

Anchor channels  
PEC-TA cold-formed

Technical Datasheet  
October 2019

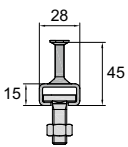
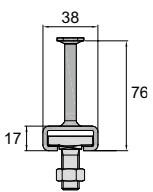
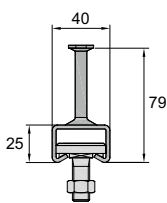
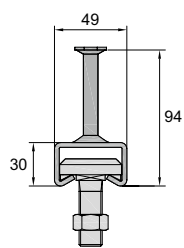
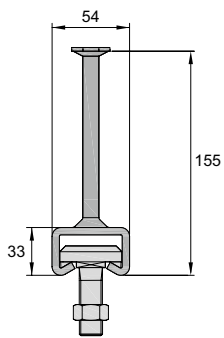
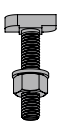
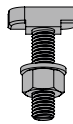
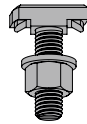
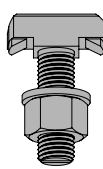


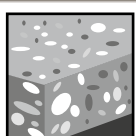
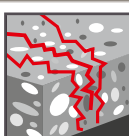
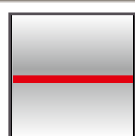
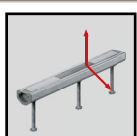
## Selector for anchor channels PEC-TA cold-formed

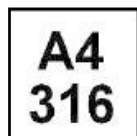
| Anchor channels PEC-TA cold-formed |                                     |                                                                                     |                    |                    |                    |                    |
|------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|--------------------|
| Type                               |                                     | PEC-TA-CE<br>28/15                                                                  | PEC-TA-CE<br>38/17 | PEC-TA-CE<br>40/25 | PEC-TA-CE<br>49/30 | PEC-TA-CE<br>54/33 |
|                                    |                                     |  |                    |                    |                    |                    |
|                                    |                                     |   |                    |                    |                    |                    |
| Channel bolt type                  |                                     | HBC-28/15                                                                           | HBC-38/17          | HBC-40/22          | HBC-50/30          |                    |
| Channel bolt size                  |                                     | M10-M20                                                                             |                    |                    |                    |                    |
| Base material                      | Cracked concrete                    | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | Uncracked concrete                  | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | NWC concrete                        | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | LWC concrete                        | ▣                                                                                   | ▣                  | ▣                  | ▣                  | ▣                  |
|                                    | Reinforced/unreinforced             | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
| Technical data                     | European Technical Assessment (ETA) | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | Static/quasi-static 2D              | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | Static 3D                           |                                                                                     |                    |                    |                    |                    |
|                                    | Seismic                             |                                                                                     |                    |                    |                    |                    |
|                                    | Fatigue                             |                                                                                     |                    |                    |                    |                    |
|                                    | Fire                                | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
| Specification                      | Hot-dip galvanized (HDG)            | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | Stainless steel A4                  | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | Rip-liner                           | ■                                                                                   | ■                  | ■                  | ■                  | ■                  |
|                                    | End caps                            |                                                                                     |                    |                    |                    |                    |
| PROFIS Anchor Channel software     |                                     | ✓                                                                                   |                    |                    |                    |                    |

■ ETA approved    ▣ Internal tests

## Product overview

| Anchor channels PEC-TA cold-formed                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PEC-TA-CE 28/15                                                                   | PEC-TA-CE 38/17                                                                   | PEC-TA-CE 40/25                                                                   | PEC-TA-CE 49/30                                                                     | PEC-TA-CE 54/33                                                                     |
|  |  |  |   |  |
|  |  |  |  |                                                                                     |
| HBC 28/15                                                                         | HBC 38/17                                                                         | HBC 40/22                                                                         | HBC 50/30                                                                           |                                                                                     |

| Base material                                                                       |                                                                                     | Load conditions                                                                     |                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |  |
| Concrete (uncracked)                                                                | Concrete (cracked)                                                                  | Static/<br>quasi-static                                                             | Static/<br>quasi-static 2D                                                            | Fire<br>resistance                                                                    |

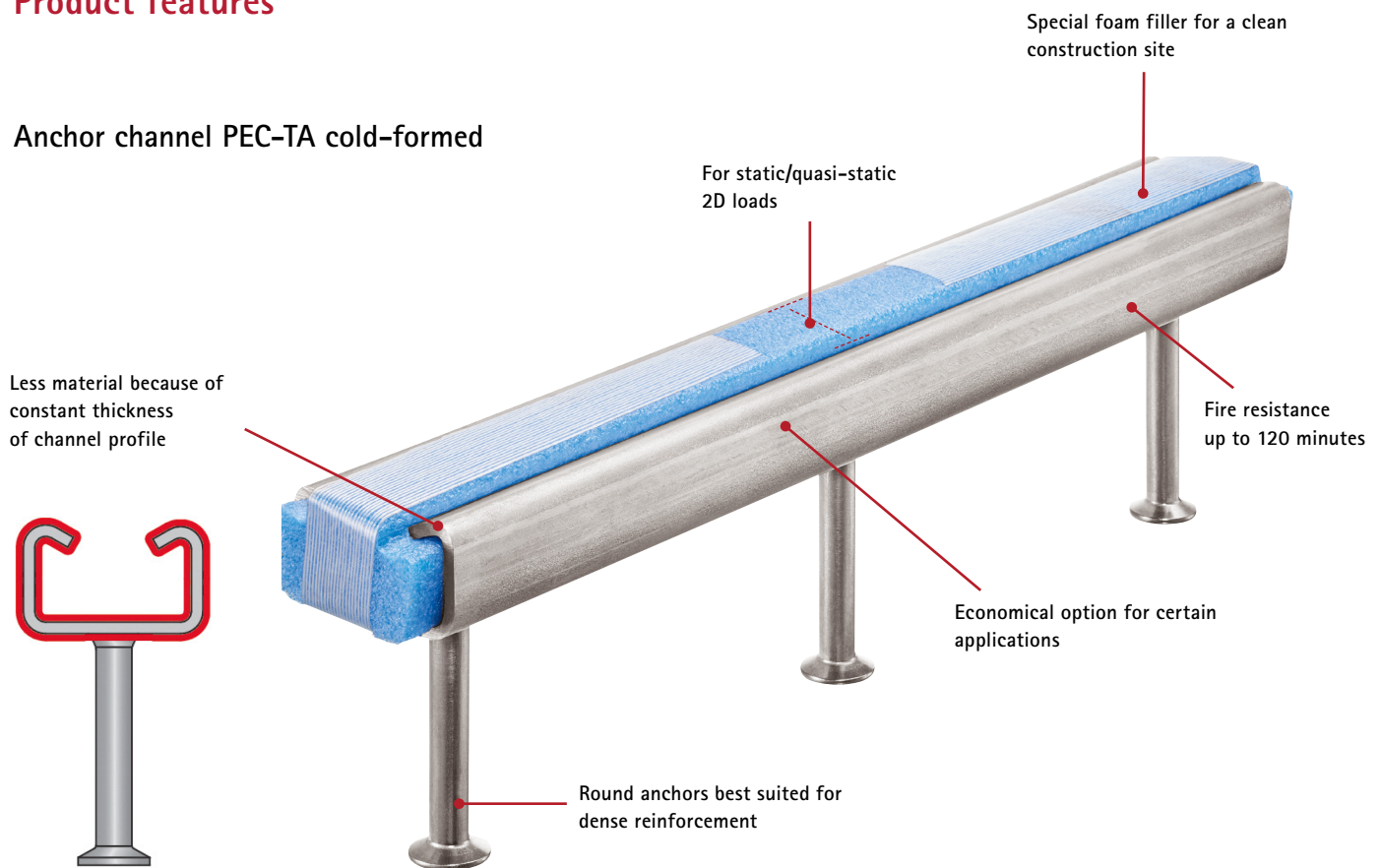
| Other Information                                                                   |                                                                                     |                                                                                      |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |
| European Technical Assessment (ETA)                                                 | CE conformity                                                                       | PROFIS Anchor Channel software                                                       | Corrosion resistance                                                                  |

## Approvals

| Description                                                                           | Issuing Authority | No. / Date of issue       |
|---------------------------------------------------------------------------------------|-------------------|---------------------------|
| European Technical Assessment (ETA) covering 2D static/quasi-static 2D and fire loads | DIBt Berlin       | ETA-16/0929<br>09.08.2018 |

## Product features

### Anchor channel PEC-TA cold-formed

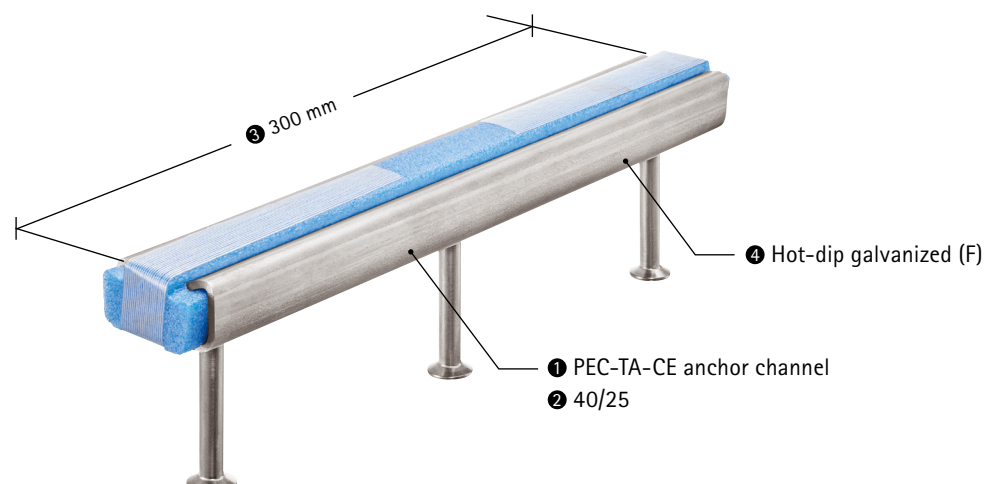


### Nomenclature of anchor channels PEC-TA cold-formed

| ① PEC anchor channel | ② Profile type and size                                                                   | ③ Anchor channel length [mm] | ④ Material finish |
|----------------------|-------------------------------------------------------------------------------------------|------------------------------|-------------------|
| PEC-TA-CE            | 40/25  | 300                          | F (HDG)           |

Examples: ① Channel type ② Profile type/size ③ Length ④ Material finish

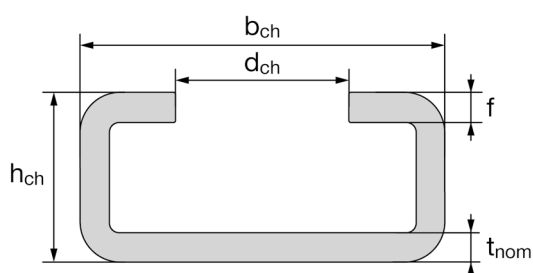
PEC-TA-CE 40/25 300F



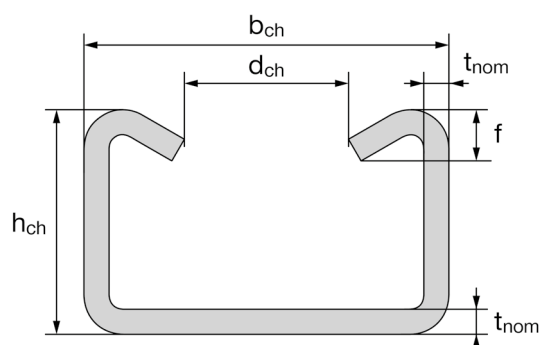


## Channel dimensions cold-formed profiles

| Anchor channel  | $b_{ch}$ | $h_{ch}$ | $t_{nom}$ | $d$  | $f$ | $I_y$              |
|-----------------|----------|----------|-----------|------|-----|--------------------|
|                 | [mm]     |          |           |      |     | [mm <sup>4</sup> ] |
| PEC-TA-CE 28/15 | 28.0     | 15.5     | 2.3       | 12.0 | 2.3 | 4277               |
| PEC-TA-CE 38/17 | 38.0     | 17.25    | 3.0       | 18.0 | 3.0 | 8224               |
| PEC-TA-CE 40/25 | 40.0     | 25.0     | 2.75      | 18.0 | 5.6 | 20122              |
| PEC-TA-CE 49/30 | 50.0     | 30.0     | 3.25      | 22.0 | 7.4 | 43105              |
| PEC-TA-CE 54/33 | 53.5     | 33.0     | 5.0       | 21.5 | 8.0 | 74706              |



PEC-TA-CE 28/15, PEC-TA-CE 38/17



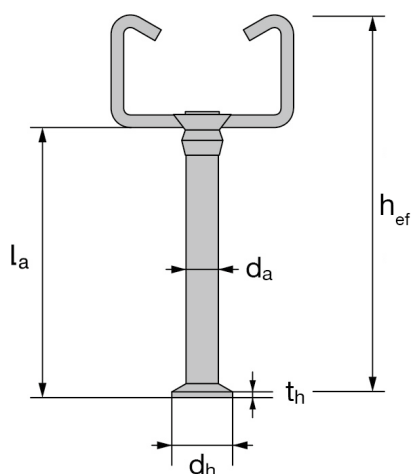
PEC-TA-CE 40/25, PEC-TA-CE 49/30, PEC-TA-CE 54/33

## Anchor dimensions

| Anchor channel  | Round anchor       |       |       |       |       |
|-----------------|--------------------|-------|-------|-------|-------|
|                 | $\min l_a$         | $d_a$ | $d_h$ | $t_h$ | $A_h$ |
|                 | [mm]               |       |       |       |       |
|                 | [mm <sup>2</sup> ] |       |       |       |       |
| PEC-TA-CE 28/15 | 31.0               | 6.0   | 12.0  | 1.3   | 85    |
| PEC-TA-CE 38/17 | 60.8               | 8.0   | 12.0  | 2.0   | 151   |
| PEC-TA-CE 40/25 | 56.0               | 8.0   | 16.0  | 2.0   | 151   |
| PEC-TA-CE 49/30 | 66.0               | 10.0  | 10.0  | 2.2   | 236   |
| PEC-TA-CE 54/33 | 123.5              | 11.0  | 24.3  | 2.5   | 369   |

<sup>1)</sup>Anchor head area

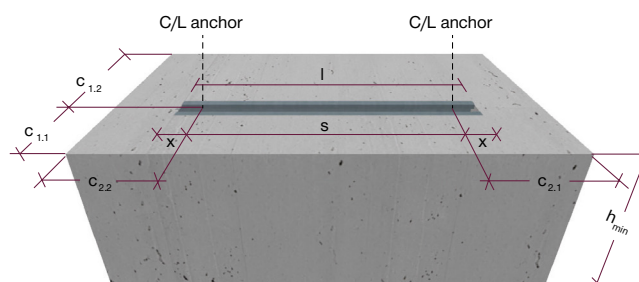
## Anchor type



## Installation parameters for anchor channel

| Anchor channel PEC-TA-CE                                                |              |      | 28/15            | 38/17 | 40/25 | 49/30 | 54/33 |     |
|-------------------------------------------------------------------------|--------------|------|------------------|-------|-------|-------|-------|-----|
| Minimum effective embedment depth                                       | $h_{ef,min}$ | [mm] | 45               | 76    | 79    | 94    | 155   |     |
| Minimum spacing                                                         | $s_{min}$    |      | 50               | 100   |       |       |       |     |
| Maximum spacing                                                         | $s_{max}$    |      | 200              |       |       | 250   |       |     |
| End spacing                                                             | $x$          |      | 25 <sup>1)</sup> |       |       |       |       |     |
| Minimum channel length                                                  | $l_{min}$    |      | 100              | 150   |       |       |       |     |
| Minimum edge distance<br>( $c_{11}$ , $c_{1,2}$ & $c_{21}$ , $c_{22}$ ) | $c_{min}$    |      | 40               | 50    |       |       | 75    | 100 |
| Minimum thickness of concrete member                                    | $h_{min}$    |      | 70               | 100   |       |       | 120   | 180 |

<sup>1)</sup> The end spacing may be increased from 25 mm to 35 mm



## Material of anchor channels and channel bolts

| Component                                                                   | Carbon steel                                                                                            |                                                                     |                                                                      | Stainless steel                                                      |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|
|                                                                             | Mechanical properties                                                                                   | Coating                                                             |                                                                      | Mechanical properties                                                |
| Channel Profile                                                             | 1.0038, 1.0044, 1.0045 according to EN 10025: 2005<br><br>1.0976, 1.0979 according to EN 10149: 2013    | Hot-dip galvanized ≥ 50 μm according to EN ISO 10684: 2004/AC: 2009 |                                                                      | 1.4362, 1.4401<br>1.4404, 1.4571, 1.4578 according to EN 10088: 2005 |
| Anchor                                                                      | 1.0038, 1.0213, 1.0214 according to EN 10025: 2005<br><br>1.5523, 1.5535 according to EN 10263: 2002-02 |                                                                     |                                                                      |                                                                      |
| Channel bolt                                                                | Steel grade 4.6 and 8.8 according to EN ISO 898-1: 2013                                                 | Electroplated according to EN ISO 4042: 1999                        | Hot-dip galvanized ≥ 50 μm according to EN ISO 10684: 2004/ AC: 2009 | Grade 50 or 70 according to EN ISO 3506: 2009                        |
| Plain washer <sup>1)</sup> according to ISO 7089: 2000 and ISO 7093-1: 2000 | Hardness class A ≥ 200 HV                                                                               | Electroplated according to EN ISO 4042: 1999                        | Hot-dip galvanized ≥ 50 μm according to EN ISO 10684: 2004/ AC: 2009 | 1.4401, 1.4404<br>1.4571, 1.4578 according to EN 10088: 2005         |
| Hexagonal nut according to ISO 4032: 2012 or DIN 934: 1987-10 <sup>2)</sup> | Property class 5 or 8 according to EN ISO 898-2: 2012                                                   | Electroplated according to EN ISO 4042: 1999                        | Hot-dip galvanized ≥ 50 μm according to EN ISO 10684: 2004/ AC: 2009 | Property class 50, 70 or 80 according to EN ISO 3506: 2009           |

<sup>1)</sup> Not in the scope of delivery

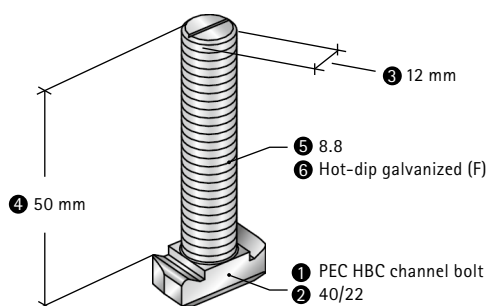
<sup>2)</sup> Hexagonal nuts according to DIN 934 for channel bolts made from carbon steel (4.6) and stainless steel

## Channel bolts nomenclature

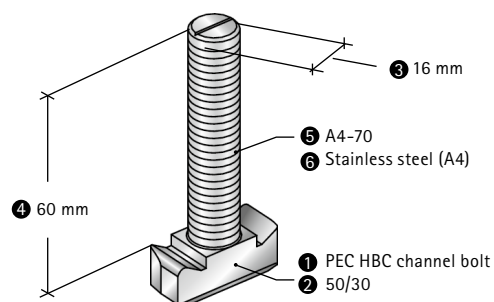
| ❶ HBC channel bolt | ❷ Bolt type |                                                                                   | ❸ Diameter | ❹ Bolt length [mm] | ❺ Steel grade | ❻ Finish or material            |
|--------------------|-------------|-----------------------------------------------------------------------------------|------------|--------------------|---------------|---------------------------------|
| HBC                | 28/15       |  | M12        | 50                 | 8.8 & A4-70   | F (HDG)<br>A4 (stainless steel) |
| HBC                | 38/17       |  | M16        | 60                 | 8.8 & A4-70   |                                 |
| HBC                | 40/22       |  | M12        | 50                 | 8.8 & A4-70   |                                 |
| HBC                | 50/30       |  | M16        | 60                 | 8.8 & A4-70   |                                 |

Examples: ❶ Channel bolt ❷ Bolt type ❸ Diameter ❹ Bolt length [mm] ❺ Steel grade ❻ Finish or material

HBC-40/22 M12x50 8.8F

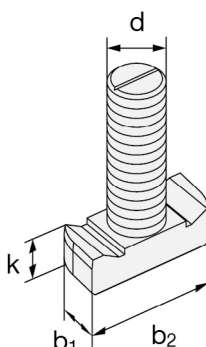


HBC-50/30 M16x60 A4-70



## Channel bolts dimensions

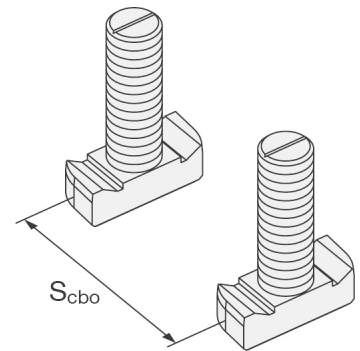
| Anchor channel                     | Channel bolt type | Dimensions     |                |      |    |
|------------------------------------|-------------------|----------------|----------------|------|----|
|                                    |                   | b <sub>1</sub> | b <sub>2</sub> | k    | d  |
|                                    |                   | [mm]           |                |      |    |
| PEC-TA-CE 28/15                    | HBC-28/15         | 10.1           | 22.2           | 5.0  | 8  |
|                                    |                   |                |                |      | 10 |
|                                    |                   | 11.0           |                | 6.0  | 12 |
| PEC-TA-CE 38/17                    | HBC-38/17         | 13.0           | 30.5           | 6.0  | 10 |
|                                    |                   |                |                | 7.0  | 12 |
|                                    |                   | 16.0           |                |      | 16 |
| PEC-TA-CE 40/25                    | HBC-40/22         | 14.0           | 33.0           | 10.5 | 10 |
|                                    |                   |                |                | 11.5 | 12 |
|                                    |                   | 17.0           |                |      | 16 |
| PEC-TA-CE 49/30<br>PEC-TA-CE 54/33 | HBC-50/30         | 17.0           | 42.0           | 14.5 | 12 |
|                                    |                   |                |                | 15.5 | 16 |
|                                    |                   | 21.0           |                |      | 20 |



## Minimum spacing for channel bolts

| Channel bolt diameter                 |               |      | M8 | M10 | M12 | M16 | M20 |
|---------------------------------------|---------------|------|----|-----|-----|-----|-----|
| Minimum spacing between channel bolts | $s_{cbo,min}$ | [mm] | 40 | 50  | 60  | 80  | 100 |

$s_{cbo}$  = center to center spacing between channel bolts ( $s_{cbo,min} = 5d$ )



## Steel grade and corrosion class

| Channel bolt                  | Carbon steel <sup>1)</sup>         |                         | Stainless steel <sup>1)</sup> |       |
|-------------------------------|------------------------------------|-------------------------|-------------------------------|-------|
| Steel grade                   | 4.6                                | 8.8                     | A4-50                         | A4-70 |
| $f_{uk}$ [N/mm <sup>2</sup> ] | 400                                | 800 / 830 <sup>2)</sup> | 500                           | 700   |
| $f_{yk}$ [N/mm <sup>2</sup> ] | 240                                | 640 / 660 <sup>2)</sup> | 210                           | 450   |
| Corrosion protection          | G <sup>3)</sup><br>F <sup>4)</sup> |                         | R <sup>5)</sup>               |       |

<sup>1)</sup> Material properties according to table on page 7

<sup>2)</sup> Material properties according to EN ISO 898-1

<sup>3)</sup> Electroplated

<sup>4)</sup> Hot-dip galvanized

<sup>5)</sup> Stainless steel

## Definition of load directions in the following tables

### Tension load (N)

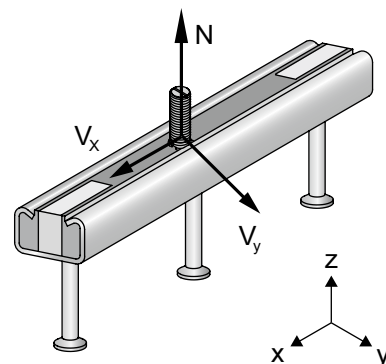
z-direction (in direction of channel bolt)

### Shear load ( $V_y$ )

y-direction (perpendicular to longitudinal axis of the channel)

### Longitudinal shear load ( $V_x$ )

x-direction (in direction of longitudinal axis of the channel)



## Steel failure modes – static resistance under tension and perpendicular shear



Static/  
quasi-static

### Resistance values under tension load – steel failure

| PEC-TA-CE                                                                         |                                                       |                |      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|-----------------------------------------------------------------------------------|-------------------------------------------------------|----------------|------|-------|-------|-------|-------|-------|
| Steel failure: Failure of anchor                                                  |                                                       |                |      |       |       |       |       |       |
|  | Characteristic resistance                             | $N_{Rk,s,a}$   | [kN] | 9.0   | 18.0  | 20.0  | 31.0  | 55.0  |
|                                                                                   | Design resistance                                     | $N_{Rd,s,a}$   | [kN] | 5.0   | 10.0  | 11.1  | 17.2  | 30.6  |
| Steel failure: Failure of connection between anchor and channel                   |                                                       |                |      |       |       |       |       |       |
|  | Characteristic resistance                             | $N_{Rk,s,c}$   | [kN] | 9.0   | 18.0  | 20.0  | 31.0  | 55.0  |
|                                                                                   | Design resistance                                     | $N_{Rd,s,c}$   | [kN] | 5.0   | 10.0  | 11.1  | 17.2  | 30.6  |
| Steel failure: Local failure by flexure of channel lips                           |                                                       |                |      |       |       |       |       |       |
|  | Characteristic or design spacing of the channel bolts | $s_{l,N}$      | [mm] | 56    | 76    | 80    | 100   | 107   |
|                                                                                   | Characteristic resistance                             | $N^0_{Rk,s,l}$ | [kN] | 9.0   | 18.0  | 20.0  | 31.0  | 55.0  |
|                                                                                   | Design resistance                                     | $N^0_{Rd,s,l}$ | [kN] | 5.0   | 10.0  | 11.1  | 17.2  | 30.6  |

### Resistance values under tension load – steel failure

| PEC-TA-CE                                                                           |                                               |                 |                 |      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|-------------------------------------------------------------------------------------|-----------------------------------------------|-----------------|-----------------|------|-------|-------|-------|-------|-------|
| Steel failure: Failure by flexure of channel                                        |                                               |                 |                 |      |       |       |       |       |       |
|  | Characteristic flexural resistance of channel | carbon steel    | $M_{Rk,s,flex}$ | [Nm] | 316   | 538   | 979   | 1669  | 2929  |
|                                                                                     |                                               | stainless steel |                 |      |       | 527   |       | 1702  | 2832  |
|                                                                                     | Characteristic flexural resistance of channel | carbon steel    | $M_{Rd,s,flex}$ | [Nm] | 257   | 468   | 851   | 1451  | 2547  |
|                                                                                     |                                               | stainless steel |                 |      |       | 458   |       | 1480  | 2463  |

### Displacements under tension load

| PEC-TA-CE                             |                    |      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|---------------------------------------|--------------------|------|-------|-------|-------|-------|-------|
| Tension load                          | N                  | [kN] | 3.6   | 7.1   | 7.9   | 12.3  | 21.8  |
| Short-term displacement <sup>1)</sup> | $\delta_{N0}$      | [mm] | 0.6   | 1.3   | 1.4   | 1.4   | 1.6   |
| Long-term displacement <sup>1)</sup>  | $\delta_{N\infty}$ | [mm] | 1.2   | 2.6   | 2.8   | 2.8   | 3.2   |

<sup>1)</sup> Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips, bending of the channel and slip of the anchor channel in concrete



Static/  
quasi-static

## Resistance values under perpendicular shear load – steel failure

| PEC-TA-CE                                                                         |                                        |                  |      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|-----------------------------------------------------------------------------------|----------------------------------------|------------------|------|-------|-------|-------|-------|-------|
| <b>Steel failure: Failure of anchor</b>                                           |                                        |                  |      |       |       |       |       |       |
|  | Characteristic resistance              | $V_{Rk,s,a,y}$   | [kN] | 9.0   | 18.0  | 20.0  | 31.0  | 55.0  |
|                                                                                   | Design resistance                      | $V_{Rd,s,a,y}$   | [kN] | 6.0   | 12.0  | 13.3  | 20.7  | 36.7  |
| <b>Steel failure: Failure of connection between anchor and channel</b>            |                                        |                  |      |       |       |       |       |       |
|  | Characteristic resistance              | $V_{Rk,s,c,y}$   | [kN] | 9.0   | 18.0  | 20.0  | 31.0  | 55.0  |
|                                                                                   | Design resistance                      | $V_{Rd,s,c,y}$   | [kN] | 5.0   | 10.0  | 11.1  | 17.2  | 30.6  |
| <b>Steel failure: Local failure by flexure of channel lips</b>                    |                                        |                  |      |       |       |       |       |       |
|  | Spacing of the channel bolts for shear | $s_{l,v}$        | [mm] | 56    | 76    | 80    | 100   | 107   |
|                                                                                   | Characteristic resistance              | $V_{Rk,s,l,y}^0$ | [kN] | 9.0   | 18.0  | 20.0  | 31.0  | 55.0  |
|                                                                                   | Design resistance                      | $V_{Rd,s,l,y}^0$ | [kN] | 5.0   | 10.0  | 11.1  | 17.2  | 30.6  |

## Displacements under perpendicular shear load

| PEC-TA-CE                             |                    |      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|---------------------------------------|--------------------|------|-------|-------|-------|-------|-------|
| Shear load                            | N                  | [kN] | 3.6   | 7.1   | 7.9   | 12.3  | 21.8  |
| Short-term displacement <sup>1)</sup> | $\delta_{N0}$      | [mm] | 0.6   | 1.3   | 1.4   | 1.4   | 1.6   |
| Long-term displacement <sup>1)</sup>  | $\delta_{N\infty}$ | [mm] | 0.9   | 2.0   | 2.1   | 2.1   | 2.4   |

<sup>1)</sup> Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete



## Static resistance under tension and perpendicular shear load



Static/  
quasi-static

### Resistance values under tension load – steel failure of channel bolts

| HBC channel bolt |                                   |                    |           | M8    | M10  | M12  | M16  | M20   |
|------------------|-----------------------------------|--------------------|-----------|-------|------|------|------|-------|
| Steel failure    |                                   |                    |           |       |      |      |      |       |
|                  | Characteristic tension resistance | $N_{Rk,s}$<br>[kN] | HBC-28/15 | 4.6   | -    |      |      |       |
|                  |                                   |                    |           | 8.8   | 22.4 | 35.4 | 44.3 | -     |
|                  |                                   |                    |           | A4-50 | 17.2 | -    |      |       |
|                  |                                   |                    |           | A4-70 | 25.6 | 38.9 | 51.3 | -     |
|                  |                                   |                    | HBC-38/17 | 4.6   | -    | 23.2 | -    |       |
|                  |                                   |                    |           | 8.8   |      | -    | 35.4 | 55.8  |
|                  |                                   |                    |           | A4-70 |      | 20.5 | 47.2 | 53.0  |
|                  |                                   |                    | HBC-40/22 | 4.6   |      | 23.2 | -    |       |
|                  |                                   |                    |           | 8.8   |      | -    | 35.4 | 55.8  |
|                  |                                   |                    |           | A4-70 |      | 20.5 | 58.6 | 91.0  |
|                  |                                   |                    | HBC-50/30 | 4.6   |      | -    |      |       |
|                  |                                   |                    |           | 8.8   |      | -    | 35.4 | 55.8  |
|                  |                                   |                    |           | A4-70 |      |      | 58.6 | 109.0 |
|                  | Design tension resistance         | $N_{Rd,s}$<br>[kN] | HBC-28/15 | 4.6   |      | -    |      |       |
|                  |                                   |                    |           | 8.8   |      | 14.9 | 23.6 | 29.5  |
|                  |                                   |                    |           | A4-50 |      | 6.0  | -    |       |
|                  |                                   |                    |           | A4-70 |      | 13.7 | 20.8 | 27.4  |
|                  |                                   |                    | HBC-38/17 | 4.6   |      | 11.6 | -    |       |
|                  |                                   |                    |           | 8.8   |      | -    | 25.2 | 28.3  |
|                  |                                   |                    |           | A4-70 |      | 11.0 | 31.3 | 43.3  |
|                  |                                   |                    | HBC-40/22 | 4.6   |      | 11.6 | -    |       |
|                  |                                   |                    |           | 8.8   |      | -    | 23.6 | 37.2  |
|                  |                                   |                    |           | A4-70 |      | 10.9 | 31.3 | 48.7  |
|                  |                                   |                    | HBC-50/30 | 4.6   |      | -    |      |       |
|                  |                                   |                    |           | 8.8   |      | -    | 23.6 | 37.2  |
|                  |                                   |                    |           | A4-70 |      |      | 31.3 | 58.3  |



Static/  
quasi-static

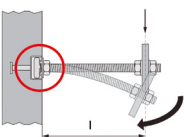
## Resistance values under perpendicular shear load – steel failure of channel bolts

| HBC channel bolt |                                 |                    |           | M8    | M10  | M12  | M16  | M20  |
|------------------|---------------------------------|--------------------|-----------|-------|------|------|------|------|
| Steel failure    |                                 |                    |           |       |      |      |      |      |
|                  | Characteristic shear resistance | $V_{Rk,s}$<br>[kN] | HBC-28/15 | 4.6   | -    |      |      |      |
|                  |                                 |                    |           | 8.8   | 14.6 | 23.2 | 33.7 | -    |
|                  |                                 |                    |           | A4-50 | 11.0 | -    |      |      |
|                  |                                 |                    |           | A4-70 | 15.4 | 24.4 | 35.4 | -    |
|                  |                                 |                    | HBC-38/17 | 4.6   | -    | 13.9 | -    |      |
|                  |                                 |                    |           | 8.8   |      | -    | 33.7 | 62.8 |
|                  |                                 |                    |           | A4-70 |      | 24.4 | 35.4 | 65.9 |
|                  |                                 |                    | HBC-40/22 | 4.6   |      | 13.9 | -    |      |
|                  |                                 |                    |           | 8.8   |      | -    | 33.7 | 62.8 |
|                  |                                 |                    |           | A4-70 |      | 24.4 | 35.4 | 65.9 |
|                  |                                 |                    | HBC-50/30 | 4.6   |      | -    |      |      |
|                  |                                 |                    |           | 8.8   |      | -    | 33.7 | 62.8 |
|                  |                                 |                    |           | A4-70 |      | -    | 35.4 | 65.9 |
|                  | Design shear resistance         | $V_{Rd,s}$<br>[kN] | HBC-28/15 | 4.6   |      | -    |      |      |
|                  |                                 |                    |           | 8.8   |      | 11.7 | 18.5 | 26.7 |
|                  |                                 |                    |           | A4-50 |      | 4.6  | -    |      |
|                  |                                 |                    |           | A4-70 |      | 9.8  | 15.6 | 22.7 |
|                  |                                 |                    | HBC-38/17 | 4.6   |      | 8.3  | -    |      |
|                  |                                 |                    |           | 8.8   |      | -    | 26.9 | 50.2 |
|                  |                                 |                    |           | A4-70 |      | 15.6 | 22.7 | 42.2 |
|                  |                                 |                    | HBC-40/22 | 4.6   |      | 8.3  | -    |      |
|                  |                                 |                    |           | 8.8   |      | -    | 26.9 | 50.2 |
|                  |                                 |                    |           | A4-70 |      | 15.6 | 22.7 | 42.3 |
|                  |                                 |                    | HBC-50/30 | 4.6   |      | -    |      |      |
|                  |                                 |                    |           | 8.8   |      | -    | 26.9 | 50.2 |
|                  |                                 |                    |           | A4-70 |      | -    | 22.7 | 42.3 |

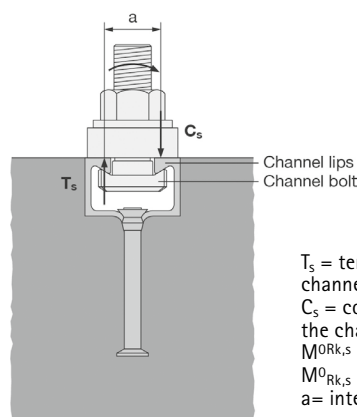


Static/  
quasi-static

## Resistance values under perpendicular shear load with lever arm – steel failure of channel bolts

| HBC channel bolt                                                                  |                                    |                |      |           | M8    | M10  | M12                | M16   | M20   |
|-----------------------------------------------------------------------------------|------------------------------------|----------------|------|-----------|-------|------|--------------------|-------|-------|
| Steel failure                                                                     |                                    |                |      |           |       |      |                    |       |       |
|  | Characteristic flexural resistance | $M^{0}_{Rk,s}$ | [Nm] | HBC-28/15 | 4.6   | -    | 29.9 <sup>1)</sup> | -     |       |
|                                                                                   |                                    |                |      | HBC-38/17 | 8.8   | 30.0 | 59.8               | 104.8 | 266.4 |
|                                                                                   |                                    |                |      | HBC-40/22 | A4-50 | 18.7 | -                  |       |       |
|                                                                                   |                                    |                |      | HBC-50/30 | A4-70 | 26.2 | 52.3               | 91.7  | 233.1 |
|                                                                                   | Design flexural resistance         | $M^{0}_{Rd,s}$ | [Nm] | HBC-28/15 | 4.6   | -    | 17.9               | -     |       |
|                                                                                   |                                    |                |      | HBC-38/17 | 8.8   | 24.0 | 47.8               | 83.8  | 213.1 |
|                                                                                   |                                    |                |      | HBC-40/22 | A4-50 | 7.8  | -                  |       |       |
|                                                                                   |                                    |                |      | HBC-50/30 | A4-70 | 16.8 | 33.5               | 58.8  | 149.4 |
|                                                                                   | Internal lever arm                 | a              | [mm] | HBC-28/15 | 28/15 | 17.3 | 18.7               | 20.0  | -     |
|                                                                                   |                                    |                |      | HBC-38/17 | 38/17 | -    | 23.0               | 24.3  | 26.3  |
|                                                                                   |                                    |                |      | HBC-40/22 | 40/22 |      | 24.3               | 25.7  | 27.3  |
|                                                                                   |                                    |                |      |           | 50/30 |      | -                  | 29.9  | 31.7  |

1) Not applicable for HBC-28/15 and HBC-50/30



$T_s$  = tension force acting on the channel lips  
 $C_s$  = compression force acting on the channel lips  
 $M^{0}_{Rk,s} \leq 0.5 \cdot N_{Rk,s,l} \cdot a$   
 $M^{0}_{Rd,s} \leq 0.5 \cdot N_{Rk,s,l} \cdot a$   
 $a$  = internal lever arm

## Displacements under perpendicular shear load

| PEC-TA-CE                             |                    |      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|---------------------------------------|--------------------|------|-------|-------|-------|-------|-------|
| Shear load                            | V                  | [kN] | 3.6   | 7.1   | 7.9   | 12.3  | 21.8  |
| Short-term displacement <sup>1)</sup> | $\delta_{V0}$      | [mm] | 0.6   | 1.3   | 1.4   | 1.4   | 1.6   |
| Long-term displacement <sup>1)</sup>  | $\delta_{V\infty}$ | [mm] | 0.9   | 2.0   | 2.1   | 2.1   | 2.4   |

<sup>1)</sup> Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete

## Recommended loads for anchor channels PEC-TA cold-formed<sup>1)</sup>

| Anchor channel                  |                     | PEC-TA-CE<br>28/15 | PEC-TA-CE<br>38/17 | PEC-TA-CE<br>40/25 | PEC-TA-CE<br>49/30 | PEC-TA-CE<br>54/33 |
|---------------------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Recommended loads <sup>2)</sup> |                     |                    |                    |                    |                    |                    |
| Tension                         | $N_{Rec}$<br>[kN]   | 3.0                | 5.9                | 6.4                | 9.8                | 16.8               |
| Shear y-direction               | $V_{Rec,y}$<br>[kN] | 3.0                | 5.9                | 5.9                | 9.8                | 16.2               |
| Shear x-direction               | $V_{Rec,x}$<br>[kN] | -                  | -                  | -                  | -                  | -                  |

<sup>1)</sup> As per load direction on page 9

<sup>2)</sup> Recommended load per bolt  $N_{Rec} = \min(N_{Rd,s,a}, N_{Rd,s,c}, N_{Rd,s,l}, N_{Rd,s,flex}, N_{Rd,s})/1.4$  or  $V_{Rec,y} = \min(V_{Rd,s,a,y}, V_{Rd,s,c,y}, V_{Rd,s,l,y}, V_{Rd,s})/1.4$ . Concrete failure modes not taken into account. The minimum bolt spacing is considered which is 5d where d is minimum diameter of the bolt.

## Concrete failure modes – static resistance under tension and perpendicular shear



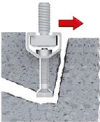
Static/  
quasi-static

### Resistance values under tension load – concrete failure

| PEC-TA-CE                                                                           |                                                        |                    |             | 28/15    | 38/17                                               | 40/25 | 49/30 | 54/33 |      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------|-------------|----------|-----------------------------------------------------|-------|-------|-------|------|
| Type of anchor (R-Round anchor)                                                     |                                                        |                    |             | R        | R                                                   | R     | R     | R     |      |
| Pull-out failure                                                                    |                                                        |                    |             |          |                                                     |       |       |       |      |
|    | Characteristic resistance in cracked concrete C12/15   |                    | $N_{Rk,p}$  | [kN]     | 5.1                                                 | 9.1   | 9.1   | 14.1  | 22.1 |
|                                                                                     | Characteristic resistance in uncracked concrete C12/15 |                    |             |          | 7.1                                                 | 12.7  | 12.7  | 19.8  | 31.0 |
|                                                                                     | Design resistance in cracked concrete C12/15           |                    | $N_{Rd,p}$  |          | 3.4                                                 | 6.1   | 6.1   | 9.4   | 14.7 |
|                                                                                     | Design resistance in uncracked concrete C12/15         |                    |             |          | 4.7                                                 | 8.5   | 8.5   | 13.2  | 20.7 |
|                                                                                     | Amplification factor for other concrete grades         |                    |             | $\Psi_c$ | $\Psi_c = \frac{f_{c,specified}}{12 \text{ (MPa)}}$ |       |       |       |      |
| Concrete cone failure                                                               |                                                        |                    |             |          |                                                     |       |       |       |      |
|  | Product factor $k_1$ for characteristic resistance     | cracked concrete   | $k_{cr,N}$  | [-]      | 7.2                                                 | 7.8   | 7.9   | 8.1   | 8.7  |
|                                                                                     |                                                        | uncracked concrete | $k_{ucr,N}$ |          | 10.3                                                | 11.2  | 11.2  | 11.6  | 12.4 |
|                                                                                     | Product factor $k_1$ for design resistance             | cracked concrete   | $k_{cr,N}$  |          | 4.8                                                 | 5.2   | 5.3   | 5.4   | 5.8  |
|                                                                                     |                                                        | uncracked concrete | $k_{ucr,N}$ |          | 6.9                                                 | 7.5   | 7.5   | 7.7   | 8.3  |
| Splitting                                                                           |                                                        |                    |             |          |                                                     |       |       |       |      |
|  | Characteristic edge distance                           |                    | $c_{cr,sp}$ | [mm]     | 135                                                 | 228   | 237   | 282   | 465  |

R= round anchors

### Resistance values under perpendicular shear load – concrete failure

| PEC-TA-CE                                                                           |                                                  |                    |             | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|-------------------------------------------------------------------------------------|--------------------------------------------------|--------------------|-------------|-------|-------|-------|-------|-------|
| Pry out failure                                                                     |                                                  |                    |             |       |       |       |       |       |
|  | Product factor                                   |                    | $k_8$       | [-]   | 2     |       |       |       |
| Concrete edge failure                                                               |                                                  |                    |             |       |       |       |       |       |
|  | Product factor $k_{12}$ for characteristic loads | cracked concrete   | $k_{cr,V}$  | [-]   | 6.9   | 7.5   |       |       |
|                                                                                     |                                                  | uncracked concrete | $k_{ucr,V}$ |       | 9.6   | 10.5  |       |       |
|                                                                                     | Product factor $k_{12}$ for design loads         | cracked concrete   | $k_{cr,V}$  |       | 4.6   | 5.0   |       |       |
|                                                                                     |                                                  | uncracked concrete | $k_{ucr,V}$ |       | 6.4   | 3.3   |       |       |

## Steel failure – combined loading



Static/  
quasi-static

### Resistances under combined tension and shear load

| PEC-TA-CE                                                                                 |                 |     | 28/15             | 38/17 | 40/25 | 49/30 | 54/33 |
|-------------------------------------------------------------------------------------------|-----------------|-----|-------------------|-------|-------|-------|-------|
| Steel failure: Local failure by flexure of channel lips and failure by flexure of channel |                 |     |                   |       |       |       |       |
| Product factor                                                                            | k <sub>13</sub> | [-] | 1.0 <sup>1)</sup> |       |       |       |       |
| Steel failure: Failure of anchor and connection between anchor and channel                |                 |     |                   |       |       |       |       |
| Product factor                                                                            | k <sub>14</sub> | [-] | 1.0 <sup>2)</sup> |       |       |       |       |

<sup>1)</sup>  $k_{13}$  can be taken as 2.0 if  $V_{Rd,s,l}$  is limited to  $N_{Rd,s,l}$

<sup>2)</sup>  $k_{14}$  can be taken as 2.0 if  $\max(V_{Rd,s,a}; V_{Rd,s,c})$  is limited to  $\min(N_{Rd,s,a}; N_{Rd,s,c})$



Fire  
resistance

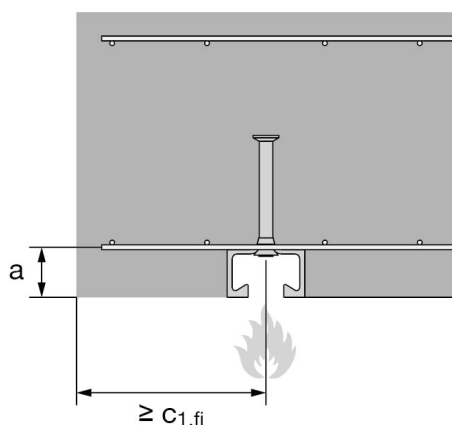
## Fire resistance

### Resistance values under tension and perpendicular shear load – fire exposure

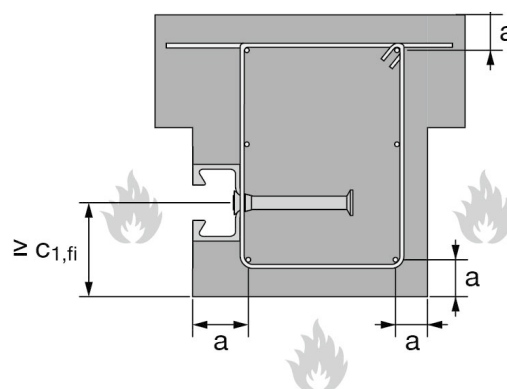
| HBC channel bolt                                                                             |                                    |      |                                                                                  | M10  | M12 | ≥ M16 |
|----------------------------------------------------------------------------------------------|------------------------------------|------|----------------------------------------------------------------------------------|------|-----|-------|
| Steel failure of anchor, connection between anchor and channel, local flexure of channel lip |                                    |      |                                                                                  |      |     |       |
| Characteristic and design<br>resistance in cracked<br>concrete C20/25                        | PEC-TA-CE 28/15                    | R60  | $N_{Rk,s,fi}$<br>=<br>$V_{Rk,s,fi}$<br>or<br>$N_{Rd,s,fi}$<br>=<br>$V_{Rd,s,fi}$ | [kN] | 0.8 | -     |
|                                                                                              |                                    | R90  |                                                                                  |      | 0.6 |       |
|                                                                                              |                                    | R120 |                                                                                  |      | 0.5 |       |
|                                                                                              | PEC-TA-CE 38/17                    | R60  |                                                                                  |      | -   | 1.9   |
|                                                                                              |                                    | R90  |                                                                                  |      | -   | 1.3   |
|                                                                                              |                                    | R120 |                                                                                  |      | -   | 1.0   |
|                                                                                              | PEC-TA-CE 40/25                    | R60  |                                                                                  |      | 1.7 | 3.5   |
|                                                                                              |                                    | R90  |                                                                                  |      | 1.2 | 2.2   |
|                                                                                              |                                    | R120 |                                                                                  |      | 0.9 | 1.5   |
|                                                                                              | PEC-TA-CE 49/30<br>PEC-TA-CE 54/33 | R60  |                                                                                  |      | -   | 3.8   |
|                                                                                              |                                    | R90  |                                                                                  |      |     | 2.5   |
|                                                                                              |                                    | R120 |                                                                                  |      |     | 1.9   |

## Minimum concrete cover

| PEC-TA-CE      | 28/15 | 38/17 | 40/25 | 49/30 | 54/33 |
|----------------|-------|-------|-------|-------|-------|
| Concrete cover | R60   | 35    |       | 50    | 50    |
|                | R90   | 45    |       | 50    | 50    |
|                | R120  | 55    |       | 50    | 50    |



Fire exposure from one side only



Fire exposure from more than one side

## Installation instructions

### Installation instructions for anchor channels PEC-TA cold-formed

1) Correct selection of anchor channel in accordance with the design specification.

2) If cutting of the anchor channel is necessary, cut the channel with an end spacing

$x = 25$  or  $35$  mm for

28/15

38/17

40/25

49/30

54/33

$x = 25$  or  $35$  mm for round or welded anchors with profile:

40/22

50/30

$x = 35$  mm for round anchor with profile 52/34

$x = 25$  mm for welded I-anchors with profile 52/34

**Minimum two anchors per channel!**

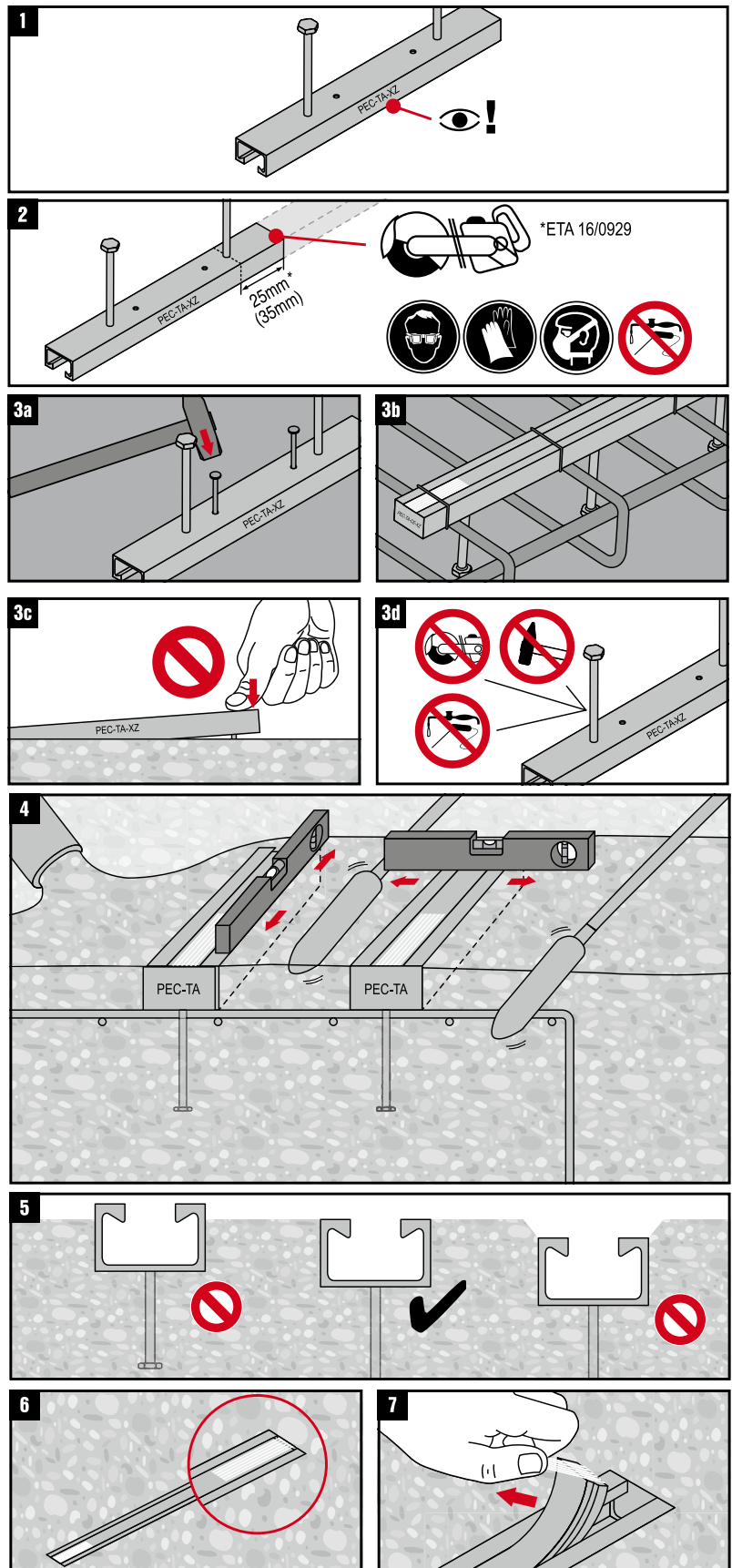
3) Position the anchor channel such that the channel lips will be flush with the surface of the concrete. Secure anchor channels to formwork (3a) or adjoining reinforcing steel (3b) with nails, staples, rivets, or wire ties as appropriate. Supports and attachments shall be adequate to ensure that anchor channels remain in position during concrete pouring. Anchor channels shall not be pushed into fresh concrete (3c). Anchors shall not be bent, cut or otherwise modified (3d).

4) Anchor channels shall be protected from intrusion of concrete and slurry into the channel during concrete pouring. Place and consolidate concrete around anchor channels to mitigate voids.

Make sure that channels are leveled.

5) Installed anchor channels must be flush with the concrete surface.

6 and 7) Remove the foam filler after hardening of concrete and striking the formwork.



Instructions for Use (IFU) for anchor channels PEC-TA

## Installation instructions for HBC channel bolts

1) Select PEC channel bolt type HBC in accordance with the design specification.

2) Place the channel bolt in the channel and lock the channel bolt in the channel by turning it 90 degrees.

3) Verify alignment of the bolt with the groove.

4) Verify that the channel bolt is not located outside of that portion of the channel bounded by the outermost anchors.

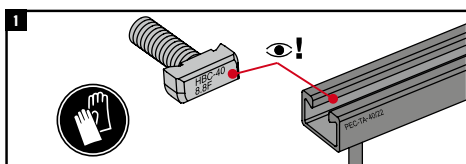
5) Do not cut channel bolts.

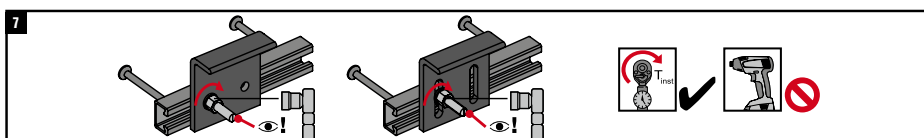
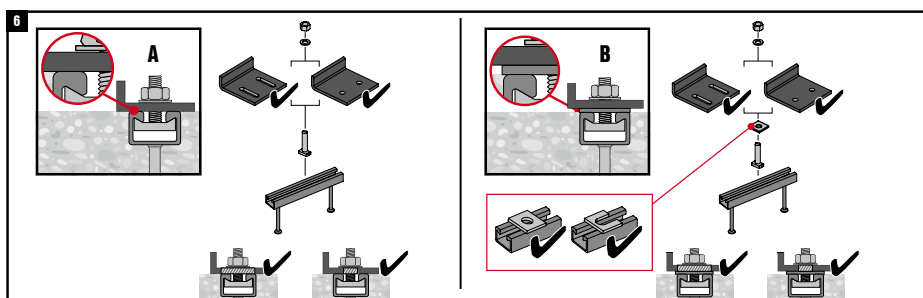
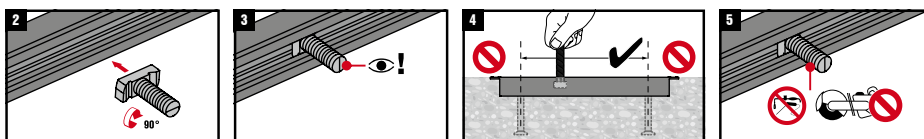
6) Install the fixture distinguishing between installation type A and installation type B.

- for installation type A the fixture is in contact with the concrete surface and the channel profile.
- for installation type B suitable steel element e.g. square plate washer is used to avoid introducing forces into the concrete during application of the installation torque  $T_{inst}$ . The steel element shall have a sufficient stiffness to avoid deformation of the channel lips

7) Apply the installation torque  $T_{inst}$  to the channel bolt with a calibrated torque wrench. Do not exceed the value  $T_{inst}$  distinguishing between installation type A and installation type B.

Select the correct installation torque  $T_{inst}$  according to material, channel type, channel bolt diameter, and installation type.

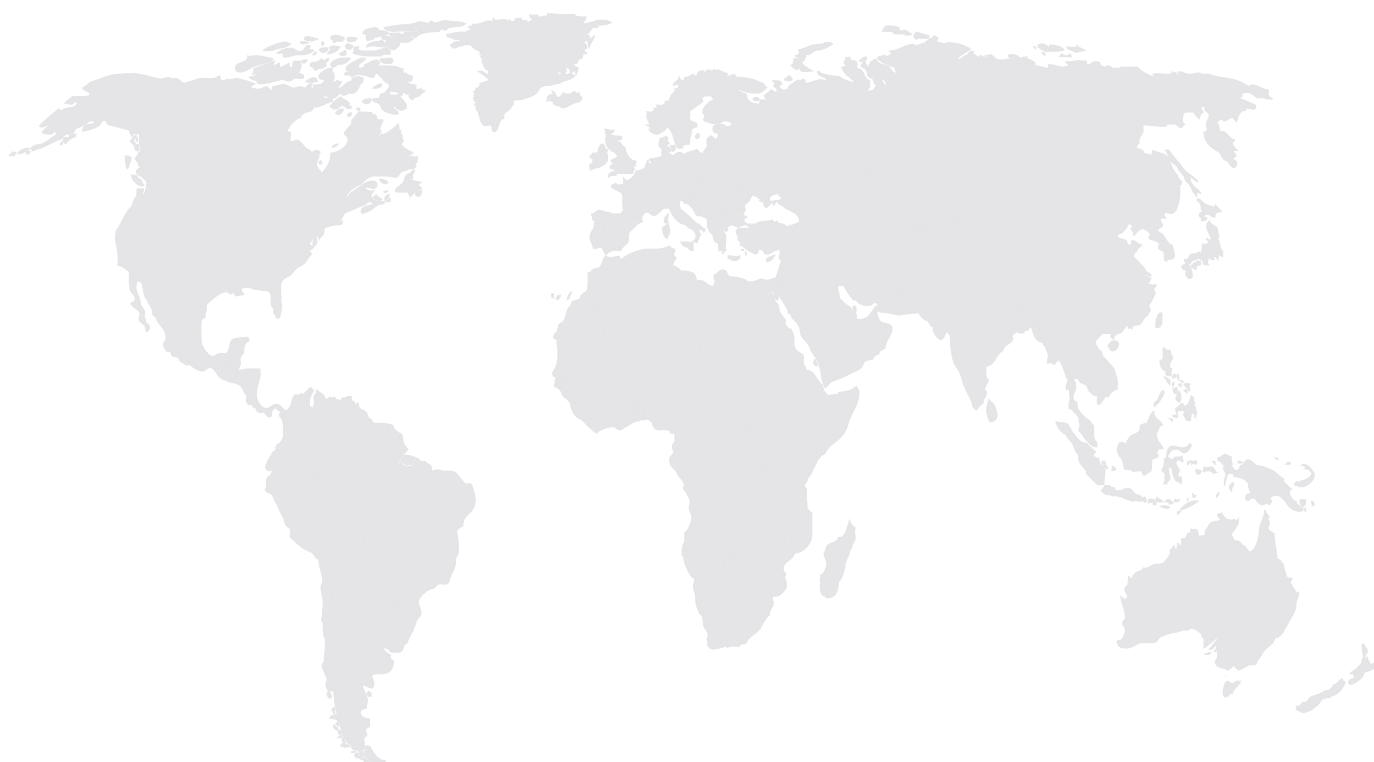
|                                                                                    |                            |
|------------------------------------------------------------------------------------|----------------------------|
|  |                            |
| HBC-28                                                                             | PEC-TA-28/15               |
| HBC-38                                                                             | PEC-TA-38/17               |
| HBC-40                                                                             | PEC-TA-40/22, PEC-TA-40/25 |
| HBC-50                                                                             | PEC-TA-49/30, PEC-TA-50/30 |
|                                                                                    | PEC-TA-52/34, PEC-TA-54/33 |



| Channel bolt |     | $T_{inst}$ (Nm)                                                                     |                                                                                       |     |              |
|--------------|-----|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----|--------------|
|              |     |  |  |     |              |
|              |     | 4.6, 8.8, A4-50, A4-70                                                              | 4.6                                                                                   | 8.8 | A4-50, A4-70 |
| 28/15        | M8  | 7                                                                                   | -                                                                                     | 20  | 15           |
|              | M10 | 10                                                                                  |                                                                                       | 40  | 30           |
|              | M12 | 13                                                                                  |                                                                                       | 60  | 50           |
| 38/17        | M10 | 15                                                                                  | 13                                                                                    | 15  | 22           |
|              | M12 | 25                                                                                  | -                                                                                     | 45  | 50           |
|              | M16 | 40                                                                                  |                                                                                       | 100 | 90           |
| 40/22        | M10 | 15                                                                                  | 13                                                                                    | 15  | 22           |
|              | M12 | 25                                                                                  | -                                                                                     | 45  | 50           |
|              | M16 | 30                                                                                  |                                                                                       | 100 | 90           |
| 50/30        | M12 | 25                                                                                  |                                                                                       | 45  | 50           |
|              | M16 | 60                                                                                  |                                                                                       | 100 | 130          |
|              | M20 | 75                                                                                  |                                                                                       | 360 | 250          |

Instructions for Use (IFU) for PEC HBC channel bolts





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