| | | | | |
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**Specifiers comments:**

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| | |
|---|---|
| Design standard: | ACI Chapter 12 |
| Application type: | Standard applications/Slab to slab at support |
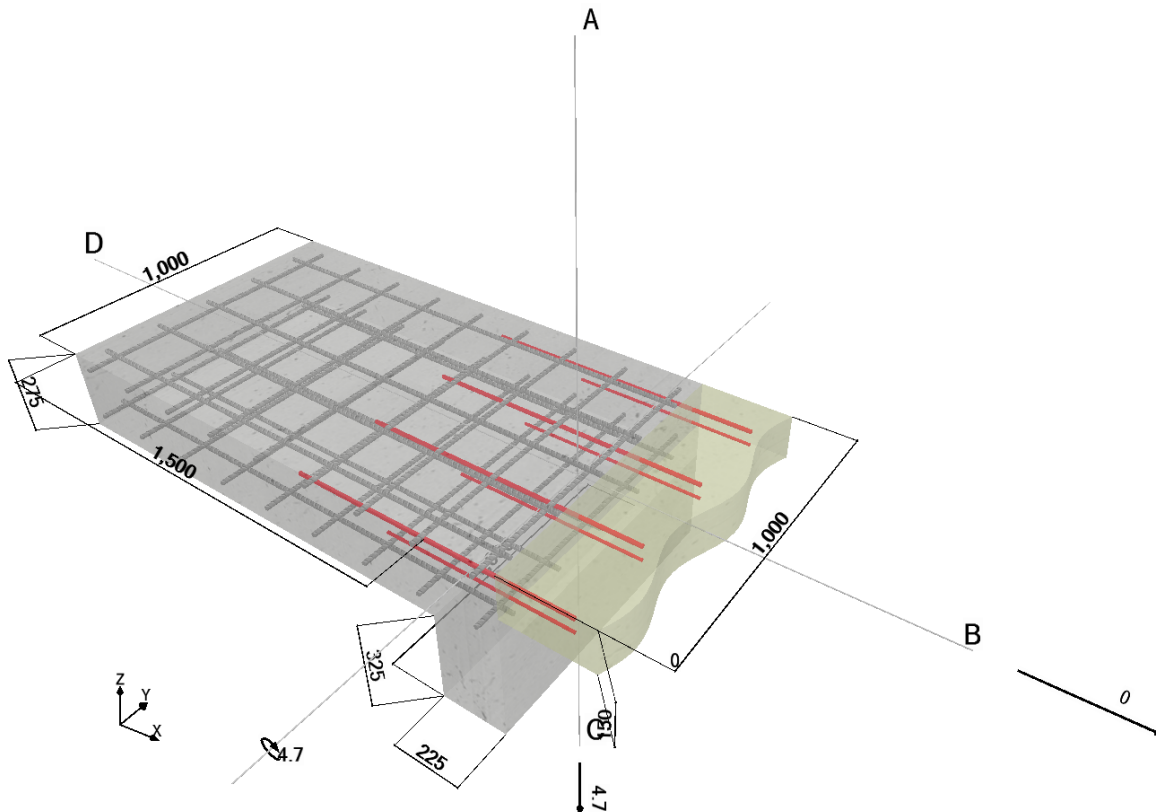


## 1. Loads

**Loads**

| | |
|---|---|
| $M_d$ | 4.70 kNm/m |
| $N_d$ | 0.00 kN/m |
| $V_d$ | 4.70 kN/m |

**Fire design**

| | |
|---|---|
| Fire rating | None |

**Fatigue design**

None

**Seismic**

| | |
|---|---|
| Seismic loads | No |

## 2. Drilling & Temperature

**Drilling**

| | |
|---|---|
| Hole condition | Dry |
| Drilling method | Hammer drilling |
| Drilling aid | Drilling aid is used |

**Temperature (ACI Chapter 12)**

| | |
|---|---|
| During installation | from 5 °C to 40 °C |
| During service | 20 °C / 20 °C |

## 3. Material & Safety

**Structure**

| | |
|---|---|
| Concrete strength f'c | 25.0 N/mm² |
| Char. yield strength (existing) | 500 N/mm² |
| Char. yield strength (new) | 500 N/mm² |

## 4. Parameters

| | |
|---|---|
| $\alpha_{cc}$ | 1.00 |
| $\alpha_{ct}$ | 1.00 |
| $\alpha_{ct,bond}$ | 1.00 |
| $\varepsilon_{ud}$ | 0.0200 |
| $k_2$ | 0.850 |
| $v'$ | 0.900 |
| $\rho_{max}$ | 0.0400 |
| $\varepsilon_{c2}$ | $2.00 \cdot 10^{-3}$ |
| $\varepsilon_{c2u}$ | $3.50 \cdot 10^{-3}$ |

## 5. Existing reinforcement

**Top longitudinal reinforcement**

| | |
|---|---|
| Bar size | 16.0 mm |
| Concrete cover | 30.0 mm |
| Spacing | 200 mm |

**Top transverse reinforcement**

| | |
|---|---|
| Bar size | 16.0 mm |
| Concrete cover | 40.0 mm |
| Spacing | 200 mm |

**Bottom longitudinal reinforcement**

| | |
|---|---|
| Bar size | 16.0 mm |
| Concrete cover | 30.0 mm |
| Spacing | 200 mm |

**Bottom transverse reinforcement**

| | |
|---|---|
| Bar size | 16.0 mm |
| Concrete cover | 40.0 mm |
| Spacing | 200 mm |

**Concrete cover to face**

| | |
|---|---|
| Concrete cover to face | 30.0 mm |

## 6. Post-installed reinforcement

**Number of layers**

| | |
|---|---|
| Number of top layers | 1.00 |
| Number of bottom layers | 1.00 |

**Top reinforcements parameters**

| | |
|---|---|
| Top diameter | 14.0 mm |
| Top spacing | 300 mm |
| Top layer 1: c | 60.0 mm |
| Top layer 1: $c_d$ (EC2, 8.4.4.1) | 60.0 mm |
| Top min. reinforcement | 100 mm²/m |
| Position Factor | 1.00 |

**Bottom reinforcements parameters**

| | |
|---|---|
| Bottom diameter | 10.0 mm |
| Bottom spacing | 300 mm |
| Bottom layer 1: c | 30.0 mm |
| Bottom layer 1: $c_d$ (EC2, 8.4.4.1) | 145 mm |
| Bottom min. reinforcement | 100 mm²/m |
| Position Factor | 1.00 |

**Other**

| | |
|---|---|
| Cover of tension force line b | 0.00 mm |

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## Selected solution

| | | Bar size | Drill bit size | Bar spacing centre/centre | Distance centre/surface | Drilled hole required | Anchorage for yield of bar |
|---|---|---|---|---|---|---|---|
| Layer of bars | | $d_b$ [mm] | D [mm] | s [mm] | $c_s$ [mm] | $\ell v_{req}$ [mm] | $\ell v_y$ [mm] |
| Top / left | 1 | 14.0 | 18.0 | 300 | 67.0 | 749 | 749 |
| Bottom / right | 1 | 10.0 | 14.0 | 300 | 160 | 417 | 417 |
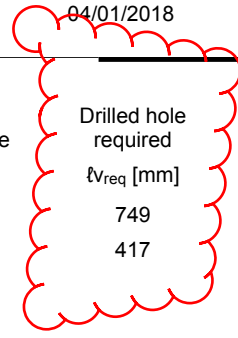
### Required accessories

Please find the required accessories in your approval or the instructions for use.

### Section Analysis

| | | | |
|---|---|---|---|
| Strut angle | $\theta$ | 24.2 | ° |
| Inner lever arm | $z_1$ | 80.7 | mm |
| Compressive reinforcement required? | | no | |
| Inner lever arm of cast-in bars | $z_{1,ex}$ | 110 | mm |

## Upper layer (tension side)

### Design Input

| | | | |
|---|---|---|---|
| Design force in bar | $F_E$ | 17.5 | kN |
| Required reinforcement | $A_{s,rqd}$ | 134 | mm²/m |
| Provided reinforcement | $d_b$ = 14 mm, s = 300 mm → $A_{s,prov}$ | 513 | mm²/m |
| Adhesive used | Hilti HIT-HY 200-R | | Agito.Rebar.Report.DesignInput.AdhesiveUsed.Comment |

### Splice Post-Installed Reinforcement

| | | |
|---|---|---|
| Bar position | $\Psi_t$ | 1.00 |
| Bar size | $d_b$ = 14 mm → $\Psi_s$ | 0.800 |
| Mortar-Concrete factor | $\Psi_m$ | 1.00 |
| Influence transverse reinf. | $K_{tr} = 40A_{tr}/(sn)$ | 0.00 |
| Cover dimension (to bar centre) | c = min($c_x$, $c_y$, s/2) | 67.0 mm |
| Influence confinement | cf = $(c+K_{tr})/d_b \leq 2.5$ | 2.50 |
| 3/40 for selected units | u = 3/40 sqrt(1 N/mm² / 1psi) | 0.903 |
| Development length | $l_d = f_y * u/(f'_c{}^{0.5}) \, \Psi_t \, \Psi_s \, \Psi_m /cf \cdot d_b*1.3$ | 529 mm |

### Splice Cast-In Reinforcement

| | | |
|---|---|---|
| Bar position | $\Psi_t$ | 1.00 |
| Bar size | $d_b$ = 14 mm → $\Psi_s$ | 0.800 |
| Influence transverse reinf. | $K_{tr} = 40A_{tr}/(sn)$ | 0.00 |

| Cover dimension (to bar centre) | $c = \min(c_x, c_y, s/2)$ | 38.0 mm |
| Influence confinement | $cf = (c+K_{tr})/d_b \leq 2.5$ | 2.38 |
| 3/40 for selected units | $u = 3/40 \sqrt{1\ N/mm^2\ /\ 1psi}$ | 0.903 |
| Development length | $l_d = f_y * u/(f'_c{}^{0.5})\ \Psi_t\ \Psi_s\ /cf \cdot d_b*1.3$ | 637 mm |

### Definition of the installation length

| Minimum anchorage length | $l_{d,min}$ | 305 mm |
| Controlling splice length | $l_0 = \max(l_{0,pi}; l_{0,ci}; l_{d,min})$ | 637 mm |
| | | |
| Front cover | $c_f$ | 30.0 mm |
| ½ of support width | $w/2$ | 112 mm |
| | | |
| Installation length | $l_{inst} = l_0 + l_{0,e} + \max(c_f; w/2)$ | 749 mm |

## Lower layer

### Design Input

| Design force in bar | $F_E$ | 0.00 kN |
| Required reinforcement | $A_{s,rqd}$ | 0.00 mm²/m |
| Provided reinforcement | $d_b = 10\ mm, s = 300\ mm \rightarrow A_{s,prov}$ | 262 mm²/m |
| Adhesive used | Hilti HIT-HY 200-R | Agito.Rebar.Report.DesignInput.AdhesiveUsed.Comment |

### Minimum Anchorage Length

| Basic anchorage length (Fyd) | $l_{b,rqd,fyd} = (\Phi/4)\cdot(f_{yd}/f_{bd})$ | 0.00 mm | |
| Factor for minimum length | $f_{mult,min}$ | 1.00 | ETA 12/0083 |
| Minimum anchorage length | $l_{b,min} = f_{mult,min}\cdot\max(0.3 l_{b,rqd,fyd}; 10\Phi; 305\ mm)$ | 305 mm | |
| | | | |
| ½ of support width | $w/2$ | 112 mm | |
| | | | |
| Installation length | $l_{inst} = l_{bd} + w/2$ | 417 mm | |

## Remarks

This design exclusively considers the local load transfer from the post-installed tensile reinforcement at the intersection between new and existing concrete. The joint surfaces for concreting must be roughened to at least such an extent that aggregates protrude. It assumes that adequate transverse reinforcement is provided in the anchorage area if required.
The shear load carrying capacity of the cross section has to be designed separately.

The Installation (drilling, cleaning, setting) must be according to the approval!

The accessory list in this report is for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.

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**Hilti PROFIS Rebar 2.4.8**

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Minimum reinforcement requirements are not checked by the software.