BARTELS
INGENIEURS VOOR BOUW & INFRA

Project:	**UT09581** verdiepingsvloer Egron, loopbrug hal B Nestlé te Nunspeet
Onderwerp:	Statische berekening aanvullende berekening
Fase:	Uitvoeringsgereed ontwerp
Status:	definitief
Berekeningnr.:	UT09581/002/PNL
Datum:	14-06-2016
Opdrachtgever:	Nestlé Nutrition Nunspeet Postbus 1 8070 AA NUNSPEET T 0341-27 72 77 F 0341-27 71 99
Architect:	Kienhuis bouwmanagement Postbus 622 7600 AP ALMELO T 0546-455100 F 0546-455660

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Projectleider:	ing. P.J. Nobel
Constructeur:	ing. P.J. Nobel

Aanvullende berekening

Verankering aan beatoand

max. belasting uit ligger → (blz 10)

Rag/kb: 54.7 / 54.2

Rd: 1,2 x 54.7 + 1,5 x 54.2 = 147 kN

8 M20 (berekend met 6 ankers, omdat programma 8 ankers niet kent).

uc = 0,83 akk

Company:		Page:	101
Specifier:		Project:	Nestle
Address:		Sub-Project I Pos. No.:	
Phone I Fax:	|	Date:	14-06-2016
E-Mail:			

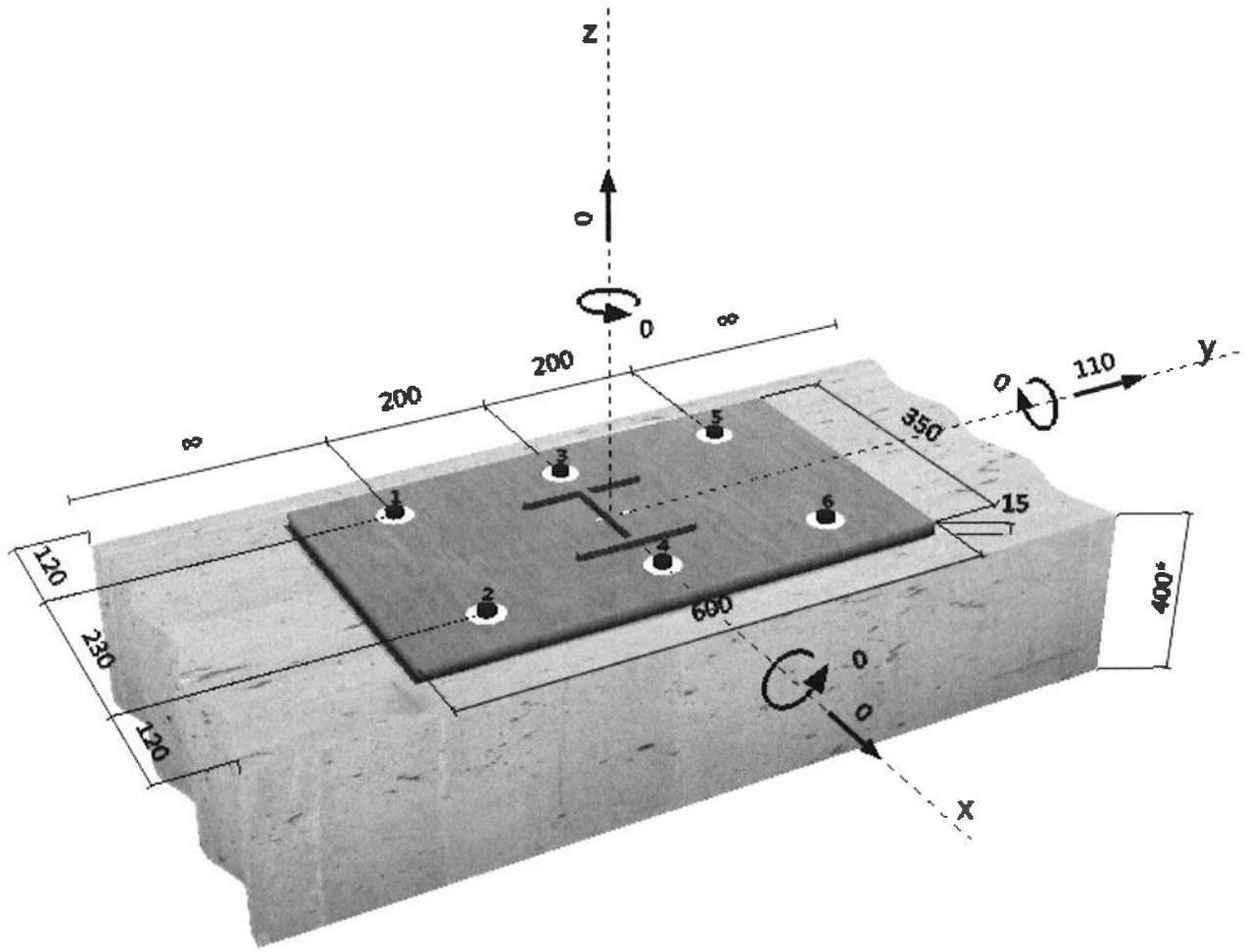
Specifier's comments:

1 Input data

SAFESET

Anchor type and diameter:	**HIT-HY 200-A + HIT-Z-R M20**
Seismic/Filling set or any suitable annular gap filling solution	
Effective embedment depth:	$h_{ef,act}$ = 120 mm ($h_{ef,limit}$ = - mm)
Material:	A4
Evaluation Service Report:	ETA 12/0006
Issued I Valid:	15-03-2013 | 10-02-2017
Proof:	SOFA design method + fib (07/2011) - after ETAG BOND testing
Stand-off installation:	e_b = 0 mm (no stand-off); t = 15 mm
Anchor plate:	l_x x l_y x t = 350 mm x 600 mm x 15 mm; (Recommended plate thickness: not calculated
Profile:	IPBi/HEA; (L x W x T x FT) = 133 mm x 140 mm x 9 mm x 9 mm
Base material:	cracked concrete, C20/25, f_c = 20,00 N/mm^2; h = 400 mm, Temp. short/long: 40/24 °C
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	no reinforcement or reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm) no longitudinal edge reinforcement Reinforcement to control splitting according to fib (07/2011), 16.1.5 present

Geometry [mm] & Loading [kN, kNm]



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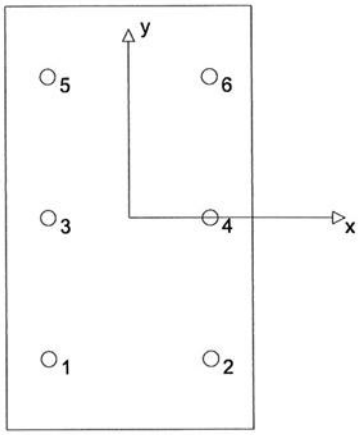
2 Load case/Resulting anchor forces

Load case: Design loads



Anchor reactions [kN]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0,000	18,333	0,000	18,333
2	0,000	18,333	0,000	18,333
3	0,000	18,333	0,000	18,333
4	0,000	18,333	0,000	18,333
5	0,000	18,333	0,000	18,333
6	0,000	18,333	0,000	18,333

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [N/mm²]
resulting tension force in (x/y)=(0/0): 0,000 [kN]
resulting compression force in (x/y)=(0/0): 0,000 [kN]

3 Tension load SOFA (fib (07/2011), section 16.2.1)

	Load [kN]	Capacity [kN]	Utilization β_N [%]	Status
Steel Strength*	N/A	N/A	N/A	N/A
Combined pullout-concrete cone failure**	N/A	N/A	N/A	N/A
Concrete Breakout Strength**	N/A	N/A	N/A	N/A
Splitting failure**	N/A	N/A	N/A	N/A

* anchor having the highest loading **anchor group (anchors in tension)

Company:
Specifier:
Address:
Phone I Fax:
E-Mail:

Page: 103
Project: Nestle
Sub-Project I Pos. No.:
Date: 14-06-2016

4 Shear load SOFA (fib (07/2011), section 16.2.2)

	Load [kN]	Capacity [kN]	Utilization β_V [%]	Status
Steel Strength (without lever arm)*	18,333	70,400	27	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	110,000	149,715	74	OK
Concrete edge failure in direction x+**	55,000	66,298	83	OK

* anchor having the highest loading **anchor group (relevant anchors)

4.1 Steel Strength (without lever arm)

$V_{Rk,s}$ [kN]	$\gamma_{M,s}$	$V_{Rd,s}$ [kN]	V_{Sd} [kN]
88,000	1,250	70,400	18,333

4.2 Pryout Strength (Concrete Breakout Strength controls)

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$\psi_{A,N}$	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k_4
357200	129600	2,756	180	360	2,000

$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1,000	0	1,000	0,900	1,000

$N^0_{Rk,c}$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,c1}$ [kN]	V_{Sd} [kN]
45,267	1,500	149,715	110,000

4.3 Concrete edge failure in direction x+

l_f [mm]	d_{nom} [mm]	k_V	α	β
120	20,0	1,700	0,100	0,070

c_1 [mm]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]	$\psi_{A,V}$
120	136800	64800	2,111

$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$	$\psi_{90°,V}$
1,000	1,000	2,500	0	1,000	1,000	2,500

$V^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]
18,842	1,500	66,298	55,000

5 Displacements (highest loaded anchor)

Short term loading:

N_{Sk} = 0,000 [kN]
V_{Sk} = 13,580 [kN]

δ_N = 0,000 [mm]
δ_V = 0,543 [mm]
δ_{NV} = 0,543 [mm]

Long term loading:

N_{Sk} = 0,000 [kN]
V_{Sk} = 13,580 [kN]

δ_N = 0,000 [mm]
δ_V = 0,815 [mm]
δ_{NV} = 0,815 [mm]

Comments: Tension displacements are valid with half of the required installation torque moment for uncracked concrete! Shear displacements are valid without friction between the concrete and the anchor plate! The gap due to the drilled hole and clearance hole tolerances are not included in this calculation!

The acceptable anchor displacements depend on the fastened construction and must be defined by the designer!

Company:
Specifier:
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Phone I Fax:
E-Mail:

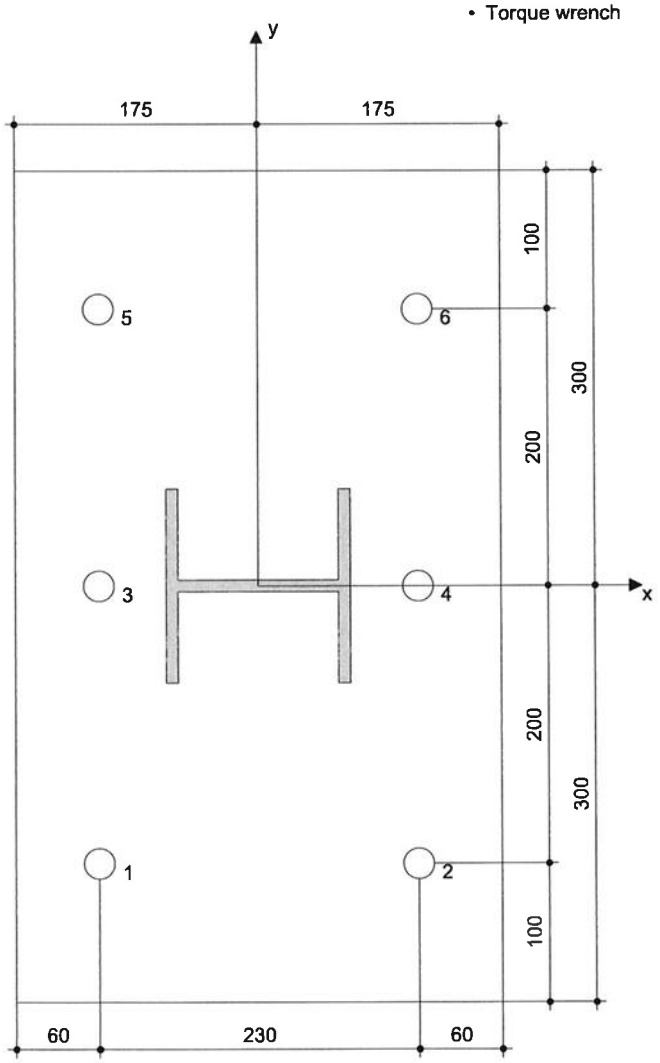
7 Installation data

Anchor plate, steel: -
Profile: IPBi/HEA; 133 x 140 x 9 x 9 mm
Hole diameter in the fixture: d_f = 22 mm
Plate thickness (input): 15 mm
Recommended plate thickness: not calculated
Drilling method: Hammer drilled
Cleaning: No cleaning of the drilled hole is required

Anchor type and diameter: HIT-HY 200-A + HIT-Z-R M20
Installation torque: 0,150 kNm
Hole diameter in the base material: 22 mm
Hole depth in the base material: 175 mm
Minimum thickness of the base material: 220 mm

7.1 Recommended accessories

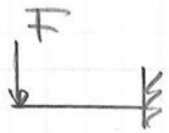
Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• No accessory required	• Dispenser including cassette and mixer • Seismic/Filling set • Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-115	-200	120	350	-	-
2	115	-200	350	120	-	-
3	-115	0	120	350	-	-
4	115	0	350	120	-	-
5	-115	200	120	350	-	-
6	115	200	350	120	-	-

Consale.



max 0,5 M.

Fd = 147 kN

Md = 0,5 x 147 = 74 kNm

HEA 220 uc = $74 \cdot 10^6 / 515 \cdot 10^3$

= 143 N/mm²

extra versteviging door schotsplaat.

Dakopbouw

praktische liggers en kolom (blz 17)
staal wordt gekoppeld aan bestaand.