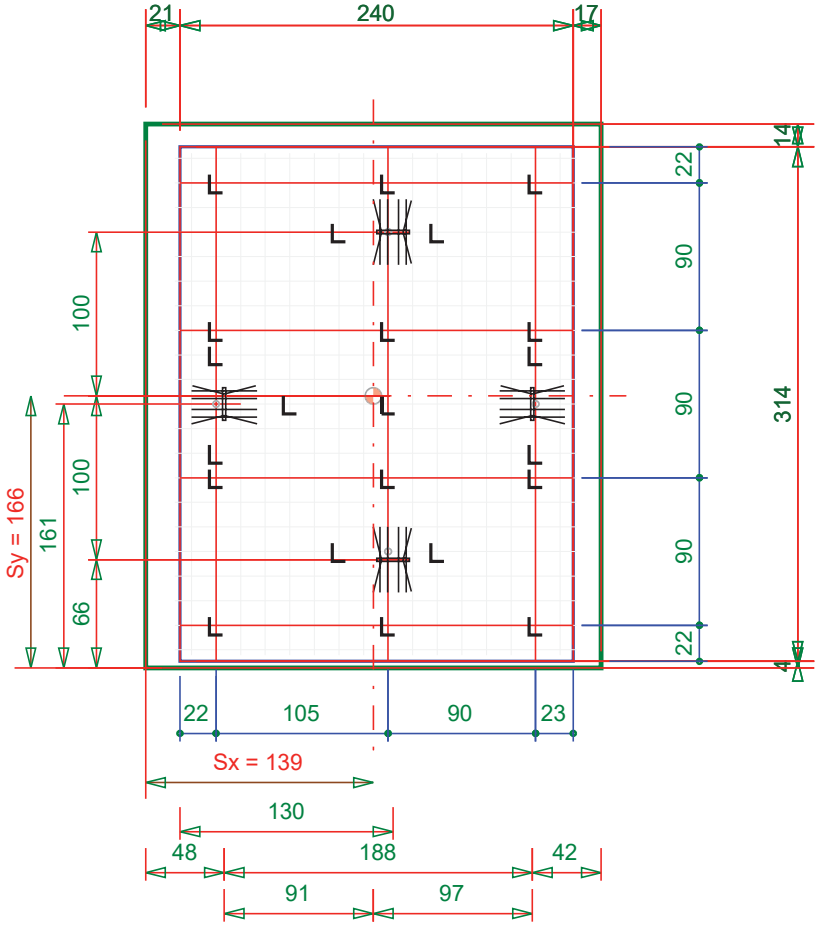
HALFEN A CRH COMPANY	Development Jinmao Xitieying Project	ProNo.	Page 1
		Pos. YWQ03d	

HALFEN - Flachanker Typ FA Calculation based: - DIBt Zul.Nr. Z-21.8-1979
The dimensioning was made of the pins to DIBt Zul. Z-21.8-1926. FA and MVA anchors to DIBt Zul. Z21.8-19
The printed report was produced with version 4.31.0.0+
Position was calculated with version: 4.31.0.0

All data, in particular the static values are for the HALFEN Sandwich panel anchors system.
Load capacities for apparently identical non HALFEN products can deviate significantly;
this can lead to load failure and therefore to damage.
HALFEN GmbH is not liable for damage caused when using third-party products.

Pos. amount.: 1
Comment:

Geometry: (all dimension are in cm)
Centre of gravity in the facing layer S_x =139 cm S_y =166 cm
(View into the empty formwork)



User input:

Concrete grade of the facing layer:	C25/30	Facing colour: dark		Gradient ΔT = 5 °K
Thickness of the facing layer:	6.0 cm	Specific weight concrete:	25 kN/m³	
Heat insulation layer thickness:	10.0 cm			
Load layer thickness:	20.0 cm	Specific weight concrete:	25 kN/m³	
Length of the facing layer:	278 cm	Height of the facing layer:	332 cm	Area = 9.23 m²

	Date 17/10/2018

Length of the supporting layer: 240 cm Height supporting layer: 314 cm Area = 7.54 m²

Loads:

Total weight facing: $G_{k,V}$ = 13.84 kN Load layer weight: $G_{k,T}$ = 37.68 kN
Total weight: $G_{k,V+T}$ = 51.52 kN

Design value (facing) $G_{d,V}$ = 18.69 kN $E_{Hd} = 1.04 * G_{k,v}$ = 14.39 kN (Earthquake)
Additional installation load: F = 0.0 kN
Wind loads: User input
Wind pressure: $w_{d,D}$ = 2.00 kN/m² Wind suction $w_{d,S}$ = 3.30 kN/m²

Positioning behaviour of the anchors:

Panel rotated: Yes
Set anchor(s) on/near neutral axis (Sy)

Clip-on Pin:

Selected pin: **22** x **SP-SPA-A-04- 250**

The horizontal load action of the pins was determined by the FEM calculation method.

Max. distance of pins: $e_H \leq$ 1000 cm
Concrete load capacity Tension: $N_{Rd,Z}$ = 6.0 kN Pressure: : $N_{Rd,D}$ = 4.3 kN

Position and action for the maximum charged pin(s): (Ref. to left lower corner facing)

Nr.	Pos. (x|y) [cm]	N Ed,Z	N Ed,D
1	238 | 206	3.74 kN	2.46 kN

Load Bearing anchor - assembled state:
Selected anchor: **2** x **SP-FA-1- 225- 160**

The horizontal action of the anchors was determined by the FEM calculation method.

In this dimensioning the anchor(s) are not covered by the approval.
Embedment depth in the facing layer and the load layer: min. 50 mm
Max. distance intersect. anchors: $e_{max} \leq 458$ cm

	SP-FA-1- 225- 160	SP-FA-1- 225- 160
Pos. (x|y) [cm]	48 | 161	236 | 161
Hor. Action actual N,Ed,z	-1.19 kN	-1.27 kN
Hor. Action actual N,Ed,d	1.86 kN	2.00 kN
Hor. Resistance N',Rd	2.00 kN ✓	2.00 kN ✓
Vertical load V ,Ed	9.34 kN	9.34 kN
Vert. Resistance V',Rd	9.80 kN ✓	9.80 kN ✓
Distance e actual	103 cm ✓	85 cm ✓
Proof N,Ed / N',Rd	0.932 ≤ 1.0 ✓	0.998 ≤ 1.0 ✓
Proof V,Ed / V',Rd	0.953 ≤ 1.0 ✓	0.953 ≤ 1.0 ✓

Load bearing anchor - Earthquake: $F_{V,d} = E_{Hd} = 14.39$kN
Selected anchor: **2** x **SP-FA-1- 225- 160**

The horizontal action of the anchors was determined by the FEM calculation method.

In this dimensioning the anchor(s) are not covered by the approval.
Embedment depth in the facing layer and the load layer: min. 50 mm
Max. distance intersect. anchors: $e_{max} \leq 458$ cm

	SP-FA-1- 225- 160	SP-FA-1- 225- 160
Pos. (x|y) [cm]	151 | 266	151 | 66
Hor. Action actual N,Ed,z	-2.29 kN	-2.22 kN
Hor. Action actual N,Ed,d	2.88 kN	2.79 kN
Hor. Resistance N',Rd	4.00 kN ✓	4.00 kN ✓
Vertical load V ,Ed	7.20 kN	7.20 kN
Vert. Resistance V',Rd	8.39 kN ✓	8.39 kN ✓
Distance e actual	105 cm ✓	95 cm ✓
Proof N,Ed / N',Rd	0.719 ≤ 1.0 ✓	0.698 ≤ 1.0 ✓
Proof V,Ed / V',Rd	0.734 ≤ 1.0 ✓	0.734 ≤ 1.0 ✓

Additional reinforcement:
Additional reinforcement B500A, B500B
(r) = placed in facing (s) = placed in load layer

Load bearing anchor r = 1 x 6 Ø 6 x L =400 mm s = 1 x 6 Ø 6 x L =400 mm

Facing layer and/or load bearing layer thickness ≥ 10 cm. In hor. and vert. direction there is an 2-layer reinforcement of as = 1.88 cm²/m, required. Each layer must arranged close to the surface.

Explanatory and calculation notes:

- Following documents have to be observed: All Technical Information included in the General certificate of DIBt approval and current valid type testing for anchoring systems.
  Additionally, all relevant dimensions and units for building construction have to be observed.
- The wind loads must be checked by the responsible engineer.
- The embedment depth of all internal components has to be verified!
  Only the minimum embedment depths are considered, in the calculation.
- The concrete grade of the facing layer is outside the approval
- Overhangs existing: For overhanging areas, wind pressure and wind suction will not be calculated simultaneously. Refer to Help.
- Thickness of facing: 6 cm does not correspond to the default in the type design examination
- Requirement: Concrete qualtity min. C30/37

U - Value of thermal transmisson calculation. Based on DIN EN ISO 6946 :2008-4

Lambda values:

Concrete facing:	λ = 2.1	W/m * K
Concrete load layer:	λ = 2.3	W/m * K
Heat insulation material:	λ = 0.035	W/m * K

Elements used:

Clip-on Pin:	**22**	x	**SP-SPA-A-04-200-A4**	Order-Id. 0272.030-00002
Load bearing anchor:	**4**	x	**SP-FA-1-225-200-A4**	Order-Id. 0771.010-00035

Wall construction:

Thermal Coefficient , inner R_{si}			d/λ = 0.1	m² * K/W
Facing:	d = 6.0	cm	d/λ = 0.0286	m² * K/W
Heat Insulation layer:	d = 10.0	cm	d/λ = 2.8571	m² * K/W
Load layer:	d = 20.0	cm	d/λ = 0.087	m² * K/W
Thermal Coefficient , outer R_{sa}			d/λ = 0.04	m² * K/W

Direction of heat flow: = upstream

Joint width hor.:	= 30.0 mm	Joint insulation design: static air layer
Joint width vert.:	= 30.0 mm	Joint insulation design: static air layer

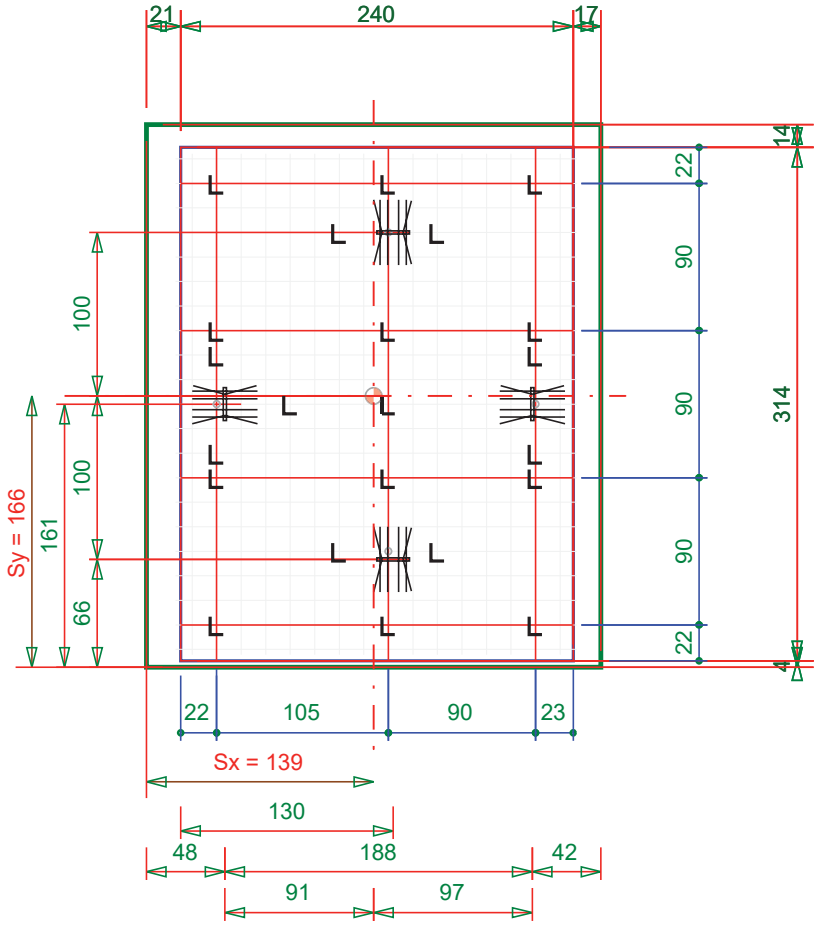
Thermal resistance Wall R = **3.1127** m² * K/W

Heat bridge loss coefficient (chi) per item and the corresponding wall areas.:

Pin:	χ = 0.0632 W / K	Area (insulated)	A_{ins} = 7.536 m²
Load bearing anchor:	χ = 0.1208 W / K	Total area of the parts	A_f = 17.5292 cm²
		Surface portion of the parts	= 0.0233 %

Coefficient of thermal trans. in wall areas without anchors	U_0	=	0.3213 W/m² * K	92.94%
	ΔU_{Anker}	=	0.0244 W/m² * K	7.06%
Coefficient of thermal trans. in wall areas with anchors	U_{SW}	=	**0.3457** W/m² * K	

Calculation based: DIBt Zul.Nr. Z-21.8-1926 SPA Ver. 4.31.0.0
Position was calculated with version: 4.31.0.0
Geometry: (all dimension are in cm) View into the empty formwork



Drawing shows the plate in assembled state

Parts list for the current position:

Load bearing anchor	2 x SP - FA - 1 - 225 - 160
Torsion anchor	2 x SP - FA - 1 - 225 - 160
Pins	22 x SPA - A - 04 - 250