

**DECLARATION OF PERFORMANCE
DP156EN21472501**

1. Unique product identification code - type: **Sismabond**.
2. Intended uses: **See Annex I°**.
3. Manufacturer: **Diasen Srl - zona Ind.le Berbentina, 5 - 60041 Sassoferrato (AN) – www.diasen.com**
4. Systems of AVCP VVCP: **System 1**.
5. Harmonised standards and notified bodies:

| | <i>Name of the body</i> | <i>System of assessment</i> | <i>Reference</i> | <i>EAD/hEN Document</i> |
|----------------------------------|-------------------------|-----------------------------|---------------------------|-------------------------|
| Technical Specification Document | DiBt (TAB) | 1 | ETA-08/0383 | EAD 330499-01-0601 |
| Constancy of performance & FCP | IFSW nr. 2873 (NB) | | 2873-CPR-M 527-12/10.2020 | |
| Technical Specification Document | DiBt (TAB) | | ETA-12/0553 | EAD 330087-00-0601 |
| Constancy of performance & FCP | IFSW nr. 2873 (NB) | | 2873-CPR-M 527-11/10.2020 | |
| Technical Specification Document | DiBt (TAB) | | ETA-12/0543 | ETAG029 |
| Constancy of performance & FCP | IFSW nr. 2873 (NB) | | 2873-CPR-M 527-6/10.2020 | |

6. Declared performance: **See Annexes**.

The performance of the product identified above is in conformity with all declared performances. This declaration of liability is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of: **Diego Mingarelli (Legal representative)**

Sassoferrato, 04/03/2020

DiaSen srl
 Z. Ind.le Berbentina, 5
 60041 Sassoferrato (AN)
 P. IVA/C.F. 01553210426



Annex I° – “Intended use”

| | |
|------------------------|--|
| Generic type | Chemical anchor for fixing Threaded Rods and Reinforcing Bars according to ETA-08/0383 |
| Base material | Concrete from C20/25 to C50/60 according to EN206-1 |
| Use category | <ul style="list-style-type: none"> • Installation in dry and wet concrete (flooded holes up to d.16); • Overhead installation; |
| Materials & Durability | <ul style="list-style-type: none"> • Galvanised steel cl. 4.6 to cl. 8.8 according to EN ISO 898 for dry indoor conditions; • Stainless steel cl. A4-50/70/80 according to EN ISO 3506 for indoor and outdoor use without particular aggressive conditions; • High Resistant Stainless Steel HCR-50/70/80 according to EN ISO 3506 for all conditions; • Rebar Class B and C according to EN 1992-1-1:2004+AC:2010, Annex C. |
| Loading | Static, quasi-static and seismic |
| Temperature (range) | <ul style="list-style-type: none"> • From -40 °C to +40 °C, with long-term maximum temperature +24 °C and short-term maximum temperature + 40 °C. • From -40 °C to +80 °C, with long-term maximum temperature +50 °C and short-term maximum temperature +80 °C. • From -40 °C to +120 °C, with long-term maximum temperature +72 °C and short-term maximum temperature +120 °C. |
| Reaction to fire | A1 according to EN 13501-1 |

| | |
|------------------------|--|
| Generic type | Chemical anchor for fixing Post-installed Rebar Connection according to ETA-12/0553 |
| Base material | Non-carbonated concrete from C12/15 to C50/60 according to EN206-1 (max 0.4 % Cl) |
| Use category | <ul style="list-style-type: none"> • Installation and use in dry and wet concrete (no flooded holes); • Joints for overlapping to reinforce existing construction elements; • Anchoring of reinforcement bars for casting new walls or beams; • Anchorage of reinforcing bars to reinforce construction elements mainly subject to compression; • Anchorage of reinforcement rods for the extension of elements subject to bending. |
| Materials & Durability | <ul style="list-style-type: none"> • Rebar Class B and C according to EN 1992-1-1:2004+AC:2010, Annex C • ZA Tension Anchor B500 as DIN 488, for indoor and outdoor use without special aggressive conditions; • ZA Tension Anchor Stainless Steel A4 as DIN 488, for indoor and outdoor use without aggressive conditions; • ZA Tension Anchor High Strength Stainless Steel as DIN 488, for all conditions. |
| Loading | Static, quasi-static and fire exposure according to EN 1992-1 (EC2) |
| Temperature (range) | <ul style="list-style-type: none"> • From -40 °C to +80 °C, with long-term maximum temperature + 50 °C and short-term maximum temperature + 80 °C. |
| Reaction to fire | A1 according to EN 13501-1 |

| | |
|------------------------|--|
| Generic type | Chemical anchor for fixing in masonry according to ETA-12/0543 |
| Base material | b, c and d , solid and hollowed brick, and autoclaved aerated concrete according to EN 771 |
| Use category | <ul style="list-style-type: none"> • d/d: installation in dry masonry; • w/w: installation in wet masonry |
| Materials & Durability | <ul style="list-style-type: none"> • Galvanised Steel cl. 4.6 to cl. 8.8 according to EN ISO 898 for dry indoor conditions; • Stainless steel cl. A4-50/70/80 according to EN ISO 3506 for indoor and outdoor use without particular aggressive conditions; • High Resistant Stainless Steel HCR-50/70/80 according to EN ISO 3506 for all conditions; |
| Loading | Static and quasi-static |
| Temperature (range) | <ul style="list-style-type: none"> • From -40 °C to +40 °C, with long-term maximum temperature +24 °C and short-term maximum temperature + 40 °C. • From -40 °C to +80 °C, with long-term maximum temperature +50 °C and short-term maximum temperature +80 °C. • From -40 °C to +120 °C, with long-term maximum temperature +72 °C and short-term maximum temperature +120 °C. |
| Reaction to fire | A1 according to EN 13501-1 |

Annex II°

| Declared performance according to ETA-08/0383 and EAD 330499-01-0601 | | | | | | | | | | | |
|--|---|---------------------|-----|----------------------------|------------|------------|-----------------------------------|------------|------------|------------|------------|
| Design method according to EN 1992-4:2018 and TR055 | | | | | | | | | | | |
| ESSENTIAL CHARACTERISTICS | | | | PERFORMANCE | | | | | | | |
| d | THREADED BARS | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| d ₀ | Nominal diameter of drill bit | | mm | 10 | 12 | 14 | 18 | 24 | 28 | 32 | 35 |
| h _{ef} | Effective embedment depth | h _{ef,min} | mm | 60 | 60 | 70 | 80 | 90 | 96 | 108 | 120 |
| | | h _{ef,std} | mm | 80 | 90 | 110 | 125 | 170 | 210 | 240 | 270 |
| | | h _{ef,max} | mm | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| h _{min} | Minimum thickness of concrete support | | mm | h _{ef} + 30 ≥ 100 | | | h _{ef} + 2d ₀ | | | | |
| T _{inst} | Torque moment (max) | | Nm | 10 | 20 | 40 | 80 | 120 | 160 | 180 | 200 |
| s _{min} | Minimum spacing | | mm | 40 | 50 | 60 | 80 | 100 | 120 | 135 | 150 |
| c _{min} | Minimum edge distance | | mm | 40 | 50 | 60 | 80 | 100 | 120 | 135 | 150 |
| TENSILE Steel Failure | | | | | | | | | | | |
| N _{Rk,s} | Tension Steel characteristic Failure | cl. 4.6-4.8 | kN | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| | | cl. 5.6-5.8 | | 18 | 29 | 42 | 78 | 122 | 176 | 230 | 280 |
| | | cl. 8.8 | | 29 | 46 | 67 | 125 | 196 | 282 | 368 | 449 |
| | | A4-70 (50) | | 26 | 41 | 59 | 110 | 171 | 247 | (230) | (281) |
| N _{Rk,s,eq,C1} | Tensile Steel characteristic Failure Seismic Cat. C1 | | kN | 1,0 x N _{Rk,s} | | | | | | | |
| γ _{Ms,N} ¹⁾ | Partial safety factor | cl. 4.6-5.6 | - | 2,0 | | | | | | | |
| | | cl. 4.8-5.8-8.8 | | 1,5 | | | | | | | |
| | | A4-70 (50) | | 1,87 | | | | | (2,86) | | |
| Combined slip-concrete fracture: "DRY-WET" | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| τ _{Rk,ucr} | Characteristic bond resistance for un-cracked concrete C20/25 | 40/24 °C | MPa | 10 | 12 | 12 | 12 | 12 | 11 | 10 | 9 |
| | | 80/50 °C | | 7,5 | 9 | 9 | 9 | 9 | 8,5 | 7,5 | 6,5 |
| | | 120/72 °C | | 5,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 5,5 | 5 |
| τ _{Rk,cr} | Characteristic bond resistance for cracked concrete C20/25 | 40/24 °C | MPa | 4 | 5 | 5,5 | 5,5 | 5,5 | 5,5 | 6,5 | 6,5 |
| | | 80/50 °C | | 2,5 | 3,5 | 4 | 4 | 4 | 4 | 4,5 | 4,5 |
| | | 120/72 °C | | 2 | 2,5 | 3 | 3 | 3 | 3 | 3,5 | 3,5 |
| τ _{Rk,eq,C1} | Characteristic bond resistance for seismic category C1 C20/25 | 40/24 °C | MPa | 2,5 | 3,1 | 3,7 | 3,7 | 3,7 | 3,8 | 4,5 | 4,5 |
| | | 80/50 °C | | 1,6 | 2,2 | 2,7 | 2,7 | 2,7 | 2,8 | 3,1 | 3,1 |
| | | 120/72 °C | | 1,3 | 1,6 | 2 | 2 | 2 | 2,1 | 2,4 | 2,4 |
| Combined slip-concrete fracture: "FLOODED HOLES" | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| τ _{Rk,ucr} | Characteristic bond resistance for un-cracked concrete C20/25 | 40/24 °C | MPa | 7,5 | 8,5 | 8,5 | 8,5 | NPD | | | |
| | | 80/50 °C | | 5,5 | 6,5 | 6,5 | 6,5 | | | | |
| | | 120/72 °C | | 4 | 5 | 5 | 5 | | | | |
| τ _{Rk,cr} | Characteristic bond resistance for cracked concrete C20/25 | 40/24 °C | MPa | 4 | 4 | 5,5 | 5,5 | NPD | | | |
| | | 80/50 °C | | 2,5 | 3 | 4 | 4 | | | | |
| | | 120/72 °C | | 2 | 2,5 | 3 | 3 | | | | |
| τ _{Rk,eq,C1} | Characteristic bond resistance for seismic category C1 C20/25 | 40/24 °C | MPa | 2,5 | 2,5 | 3,7 | 3,7 | NPD | | | |
| | | 80/50 °C | | 1,6 | 1,9 | 2,7 | 2,7 | | | | |
| | | 120/72 °C | | 1,3 | 1,6 | 2 | 2 | | | | |
| ψ _c | Increasing factor for concrete | C30/37 | - | 1,04 | | | | | | | |
| | | C40/50 | | 1,08 | | | | | | | |

¹⁾ In the absence of other national regulations

| | | | | | | | | | | | |
|---------------------------------|---|------------------------|----|-----------------------------------|------------|------------|------------|------------|------------|------------------------------------|---------------------|
| | C50/60 | | | | | | | | | 1,10 | |
| Ψ_{sus}^0 | Reduction factor for C20/25 cracked and non-cracked concrete and seismic category | 40/24 °C | - | | | | | | | 0,73 | |
| | | 80/50 °C | - | | | | | | | 0,65 | |
| | | 120/72 °C | - | | | | | | | 0,57 | |
| | | | | | | | | | | | |
| Ψ_c | Increase factor for concrete per seismic category | Da C25/30 a C50/60 | - | | | | | | | 1,0 | |
| Concrete Cone Failure | | | | | | | | | | | |
| $K_{cr,N}$ | Factor according to EN 1992-4 § 7.2.1.4 cracked | | - | | | | | | | 7,7 | |
| $K_{ucr,N}$ | Factor according to EN 1992-4 § 7.2.1.4 un-cracked | | - | | | | | | | 11,0 | |
| $c_{cr,N}$ | Edge distance | | mm | | | | | | | $1,5 \times h_{ef}$ | |
| $s_{cr,N}$ | Centre distance | | mm | | | | | | | $2,0 \times c_{cr,N}$ | |
| Splitting Failure | | | | | | | | | | | |
| $c_{cr,sp}$ | Characteristic edge distance | $h/h_{ef} \geq 2,0$ | mm | | | | | | | $1,0 \times h_{ef}$ | |
| | | $2,0 > h/h_{ef} > 1,3$ | mm | | | | | | | $2 \times h_{ef} (2,5 - h/h_{ef})$ | |
| | | $h/h_{ef} \leq 1,3$ | mm | | | | | | | | $2,4 \times h_{ef}$ |
| $s_{cr,sp}$ | Characteristic spacing | | mm | | | | | | | $2,0 \times c_{cr,sp}$ | |
| γ_{inst} | Installation coefficient dry and wet concrete | | - | 1,0 | | | | | | 1,2 | |
| γ_{inst} | Installation coefficient in flooded hole | | - | | 1,4 | | | | | (NPD) | |
| d | THREADED ROD | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| SHEAR Steel Failure | | | | | | | | | | | |
| $V_{Rk,s}$ | Shear Steel Characteristic Failure | cl. 4.6-4.8 | kN | 9 | 14 | 20 | 38 | 59 | 58 | 110 | 115 |
| | | cl. 5.6-5.8 | kN | 11 | 17 | 25 | 47 | 74 | 106 | 138 | 168 |
| | | cl. 8.8 | kN | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| | | A4-70 (50) | kN | 13 | 20 | 30 | 55 | 86 | 124 | (115) | (140) |
| $V_{Rk,eq,C1}$ | Shear Steel Characteristic Failure Seismic Cat. C1 | | kN | $0,70 \times V_{Rk,s}$ | | | | | | | |
| M_{Rk}^0 | Characteristic bending moment | cl. 4.6-4.8 | Nm | 15 | 30 | 52 | 133 | 260 | 449 | 666 | 900 |
| | | cl. 5.6-5.8 | Nm | 19 | 37 | 65 | 166 | 324 | 560 | 833 | 1123 |
| | | cl. 8.8 | Nm | 30 | 60 | 105 | 266 | 519 | 896 | 1333 | 1797 |
| | | A4-70 (50) | Nm | 26 | 52 | 92 | 232 | 454 | 784 | (832) | (1125) |
| $M_{Rk,eq,C1}^0$ | Characteristic bending moment Seismic category C1 | | Nm | (NPD) | | | | | | | |
| $\gamma_{Ms,V}^{1)}$ | Partial safety factor | cl. 4.6-5.6 | - | | | | | | | 1,67 | |
| | | cl. 4.8-5.8-8.8 | - | | | | | | | 1,25 | |
| | | A4-70 (50) | - | | | | | | 1,56 | (2,38) | |
| K_7 | Ductility factor according to EN 1992-4 § 7.2.2.3.1 | | - | | | | | | | 1,0 | |
| Concrete Pry-out failure | | | | | | | | | | | |
| K_8 | Ductility factor according to EN 1992-4 § 7.2.2.4 | | - | | | | | | | 2,0 | |
| γ_{inst} | Installation coefficient | | - | | | | | | | 1,0 | |
| Concrete Edge failure | | | | | | | | | | | |
| l_f | Effective anchor length | | - | $\min(h_{ef}, 12 \times d_{nom})$ | | | | | | $\min(h_{ef}, 300mm)$ | |
| d_{nom} | Outer diameter of the anchor | | mm | 8 | 10 | 12 | 16 | 20 | 24 | 27 | 30 |
| γ_{inst} | Installation safety factor | | - | | | | | | | 1,0 | |
| α_{gap} | Factor for annular gap | | - | | | | | | | $0,5 (1,0)^{2)}$ | |

2) In brackets the value with hole filling on the workpiece: Use a special washer to fill as required by ETA-08/0383

Annex III°

| Displacement under TENSION load (threaded rods) ⁴⁾ | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|--|--|-----------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| $\delta_{N0,ucr}$ - factor | Short-term displacement Normal Concrete | 40/24 °C | mm/MPa | 0,021 | 0,023 | 0,026 | 0,031 | 0,036 | 0,041 | 0,045 | 0,049 |
| | | 80/50 °C | | 0,050 | 0,056 | 0,063 | 0,075 | 0,088 | 0,100 | 0,110 | 0,119 |
| | | 120/72 °C | | 0,050 | 0,056 | 0,063 | 0,075 | 0,088 | 0,100 | 0,110 | 0,119 |
| $\delta_{N\infty,ucr}$ - factor | Long-term displacement in Normal Concrete | 40/24 °C | mm/MPa | 0,030 | 0,033 | 0,037 | 0,045 | 0,052 | 0,060 | 0,065 | 0,071 |
| | | 80/50 °C | | 0,072 | 0,081 | 0,090 | 0,108 | 0,127 | 0,145 | 0,159 | 0,172 |
| | | 120/72 °C | | 0,072 | 0,081 | 0,090 | 0,108 | 0,127 | 0,145 | 0,159 | 0,172 |
| $\delta_{N0,cr}$ - factor | Short-term displacement Cracked Concrete | 40/24 °C | mm/MPa | 0,090 | | 0,070 | | | | | |
| | | 80/50 °C | | 0,219 | | 0,170 | | | | | |
| | | 120/72 °C | | 0,219 | | 0,170 | | | | | |
| $\delta_{N\infty,cr}$ - factor | Long-term displacement Cracked Concrete | 40/24 °C | mm/MPa | 0,105 | | 0,105 | | | | | |
| | | 80/50 °C | | 0,255 | | 0,245 | | | | | |
| | | 120/72 °C | | 0,255 | | 0,245 | | | | | |

4) Calculation of the displacement: $\delta_{N0} = \delta_{N0} - \text{factor} \cdot \tau$ τ : action bond stress for tension
 $\delta_{N\infty} = \delta_{N\infty} - \text{factor} \cdot \tau$

| Displacement under SHEAR load (threaded rod) ⁵⁾ | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|--|-------|--|------|------|------|------|------|------|------|------|
| $\delta_{V0,ucr}$ - factor | Short-term displacement Normal Concrete | mm/kN | | 0,06 | 0,06 | 0,05 | 0,04 | 0,04 | 0,03 | 0,03 | 0,03 |
| $\delta_{V\infty,ucr}$ - factor | Long-term displacement in Normal Concrete | mm/kN | | 0,09 | 0,08 | 0,08 | 0,06 | 0,06 | 0,05 | 0,05 | 0,05 |
| $\delta_{V0,cr}$ - factor | Short-term displacement Cracked Concrete | mm/kN | | 0,12 | 0,12 | 0,11 | 0,10 | 0,09 | 0,08 | 0,08 | 0,07 |
| $\delta_{V\infty,cr}$ - factor | Long-term displacement Cracked Concrete | mm/kN | | 0,18 | 0,18 | 0,17 | 0,15 | 0,14 | 0,13 | 0,12 | 0,10 |

5) Calculation of the displacement: $\delta_{V0} = \delta_{V0} - \text{factor} \cdot V$ V : action shear load
 $\delta_{V\infty} = \delta_{V\infty} - \text{factor} \cdot V$

Annex IV°

| Declared performance according to ETA-08/0383 and EAD 330499-01-0601 | | | | | | | | | | | | |
|--|---|-----------------------|--|-------------|-----|-----------------------------------|-----|-----|-----|-----|-----|-----|
| Design method according to EN 1992-4:2018 and TR055 | | | | | | | | | | | | |
| ESSENTIAL CHARACTERISTICS | | | | PERFORMANCE | | | | | | | | |
| d | REINFORCING BARS | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 | Ø28 | Ø32 |
| d ₀ | Nominal diameter of drill bit | mm | | 12 | 14 | 16 | 18 | 20 | 24 | 32 | 35 | 40 |
| h _{ef} | Effective embedment depth | h _{ef,min} | mm | 60 | 60 | 70 | 75 | 80 | 90 | 100 | 112 | 128 |
| | | h _{ef,std} | mm | 80 | 90 | 110 | 115 | 125 | 170 | 210 | 250 | 270 |
| | | h _{ef,max} | mm | 160 | 200 | 240 | 280 | 320 | 400 | 500 | 580 | 640 |
| h _{min} | Minimum thickness of concrete support | mm | h _{ef} + 30 ≥ 100 | | | h _{ef} + 2d ₀ | | | | | | |
| s _{min} | Minimum spacing | mm | 40 | 50 | 60 | 70 | 80 | 100 | 125 | 140 | 160 | |
| c _{min} | Minimum edge distance | mm | 40 | 50 | 60 | 70 | 80 | 100 | 125 | 140 | 160 | |
| TENSILE Steel Failure | | | | | | | | | | | | |
| N _{Rk,s} | Tension Steel Characteristic Failure | kN | A _s × f _{uk} ³⁾ | | | | | | | | | |
| N _{Rk,s,eq,C1} | Tension Steel Characteristic Failure under Seismic Category C1 | kN | 1,0 × A _s × f _{uk} ³⁾ | | | | | | | | | |
| A _s | Resistant Area | mm ² | 50 | 79 | 113 | 154 | 201 | 314 | 491 | 616 | 804 | |
| γ _{Ms,N1} | Partial safety factor | - | 1,4 | | | | | | | | | |
| Combined pull-out and concrete failure: "DRY-WET" | | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 | Ø28 | Ø32 |
| τ _{Rk,ucr} | Characteristic bond resistance for un-cracked concrete C20/25 | 40/24 °C | MPa | 10 | 12 | 12 | 12 | 12 | 12 | 11 | 10 | 8,5 |
| | | 80/50 °C | | 7,5 | 9 | 9 | 9 | 9 | 9 | 8 | 7 | 6 |
| | | 120/72 °C | | 5,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | 6 | 5 | 4,5 |
| τ _{Rk,cr} | Characteristic bond resistance for cracked concrete C20/25 | 40/24 °C | MPa | 4 | 5 | 5,5 | 5,5 | 5,5 | 5,5 | 5,5 | 6,5 | 6,5 |
| | | 80/50 °C | | 2,5 | 3,5 | 4 | 4 | 4 | 4 | 4 | 4,5 | 4,5 |
| | | 120/72 °C | | 2 | 2,5 | 3 | 3 | 3 | 3 | 3,5 | 3,5 | 3,5 |
| τ _{Rk,eq,C1} | Characteristic bond resistance for seismic category C1 C20/25 | 40/24 °C | MPa | 2,5 | 3,1 | 3,7 | 3,7 | 3,7 | 3,7 | 3,8 | 4,5 | 4,5 |
| | | 80/50 °C | | 1,6 | 2,2 | 2,7 | 2,7 | 2,7 | 2,7 | 2,8 | 3,1 | 3,1 |
| | | 120/72 °C | | 1,3 | 1,6 | 2 | 2 | 2 | 2 | 2,1 | 2,4 | 2,4 |
| Combined pull-out and concrete failure: "FLOODED HOLES" | | | | | | | | | | | | |
| τ _{Rk,ucr} | Characteristic bond resistance for un-cracked concrete C20/25 | 40/24 °C | MPa | 7,5 | 8,5 | 8,5 | 8,5 | 8,5 | NPD | | | |
| | | 80/50 °C | | 5,5 | 6,5 | 6,5 | 6,5 | 6,5 | | | | |
| | | 120/72 °C | | 4 | 5 | 5 | 5 | 5 | | | | |
| τ _{Rk,cr} | Characteristic bond resistance for cracked concrete C20/25 | 40/24 °C | MPa | 4 | 4 | 5,5 | 5,5 | 5,5 | NPD | | | |
| | | 80/50 °C | | 2,5 | 3 | 4 | 4 | 4 | | | | |
| | | 120/72 °C | | 2 | 2,5 | 3 | 3 | 3 | | | | |
| τ _{Rk,eq,C1} | Characteristic bond resistance for seismic category C1 C20/25 | 40/24 °C | MPa | 2,5 | 2,5 | 3,7 | 3,7 | 3,7 | NPD | | | |
| | | 80/50 °C | | 1,6 | 1,9 | 2,7 | 2,7 | 2,7 | | | | |
| | | 120/72 °C | | 1,3 | 1,6 | 2 | 2 | 2 | | | | |
| ψ ⁰ _{sus} | Reduction factor for C20/25 cracked and non-cracked concrete and seismic category | 40/24 °C | - | 0,73 | | | | | | | | |
| | | 80/50 °C | | 0,65 | | | | | | | | |
| | | 120/72 °C | | 0,57 | | | | | | | | |
| ψ _c | Increase factor for concrete per seismic category | Da C25/30 a C50/60 | - | 1,0 | | | | | | | | |
| Concrete Cone Failure | | | | | | | | | | | | |

3) f_{uk} secondo la specifica del ferro di armatura

| | | | | | | | | | | | | |
|--------------------------------|--|-----------------|---|------------|------------------------------------|------------|------------|-------------------------|------------|------------|------------|--|
| $K_{cr,N}$ | Factor according to 1992-4 § 7.2.1.4 cracked | - | 7,7 | | | | | | | | | |
| $K_{ucr,N}$ | Factor according to EN 1992-4 § 7.2.1.4 un-cracked | - | 11,0 | | | | | | | | | |
| $C_{cr,N}$ | Critical Edge distance | mm | $1,5 \times h_{ef}$ | | | | | | | | | |
| $S_{cr,N}$ | Critical spacing | mm | $2,0 \times C_{cr,N}$ | | | | | | | | | |
| Splitting Failure | | | | | | | | | | | | |
| $C_{cr,sp}$ | Characteristic edge distance from Splitting | mm | $h/h_{ef} \geq 2,0$ | | $1,0 \times h_{ef}$ | | | | | | | |
| | | | $2,0 > h/h_{ef} > 1,3$ | | $2 \times h_{ef} (2,5 - h/h_{ef})$ | | | | | | | |
| | | | $h/h_{ef} \leq 1,3$ | | $2,4 \times h_{ef}$ | | | | | | | |
| $S_{cr,sp}$ | Critical Spacing for Splitting | mm | $2,0 \times C_{cr,sp}$ | | | | | | | | | |
| γ_{inst} | Installation safety coefficient dry and wet concrete | - | 1,2 | | | | | | | | | |
| γ_{inst} | Installation safety coefficient in flooded holes | - | 1,4 | | | | | (NPD) | | | | |
| d | REBAR | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 | Ø28 | Ø32 | |
| SHEAR Steel Failure | | | | | | | | | | | | |
| $V_{Rk,s}$ | Characteristic shear failure steel | kN | $0,5 \times A_s \times f_{uk}^{(3)}$ | | | | | | | | | |
| $V_{Rk,s,seis,C1}$ | Characteristic shear failure steel Seismic category C1 | kN | $0,35 \times A_s \times f_{uk}^{(3)}$ | | | | | | | | | |
| A_s | Resistant section of reinforcing steel | mm ² | 50 | 79 | 113 | 154 | 201 | 314 | 491 | 616 | 804 | |
| M_{Rk}^0 | Characteristic bending moment | Nm | $1,2 \times W_{el} \times f_{uk}^{(3)}$ | | | | | | | | | |
| $M_{Rk,eq,C1}^0$ | Characteristic bending moment Seismic category C1 | Nm | (NPD) | | | | | | | | | |
| W_{el} | Elastic Section Modulus | mm ³ | 50 | 98 | 170 | 269 | 402 | 785 | 1534 | 2155 | 3217 | |
| $\gamma_{Ms,V}^{(1)}$ | Partial safety factor | - | 1,5 | | | | | | | | | |
| Concrete Pryout Failure | | | | | | | | | | | | |
| K_b | Factor according to EN 1992-4 § 7.2.2.4 | - | 2,0 | | | | | | | | | |
| γ_{inst} | Installation safety coefficient | - | 1,0 | | | | | | | | | |
| Concrete Edge Failure | | | | | | | | | | | | |
| l_f | Effective anchor length | - | min (h_{ef} ; $12 \times d_{nom}$) | | | | | min (h_{ef} ; 300mm) | | | | |
| d_{nom} | Outer diameter of the anchor | mm | 8 | 10 | 12 | 14 | 16 | 20 | 25 | 28 | 32 | |
| γ_{inst} | Installation safety coefficient | - | 1,0 | | | | | | | | | |
| α_{gap} | Factor for annular gap | - | $0,5 (1,0)^2$ | | | | | | | | | |

DIASEN srl

Zona Ind. Berbentina, 5 60041 Sassoferrato (AN) - ITALY
Tel. +39 0732 9718 - Fax +39 0732 971899 - diasen@diasen.com - www.diasen.com

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ANNEX V°

| Displacements under TENSION load (rebar) ⁴⁾ | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 | Ø28 | Ø32 |
|--|---|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| $\delta_{N0,ucr}$ - factor | Short-term displacement Normal Concrete | 40/24 °C | 0,021 | 0,023 | 0,026 | 0,028 | 0,031 | 0,036 | 0,043 | 0,075 | 0,052 |
| | | 80/50 °C | 0,050 | 0,056 | 0,063 | 0,069 | 0,075 | 0,088 | 0,104 | 0,113 | 0,126 |
| | | 120/72 °C | 0,050 | 0,056 | 0,063 | 0,069 | 0,075 | 0,088 | 0,104 | 0,113 | 0,126 |
| $\delta_{N\infty,ucr}$ - factor | Long-term displacement in Normal Concrete | 40/24 °C | 0,030 | 0,033 | 0,037 | 0,041 | 0,045 | 0,052 | 0,061 | 0,071 | 0,075 |
| | | 80/50 °C | 0,072 | 0,081 | 0,090 | 0,099 | 0,108 | 0,127 | 0,149 | 0,163 | 0,181 |
| | | 120/72 °C | 0,072 | 0,081 | 0,090 | 0,099 | 0,108 | 0,127 | 0,149 | 0,163 | 0,181 |
| $\delta_{N0,cr}$ - factor | Short-term displacement Cracked Concrete | 40/24 °C | 0,090 | 0,070 | | | | | | | |
| | | 80/50 °C | 0,219 | 0,170 | | | | | | | |
| | | 120/72 °C | 0,219 | 0,170 | | | | | | | |
| $\delta_{N\infty,cr}$ - factor | Long-term displacement Cracked Concrete | 40/24 °C | 0,105 | 0,105 | | | | | | | |
| | | 80/50 °C | 0,255 | 0,245 | | | | | | | |
| | | 120/72 °C | 0,255 | 0,245 | | | | | | | |

⁴⁾ Calculation of the displacement: $\delta_{N0} = \delta_{N0} - \text{factor} \cdot \tau$ τ : action bond stress for tension
 $\delta_{N\infty} = \delta_{N\infty} - \text{factor} \cdot \tau$

| Displacements under TENSION load (rebar) ⁵⁾ | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 | Ø28 | Ø32 |
|--|---|-------|------|------|------|------|------|------|------|------|------|
| $\delta_{V0,ucr}$ - factor | Short-term displacement Normal Concrete | mm/kN | 0,06 | 0,05 | 0,05 | 0,04 | 0,04 | 0,04 | 0,03 | 0,03 | 0,03 |
| $\delta_{V\infty,ucr}$ - factor | Long-term displacement in Normal Concrete | mm/kN | 0,09 | 0,08 | 0,08 | 0,06 | 0,06 | 0,05 | 0,05 | 0,04 | 0,04 |
| $\delta_{V0,cr}$ - factor | Short-term displacement Cracked Concrete | mm/kN | 0,12 | 0,12 | 0,11 | 0,11 | 0,10 | 0,09 | 0,08 | 0,07 | 0,06 |
| $\delta_{V\infty,cr}$ - factor | Long-term displacement Cracked Concrete | mm/kN | 0,18 | 0,18 | 0,17 | 0,16 | 0,15 | 0,14 | 0,12 | 0,11 | 0,10 |

⁵⁾ Calculation of the displacement: $\delta_{V0} = \delta_{V0} - \text{factor} \cdot V$ V : action shear load
 $\delta_{V\infty} = \delta_{V\infty} - \text{factor} \cdot V$

ANNEX VI°

| Declared performance according to ETA-12/0553 and EAD 330087-00-0601 | | | | | | | | | | | | | |
|--|---|-------------------|--|----------------------|-------------------------------------|-----|-----|-----|-----|-----|-------------------------------------|-----|-----|
| Design according to EN 1992-1-1:2004+AC:2010 and ETA-12/0553 | | | | | | | | | | | | | |
| ESSENTIAL CHARACTERISTICS | | | PERFORMANCE | | | | | | | | | | |
| d | POST-INSTALLED REBAR | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø22 | Ø24 | Ø25 | Ø28 | Ø32 |
| d ₀ | Nominal diameter of drill bit | mm | 12 | 14 | 16 | 18 | 20 | 25 | 28 | 32 | 32 | 35 | 40 |
| ℓ _{v,MAX} | Anchorage depth MAX | mm | See table B2 of ETA-12/0553 | | | | | | | | | | |
| ℓ _{b,MIN} | Anchorage depth MIN | mm | § 8.6 - § 8.7 according to EN 1992-1-1:2004+AC:2010 | | | | | | | | | | |
| ℓ _{0,MIN} | Length of overlap | mm | § 8.11 according to EN 1992-1-1:2004+AC:2010 | | | | | | | | | | |
| α _{ib} | Amplification factor for ℓ _{b,MIN} and ℓ _{0,MIN} | - | 1,0 | | | | | | | | | | |
| c ^{4) 5)} | Minimum concrete cover min c | Without drilling | rotary hammer HD | | 30 mm + 0,06 · l _v ≥ 2·Ø | | | | | | 40 mm + 0,06 · l _v ≥ 2·Ø | | |
| | | | pneumatic drill CD | | 50 mm + 0,08 · l _v | | | | | | 60 mm + 0,08 · l _v | | |
| | | With drilling | rotary hammer HD | | 30 mm + 0,02 · l _v ≥ 2·Ø | | | | | | 40 mm + 0,02 · l _v ≥ 2·Ø | | |
| | | | pneumatic drill CD | | 50 mm + 0,02 · l _v | | | | | | 60 mm + 0,02 · l _v | | |
| s _{min} | Minimum spacing | mm | ≥ 5·Ø ≥ 50 mm | | | | | | | | | | |
| Design values of ultimate bond resistance | | | | | | | | | | | | | |
| f _{bd} | Bond design value resistance "for all drilling methods for good conditions" | N/mm ² | C12/15 | 1,6 | | | | | | | | | |
| | | | C16/20 | 2,0 | | | | | | | | | |
| | | | C20/25 | 2,3 | | | | | | | | | |
| | | | C25/30 | 2,7 | | | | | | | | | |
| | | | C30/37 | 3,0 | | | | | | | | | |
| | | | C35/45 | 3,4 | | | | | | | | | |
| | | | C40/50 | 3,7 | | | | | | | | | |
| | | | C45/55 | 4,0 (3,7 per Ø28+32) | | | | | | | | | |
| C50/60 | 4,3 (3,7 per Ø28+32) | | | | | | | | | | | | |
| f _{bd,c} | "for all other bond conditions" | N/mm ² | f _{bd} · 0,7 | | | | | | | | | | |
| FIRE EXPOSURE Design Method according to EN 1992-1-1:2004+AC:2008 | | | | | | | | | | | | | |
| f _{bd} | Bond design value resistance "under Fire Exposure" | N/mm ² | ⁶⁾ f _{bd,fi} = k _{fi} (θ) · f _{bd} · γ _c / γ _{Mfi} | | | | | | | | | | |

f_{bd} = see table above

γ_c = partial safety factor according to EN 1992-1-1

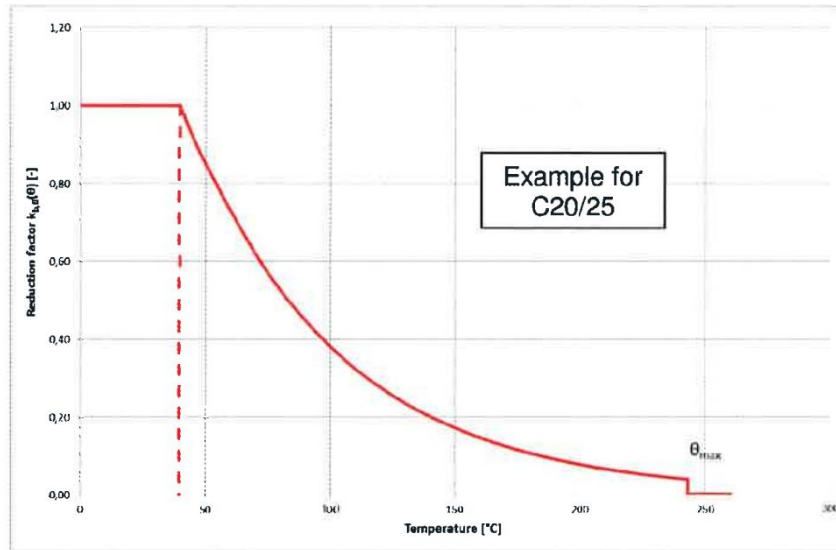
γ_{Mfi} = partial safety factor according to EN 1992-1-2 under fire exposure

4) Non ammessa perforazione carotata

5) Per la copertura minima di calcestruzzo si deve rispettare l'Eurocodice EC 1992-1-1:2004 + AC:2010;

6) Con k_{fi}(θ) fattore di riduzione sotto esposizione al fuoco (vedi grafico sotto)

Example graph of Reduction factor $k_{b,fi}(\theta)$ for concrete classes C20/25 for good bond conditions:



Annex VII°

| Declared performance according to <u>ETA-12/0543</u> and <u>ETAG029</u> Design method according to TR054 | | | | | | | | | | | | |
|---|------------------------------|----------------------------------|-------------------|----|--------------------|------------------|--------------------|------------------|--------------------|------------------|-----|--|
| ESSENTIAL CHARACTERISTICS | | | | | PERFORMANCE | | | | | | | |
| Installation parameters <u>SOLID MASONRY</u> | | | | | M8 | | M10 | | M12 | | | |
| d_0 | Nominal diameter of drill | | | | mm | | 10 | | 12 | | 14 | |
| h_{ef} | Effective embedment depth | | | | mm | | 80 | | 90 | | 100 | |
| T_{inst} | Torque moment (max) | | | | mm | | 2 | | | | | |
| Characteristic resistance to TENSILE and SHEAR loads ⁷⁾ | | | | | M8 | | M10 | | M12 | | | |
| Type ⁸⁾ | Density (kg/m ³) | Compression (N/mm ²) | Temperature Range | | $N_{Rk,b}$ tensile | $V_{Rk,b}$ shear | $N_{Rk,b}$ tensile | $V_{Rk,b}$ shear | $N_{Rk,b}$ tensile | $V_{Rk,b}$ shear | | |
| Solid brick ⁸⁾ | $\rho \geq 1,6$ | $f_b \geq 10$ | 40/24 °C | kN | 3,5 | 3,5 | 3,5 | 3,5 | 4,0 | 3,5 | | |
| | | | 80/50 °C | | 3,5 | | 3,5 | | 4,0 | | | |
| | | | 120/72 °C | | 2,5 | | 3,0 | | 3,5 | | | |
| Solid brick ⁸⁾ | $\rho \geq 1,6$ | $f_b \geq 28$ | 40/24 °C | kN | 5,5 | 5,5 | 6,0 | 5,5 | 7,0 | 5,5 | | |
| | | | 80/50 °C | | 5,5 | | 6,0 | | 7,0 | | | |
| | | | 120/72 °C | | 4,5 | | 5,0 | | 6,0 | | | |
| γ_M ¹⁾ | Partial Safety Factor | | | | - | | 2,5 | | | | | |
| Installation parameters <u>HOLLOWED MASONRY "with bussola"</u> | | | | | M8 | | M10 | | M12 | | | |
| d_0 | Nominal diameter of drill | | | | mm | | 12 | | 16 | | 18 | |
| h_{ef} | Effective embedment depth | | | | mm | | 80 | | 85 | | 85 | |
| T_{inst} | Torque moment (max) | | | | mm | | 2 | | | | | |
| Characteristic resistance to TENSILE and SHEAR loads ⁸⁾ | | | | | M8 | | M10 | | M12 | | | |

⁷⁾ Resistance values valid with C_{cr} edge distances, see ETA-12/0543 even for shorter distances.

⁸⁾ See ETA-12/0543 for description of bricks and for use on other types of bricks.

| Type ⁹⁾ | Density (kg/m ³) | Compression (N/mm ²) | Temperature Range | | N _{Rk,b} tensile | V _{Rk,b} shear | N _{Rk,b} tensile | V _{Rk,b} shear | N _{Rk,b} tensile | V _{Rk,b} shear |
|------------------------------------|------------------------------|----------------------------------|-------------------|----|---------------------------|-------------------------|---------------------------|-------------------------|---------------------------|-------------------------|
| Brick doppio ⁹⁾ | $\rho \geq 1,2$ | $f_b \geq 28$ | 40/24 °C | kN | 1,2 | 2,5 | 1,2 | 2,5 | 1,2 | 2,5 |
| | | | 80/50 °C | | 1,2 | | 1,2 | | | |
| | | | 120/72 °C | | 0,9 | | 0,9 | | | |
| Brick forato leggero ⁸⁾ | $\rho \geq 0,8$ | $f_b \geq 6$ | 40/24 °C | kN | 0,5 | 2,5 | 0,5 | 2,5 | 0,5 | 2,5 |
| | | | 80/50 °C | | 0,5 | | 0,5 | | | |
| | | | 120/72 °C | | 0,4 | | 0,4 | | | |
| γ_M ¹⁾ | Partial Safety Factor | | | - | 2,5 | | | | | |

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- product already in stock at the time of updating the marking,
- printing errors.

⁹⁾ See ETA-12/0543 for description of bricks and use on other types of bricks.

DIASEN srl

Zona Ind. Berbentina, 5 60041 Sassoferrato (AN) - ITALY
Tel. +39 0732 9718 - Fax +39 0732 971899 - diasen@diasen.com - www.diasen.com

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