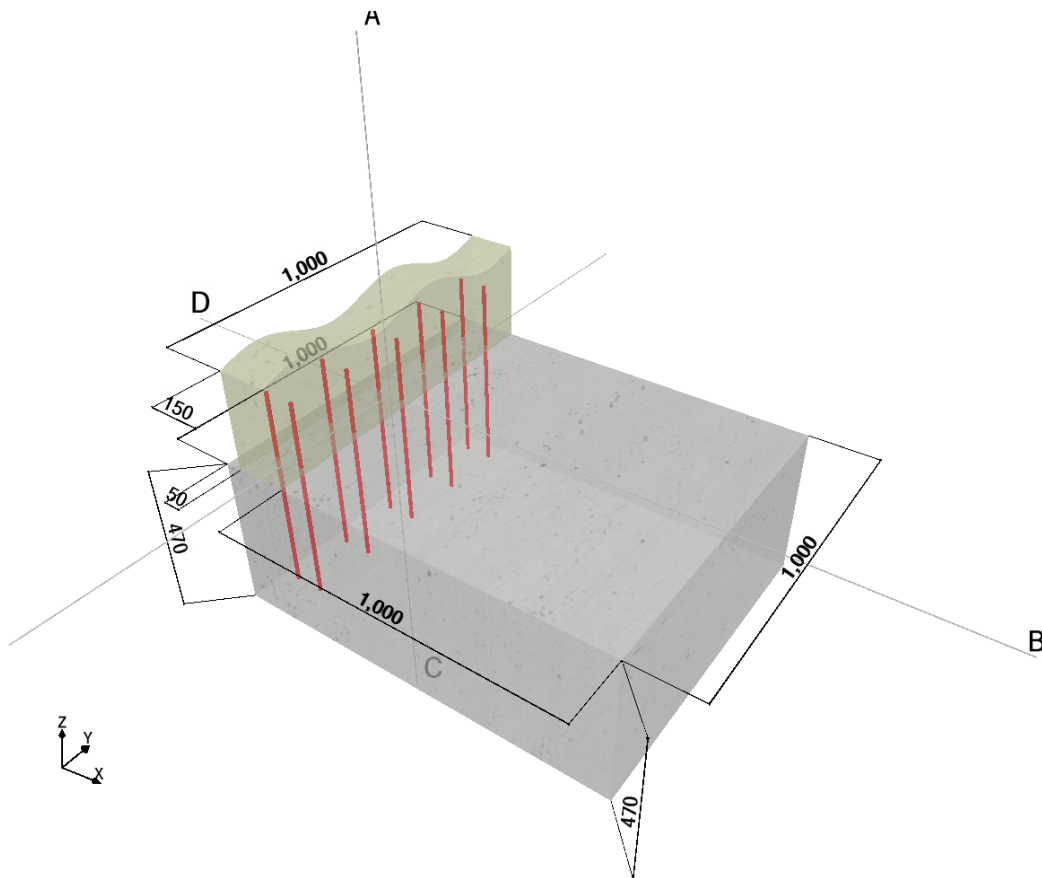


Company: MTTJV
 Specifier: Shaheen Syed
 Address:
 Phone | Fax: 30684030 |
 E-Mail: sparamban@mttjv.com

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Specifiers comments:

Design standard: EC2 / ETA
 Application type: Compression
 Service life: 50 years (ETA)


1. Loads for yielding of the bar

| Loads | |
|----------------|--------------|
| Top | -49.2 kN/bar |
| Bottom | -49.2 kN/bar |
| Fire design | |
| Fire rating | None |
| Fatigue design | |
| None | |
| Seismic | |
| Seismic loads | No |

2. Drilling & Temperature

| Drilling | |
|-----------------------|------------------------------|
| Hole condition | Dry |
| Drilling method | SAFEset - Automatic cleaning |
| Drilling aid | Drilling aid is used |
| Temperature (EC2/ETA) | |
| During installation | from 5 °C to 40 °C |
| During service | 50 °C / 30 °C |

3. Material & Safety

| Structure | |
|-------------------------------------|-----------------------|
| Concrete class (existing structure) | C30/37 |
| Char. yield strength (existing) | 500 N/mm ² |
| Char. yield strength (new) | 500 N/mm ² |

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4. Eurocode 2 parameters

| | |
|--------------------|----------------------|
| α_{cc} | 1.00 |
| α_{ct} | 1.00 |
| $\alpha_{ct,bond}$ | 1.00 |
| ϵ_{ud} | 0.0200 |
| k_2 | 0.850 |
| ν' | 0.880 |
| ρ_{max} | 0.0400 |
| ϵ_{c2} | $2.00 \cdot 10^{-3}$ |
| ϵ_{c2u} | $3.50 \cdot 10^{-3}$ |

5. Post-installed reinforcement

| | |
|---|------------------------|
| Number of layers | |
| Number of top layers | 1.00 |
| Number of bottom layers | 1.00 |
| Top reinforcements parameters | |
| Top diameter | 12.0 mm |
| Top spacing | 200 mm |
| Top layer 1: c | 25.0 mm |
| Top layer 1: c_d (EC2, 8.4.4.1) | 75.0 mm |
| Top bond condition | Good |
| Top min. reinforcement | 100 mm ² /m |
| Bottom reinforcements parameters | |
| Bottom diameter | 12.0 mm |
| Bottom spacing | 200 mm |
| Bottom layer 1: c | 25.0 mm |
| Bottom layer 1: c_d (EC2, 8.4.4.1) | 94.0 mm |
| Bottom bond condition | Good |
| Bottom min. reinforcement | 100 mm ² /m |
| Other | |
| Transverse pressure | 0.00 N/mm ² |
| Cover of tension force line b | 0.00 mm |

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Selected solution

| Layer of bars | | Bar size Ø [mm] | Drill bit size D [mm] | Bar spacing centre/centre s [mm] | Distance centre/surface c _s [mm] | Required drill hole l _{inst} [mm] | Anchorage for yield of bar l _{vy} [mm] |
|----------------|---|--------------------|--------------------------|--|---|--|---|
| Top / left | 1 | 12.0 | 14.0 | 200 | 81.0 | 435 | 435 |
| Bottom / right | 1 | 12.0 | 14.0 | 200 | 1,031 | 435 | 435 |

Required accessories

Drilling

- Suitable rotary hammer
- Properly sized SAFEset automatic cleaning drill bit
- Vacuum cleaner

Cleaning

- No accessory required

Setting

- Dispenser including cassette and mixer
- For deep installations, a piston plug is necessary

Upper layer (compression side)

Design Input

| | | | |
|------------------------|---|------------------------|------------------|
| Design force in bar | F _E | -49.2 kN | EC2 9.2.1.4(2) |
| Provided reinforcement | Ø = 12 mm, s = 200 mm → A _{s,prov} | 565 mm ² /m | |
| Stress in bars | σ _{sd} = F _E /A _{s,prov} = f _{yd} | 435 N/mm ² | Design for yield |
| Adhesive used | Hilti HIT-RE 500 V4 | | |

Anchorage Post-Installed Reinforcement

| | | | |
|---|--|------------------------|--|
| Bond condition | Good → η ₁ | 1.00 | (input) |
| Bond strength | f _{bd,pi} | 3.00 N/mm ² | ETA 20/0540 |
| Basic anchorage length | l _{b,rqd} = (Ø/4) • (σ _{sd} /f _{bd,pi}) | 435 mm | |
| Basic anchorage length (F _{yd}) | l _{b,rqd,fyd} = (Ø/4) • (f _{yd} /f _{bd,pi}) | 435 mm | |
| Factor for minimum length | f _{mult,min} | 1.00 | |
| Minimum anchorage length | l _{0,min} = f _{mult,min} • max(0.6l _{b,rqd,fyd} ; 10Ø; 100 mm) | 261 mm | EC2 8.7.3(1) and German National Annex |
| Min of clear cover or half spacing | c _d | 75.0 mm | EC2 8.4.4(1) |
| Influence cover/spacing | α ₂ = (value for compression) | 1.00 | |
| Transverse reinforcement | ΣA _{st} = Ø _t ² • π/4 • (1+0.7•l _{b,rqd} /s _t) | 0.00 mm ² | |
| Min. transverse reinforcement | ΣA _{st,min} = (EN 1992-1-1, table 8.2) | 0.00 mm ² | |
| K-factor | K = (EN 1992-1-1, table 8.2) | 0.0500 | |
| Influence of transv. reinf. | α ₃ = (value for compression) | 1.00 | EC2 8.4.4(1) |
| Influence of transv. pressure | α ₅ = (value for compression) | 1.00 | |
| Design anchorage length | l _{bd} = max(α•l _{b,rqd} ; l _{b,min}) | 435 mm | |

| | | | |
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| E-Mail: | sparamban@mttjv.com | | |

Definition of the installation length

| | | |
|------------------------------|---------------------|--------|
| Controlling anchorage length | l_{bd} | 435 mm |
| Installation length | $l_{inst} = l_{bd}$ | 435 mm |

Lower layer (compression side)

Design Input

| | | | |
|------------------------|--|------------------------|------------------|
| Design force in bar | F_E | -49.2 kN | EC2 9.2.1.4(2) |
| Provided reinforcement | $\varnothing = 12 \text{ mm}, s = 200 \text{ mm} \rightarrow A_{s,prov}$ | 565 mm ² /m | |
| Stress in bars | $\sigma_{sd} = F_E/A_{s,prov} = f_{yd}$ | 435 N/mm ² | Design for yield |
| Adhesive used | Hilti HIT-RE 500 V4 | | |

Anchorage Post-Installed Reinforcement

| | | | |
|---|--|------------------------|--|
| Bond condition | Good $\rightarrow \eta_1$ | 1.00 | (input) |
| Bond strength | $f_{bd,pi}$ | 3.00 N/mm ² | ETA 20/0540 |
| Basic anchorage length | $l_{b,rqd} = (\varnothing/4) \cdot (\sigma_{sd}/f_{bd,pi})$ | 435 mm | |
| Basic anchorage length (F _{yd}) | $l_{b,rqd,fyd} = (\varnothing/4) \cdot (f_{yd}/f_{bd,pi})$ | 435 mm | |
| Factor for minimum length | $f_{mult,min}$ | 1.00 | |
| Minimum anchorage length | $l_{0,min} = f_{mult,min} \cdot \max(0.6l_{b,rqd,fyd}; 10\varnothing; 100 \text{ mm})$ | 261 mm | EC2 8.7.3(1) and German National Annex |
| Min of clear cover or half spacing | c_d | 94.0 mm | EC2 8.4.4(1) |
| Influence cover/spacing | $\alpha_2 = (\text{value for compression})$ | 1.00 | |
| Transverse reinforcement | $\sum A_{st} = \varnothing_t^2 \cdot \pi/4 \cdot (1+0.7 \cdot l_{b,rqd}/s_t)$ | 0.00 mm ² | |
| Min. transverse reinforcement | $\sum A_{st,min} = (\text{EN 1992-1-1, table 8.2})$ | 0.00 mm ² | |
| K-factor | $K = (\text{EN 1992-1-1, table 8.2})$ | 0.0500 | |
| Influence of transv. reinf. | $\alpha_3 = (\text{value for compression})$ | 1.00 | EC2 8.4.4(1) |
| Influence of transv. pressure | $\alpha_5 = (\text{value for compression})$ | 1.00 | |
| Design anchorage length | $l_{bd} = \max(\alpha \cdot l_{b,rqd}; l_{b,min})$ | 435 mm | |

Definition of the installation length

| | | |
|------------------------------|----------|--------|
| Controlling anchorage length | l_{bd} | 435 mm |
|------------------------------|----------|--------|



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| | | | |
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| | | |
|---------------------|---------------------|--------|
| Installation length | $l_{inst} = l_{bd}$ | 435 mm |
|---------------------|---------------------|--------|



| | | | |
|--------------|---------------------|------------------|-------------------------------|
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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!

Fixed diameter and spacing selected. Please be aware that over-reinforcement of the section may lead to brittle failure of the fastening.

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.

Minimum reinforcement requirements are not checked by the software.