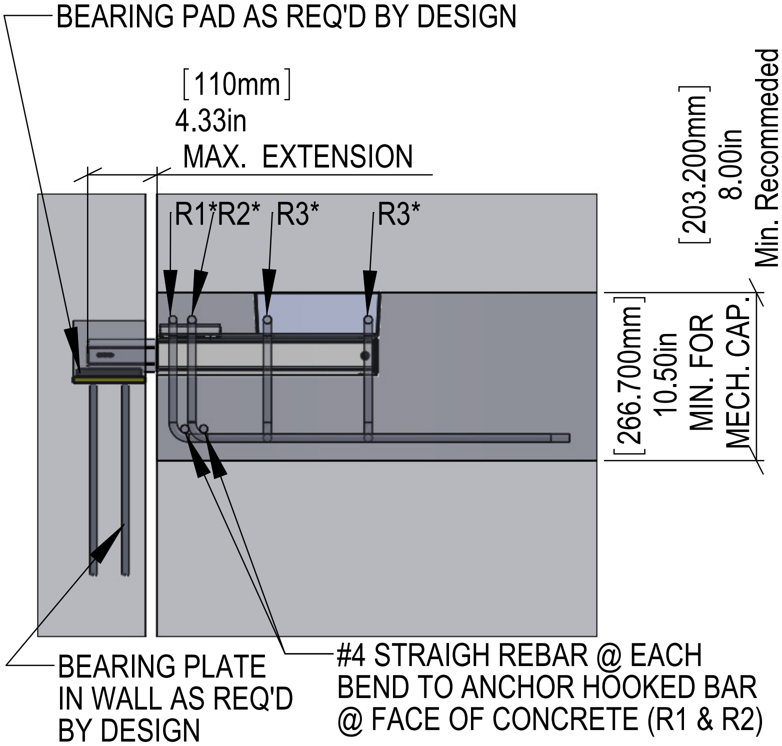
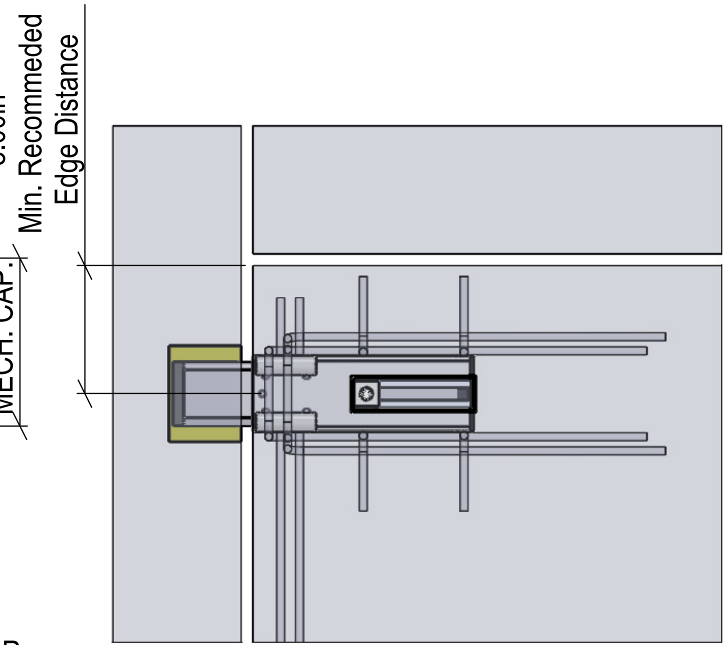
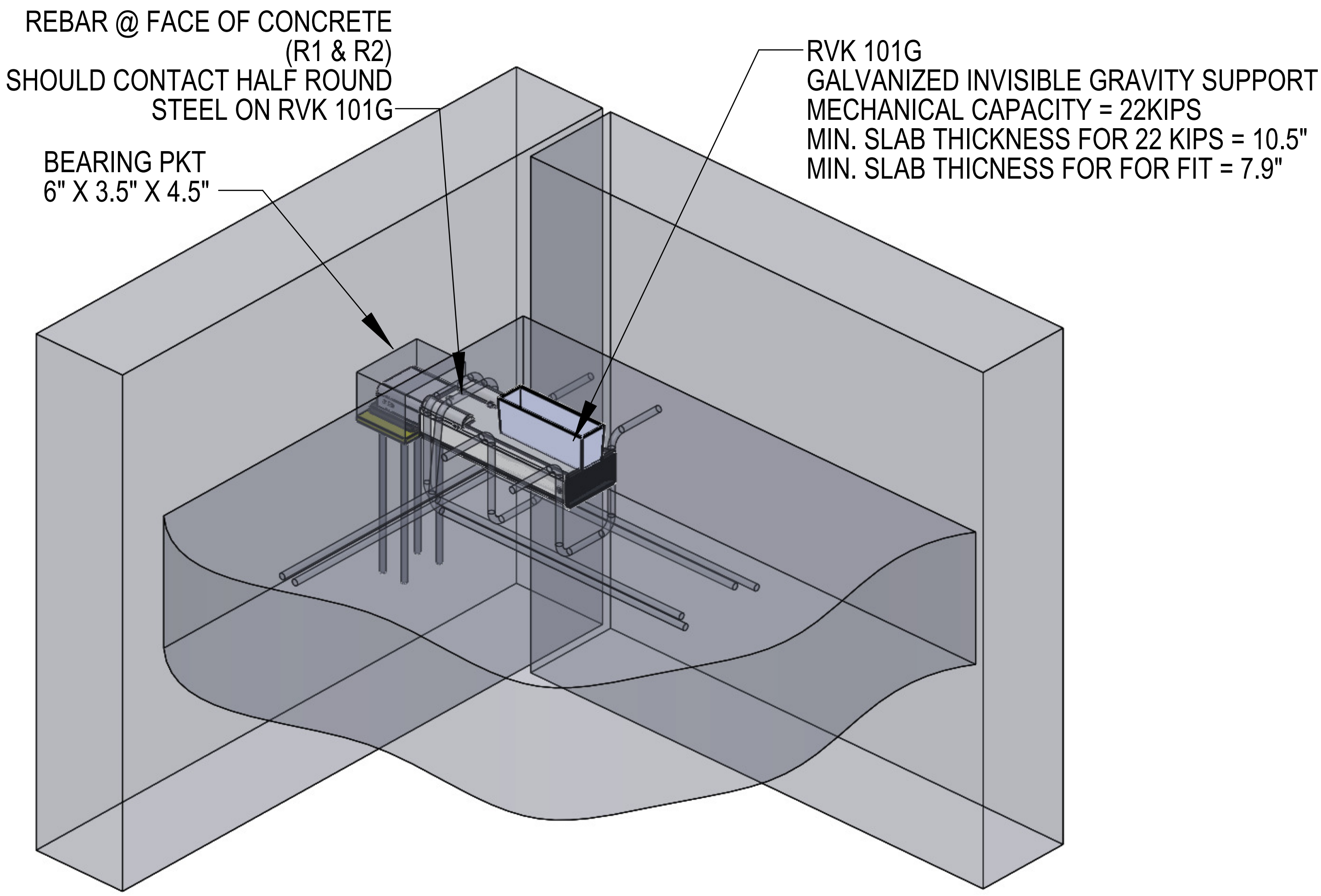


SECTION VIEW



TOP VIEW



*SEE REBAR BEND SHEET FOR REBAR SIZE AND DIMENSIONS

JVI
7131 North Ridgeway Avenue
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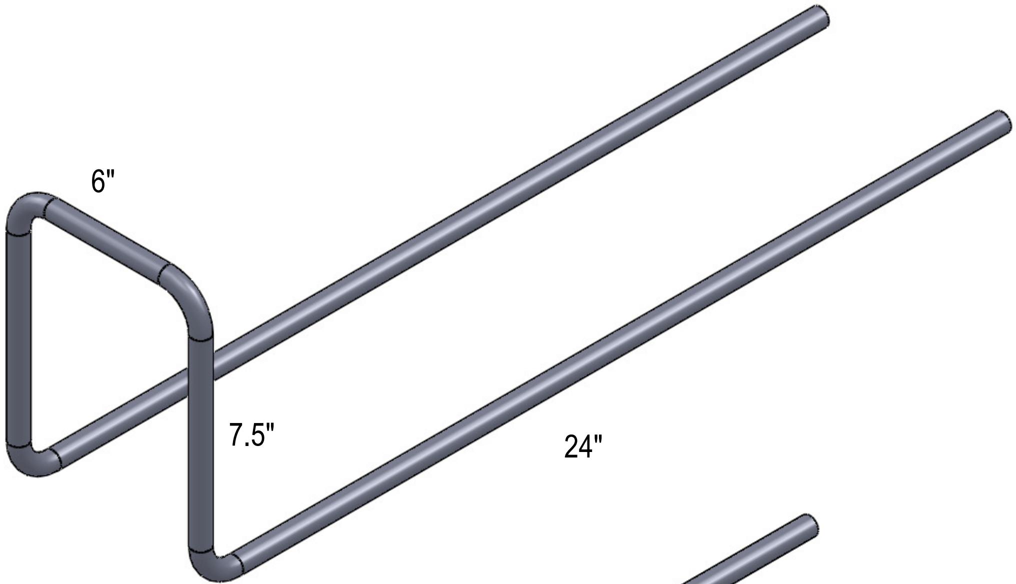
Tel. 847/675-1560 - Fax 847/675-0083

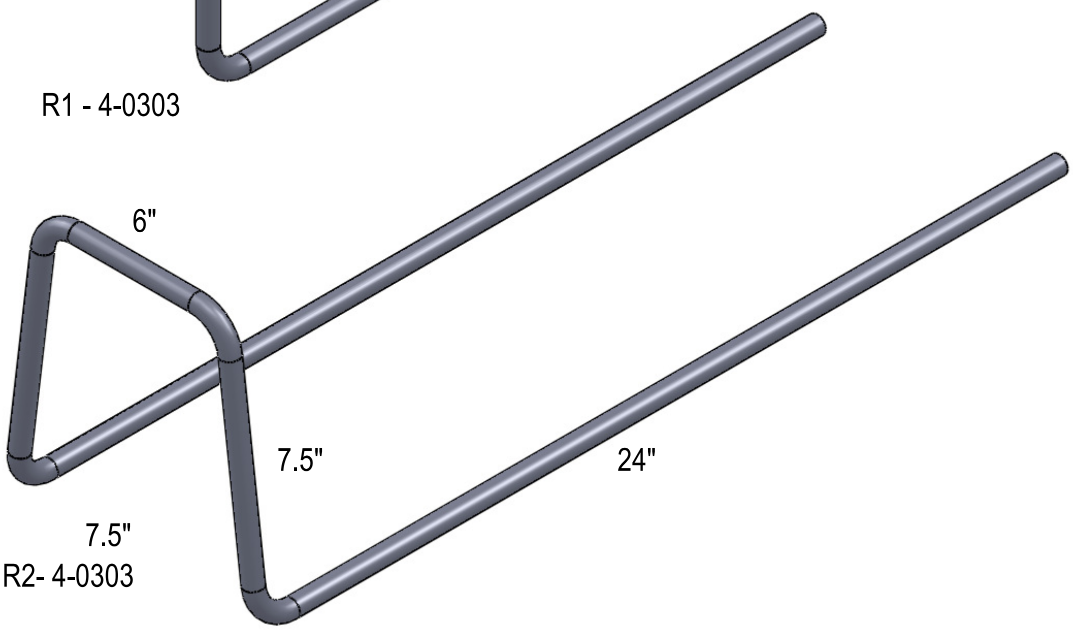
RVK 101G DETAILING

EXAMPLE RVK 101G DETAILING
NOT FOR CONSTRUCTION

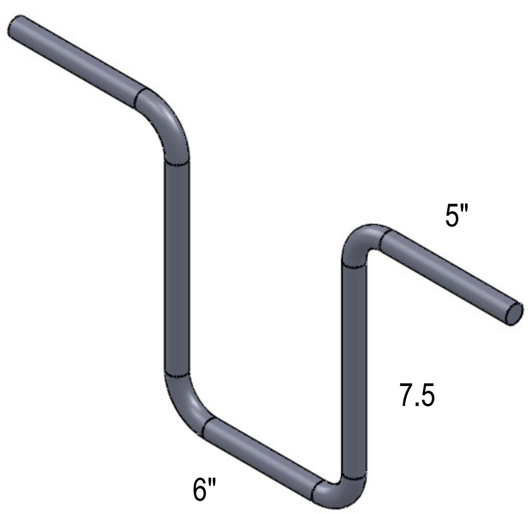
DATE	DRAWN	CHECKED	SCALE
04.14.2015	JVI	__ __ __	1" = 1'-0"



R1 - 4-0303



R2- 4-0303



R3 - 4-0207

JVI
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RVK101G EXAMPLE REBAR BEND SHEET

REBAR DEFINITION FOR EXAMPLE RVK 101G DETAIL
NOT FOR CONSTRUCTION

DATE	DRAWN	CHECKED	SCALE
04.14.2015	JVI	__ __ __	3"=1'-0"

MEMO 54b

MEMO		Dato:	26.04.2011	Sign.:	sss
RVK 101		Siste rev.:	25.05.2016	Sign.:	sss
REINFORCEMENT DESIGN		Dok. nr.:	K3-10/54bE	Control:	ps
DESIGN					

REINFORCEMENT DESIGN

CONTENTS

PART 1 – BASIC ASSUMTIONS

GENERAL

The following calculations of anchorage of the units and the corresponding reinforcement must be considered as an example illustrating the design model.

It must always be checked that the forces from the anchorage reinforcement can be transferred to the main reinforcement of the concrete components. The recommended reinforcement includes only the reinforcement necessary to anchor the unit to the concrete.

In the vicinity of the unit the element must be designed for the force R_1.

STANDARDS

The calculations are carried out in accordance with:

- Eurocode 2: Design of concrete structures. Part 1-1: General rules and rules for buildings.
- Eurocode 3: Design of steel structures. Part 1-1: General rules and rules for buildings.
- Eurocode 3: Design of steel structures. Part 1-8: Design of joints.
- EN 10080: Steel for the reinforcement of concrete. Weldable reinforcing steel. General.

For all NDPs (Nationally Determined Parameter) in the Eurocodes the recommended values are used.

NDP's are as follows:

Parameter	γ_c	γ_s	α_{cc}	α_{ct}
Recommended value	1.5	1.15	1.0	1.0

Table 1: NDP-s in EC-2.

Parameter	γ_{M0}	γ_{M1}	γ_{M2}
Recommended value	1.0	1.0	1.25

Table 2: NDP-s in EC-3.

QUALITIES

Concrete grade C35/45:

$f_{ck} = 35{,}0$ MPa	EC2, Table 3.1
$f_{cd} = \alpha_{cc} \cdot f_{ck}/\gamma_c = 1 \cdot 35/1{,}5 = 23{,}3$ MPa	EC2, Pt.3.15
$f_{ctd} = \alpha_{ct} \cdot f_{ctk,0,05}/\gamma_c = 1 \cdot 2{,}20/1{,}5 = 1{,}46$ MPa	EC2, Pt.3.16
$f_{bd} = 2{,}25 \cdot \eta_1 \cdot \eta_2 \cdot f_{ctd} = 2{,}25 \cdot 0{,}7 \cdot 1{,}0 \cdot 1{,}46 = 2{,}3$ MPa	EC2, Pt.8.4.2

Reinforcement 500C (EN 1992-1-1, Annex C):

$f_{yd} = f_{yk}/\gamma_s = 500/1{,}15 = 435$ MPa	EC2, Clause 3.2.7

Note: *Reinforcement steel of different ductility grade may be chosen provided that the bendability is sufficient for fitting the vertical suspension reinforcement to the half round steels in front of the unit.*

Structural steel S355:

Tension: $f_{yd} = f_y/\ \gamma_{M0} = 355/1{,}0 = 355$ MPa
Compression: $f_{yd} = f_y/\ \gamma_{M0} = 355/1{,}0 = 355$ MPa
Shear: $f_{sd} = f_y/(\gamma_{M0} \cdot \sqrt{3}) = 355/(1{,}0 \cdot \sqrt{3}) = 205$ MPa

DIMENSIONS

Inner tube: HUP 100x50x6, Cold formed, S355
Outer tube: HUP 120x60x4, Cold formed, S355

LOADS

Vertical ultimate limit state load = F_V = 100kN.

PART 2 - REINFORCEMENT

EQUILIBRIUM

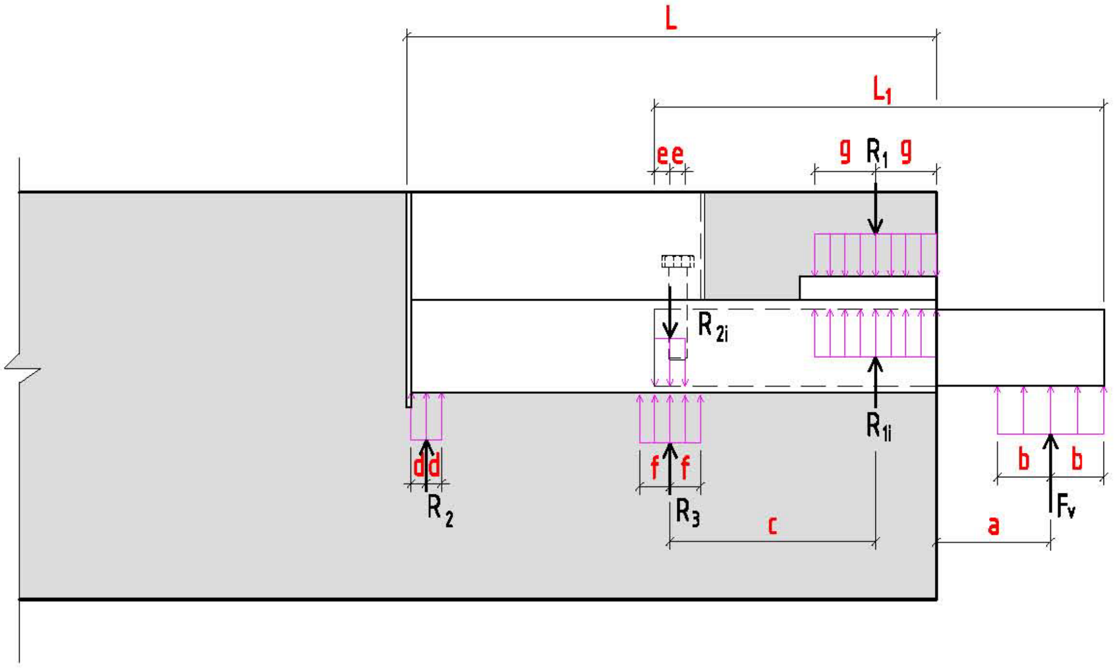


Figure 1: Forces acting on the unit.

F_V = External force on the inner tube

R_{1i}, R_{2i} = Internal forces between the inner and outer tubes.
R_1, R_2, R_3 = Support reaction forces the outer tube.

g= distance to the middle plane of the anchoring stirrups in front of the unit.

I) Equilibrium inner tube:

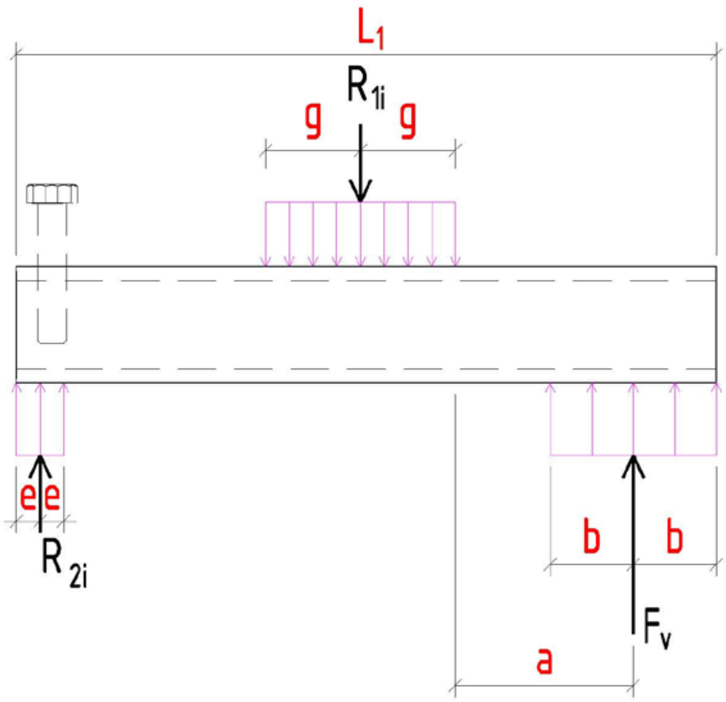


Figure 2: Forces acting on the inner tube.

Equilibrium equations of the inner tube:

1): ∑M=0: $F_v \cdot (L_1 - b - e) - R_{1i} \cdot (L_1 - b - a - g - e) = 0$ (1)

2): $\sum F_y = 0$: $F_v - R_{1i} + R_{2i} = 0$ (2)

Assuming nominal values:
L_1=295mm, a=75mm, b=35mm, g=40mm, e=10mm

Solving R_{1i} from eq. 1:

$$R_{1i} = \frac{F_v \cdot (L_1 - b - e)}{(L_1 - b - a - g - e)} \quad (3)$$

Solving R_{2i} from eq. 2:

$R_{2i} = R_{1i} - F_v$ (4)

Results:

$$R_{1i} = \frac{100kN \cdot (295 - 35 - 10)mm}{(295 - 35 - 75 - 40 - 10)mm} = 185.2kN$$

$$R_{2i} = 185.2kN - 100kN = 85.2kN$$

II) Equilibrium outer tube:

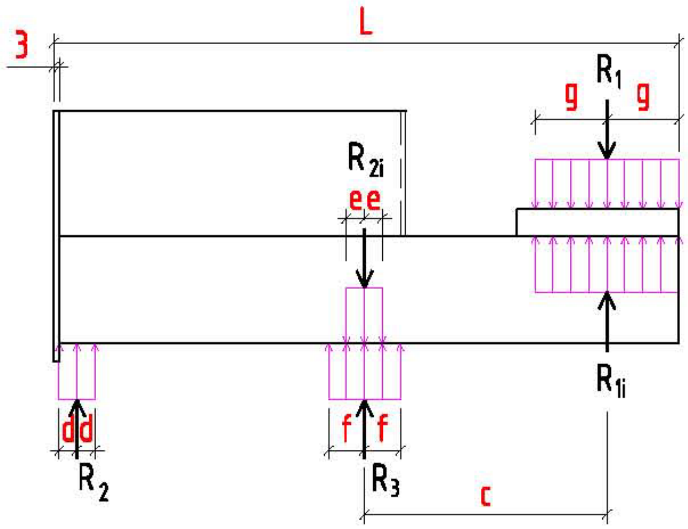


Figure 3 Forces acting on the outer tube.

Exact distribution of forces depends highly on the behavior of the outer tube. Both longitudinal bending stiffness and local transverse bending stiffness in the contact points between the inner and the outer tubes affects the equilibrium. Two situations are considered:

1) Rigid outer tube.

Outer tube rotates as a stiff body. This assumption gives minimum reaction force at R_1, and maximum reaction force at R_2. R_3 becomes zero. (The force R_3 will actually be negative, but since no reinforcement to take the negative forces is included at this position, it is assumed to be zero.)

Equilibrium equations of the outer tube:

1): $\sum M=0$: $(R_{1i}-R_1)\cdot(L-3-g-d) - (R_{2i}-R_3)\cdot(L-3-g-c-d)=0$ (5)

2): $\sum F_y=0$: $R_2+R_3+R_{1i}-R_{2i}-R_1=0$ (6)

Assuming nominal values:
L=348mm, c=135mm, g=40mm, e=10mm, d=10mm ; ($c=L_1$-b-a-g-e=295-35-75-40-10=135mm, see Figure 1)

Solving R_1 from eq. 5:

$$(R_{1i} - R_1) \cdot (L - 3 - g - d) - (R_{2i} - R_3) \cdot (L - 3 - g - c - d) = 0$$
$$(185.2 - R_1) \cdot (348 - 3 - 40 - 10) - (85.2 - 0) \cdot (348 - 3 - 40 - 135 - 10) = 0$$
$$54634 - 295R_1 - 13632 = 0$$
$$R_1 = \frac{41002}{295} = 139kN$$

Solving R_2 from eq. 6:

$$R_2 = R_1 + R_{2i} - R_{1i} - R_3 = 139 + 85.2 - 185.2 = 39kN$$

2) Outer tube without bending stiffness. No forces transferred to outer tube at the back of inner tube.

This assumption gives maximum reaction forces R_1 and R_3. R_2 becomes zero. The forces follow directly from the assumption: $R_1 = R_{1i}$ $R_3 = R_{2i}$ and $R_2 = 0$

$$R_1 = 185.2kN$$
$$R_2 = 0kN$$
$$R_3 = 85.2kN$$

The magnitude of the forces will be somewhere in between the two limits, and the prescribed reinforcement ensures integrity for both situations. Reinforcement is to be located at the assumed attack point for support reactions.

Reinforcement for R_1, R_2 and R_3:

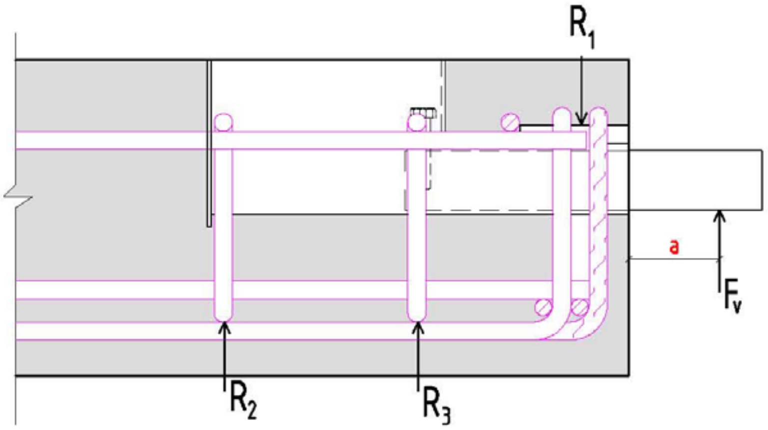


Figure 4: Forces.

Reinforcement necessary to anchor the unit to the concrete:

Reinforcement R_1: $A_{s1} = R_1/f_{sd}$ = 185.2kN/435Mpa =426 mm^2
Select 2-Ø12 = 2×2×113 =452 mm^2
Capacity selected reinforcement: R=452 mm^2 ·435MPa=196.6kN

Reinforcement R_3: $A_{s3} = R_3/f_{sd}$ = 85.2kN/435MPa =196 mm^2
Select 1-Ø12 = 1×2×113 = 226 mm^2
Capacity selected reinforcement: R=226 mm^2 ·435MPa=98.3kN

Reinforcement R_2: $A_{s2} = R_2/f_{sd}$ = 39kN/435MPa =89 mm^2
Select 1-Ø12 = 1×2×113 = 226mm^2
Capacity selected reinforcement: R=226 mm^2 ·435MPa=98.3kN

Tolerances on the positioning of the reinforcement:

Due to the small internal distances, the magnitude of the forces will change when changing the position of the reinforcement. Thus, strict tolerances are required.

Alt 1) Assume:
L_1=295mm, a=75mm, b=35mm, g=40+5=45mm, e=10mm

Gives:

$$R_1 = \frac{100kN \cdot (295-35-10)mm}{(295-35-75-45-10)mm} = 192.3kN$$

$$R_2 = 192.3kN - 100kN = 92.3kN$$

Alt 2) Assume:
L_1=295mm, a=75mm, b=35mm, g=40-5=35mm, e=10mm

Gives:

$$R_1 = \frac{100kN \cdot (295-35-10)mm}{(295-35-75-35-10)mm} = 178.6kN$$

$$R_2 = 178.6kN - 100kN = 178.6kN$$

Alt 3) Assume:
L_1=295mm, a=75mm, b=35mm, g=40mm, e=10-5=5mm

Gives:

$$R_1 = \frac{100kN \cdot (295-35-5)mm}{(295-35-75-40-5)mm} = 182.1kN$$

$$R_2 = 182.1kN - 100kN = 82.1kN$$

Alt 4) Assume:
L_1=295mm, a=75mm, b=35mm, g=40mm, e=10+5=15mm

Gives:

$$R_1 = \frac{100kN \cdot (295-35-15)mm}{(295-35-75-40-15)mm} = 188.5kN$$

$$R_2 = 188.5kN - 100kN = 88.5kN$$

Alt 5) Assume:
L_1=295mm, a=75mm, b=35mm, g=40+5=45mm, e=10+5=15mm

Gives:

$$R_1 = \frac{100kN \cdot (295-35-15)mm}{(295-35-75-45-15)mm} = 196kN$$

$$R_2 = 196kN - 100kN = 96kN$$

Conclusion tolerances: Alt 5 represents the most unfavorable position of reinforcement allowed without exceeding the reinforcement capacity. Thus, the assembling tolerances for P1, P2 and P4 should be ±5mm. For recommended reinforcement pattern, see Memo 55b.

Transverse reinforcement:

- One transverse bar with the same diameter as the anchorage bar to be placed in the bend of every anchoring bar.

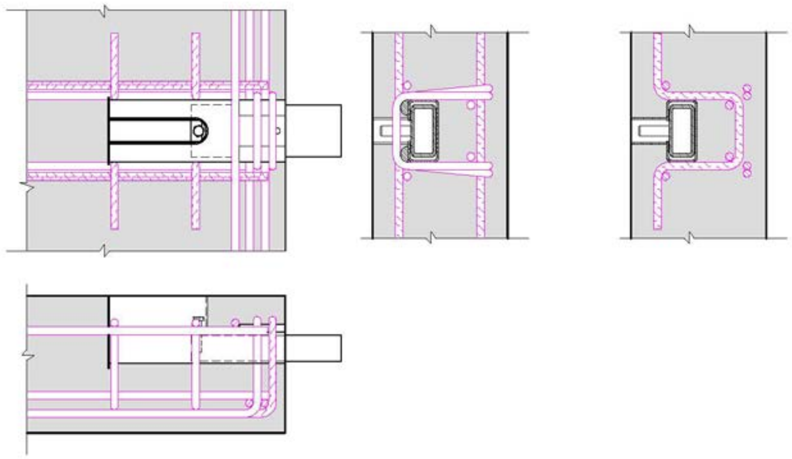


Figure 5: Anchoring reinforcement.

REVISION HISTORY	
Date:	**Description:**
26.04.2011	First Edition.
19.10.2011	Updated.
07.01.2016	Included revision history table. Included note on reinforcement ductility grade. Reduced number of values in Table 2.
25.05.2016	New template

MEMO 55b

MEMO 55b		Dato:	26.04.2011	Sign.:	sss
RVK 101		Siste rev.:	25.05.2016	Sign.:	sss
REKOMMENDED REINFORCEMENT PATTERN		Dok. nr.:	K3-10/55bE	Control:	ps
DESIGN					

REKOMMENDED REINFORCEMENT

PATTERN RVK 101

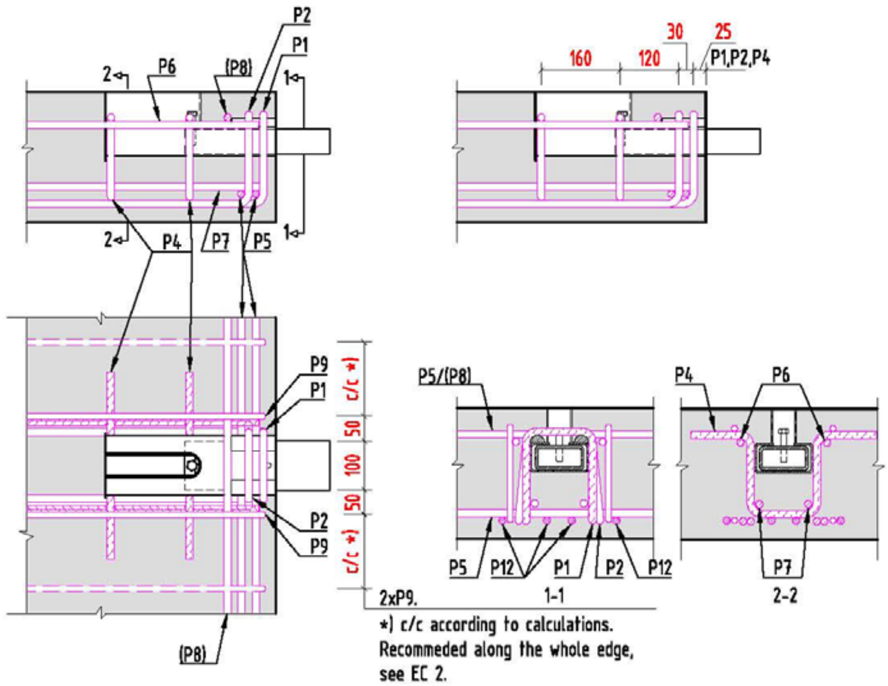


Figure 1: Recommended reinforcement pattern for RVK 101 units. Slab thickness t=265mm and edge distance k>450mm. Slab thickness t=200mm and edge distance k>400mm.

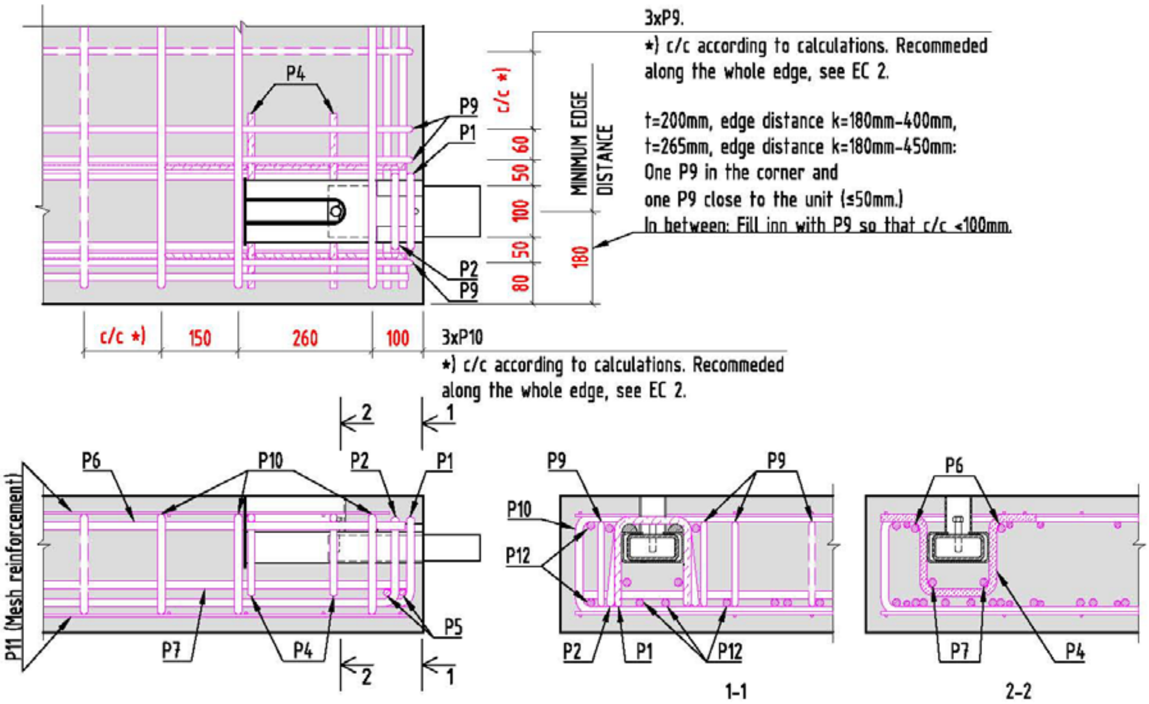


Figure 2: Recommended reinforcement pattern for RVK 101 units. Slab thickness t=265mm and edge distance 180mm≤k≤450mm. Slab thickness t=200mm and edge distance 180mm≤k≤400mm. Ultimate limit load according to Figure 5.

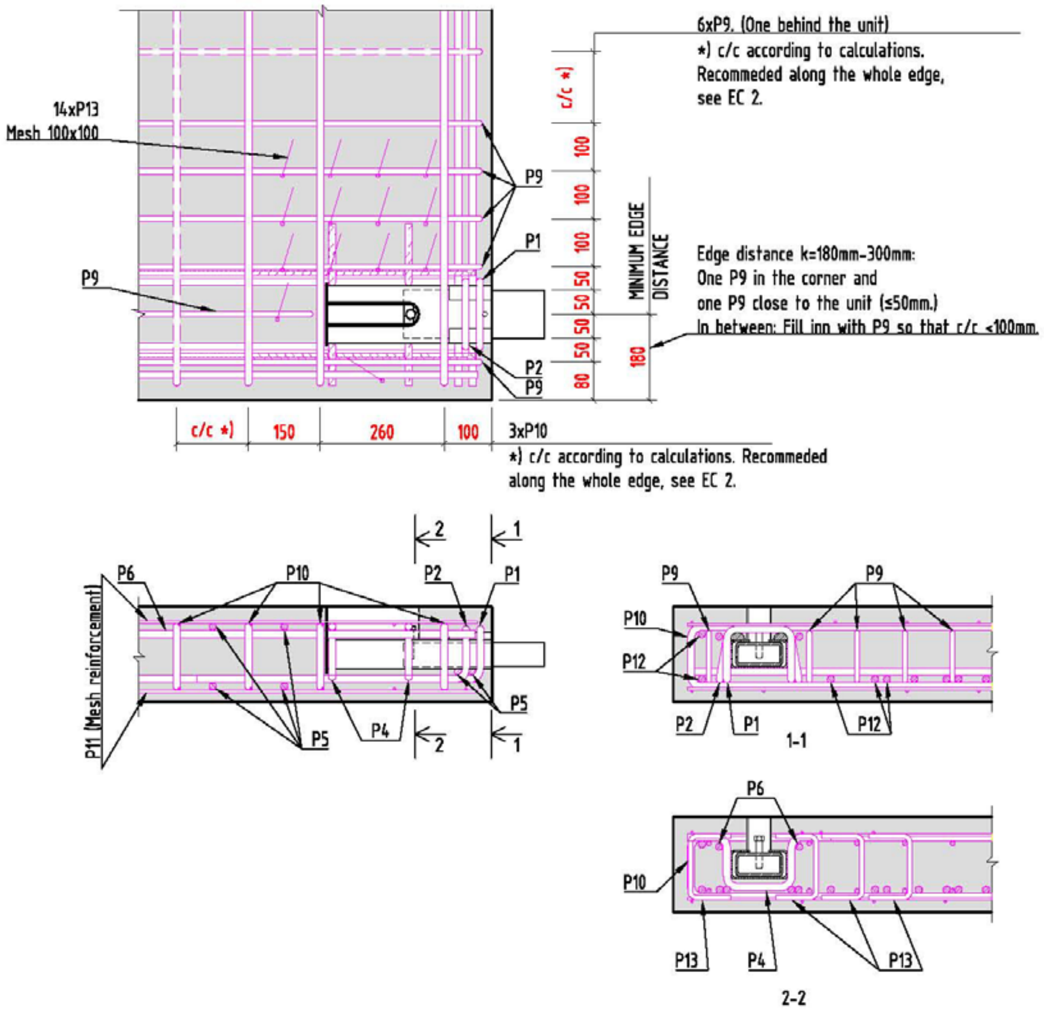


Figure 3: Recommended reinforcement pattern for RVK 101 units. Slab thickness t<265mm and edge distance 180mm≤k<300mm. Ultimate limit load according to Figure 5.

The following comments can be made in connection with the recommended reinforcement pattern shown in Figure 1:

- Reinforcement is illustrated in a slab with thickness 265mm, concrete cover 30mm and large edge distance.
- In the area marked "c/c*)", the tested elements (thickness t=265mm) were reinforced with P9 c/c 150mm along the whole edge.
- Two stirrups P9 to be placed closed to the unit. One on each side. Edge reinforcement P9 beyond the prescribed locations should be in accordance with calculations. However, according to EC 2 clauses 6.4.2(5) and 9.3.1.4, stirrups continuously along the edge are always recommended.
- Transverse reinforcement P5 in the bends of P9. When the concrete cover is 25mm, or less, the upper P5 bar can run above the half round steel in front of the unit. With 30mm concrete cover, the upper P5 bar may have to be cut. Then, a straight bar P8 is to be placed transverse of the unit as illustrated, in overlap with P5. If possible, the P5 bar should be made continuously.
- The illustrated reinforcement is the necessary reinforcement required to transfer the forces in the unit to the concrete. It is not to be understood as the complete slab reinforcement. The main reinforcement for the slab/landings, inclusive edge reinforcement must be calculated in each case.

The following comments can be made in connection with the recommended reinforcement pattern shown in Figure 2:

- Reinforcement is illustrated in a slab with thickness 265mm, concrete cover 30mm and edge distance 180mm.
- In the areas marked "c/c*)", the tested elements (thickness t=265mm) were reinforced with P10 c/c 150mm and P9 c/c 150mm along the two edges.
- Mesh reinforcement with transverse reinforcement P10 (closed bars) below. P10 runs above the unit, and below P1/P2. The mesh reinforcement may be replaced with straight bars with corresponding cross section area and c/c distance.
- Slab thickness t=200mm: When the unit is located at 400mm, or closer to the corner than 400mm, stirrups **shall always** be used along both edges as prescribed (P9/P10).
  Slab thickness t=265mm: When the unit is located at 450mm, or closer to the corner than 450mm, stirrups **shall always** be used along both edges as prescribed (P9/P10).
  These stirrups anchor the main reinforcement, and will in addition function as shear reinforcement in the slab. Edge reinforcement P9/P10 beyond the prescribed locations should be in accordance with calculations. However, according to EC 2 clauses 6.4.2(5) and 9.3.1.4, stirrups continuously along the edge are always recommended.
- P10 may be replaced with u-shaped stirrups in overlap with straight bars.

- The illustrated reinforcement is to be understood as a minimum of reinforcement which always should be found when the unit is located close to the corner. It is not to be understood as the complete slab reinforcement. The main reinforcement for the slab/landings, inclusive edge reinforcement must be calculated in each case.

The following comments can be made in connection with the recommended reinforcement pattern shown in Figure 3:

- Reinforcement is illustrated in a slab with thickness 200mm, concrete cover 30mm and edge distance 180mm. Notice the reduction in load in this case, see Figure 5.

- In the areas marked “c/c*)”, the tested elements (thickness t=200mm) were reinforced with P10 c/c 150mm and P9 c/c 100mm along the two edges.

- Mesh reinforcement with transverse reinforcement P10 (closed bars) below. P10 runs above the unit, and below P1/P2. The mesh reinforcement may be replaced with straight bars with corresponding cross section area and c/c distance.

- Slab thickness t=200mm: When the unit is located at 400mm, or closer to the corner than 400mm, stirrups **shall always** be used along both edges as prescribed (P9/P10).
  Slab thickness t=265mm: When the unit is located at 450mm, or closer to the corner than 450mm, stirrups **shall always** be used along both edges as prescribed (P9/P10).
  These stirrups anchor the main reinforcement, and will in addition function as shear reinforcement in the slab. Edge reinforcement P9/P10 beyond the prescribed locations should be in accordance with calculations. However, according to EC 2 clauses 6.4.2(5) and 9.3.1.4, stirrups continuously along the edge are always recommended.

- When the slab thickness is less than 265mm, and the unit is located closer to the corner than 300mm, stirrups P13 (shear reinforcement) may be used in the corner area, as illustrated, to increase the concrete capacity, see Figure 5.

- P10 may be replaced with u-shaped stirrups in overlap with straight bars.

- Transverse reinforcement 4Ø12 –P5 behind the unit as illustrated.

- The illustrated reinforcement is to be understood as a minimum of reinforcement which always should be found when the unit is located close to the corner. However, is not to be understood as the complete slab reinforcement. The main reinforcement for the slab/landings, inclusive edge reinforcement must be calculated in each case.

General comments in connection with all reinforcement patterns:

- Minimum slab thickness: t=200mm. Notice the reduction in load, see Figure 5.
- P1 and P2 to be placed directly onto the unit, with the half round steel at top of the unit positioned in the bend of P1/P2. It is recommended to spot weld P1 and P2 to the unit in order to ensure the correct position.
- Position, shape and anchorage of the stirrups P1 and P2 in the front is the governing factor concerning force transfer from the unit to the slab. Exact and careful detailing is therefore important. Inaccuracy may cause minor concrete cracks to develop before activating the reinforcement as assumed.
- Transverse reinforcement in the bend of P1/P2 (P5). P5 shall have the same diameter as P1/P2 and should run along the whole width of the slab.
- The transverse reinforcement P5 may be a part of the main transverse reinforcement and should have proper anchoring on the outside of the unit on both sides, especially towards the edge. This may require anchoring of P5 with an upward bend, or u-shaped bars. The required anchoring must be evaluated in every case.
- P1 and P2 should be anchored to the maximum depth, depending on the slab thickness.
- The inner width of the stirrups P1 and P2 should correspond to the width of the outer tube. This in order to have the most direct transfer of forces from the outer tube to the vertical legs of the stirrups.
- The main reinforcement of the slab should have sufficient overlap with P1 and P2. This is illustrated with four straight bars P12. The total amount of main reinforcement must be calculated in each case.
- All recommended reinforcement assumed to continue beyond the boundary of the illustrated area shall have a proper anchoring on the outside of the area. Thus, the reinforcement should continue at least one anchoring length outside the illustrated area, or be anchored by hooks.
- Shear reinforcement due to punching shear according to EC 2, clause 6.4.3.

Tolerances on location of anchoring bars:

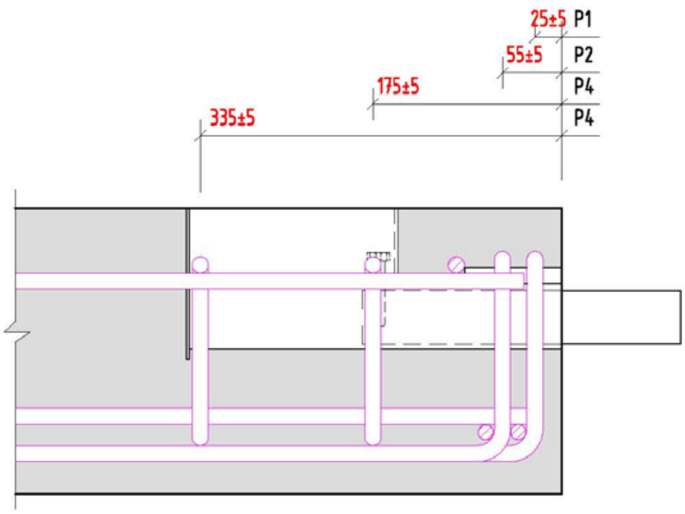


Figure 4: Tolerances P1, P2 and P4.

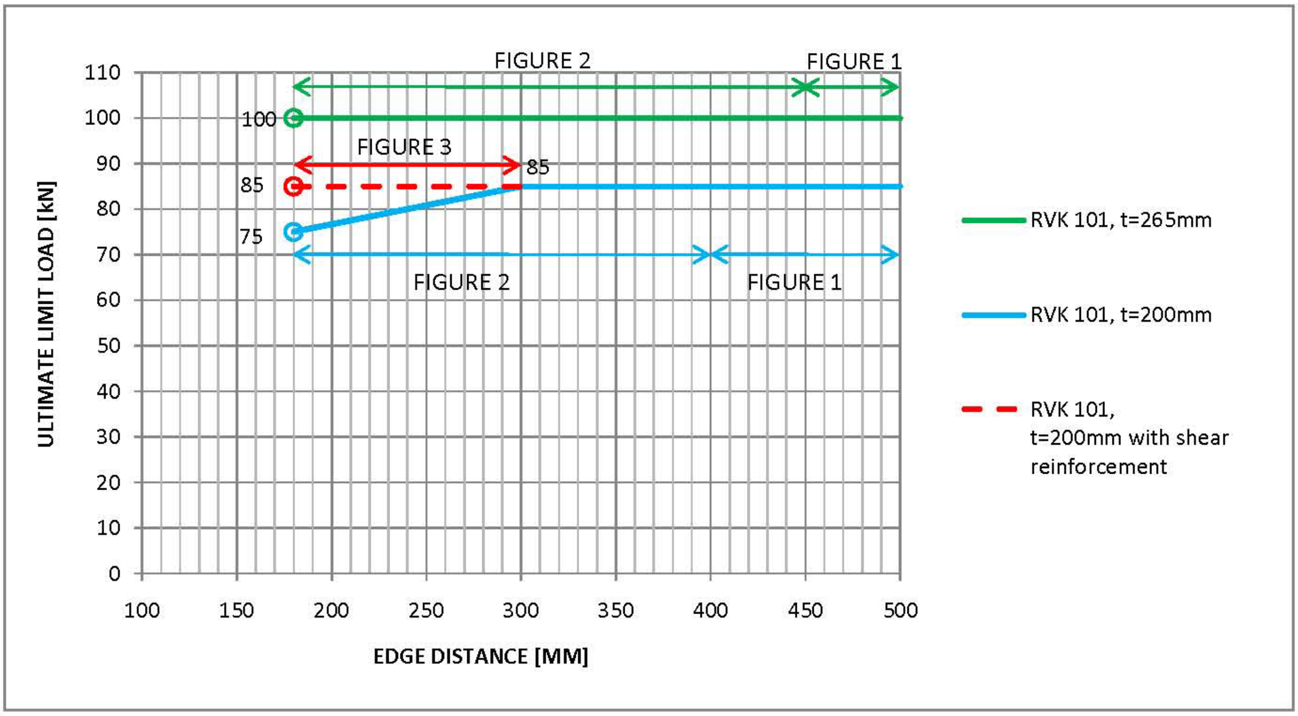
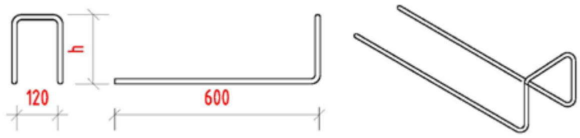
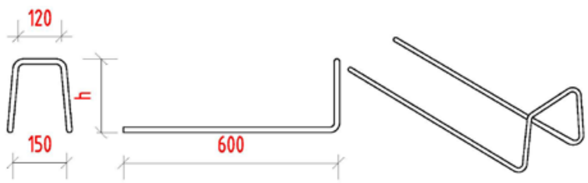
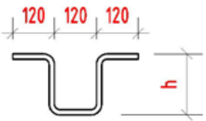
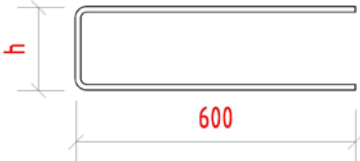
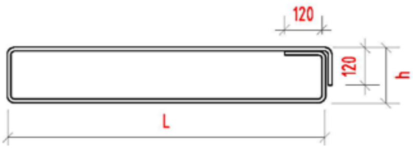
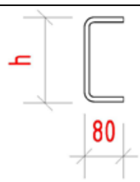


Figure 5: Slab thickness, recommended reinforcement pattern and load limitations. The coloured arrows refer to the recommended reinforcement patterns, as given in above Figures. The colour of the arrow giving the recommended reinforcement pattern corresponds to the colour of the line giving the load limitation. (In Memo 52, Figure 3, the load limitation is illustrated alone, without the arrows and references to reinforcement pattern)

Pos	Diameter	Cutting length	Nr. Pr unit	Bar schedule	Grade [3)]
P1	12		1	 Mandrel diameter=32mm (if this is in accordance with national regulations.) h=Decided locally, but as deep as possible. Normally: Slab thickness - 40mm - national rules for concrete cover. If the mandrel diameter is 4xØ (in accordance with EC-2) the width should be increased to 130mm to ensure good contact between the stirrups and the round steel.	500C (EC2, App C)
P2	12		1	 Mandrel diameter=32mm (if this is in accordance with national regulations.) h=Decided locally, but as deep as possible. Normally: Slab thickness - 40mm - national rules for concrete cover. If the mandrel diameter is 4xØ (in accordance with EC-2) the widths should be increased to respectively 130mm and 160 mm to ensure good contact between the stirrups and the round steel.	500C (EC2, App C)
P4	12		2	 h= Decided locally. Normally: Slab thickness – 30mm – 2 x national rules for concrete cover.	500C (EC2, App C)
P5	12		2 6[2)]	 Normally: Width of slab – 2 x national rules for concrete cover.	500C (EC2, App C)
P6	12	1000	2		500C (EC2, App C)
P7	12	1000	2	 Slab thickness t=200mm: There is not enough space for the bars, and they don't need to be used.	500C (EC2, App C)

Pos	Diameter	Cutting length	Nr. Pr unit	Bar schedule	Grade [3)]
P8	12		1	 Normally: Width of slab – 2 x national rules for concrete cover. Alternatively u-shaped or closed stirrups may be used.	500C (EC2, App C)
P9	10		2 + 3[1)] + 6[2)] +	 h= Decided locally. Normally: Slab thickness –30mm – 2 x national rules for concrete cover. Recommended along whole edge.	500C (EC2, App C)
P10	12		3[1), 2)] +	 h= Decided locally. Normally: Slab thickness – 2 x national rules for concrete cover – thickness of mesh reinforcement.	500C (EC2, App C)
P11				Minimum mesh reinforcement K131, or main reinforcement in both directions with corresponding cross section area and c/c.	500C (EC2, App C)
P12	12		4 + 5[1), 2)] +	 The amount of main reinforcement must be according to calculations in each case. Minimum 4xØ12 in overlap with P1/P2 as illustrated. Normally: Length of slab – 2 x national rules for concrete cover	500C (EC2, App C)
P13	8		14[2)]	 h= Decided locally. Normally: Slab thickness – 2 x national rules for concrete cover – thickness of mesh reinforcement.	500C (EC2, App C)

[1)] Edge distance≤400mm. Slab thickness, t=200mm.
Edge distance≤450mm. Slab thickness, t=265mm.

[2)] Edge distance<300mm and slab thickness t<265mm.

[3)] Reinforcement steel of different ductility grade may be chosen provided that the bendability is sufficient for fitting the vertical suspension reinforcement to the half round steels in front of the unit.

Table 1: List of reinforcement RVK 101.

REVISION HISTORY	
Date:	**Description:**
26.04.2011	First Edition.
04.07.2011	Updated.
07.01.2016	Included revision history table. Included note on reinforcement ductility grade in Table 1.
25.05.2016	New template

MEMO 52	Dato:	26.04.2011	Sign.:	sss
RVK 101	Siste rev.:	06.12.2016	Sign.:	sss
CAPACITIES AND MAIN DIMENSIONS	Dok. nr.:	K3-11/52E	Control:	ps
PLANNING				

CAPACITIES AND MAIN DIMENSIONS

RVK 101

The main components of the RVK-unit are two hollow rectangular steel tubes, where the smallest tube is sliding within the other, and is accessible from the surface of the concrete. The RVK-units are in particular designed to connect precast stairs and landings to the walls in the shafts. The units are embedded in the precast stair or landing, and all that is required in the wall is a recess.

During erection the inner tube is retracted into the unit, to be pushed out into the recess when the precast element is in the correct position. A rubber pad at the support in the wall is important in order to reduce the impact sound transfer from the stairs to the walls.

The capacity of the steel unit itself only depend upon the position of the global loading, and the anchoring reinforcement, as the anchoring stirrups serve as internal supports for the steel unit. The assumed conditions for the equilibrium and corresponding steel capacity are given in memo 54b.

The concrete elements capacity due to local punching shear may in some situations limit the applicable utilization of the steel unit. The punching shear capacity does not only depend on the capacity of the stirrups anchoring the unit, but also the reinforcement pattern in the vicinity of the unit. Important parameters are the units distance to the edge, as well as the thickness of the element. When the unit is located close to the corner, the reinforcement layout of the whole corner will influence on the local punching shear capacity. Detailing of the reinforcement will be of major importance when the concrete is governing the capacity. As the manufactures may have various solutions with respect to reinforcement layout, the final design of the elements and evaluation of punching shear capacity should be carried out under the supervision of structural engineer with knowledge about the behaviour of reinforced concrete.

The different recommended reinforcement patterns given in Memos 55b are in accordance with the reinforcement patterns in precast elements subjected to tests at Sintef, Norway in 2011. Only the local reinforcement in the vicinity of the unit is illustrated in the Memos. The recommended load reductions, due to concrete failure, as given in Figure 2 and Figure 3, are established based on results from the tests. Minimum requirements to location and slab thickness can be found in Table 5 and Table 10. The minimum concrete grade to make use of the test results are C35/45.

The RVK 101 units require a slab thickness of 265mm to be fully utilized with the standard reinforcement pattern. Reduced ultimate limit load is recommended when the slab thickness is less than 265mm, see Figure 3. When the RVK 101 units is used in thinner slabs than 265mm, and located closer to the corner than 300mm, shear reinforcement may be used to increase the concrete capacity.

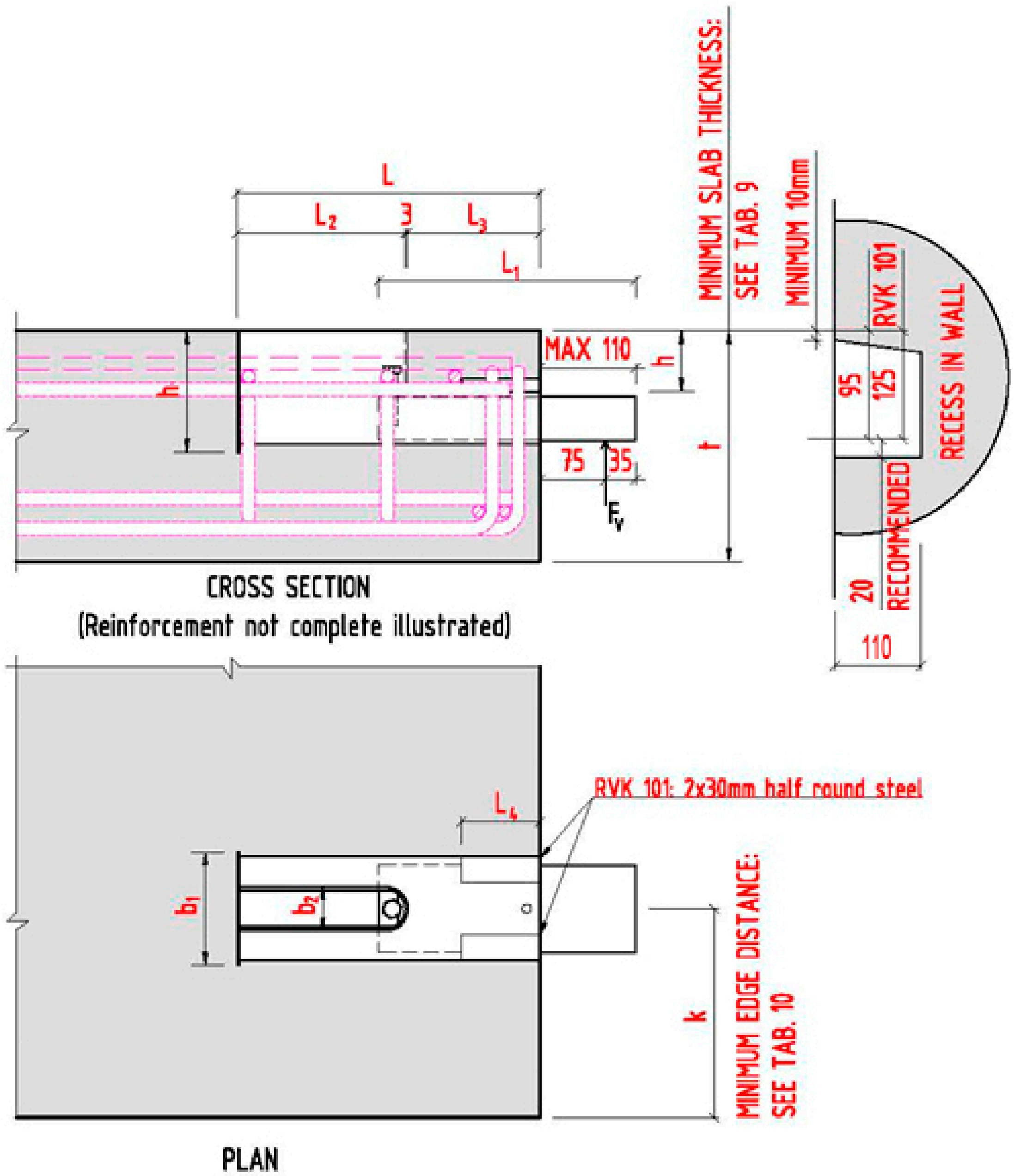


Figure 1: RVK dimensions.
and Figure 2.

RVK 101

Unit	Outer tube b/h/t	Inner tube b/h/t	Clearances between tubes	
			Vertically	Horizontally
mm	120/60/4	100/50/6	2	12

Table 1: Tube dimensions.

Unit	L	L_1	L_2	L_3	L_4	h	h_1	b_1	b_2
mm	348	295	193	152	90	70	140	130	51
in	13.7	11.6	7.5	6.0	3.5	2.8	5.5	5.1	2.0

Table 2: Dimensions.

Unit	Vertical load F_V
kN	100
kips	22

Table 3 Maximum capacity of the steel unit.

Unit	Minimum slab thickness - due to available space (t)
mm	200
in	7.9

Table 4: Minimum slab thickness – due to available space.

Unit	Slab thickness (t)	Minimum edge distance[1)] (k)
mm	265	180
in	10.4	7.1
[1)] Special requirements to the reinforcement pattern in the corner, see Memo 55b		

Table 5: Recommended minimum slab thickness to take advantage of the steel unit capacity, see Figure 1 and Figure 3.

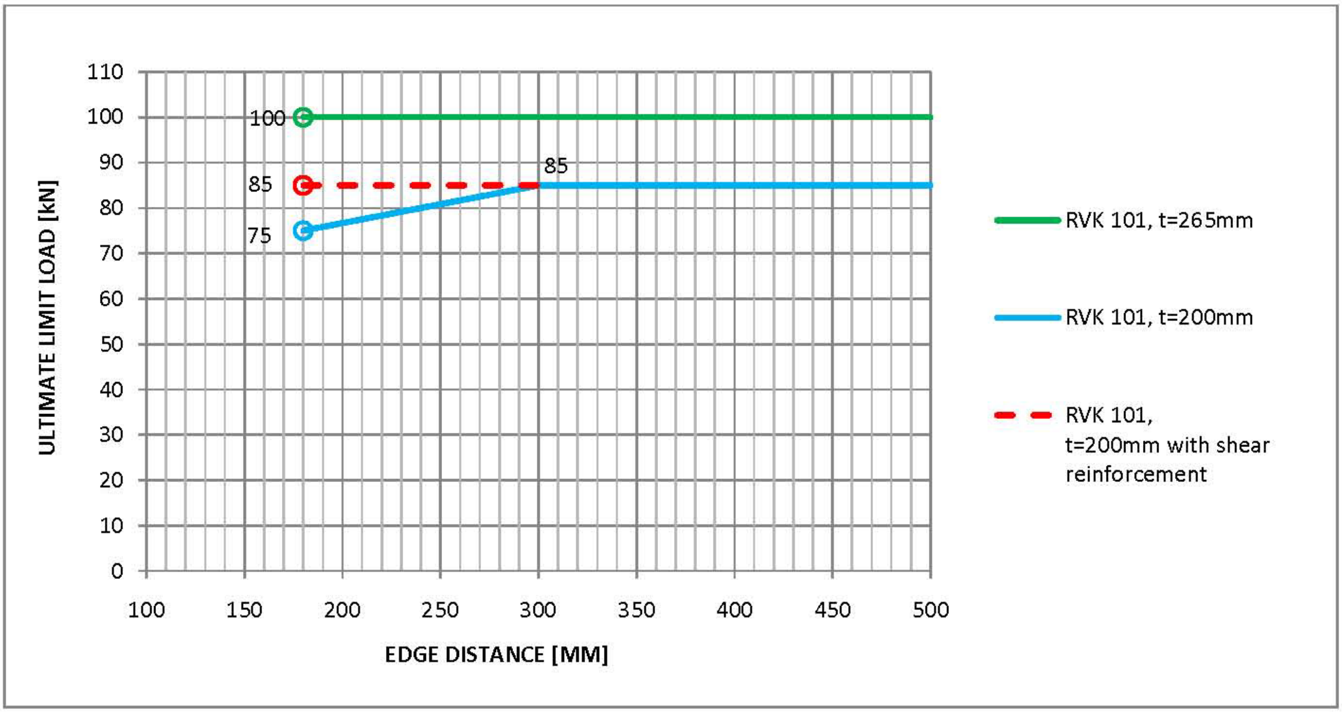


Figure 2: Recommended ultimate limit load when using RVK 101 with slab thicknesses t=200mm-265mm.