



3 Input Data for all Stages

3.1 General Input Data

Verification according to EC7 NAD from the Netherlands

Model	Sheet piling
Check vertical balance	Yes
Number of construction stages	3
Unit weight of water	9,81 kN/m³
Number of curves on spring characteristic	3
Unloading curve on spring characteristic	No

3.2 Sheet Piling Properties

Length	20,53 m
Level top side	0,53 m
Number of sections	1
Pr;max;point	0,00 MPa
Xi factor	0,72

Section name	From [m]	To [m]	Stiffness EI [kNm²/m']	Acting width [m]	Maximum moment [kNm/m']
AZ 26	-20,00	0,53	1,1657E+05	1,00	624,00

Section name	From [m]	To [m]	Red. factor EI [-]	Red. factor max. moment [-]	Note to reduction factor
AZ 26	-20,00	0,53	0,69	0,69	

Section name	From [m]	To [m]	Corrected stiffness EI [kNm²]	Corrected max. moment [kNm]
AZ 26	-20,00	0,53	8,0430E+04	430,56

Section name	From [m]	To [m]	Height [mm]	Coating area [m²/m² wall]	Section area [cm²/m']
AZ 26	-20,00	0,53	427,00	1,41	198,00

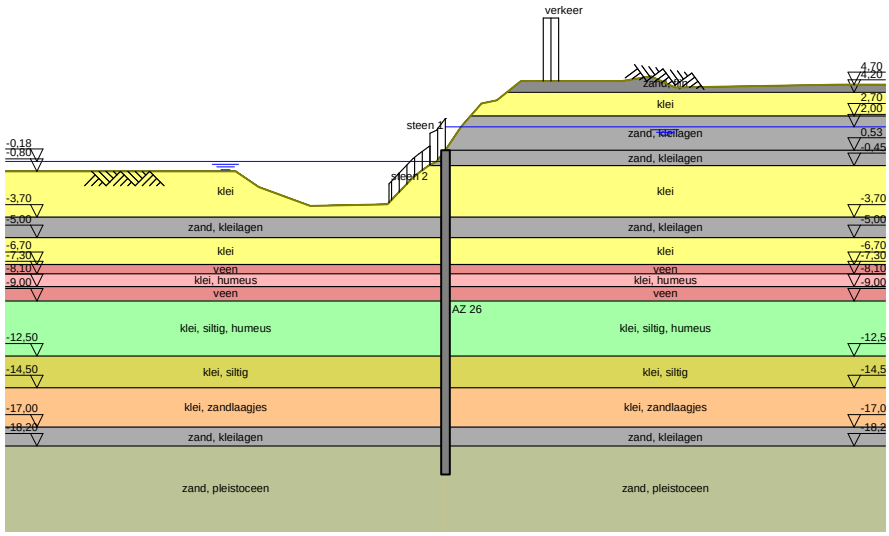
3.3 Calculation Options

First stage represents initial situation	No	
Calculation refinement	Coarse	
Reduce delta(s) according to CUR	Yes	
Verification	EC7 NAD NL method A: Partial factors (design values) in all stages Eurocode 7 using the factors as described in the National Application Document of the Netherlands. It is basically design approach III.	
Used partial factor set	RC 3	
Factors on loads		
- Permanent load, unfavourable	1,00	
- Permanent load, favourable	1,00	
- Variable load, unfavourable	1,00	User defined
- Variable load, favourable	0,00	
Material factors		
- Cohesion	1,40	
- Tangent phi	1,20	
- Delta (wall friction angle)	1,20	
- Modulus of subgrade reactions	1,30	

Geometry modification		
- Reduction in surface level on passive side	0,00 m	
- Reduction in phreatic line on passive side	0,00 m	User defined
- Raise in phreatic line on active side	0,00 m	User defined
Overall stability factors		
- Cohesion	1,60	
- Tangent phi	1,30	
- Factor on Unit weight soil	1,00	
Vertical balance factors		
- Gamma m:b4	1,20	

4 Outline Stage 1: val na hoogwater

Outline - Stage 1: val na hoogwater

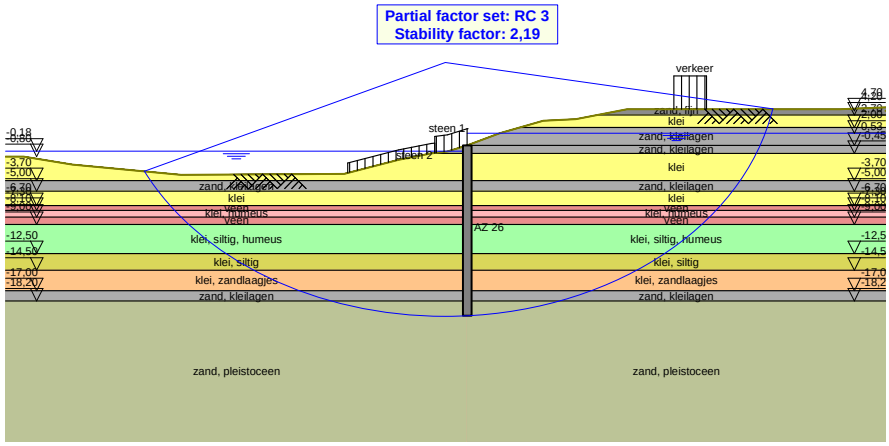


5 Overall Stability Stage 1: val na hoogwater

Stability factor : 2,19

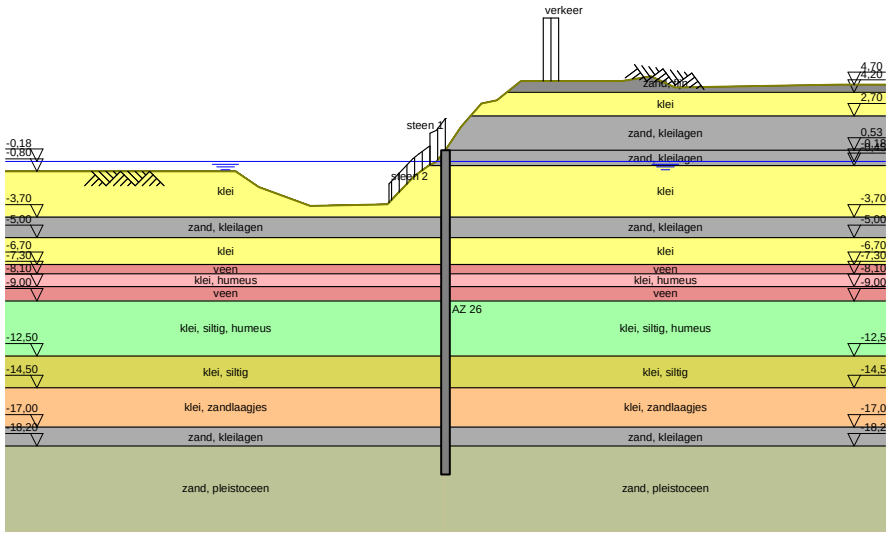
5.1 Overall Stability

Overall Stability - Stage 1: val na hoogwater



6 Outline Stage 2: gebruiksfase

Outline - Stage 2: gebruiksfase

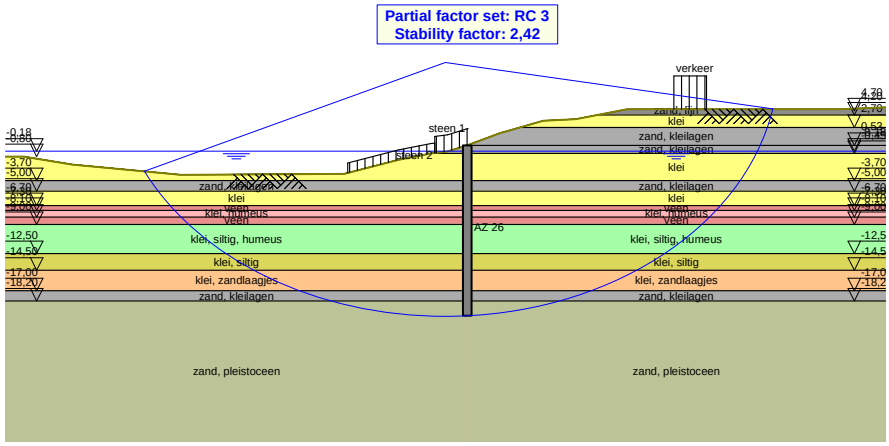


7 Overall Stability Stage 2: gebruiksfase

Stability factor : 2,42

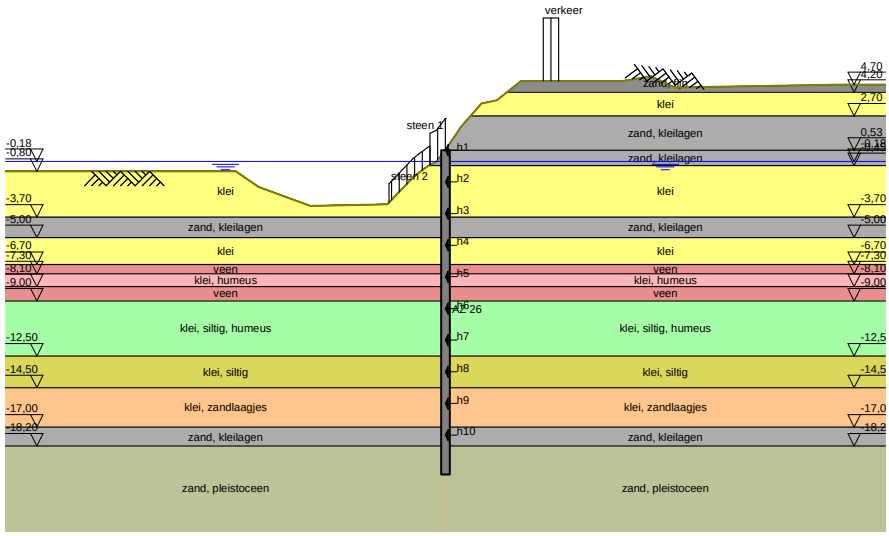
7.1 Overall Stability

Overall Stability - Stage 2: gebruiksfase



8 Outline Stage 3: val na hoogwater met extra krachten

Outline - Stage 3: val na hoogwater met extra krachten

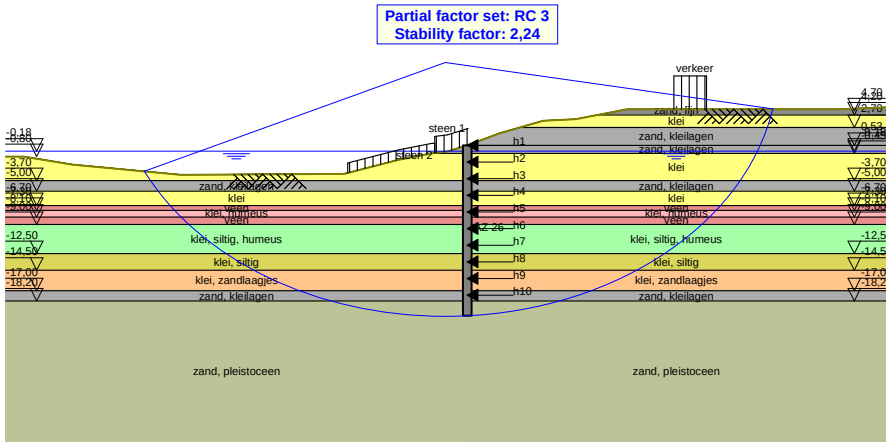


9 Overall Stability Stage 3: val na hoogwater met extra krachten

Stability factor : 2,24

9.1 Overall Stability

Overall Stability - Stage 3: val na hoogwater met extra krachten



End of Report