# BANTEK RE-500 PLUS V2


585 ml

USE 8mm to 32mm TMT Bar


Approved for:
Concrete C20/25 to C50/60, non-cracked & cracked

Suitable for:
Concrete C12/15, Natural stone with dense structure

| Cartridge sizes | | Art.No.129022 |
|---|---|---|
| 585 ml | side-by-side | 12 90 22 |

| Installation condition | | |
|---|---|---|
| Dry concrete | Wet Concrete | Flooded drill hole |
| A-1 | B-2 | C-3 |

| Drilling method | | |
|---|---|---|
| Hammer drill | Diamond drill | Hollow drill |
| D-4 | E-5 | 6 |

BANTEK RE-500 PLUS

## Applications


## Approvals and certificates

| Description | Authority/laboratory | Guideline for assessment | No./date of issue |
|---|---|---|---|
| GAAFS.US Assessment | Certificate CE | CE-CESKES-21-072829 | CE 07/08/2021 to 06.08.2024 |
| GAAFS.US Assessment | Certificate ISO 900:15 QVA:201 | QVA-SNPS-21-072828 | ISO 07/08/202107/08/2024 |

### Handing precautions

It is harmful if ingested or absorbed through the skin and causes sensitization. It can cause severe irritation in contact with eyes and skin. Wash thoroughly after handling. Adequate ventilation is essential. Containers should be tightly closed when not in use or during transportation. Do not inhale mist or vapors. It is recommended to use gloves, safety goggles and protective clothing for safe handling

## Basic load data (for a single anchor)

All data in this section applies when:

- Installation is correct (see installation instructions)
- No edge distance and spacing influence
- Base material thickness and embedment depth are according to anchor characteristics
- Rebar material is according to specifications,steel grade B500B
- Concrete C 20/25, $f_{ck}$ = 20 N/mm²
- Concrete C 50/60, $f_{ck}$ = 60 N/mm²
- Temperature range I (min. base material temperature -40°C, max long term/short term base material temperature: +25°C/40°C).
- Dry or wet conditions of drill hole, hammer drilling

### Characteristic resistance

| Rebar size | | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | | |
| Tension | C20/25 | $N_{Rk}$ | [kN] | 27.6 | 39.7 | 56.9 | 66.2 | 68.9 | 108.1 | 149.8 | 149.8 | 218.4 | 255.7 |
| | C50/60 | | | 27.7 | 43.7 | 62.3 | 72.7 | 82.9 | 141.3 | 209.2 | 199.7 | 287.4 | 364.9 |
| Shear | ≥ C20/25 | $V_{Rk}$ | [kN] | 14.9 | 21.8 | 31.3 | 42.6 | 54.4 | 69.6 | 124.4 | 135.5 | 169.6 | 221.3 |
| Cracked concrete | | | | | | | | | | | | | |
| Tension | C20/25 | $N_{Rk}$ | [kN] | 12.3 | 19.9 | 29.2 | 35.8 | 40.9 | 64.2 | 95.2 | 99.3 | 130.5 | 165.8 |
| | C50/60 | | | 13.4 | 21.9 | 31.9 | 39.4 | 44.4 | 70.3 | 104.7 | 109.1 | 143.8 | 182.8 |
| Shear | ≥ C20/25 | $V_{Rk}$ | [kN] | 13.9 | 21.9 | 31.5 | 42.6 | 55.5 | 86.6 | 124.5 | 135.5 | 169.7 | 221.7 |

### Design resistance

| Rebar size | | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | | |
| Tension | C20/25 | $N_{Rd}$ | [kN] | 13.4 | 18.8 | 27.0 | 31.4 | 32.7 | 51.9 | 71.3 | 71.3 | 103.9 | 121.7 |
| | C50/60 | | | 14.7 | 20.7 | 30.4 | 34.6 | 39.5 | 67.1 | 99.5 | 95.0 | 136.8 | 173.8 |
| Shear | ≥ C20/25 | $V_{Rd}$ | [kN] | 9.2 | 14.5 | 20.7 | 28.2 | 36.9 | 57.6 | 82.9 | 90.0 | 112.9 | 147.4 |
| Cracked concrete | | | | | | | | | | | | | |
| Tension | C20/25 | $N_{Rd}$ | [kN] | 5.7 | 9.4 | 13.8 | 17.0 | 19.4 | 30.5 | 45.2 | 47.1 | 62.2 | 79.0 |
| | C50/60 | | | 6.3 | 10.4 | 15.2 | 18.7 | 21.4 | 33.6 | 49.8 | 51.8 | 68.4 | 86.9 |
| Shear | ≥ C20/25 | $V_{Rd}$ | [kN] | 9.2 | 14.5 | 20.7 | 28.2 | 36.9 | 57.6 | 82.9 | 90.0 | 112.9 | 147.4 |

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Recommended/allowable loads[1)]

| Rebar size | | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | | |
| Tension | C20/25 | $N_{rec}$ | [kN] | 9.8 | 13.9 | 19.5 | 22.6 | 23.4 | 37.5 | 50.9 | 51.1 | 74.70 | 87.1 |
| | C50/60 | | | 10.9 | 15.2 | 22.1 | 25.1 | 28.7 | 48.5 | 71.9 | 68.1 | 98.1 | 124.9 |
| Shear | ≥ C20/25 | $V_{rec}$ | [kN] | 7.1 | 10.9 | 15.2 | 20.8 | 26.9 | 41.8 | 59.9 | 64.7 | 81.1 | 105.8 |
| Cracked concrete | | | | | | | | | | | | | |
| Tension | C20/25 | $N_{rec}$ | [kN] | 4.8 | 7.1 | 10.1 | 12.9 | 14.2 | 22.1 | 32.9 | 34.1 | 44.8 | 56.9 |
| | C50/60 | | | 5.1 | 7.9 | 11.1 | 13.49 | 15.9 | 24.5 | 35.7 | 37.2 | 49.2 | 62.7 |
| Shear | ≥ C20/25 | $V_{rec}$ | [kN] | 6.9 | 10.8 | 15.2 | 20.8 | 26.7 | 41.5 | 59.3 | 64.8 | 80.9 | 105.6 |

[1)] Material safety factor $\gamma_M$ and safety factor for action $\gamma$ = 1.4 are included. The material safety factor depends on the failure mode.

## Design method (simplified)

Simplified version of the design method according to SIO Design of concrete structures -Design of fastenings for use in concrete ( QVA-SNPS-21-072828):

- Influence factors related to concrete strength, edge distance, spacing and others must be considered when applicable
- Valid for a group of anchors. The influencing factors must then be considered for each edge distance and spacing. The calculated design resistances are on the safe side. They will be lower than the exact values according to CE-CESKES-21-072829. For an economical optimization, we recommend using the anchor design module of the Bantek Technical Software II
- The design method is based on the simplification that no different loads are acting on individual anchors (no eccentricity)
- Temperature range 1 (min. base material temperature -40°C, max. long term. short term base material temperature: +25°C/40°C)
- Dry or wet conditions of drill hole, hammer drilling (Installation factors might apply for other drilling methods)
- Rebar material according to specifications, steel grade B500B

### I. Tension loading

The decisive design resistance in tension is the lowest value of the following failure modes:

### 1. Design steel tensile resistance

*Table 1: Design value of steel resistance under tension load $N_{Rd,s}$ of a single anchor*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Design steel resistance | $N_{Rd,s}$ | [kN] | 20.0 | 31.5 | 44.9 | 60.9 | 79.5 | 123.8 | 178.6 | 193.0 | 242.5 | 316.0 |



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## 2. Design combined pull-out and concrete cone resistance

*Table 2: Basic design resistance $N^0_{Rd,p}$ in case of combined pull-out and concrete cone failure of a single anchor*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | |
| Combined pull-out and concrete cone resistance | $N^0_{Rd,p}$ | [kN] | 13.9 | 19.0 | 28.1 | 31.9 | 36.0 | 61.5 | 90.9 | 86.8 | 124.9 | 158.4 |
| Cracked concrete | | | | | | | | | | | | |
| Combined pull-out concrete cone resistance | $N^0_{Rd,p}$ | [kN] | 5.9 | 9.8 | 13.8 | 17.4 | 19.6 | 31.1 | 45.8 | 47.8 | 62.7 | 79.2 |

*Table 3: Characteristic edge distance and spacing*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Spacing | $s_{cr,p}$ | [mm] | 220 | 275 | 329 | 355 | 376 | 508 | 609 | 608 | 679 | 776 |
| Edge distance | $c_{cr,p}$ | [mm] | 110 | 134 | 166 | 178 | 189 | 255 | 306 | 308 | 340 | 389 |

### a. Influence of concrete strength

*Table 4: Influence of concrete strength on combined pull-out and concrete cone resistance*

| Concrete strength classes (EN 206:2000) | | | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic compressive strengthof concrete determined by testing cylinders[1)] | f | [N/mm²] | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Characteristic compressive strength of concrete determined by testing cube[2)] | F | [N/mm²] | 15 | 20 | 25 | 30 | 37 | 45 | 50 | 55 | 60 |
| Influencing factor | f | [-] | 0.77 | 0.89 | 1.00 | 1.02 | 1.04 | 1.07 | 1.08 | 1.09 | 1.10 |

[1)] strength at 29 days of 160 mm diameter by 325 mm cylinders

[2)] strength at 29 days of 160 mm cubes

## Material Safety Data Sheet (MSDS)

BCPC oat Low viscosity Insulation Epoxy Resin-4140 (Part-A)
Description: BCP Coat 4140 is a general purpose low viscosity modified liquid Epoxy Resin,
Applications BCPC oat is suitable for formulating priming coats, solvent-free self-leveling coatings, Italian Marble , Granites
• Protective Coatings
• Sealing of cracks
2 Composition/Data on components
CAS No. Description
25068-38-6 [Reaction product: biphenyl-A-(epichlorhydrin) epoxy resin (number average molecular weight ≤ 700)] · Identification number(s)
· NLP Number: 500-033-5 ·
Index number: 603-074-00-8
3 Hazards identification
· Information pertaining to particular dangers for man and environment:
R 36/38 Irritating to eyes and skin.
R 43 May cause sensitization by skin contact
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
Contains epoxy constituents. See information supplied by the manufacturer. · Classification system: · NFPA ratings (scale 0 - 4)
H315 - Causes skin irritation.
H319 - Causes serious eye irritation.
H317 - May cause an allergic skin reaction
H411 - Toxic to aquatic life with long lasting effects.
Prevention: P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash thoroughly after handling.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
Response: P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes.
Remove contact
lenses, if present and easy to do. Continue rinsing

### b. Influence of embedment depth

### c. Influence of spacing

*Table 5: Influence of spacing on combined pull-out and concrete cone resistance*

| Number of fixing per direction | $s/s_{cr,p}$ [1)] | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.70 | 0.75 | 0.90 | 0.95 | ≥ 1.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | $f_{sx,p}, f_{sy,p}$ | 0.55 | 0.58 | 0.60 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | 0.75 | 0.78 | 0.80 | 0.83 | 0.85 | 0.88 | 0.85 | 0.88 | 0.95 | 0.98 | 1.00 |
| 3 | $f_{sx,p}, f_{sy,p}$ | 0.40 | 0.43 | 0.47 | 0.50 | 0.53 | 0.57 | 0.60 | 0.63 | 0.67 | 0.70 | 0.73 | 0.77 | 0.80 | 0.83 | 0.80 | 0.83 | 0.93 | 0.97 | 1.00 |
| 4 | $f_{sx,p}, f_{sy,p}$ | 0.33 | 0.36 | 0.40 | 0.44 | 0.48 | 0.51 | 0.55 | 0.59 | 0.63 | 0.66 | 0.70 | 0.74 | 0.78 | 0.81 | 0.78 | 0.81 | 0.93 | 0.96 | 1.00 |
| 5 | $f_{sx,p}, f_{sy,p}$ | 0.28 | 0.32 | 0.36 | 0.40 | 0.44 | 0.48 | 0.52 | 0.56 | 0.60 | 0.64 | 0.68 | 0.72 | 0.76 | 0.80 | 0.76 | 0.80 | 0.92 | 0.96 | 1.00 |

[1)] Choose always the lowest value of the spacing s, when there are different spacings in one row

### d. Influence of edge distance

*Table 6: Influence of edge distance on combined pull-out and concrete cone resistance*

| $c/c_{cr,P}$ | 0,10 | 0,15 | 0,20 | 0,25 | 0,30 | 0,35 | 0,40 | 0,45 | 0,50 | 0,55 | 0,60 | 0,65 | 0,70 | 0,75 | 0,70 | 0,75 | 0,90 | 0,95 | ≥ 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $f_{cx,1}$ | 0.73 | 0.75 | 0.76 | 0.78 | 0.79 | 0.81 | 0.82 | 0.84 | 0.85 | 0.87 | 0.88 | 0.90 | 0.91 | 0.93 | 0.91 | 0.93 | 0.97 | 0.99 | 1.00 |
| $f_{cx,2}$ | 0.55 | 0.58 | 0.60 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | 0.75 | 0.78 | 0.80 | 0.83 | 0.85 | 0.88 | 0.85 | 0.88 | 0.95 | 0.98 | 1.00 |
| $f_{cy}$ | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

## $e_{Ed}$ Influence of sustained loads

*Table 7: Influence of sustained loads on combined pull-out and concrete cone resistance*

| $a_{sus}$ | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|---|---|---|---|---|---|---|---|---|---|---|
| $f_{sus}$ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 0.80 | 0.70 | 0.60 |

## 3. Design concrete cone resistance

No verification of splitting is required if at least one of the conditions is fulfilled:

aThe edge distance in all directions is c ≥ c for single fasteners and c ≥ 1.2 c for fastener groups and the member depth is h ≥ $h_{min}$ in both cases.

a) The characteristic resistance for concrete cone failure and pull-out failure is calculated for cracked concrete and reinforcement resists the splitting forces and limits the crack width to $w_k \leq 0.3$ mm

*Table 8: Basic design resistance $N^0_{Rd,c}$ in case of concrete cone failure of a single anchor*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | |
| Concrete cone resistance | $N^0_{Rd,c}$ | [kN] | 16.8 | 20.0 | 27.0 | 32.7 | 32.7 | 51.9 | 71.3 | 71.3 | 103.9 | 121.7 |
| Cracked concrete | | | | | | | | | | | | |
| Concrete cone resistance | $N^0_{Rd,c}$ | [kN] | 11.7 | 14.0 | 18.9 | 22.9 | 22.9 | 36.3 | 49.9 | 49.9 | 72.7 | 85.2 |

*Table 9: Characteristic edge distance $c_{cr,N}$ and spacing $s_{cr,N}$*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 80 | 90 | 110 | 125 | 125 | 170 | 210 | 210 | 270 | 300 |
| Spacing | $s_{cr,N}$ | [mm] | 240 | 270 | 330 | 375 | 370 | 510 | 630 | 630 | 810 | 900 |
| Edge distance | $c_{cr,N}$ | [mm] | 120 | 135 | 165 | 188 | 188 | 254 | 315 | 315 | 405 | 455 |

Above characteristic spacing and edge distances are given for the typical effective anchorage depths. Calculating for smal·ler depths leads to conservative load capacities. For calculation with bigger depths, use the following:

## A Influence of concrete strength

*Table 10: Influence of concrete strength on concrete cone resistance*

| Concrete strength classes (EN 206:2000) | | | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic compressive strengthof concrete determined by testing cylinders[1)] | $f_{ck}$ | [N/mm²] | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Characteristic compressive strength of concrete determined by testing cube[2)] | $f_{ck,cube}$ | [N/mm²] | 15 | 20 | 25 | 30 | 37 | 45 | 50 | 55 | 60 |
| Influencing factor | $f_{b,N}$ | [-] | 0.77 | 0.89 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 | 1.50 | 1.58 |

[1)] strength at 28 days of 150 mm diameter by 300 mm cylinders

[2)] strength at 28 days of 150 mm cubes

### A. Influence of embedment depth

Consider the approved range of embedment h h ≤ $h_e$ according to the table „anchor characteristics".

### B. Influence of spacing

*Table 11: Influence of spacing on concrete cone resistance*

| Number of fixing per direction | $s/s_{cr,p}$ [1)] | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.70 | 0.75 | 0.90 | 0.95 | ≥1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | $f_{sx}$, $f_{sy}$ | 0.55 | 0.58 | 0.60 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | 0.75 | 0.78 | 0.80 | 0.83 | 0.85 | 0.88 | 0.85 | 0.88 | 0.95 | 0.98 | 1.00 |
| 3 | $f_{sx}$, $f_{sy}$ | 0.40 | 0.43 | 0.47 | 0.50 | 0.53 | 0.57 | 0.60 | 0.63 | 0.67 | 0.70 | 0.73 | 0.77 | 0.80 | 0.83 | 0.80 | 0.83 | 0.93 | 0.97 | 1.00 |
| 4 | $f_{sx}$, $f_{sy}$ | 0.33 | 0.36 | 0.40 | 0.44 | 0.48 | 0.51 | 0.55 | 0.59 | 0.63 | 0.66 | 0.70 | 0.74 | 0.78 | 0.81 | 0.78 | 0.81 | 0.93 | 0.96 | 1.00 |
| 5 | $f_{sx}$, $f_{sy}$ | 0.28 | 0.32 | 0.36 | 0.40 | 0.44 | 0.48 | 0.52 | 0.56 | 0.60 | 0.64 | 0.68 | 0.72 | 0.76 | 0.80 | 0.76 | 0.80 | 0.92 | 0.96 | 1.00 |

[1)] Choose always the lowest value of the spacing s, when there are different spacings in one row

### a. Influence of edge distance

*Table 12: Influence of edge distance on concrete cone resistance*

| $c/c_{cr,N}$ | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.70 | 0.75 | 0.90 | 0.95 | ≥1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $f_{cx,1}$ | 0.73 | 0.75 | 0.76 | 0.78 | 0.79 | 0.81 | 0.82 | 0.84 | 0.85 | 0.87 | 0.88 | 0.90 | 0.91 | 0.93 | 0.91 | 0.93 | 0.97 | 0.99 | 1.00 |
| $f_{cx,2}$ / $f_{cy}$ | 0.55 | 0.58 | 0.60 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | 0.75 | 0.78 | 0.80 | 0.83 | 0.85 | 0.88 | 0.85 | 0.88 | 0.95 | 0.98 | 1.00 |

## C. Design splitting resistance

*Table 13: Design resistance $N_{Rd,sp}$ in case of concrete splitting failure of a single anchor*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | |
| Splitting resistance | $N^{0}_{Rd,c}$ | [kN] | 13.8 | 19.0 | 27.0 | 31.9 | 32.9 | 51.9 | 71.8 | 71.7 | 104.0 | 122.0 |

*Table 14: Characteristic edge distance and spacing s*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Characteristic spacing | $s_{cr,sp}$ | [mm] | 360 | 420 | 528 | 600 | 590 | 816 | 1004 | 1004 | 1296 | 1440 |
| Characteristic edge distance | $c_{cr,sp}$ | [mm] | 180 | 210 | 264 | 300 | 295 | 408 | 502 | 502 | 648 | 720 |
| Minimum member thickness | $h_{min}$ | [mm] | 110 | 120 | 142 | 161 | 165 | 218 | 274 | 274 | 340 | 380 |

Above characteristic spacing and edge distances are given for the typical effective anchorage depth. Calculating for smaller depths leads to conservative load capacities. For calculation with bigger depths, use the following:

and h to the table „anchor characteristics".

## A. Influence of concrete strength

*Table 15: Influence of concrete strength on splitting resistance*

| Concrete strength classes (EN 206:2000) | | | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic compressive strength of concrete determined by testing cylinders [1] | $f_{ck}$ | [N/mm²] | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Characteristic compressive strength of concrete determined by testing cube [2] | $f_{ck,cube}$ | [N/mm²] | 15 | 20 | 25 | 30 | 37 | 45 | 50 | 55 | 60 |
| Influencing factor | $f_{b,N}$ | [-] | 0.77 | 0.89 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 | 1.50 | 1.58 |

[1] strength at 28 days of 150 mm diameter by 300 mm cylinders

[2] strength at 28 days of 150 mm cubes

## B. Influence of embedment depth

Consider the approved range of embedment h f according to the table „anchor characteristics “.

## C. Influence of spacing

*Table 16: Influence of spacing on splitting resistance*

| Number of fixing per direction | $s/s_{cr,sp}$ [1] | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.70 | 0.75 | 0.90 | 0.95 | ≥ 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | $f_{sx,sp}$ , $f_{sy,sp}$ | 0.55 | 0.58 | 0.60 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | 0.75 | 0.78 | 0.80 | 0.83 | 0.85 | 0.88 | 0.85 | 0.88 | 0.95 | 0.98 | 1.00 |
| 3 | $f_{sx,sp}$ , $f_{sy,sp}$ | 0.40 | 0.43 | 0.47 | 0.50 | 0.53 | 0.57 | 0.60 | 0.63 | 0.67 | 0.70 | 0.73 | 0.77 | 0.80 | 0.83 | 0.80 | 0.83 | 0.93 | 0.97 | 1.00 |
| 4 | $f_{sx,sp}$ , $f_{sy,sp}$ | 0.33 | 0.36 | 0.40 | 0.44 | 0.48 | 0.51 | 0.55 | 0.59 | 0.63 | 0.66 | 0.70 | 0.74 | 0.78 | 0.81 | 0.78 | 0.81 | 0.93 | 0.96 | 1.00 |
| 5 | $f_{sx,sp}$ , $f_{sy,sp}$ | 0.28 | 0.32 | 0.36 | 0.40 | 0.44 | 0.48 | 0.52 | 0.56 | 0.60 | 0.64 | 0.68 | 0.72 | 0.76 | 0.80 | 0.76 | 0.80 | 0.92 | 0.96 | 1.00 |

[1] Choose always the lowest value of the spacing s, when there are different spacing's in one row

## D. Influence of edge distance

*Table 17: Influence of edge distance on splitting resistance*

| $c/c_{cr,sp}$ | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.70 | 0.75 | 0.90 | 0.95 | ≥ 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $f_{cx,1,sp}$ | 0.73 | 0.75 | 0.76 | 0.78 | 0.79 | 0.81 | 0.82 | 0.84 | 0.85 | 0.87 | 0.88 | 0.90 | 0.91 | 0.93 | 0.91 | 0.93 | 0.97 | 0.99 | 1.00 |
| $f_{cx,2,sp}$ / $f_{cy,sp}$ | 0.55 | 0.58 | 0.60 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | 0.75 | 0.78 | 0.80 | 0.83 | 0.85 | 0.88 | 0.85 | 0.88 | 0.95 | 0.98 | 1.00 |

### a. Influence of concrete member thickness

*Table 18: Influence of concrete member thickness on splitting resistance*

| $h/h_{min}$ | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.3 | 2.4 | 2.7 | 2.8 | 2.9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $f_h$ | 1.00 | 1.07 | 1.13 | 1.19 | 1.25 | 1.31 | 1.37 | 1.42 | 1.48 | 1.53 | 1.59 | 1.64 | 1.69 | 1.74 | 1.79 | 1.74 | 1.79 | 1.94 | 1.99 | 2.00 |

## D. Shear loading

### 1. Design steel shear resistance

*Table 19: Design value of steel resistance of a single anchor*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Design steel resistance | $V_{Rd,s}$ | [kN] | 9.2 | 14.5 | 20.7 | 28.2 | 36.9 | 57.6 | 82.9 | 90.0 | 112.9 | 147.4 |


BANTEK RE-500 PLUS

2. Design concrete pry-out resistance

*Table 20: factor $k_8$ for calculating design pry-out resistance*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Concrete pry-out resistance factor | $k_8$ | [-] | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

*3.* Design concrete edge resistance

Verification of concrete edge failure may be omitted for single fasteners and groups with an edge distance in all directions c ≥ max (10 $h_{ef}$; 60 d). For anchorages with more than one edge, the resistance for all edges shall be calculated. The smallest value should be used in the verification.

**BATCH NO: 120923**
BCP Pest Low Viscosity Insulation Epoxy Resin M-4140 BATCH NO: 12092

BCP Pest Low viscosity Insulation Epoxy Resin M-4140 (Part-A)
Description: BCP pest 4140 is a general purpose low viscosity modified liquid Epoxy Resin,
Applications BCP pest is suitable for formulating priming coats, solvent-free self-leveling coatings, Italian Marble , Granites

• Protective Coatings
• Sealing of cracks
Product Data Property
Unit
BCP pest 4140
Result

Appearance
Clear liquid
Color (pink red)
≤ 2 5
Epoxy Index
eq/kg
1.20 – 1.30
5.15
Epoxy injection

g/eq
182 – 192
185
Viscosity at 25°C
mpa s
500 – 600
cp@ 515
Density at 20°C
g/cm3
~1.08
Flash Poin
°C
~120
Paste TIME
30 To 35 minute
35 min
TACKY FREE AT 50 º C
90 To 95 Minits
90 Min
RATIO OF MIXING
3:1

*Table 21: Design resistance $V^0_{Rd,c}$ in case of concrete edge failure*

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | $h_{ef}$ | [mm] | 100 | 125 | 150 | 160 | 160 | 200 | 225 | 230 | 280 | 350 |
| Non-cracked concrete | | | | | | | | | | | | |
| Basic design edge resistance | $V^0_{Rd,c}$ | [kN] | 2.8 | 3.6 | 4.6 | 5.6 | 5.8 | 8.3 | 12.2 | 12.2 | 14.3 | 17.2 |
| Cracked concrete | | | | | | | | | | | | |
| Basic design edge resistance | $V^0_{Rd,c}$ | [kN] | 2.0 | 2.5 | 3.2 | 4.0 | 4.1 | 5.9 | 8.6 | 8.6 | 10.2 | 12.2 |

## a. Influence of concrete strength

*Table 22: Influence of concrete strength on concrete edge resistance*

| Concrete strength classes (EN 206:2000) | | | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic compressive strength of concrete determined by testing cylinders[1)] | f | [N/mm²] | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Characteristic compressive strength of concrete determined by testing cube[2)] | f | [N/mm²] | 15 | 20 | 25 | 30 | 37 | 45 | 50 | 55 | 60 |
| Influencing factor | f | [-] | 0.77 | 0.89 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 | 1.50 | 1.58 |

[1)] strength at 28 days of 150 mm diameter by 300 mm cylinders

[2)] strength at 28 days of 150 mm cubes

## b. Influence of embedment depth

*Table 23: Influence of embedment depth on concrete edge resistance*

| $h_{ef}/d$ | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | ≥ 12 |
|---|---|---|---|---|---|---|---|---|---|
| f | 0.87 | 0.91 | 0.94 | 0.97 | 1.00 | 1.02 | 1.05 | 1.07 | 1.08 |

## c. Influence of spacing

In groups loaded perpendicular to the edge only two adjacent anchors closest and parallel to the edge carry the load. The smallest spacing should be used for the verification.

*Table 24: Influence of spacing on concrete edge resistance*

| $s/c_{1)}$ | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.20 | 1.40 | 1.60 | 1.80 | 2.00 | 2.20 | 2.40 | 2.60 | 2.80 | 2.60 | 2.80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| f | 1.17 | 1.20 | 1.23 | 1.27 | 1.30 | 1.33 | 1.40 | 1.47 | 1.53 | 1.60 | 1.67 | 1.73 | 1.80 | 1.87 | 1.93 | 1.87 | 1.93 |

[1)] Always choose the lowest value of the spacing s, when there are different spacing in the row closest to the edge.

## d. Influence of edge distance $c_1$

*Table 25: Influence of edge distance $c_1$ on concrete edge resistance*

| $c_1/d$ | 4 | 8 | 12 | 15 | 20 | 30 | 40 | 50 | 60 | 100 | 150 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $f_{c1,V}$ | 0.47 | 1.19 | 2.05 | 2.76 | 4.05 | 6.95 | 10.22 | 13.76 | 17.54 | 34.66 | 59.52 | 87.35 |

## e. Influence of edge distance $c_2$

*Table 26: Influence of edge distance $c_2$ on concrete edge resistance*

| $c_{2/c1}$ [1)] | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 |
|---|---|---|---|---|---|---|
| f | 0.75 | 0.80 | 0.85 | 0.90 | 0.95 | 1.00 |

[1)] Distance to the second edge: $c_1 \leq c_2$

## f. Influence of load direction

*Table 27: Influence of load direction on concrete edge resistance*

| $\alpha$[1)] | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|---|---|---|
| $f_{\alpha,V}$ | 1.00 | 1.01 | 1.05 | 1.11 | 1.20 | 1.34 | 1.51 | 1.72 | 1.92 | 2.00 |

[1)] For $\alpha \geq 90°$ the component of the shear load acting away from the edge may be neglected and the verification may be done with component acting parallel to the edge only.

## g. Influence of concrete member thickness

*Table 28: Influence of concrete member thickness on edge resistance*

| $h/c_1$ | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 | 1.3 | 1.4 | ≥ 1.50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F | 0.26 | 0.37 | 0.45 | 0.52 | 0.58 | 0.63 | 0.68 | 0.73 | 0.77 | 0.82 | 0.86 | 0.89 | 0.93 | 0.97 | 1.00 |
| | | | | | | | | | | | | | | | |

# BANTEK RE-500 PLUS V2

## Design bond strength

### Service temperature for working life of 50 years

| | Base material temperature | Maximum long-term base material temperature | Maximum short-term base material temperature |
|---|---|---|---|
| Temperature range I | - 40°C to +40°C | +24°C | +40°C |
| Temperature range II | - 40°C to +60°C | +35°C | +60°C |
| Temperature range III | - 40°C to +70°C | +43°C | +70°C |

### Working life of 50 years

1- Non-cracked concrete

| Thread size | | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø24 | Ø25 | Ø28 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design bond resistance in non-cracked concrete C20/25 in hammer drilled holes (HD), with hollow drill bit (HDB), and compressed air drilled holes (CD) | | | | | | | | | | | | | |
| Temperature range I | Dry, wet concrete and flooded bore holee | $\tau_{Rd,ucr}$ | [N/mm²] | 6.7 | 6.7 | 6.7 | 5.7 | 5.7 | 5.7 | 5.7 | 5.2 | 5.2 | 5.2 |
| Temperature range II | | | | 4.5 | 4.5 | 4.5 | 4.0 | 4.0 | 4.0 | 3.6 | 3.6 | 3.6 | 3.6 |
| Temperature range III | | | | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.6 | 2.6 | 2.6 | 2.4 | 2.4 |

2- Cracked concrete

| Thread size | | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø24 | Ø25 | Ø28 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design bond resistance in cracked concrete C20/25 in hammer drilled holes (HD), with hollow drill bit (HDB), and compressed air drilled holes (CD) | | | | | | | | | | | | | |
| Temperature range I | Dry, wet concrete and flooded bore holee | $\tau_{Rd,ucr}$ | [N/mm²] | 2.9 | 3.3 | 3.3 | 3.1 | 3.1 | 2.9 | 2.9 | 2.9 | 2.6 | 2.6 |
| Temperature range II | | | | 1.9 | 2.1 | 2.1 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.7 | 1.7 |
| Temperature range III | | | | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |

## Reduction factors

Working life of 60 years

1- Non-cracked concrete

| Rebar size | | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø24 | Ø25 | Ø28 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduction factors in non-cracked concrete C20/25 in hammer drilled holes (HD), with hollow drill bit (HDB), and compressed air drilled holes (CD) | | | | | | | | | | | | | |
| Temperature range I | Dry, wet concrete and flooded bore hole | $\tau_{Rd,ucr}$ | [N/mm²] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Temperature range II | | | | 0.68 | 0.68 | 0.68 | 0.71 | 0.71 | 0.71 | 0.63 | 0.68 | 0.68 | 0.68 |
| Temperature range III | | | | 0.43 | 0.43 | 0.43 | 0.50 | 0.50 | 0.46 | 0.46 | 0.50 | 0.45 | 0.45 |

2- Cracked concrete

| Rebar size | | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø24 | Ø25 | Ø28 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduction factors in cracked concrete C20/25 in hammer drilled holes (HD), with hollow drill bit (HDB), and compressed air drilled holes (CD) | | | | | | | | | | | | | |
| Temperature range I | Dry, wet concrete and flooded bore hole | $\tau_{Rd,cr}$ | [N/mm²] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Temperature range II | | | | 0.67 | 0.64 | 0.64 | 0.69 | 0.62 | 0.67 | 0.67 | 0.67 | 0.64 | 0.64 |
| Temperature range III | | | | 0.42 | 0.36 | 0.36 | 0.38 | 0.38 | 0.42 | 0.42 | 0.42 | 0.45 | 0.45 |

# BANTEK RE-500 PLUS V2

## Mechanical characteristics

| Steel grade | Rebar size | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø24 | Ø25 | Ø28 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stressed cross section | $A_s$ | [mm²] | 50 | 79 | 113 | 154 | 201 | 314 | 452 | 491 | 616 | 804 |
| | Section modulus | W | [mm³] | 50 | 98 | 170 | 269 | 402 | 785 | 1357 | 1534 | 2155 | 3217 |
| 460A | Yield strength | $f_y$ | [N/mm²] | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 |
| | Tensile strength | $f_u$ | [N/mm²] | 483 | 483 | 483 | 483 | 483 | 483 | 483 | 483 | 483 | 483 |
| | Design bending moment | $M^0_{Rd,s}$ | [Nm] | 19 | 38 | 66 | 104 | 155 | 303 | 524 | 593 | 833 | 1243 |
| 460B | Yield strength | fy | [N/mm²] | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 |
| | Tensile strength | fu | [N/mm²] | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 | 497 |
| | Design bending moment | $M^0_{Rd,s}$ | [Nm] | 20 | 39 | 68 | 107 | 160 | 312 | 540 | 610 | 857 | 1279 |
| B500B | Yield strength | $f_y$ | [N/mm²] | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| | Tensile strength | $f_u$ | [N/mm²] | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 |
| | Design bending moment | $M^0_{Rd,s}$ | [Nm] | 22 | 43 | 75 | 118 | 177 | 345 | 597 | 675 | 948 | 1415 |

## Material specifications

| Product form | | Bars and de-coiled rods | | |
|---|---|---|---|---|
| Class | | A | B | V |
| Characteristic yield strength $f_{yk}$ or $f_{0,2k}$ (MPa) | | 400 to 600 | | |
| Minimum value of $k = (f_t/f_y)_k$ | | ≥ 1,05 | ≥ 1,08 | ≥ 1,15<br>< 1,35 |
| Characteristic strain at maximum force, $\epsilon_{uk}$ (%) | | ≥ 2,5 | ≥ 5,0 | ≥ 7,5 |
| Bendability | | Bend/Rebind test | | |
| Maximum deviation from nominal mass (individual bar or wire) (%) | Nominal bar size (mm)<br>≤ 8<br>> 8 | +/- 6,0<br>+/- 4,5 | | |

BANTEK RE-500 PLUS

## Working and curing times

| Temperature of base material | Gelling – | Min. curing time – dry conditions[1)] |
|---|---|---|
| 5°C to 9°C | 80 min | 61 h |
| 10°C to 15°C | 60 min | 49 h |
| 15°C to 20°C | 40 min | 25 h |
| 20°C to 25°C | 30 min | 13 h |
| 25°C to 35°C | 12 min | 11 h |
| 35°C to 40°C | 8 min | 8 h |
| +41°C | 8 min | 5 h |

[1)] for wet base material the curing time must be doubled

## Installation parameters

| Rebar size | | | Ø 8[1)] | Ø 10[1)] | Ø 12[1)] | Ø 14 | Ø 16 | Ø 20 | Ø 24[1)] | Ø 25[1)] | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter of element | $d = d_{nom}$ | [mm] | 8 | 10 | 12 | 14 | 16 | 20 | 24 | 25 | 28 | 32 |
| Nominal drill hole diameter | $d_0$ | [mm] | 10 \| 12 | 12 \| 14 | 14 \| 16 | 18 | 20 | 25 | 30 \| 32 | 30 \| 32 | 35 | 40 |
| Effective anchorage depth | $h_{ef,min}$ | [mm] | 60 | 60 | 70 | 75 | 80 | 90 | 96 | 100 | 112 | 128 |
| | $h_{ef,max}$ | [mm] | 160 | 200 | 240 | 280 | 320 | 400 | 480 | 500 | 560 | 640 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | | | | |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 50 | 60 | 70 | 75 | 85 | 120 | 120 | 130 | 150 |
| Minimum edge distance | $c_{min}$ | [mm] | 35 | 40 | 45 | 50 | 50 | 60 | 70 | 70 | 75 | 85 |

[1)] both nominal drill hole diameter can be used

**Material Safety Data Sheet (MSDS)**
BCPC oat Low viscosity Insulation Epoxy Resin-4140 (Part-A)
Description: BCPC oat 4140 is a general purpose low viscosity modified liquid Epoxy Resin,
Applications BCPC oat is suitable for formulating priming coats, solvent-free self-leveling coatings, Italian Marble , Granites

- Protective Coatings
- Sealing of cracks

2 Composition/Data on components
CAS No. Description
25068-38-6 [Reaction product: biphenyl-A-(epichlorhydrin) epoxy resin (number average molecular weight ≤ 700)] · Identification number(s)
NLP Number: 500-033-5 ·
Index number: 603-074-00-8
3 Hazards identification

Information pertaining to particular dangers for man and environment:
R 36/38 Irritating to eyes and skin.
R 43 May cause sensitization by skin contact
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

# BANTEK RE-500 PLUS V2

Contains epoxy constituents. See information supplied by the manufacturer. · Classification system: · NFPA ratings (scale0 4)
H315 - Causes skin irritation.

H319 - Causes serious eye irritation.
H317 - May cause an allergic skin reaction
H411 - Toxic to aquatic life with long lasting effects.
Prevention: P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 Wash thoroughly after handling.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.

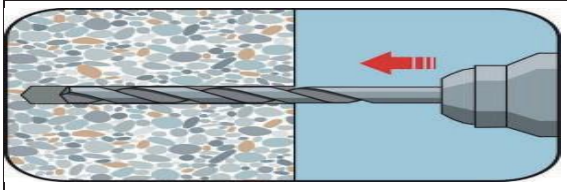
P280 Wear protective gloves/protective clothing/eye protection/face protection.
Response: P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes.
Remove contact
lenses, if present and easy to do. Continue rinsing
.

Tensile Strength
55.2 N/mm
Compression Strength
113 N/mm
Flexural Strength
95.45 N/mm
SHELF LIFE @ 25º C
24 Month
Properties

Liquid epoxy resin with several applications:
• Versatile, low viscosity, good workability with wide range of hardeners
• Excellent mechanical properties and chemical resistance
• Very good processing properties
Mix Ratio
Components
Parts by Weigh
Components
Parts by Weight
BCP Resin 4140
100
BCP pest hardener 4140 25
Storage
BCP pest Resin should be stored in a dry place, preferably in the sealed
original
container, at temperatures between 2°C to 40°C. It should not be exposed to
direct sun light. should not be exposed to
direct sun light.

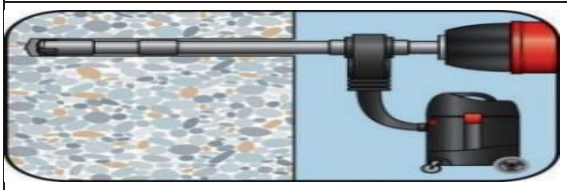
## Installation instructions

### A) Bore hole drilling



1a. Hammer (HD) or compressed air drilling (CD)

Drill a hole into the base material to the size and embedment depth required by the selected reinforcing bar. Proceed with Step B1.

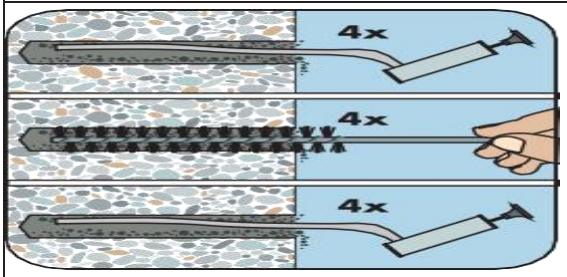


1b. Hollow drill bit system (HDB)

Drill a hole into the base material to the size and embedmeant depth required by the selected reinforcing bar. This drilling system removes the dust and cleans the bore hole during drilling. Proceed with Step C.

### B) Bore hole cleaning

MAC: Cleaning for dry and wet bore holes with diameter d0 ≤ 20 mm and bore hole depth h ≤ 10 $d_{nom}$ (non-cracked concrete only!)

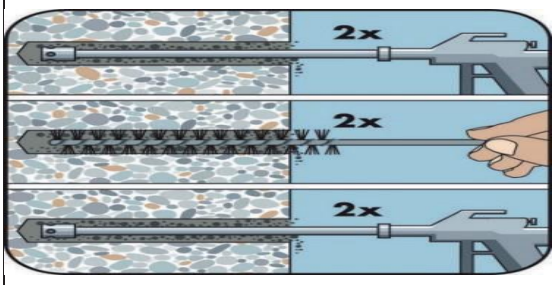



2a. Starting from the bottom or back of the bore hole, blow the hole clean with a hand pump a minimum of four times until return air stream is free of noticeable dust.

2b. Check brush diameter. Brush the hole with an appropriate sized wire brush > $d_{b,min}$ a minimum of four times in a twisting motion. If the bore hole ground is not reached with the brush, a brush extension shall be used.

2c. Finally blow the hole clean again with a hand pump a minimum of four times until return air stream is free of noticeable dust.

CAC: Cleaning for dry, wet and water-filled bore holes for all diameters in non-cracked and cracked concrete

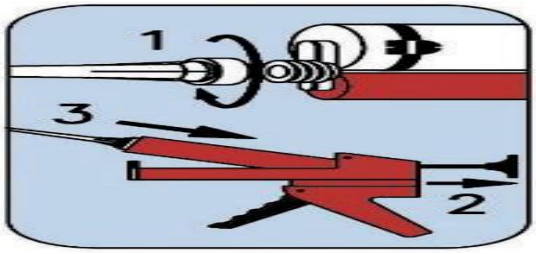
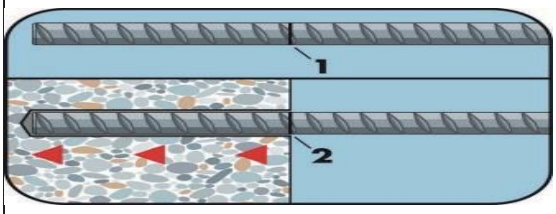
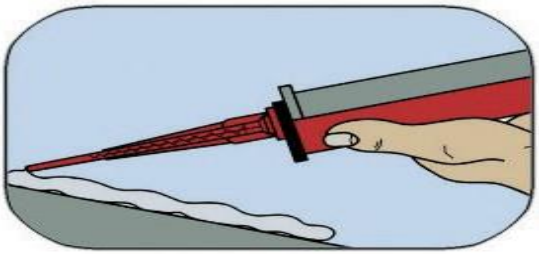
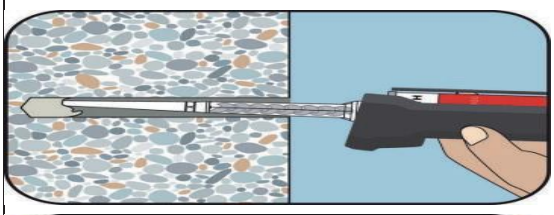
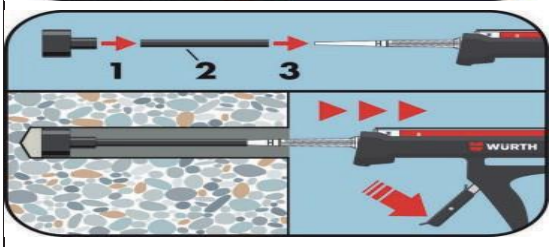



2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension shall be used.

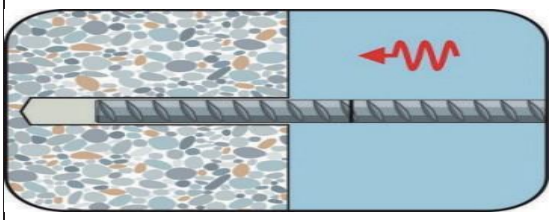
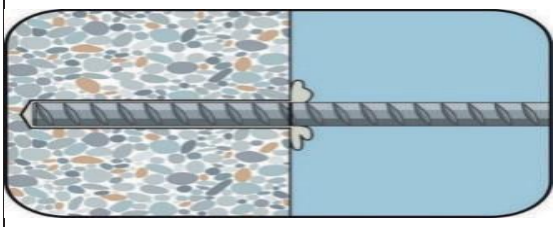
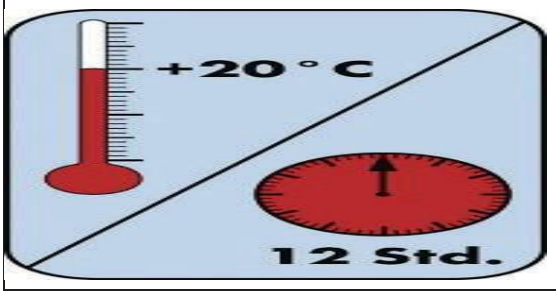
2b. Check brush diameter. Brush the hole with an appropriate sized wire brush > $d_{b,min}$ a minimum of 2 times. If the bore hole ground is not reached with the brush, a brush extension shall be used.

2c. Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached, an extension shall be used.

# BANTEK RE-500 PLUS V2

| C) Preparation of bar and cartridge | | |
|---|---|---|
|  | 3a. | Attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. Forevery working interruption longer than the recommended working time as well as for every new cartridge, a new static-mixer shall be used. |
|  | 3b. | Prior to inserting the reinforcing bar into the filled bore hole, the position of the embedment depth shall be marked (e.g. with tape) on the reinforcing bar. After that, insert the bar in the empty hole to verify hole and depth lv. The anchor should be free of dirt, grease, oil and other foreign material. |
|  | 3c. | Prior to dispensing into the bore hole, squeeze out separate-tally the mortar until it shows a consistent grey or red color (minimum of three full strokes) and discard non-uniformly mixed adhesive components. |
| **D) Filling the bore hole** | | |
|  <br>  | 4. | Starting from the bottom or back of the cleaned bore hole,fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. If the bottom or back of the anchor hole is not reached, an appropriate extension nozzle must be used. Observe the gel-/working times.<br><br>Piston plugs and mixer nozzle extensions shall be used forthe following applications:<br>• Horizontal assembly (horizontal direction) and ground erection (vertical downwards direction): Drill bit-Ø $d_0 \geq 18$ mm and embedment depth heft >250 mm<br>• Overhead assembly (vertical upwards direction):Drill bit-Ø $d_0 \geq 18$ mm |

## E) Setting the rebar

| | | |
|---|---|---|
|  | 5a. | Push the reinforcing bar into the bore hole while turning slightly to ensure positive distribution of the adhesive untilthe embedment depth is reached. The bar should be free of dirt, grease, oil or other foreign material. |
|  | 5b. | Be sure that the bar is inserted in the bore hole until the embedment mark is at the concrete surface and that excessmortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For horizontal and overhead installation, fix embedded part (e.g. with wedges). |
|  | 5c. | Observe gelling time $t_{gel}$. Attend that the gelling time can vary according to the base material temperature. Do not move or load the bar until full curing time $t_{cure}$ has elapsed. |

## Filling quantity

Anchor type: M8 - M30

| Rebar size | | | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 20 | Ø 24 | Ø 25 | Ø 28 | Ø 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $d_0$ | [mm] | 12 | 14 | 16 | 18 | 20 | 25 | 32 | 32 | 35 | 40 |
| Drill depth | $h_0$ / $h_1$ | [mm] | = $l_v$ | | | | | | | | | |
| Filling volume per 10mm embedment depth | | [ml] | 0.81 | 1.01 | 1.21 | 1.43 | 1.66 | 2.59 | 4.85 | 4.47 | 5.07 | 6.62 |

Assumed waste of 15 % included.

# BANTEK RE-500 PLUS V2

## Handing precautions

It is harmful if ingested or absorbed through the skin and causes sensitization. It can cause severe irritation in contact with eyes and skin. Wash thoroughly after handling. Adequate ventilation is essential. Containers should be tightly closed when not in use or during transportation. Do not inhale mist or vapors. It is recommended to use gloves, safety goggles and protective clothing for safe handling.

## Additional information:

The lists that were valid during the creation were used as basis. · Personal protective equipment: · General protective and hygienic measures: Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin. · Breathing equipment: Not required. ·

## Protection of hands:

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation · Material of gloves The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. · Penetration time of glove material The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed. · Eye protection:

## 9 Physical and chemical properties

General Information Form: Paste
. Color: Pink Red
. Odor: Characteristic
. Change in condition Boiling point/Boiling range: >200°C (>392°F)
· Flash point: >200°C (>392°F)
· Danger of explosion: Product does not present an explosion hazard
· Density at 25°C (77°F): 1.15 - 1.20 g/cm³
. Solubility in / Miscibility with Water: Insoluble
· pH-value: Neutral
Viscosity: Dynamic at 25°C (77°F): 10.000 - 12.000 mPas (Brookfield DV II) .

## 10 Stability and reactivity

Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications. · Materials to be avoided: Strong Oxidising agents, Strong Alkali, Strong Bases, Amines · Dangerous reactions Reacts with amines with exothermic reaction liberating heat and fumes · Dangerous products of decomposition: Carbon monoxide and carbon dioxide .

## 11 Toxicological information

Acute toxicity: · Primary irritant effect: · on the skin: Irritant to skin and mucous membranes. · on the eye: Irritating effect. · Sensitization: Sensitization possible through skin contact. .

## 12 Ecological information

Ecological effects: · Remark: Toxic for fish · General notes: Water hazard class 2 (Assessment by list): hazardous for water Do not allow product to reach ground water, water course or sewage system. Danger to drinking water if even small quantities leak into the ground. Also poisonous for fish and plankton in water bodies. Toxic for aquatic organisms.

## 13 Disposal considerations

Product: · Recommendation: Must not be disposed of together with household garbage. Do not allow product to reach sewage system. · Uncleaned packaging: · Recommendation: Disposal must be made according to official regulations. .

## 14 Transport information

· DOT regulations: · Hazard class:
· Land transport ADR/RID (cross-border):
ADR/RID class: 9 Miscellaneous dangerous substances and articles
Danger code (Kemmler): 90 ·
UN-Number: 3082
· Packaging group: III
· Label: 9

· Description of goods: 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (reaction product: bisphenol-A-(epichlorhydrin) epoxy resin (number average molecular weight ≤ 700)
· Maritime transport IMDG:
· IMDG Class: 9 ·
UN Number: 3082

· Label 9 ·
Packaging group: III
· EMS Number: F-A,S-F · Marine

pollutant: YES ·

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. [reaction product bisphenol-A (epichlorohydrin) epoxy resin (number average molecular weight ≤700)]

· Air transport ICAO-TI and IATA-DGR:

· ICAO/IATA Class: 9

· UN/ID Number: 3082

· Label 9

· Special marking: Symbol (fish and tree) ·

Packaging group: III ·

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. [reaction product bisphenol-A (epichlorohydrin) epoxy resin (number average molecular weight ≤700)]

· UN "Model Regulation": UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., 9, III

## . 15 Regulations

· Sara · Section 355 (extremely hazardous substances): Substance is not listed. · Section 313 (Specific toxic chemical listings): Substance is not listed. · TSCA (Toxic Substances Control Act): Substance is listed. · Proposition 65 · Chemicals known to cause cancer: Substance is not listed. · Chemicals known to cause reproductive toxicity for females: Substance is not listed. · Chemicals known to cause reproductive toxicity for males: Substance is not listed. · Chemicals known to cause developmental toxicity: Substance is not listed. · Carcinogenicity categories · EPA (Environmental Protection Agency) Substance is not listed. · IARC (International Agency for Research on Cancer) Substance is not listed. · NTP (National Toxicology Program) Substance is not listed. · TLV (Threshold Limit Value established by ACGIH) Substance is not listed. · NIOSHCa (National Institute for Occupational Safety and Health) Substance is not listed. · OSHA-Ca (Occupational Safety & Health Administration) Substance is not listed. · Product related hazard information's: The product has been classified and marked in accordance with directives on hazardous materials. · Risk phrases: 36/38 Irritating to eyes and skin. 43 May cause sensitisation by skin contact. 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic

environment. Safety phrases: 2 Keep out of the reach of children. 28 After contact with skin, wash immediately with plenty of … (to be specified by the manufacturer). 37/39 Wear suitable gloves and eye/face protection. 61 Avoid release to the environment. Refer to special instructions/safety data sheets. · Special labelling of certain preparations: Contains epoxy constituents. See information supplied by the manufacturer. .

## 16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

**Abbreviations and acronyms:**

ADR: Accord European sur le transport des merchandises dangerousness par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) RID: Regalement international concerning le transport des merchandises dangerousness par Chemins de for (Regulations Concerning the International Transport of Dangerous Goods by Rail) IMDG: International Maritime Code for Dangerous Goods DOT: US Department of Transportation IATA: International Air Transport Association IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA) ICAO: International Civil Aviation Organization ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO) GHS: Globally Harmonized System of Classification and Labelling of Chemicals ACGIH: American Conference of Governmental Industrial Hygienists EINECS: European Inventory of Existing Commercial Chemical Substances CAS: Chemical Abstracts Service (division of the American Chemical Society) NFPA: National Fire Protection Association (USA) HMIS: Hazardous Materials Identification System (USA) .

**P321 Specific treatment (see on this label).**
P332+P313 If skin irritation occurs: Get medical advice/attention.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P337+P313 If eye irritation persists: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse. P363 Wash contaminated clothing before reuse.
P391 Collect spillage.
Disposal: P501 Dispose of contents/container in accordance with local/regional/national/international regulations
4 First aid measures ·

# BANTEK RE-500 PLUS V2

After inhalation: Supply fresh air and to be sure call for a doctor. In case of unconsciousness place patient stably in side position for transportation. ·
After skin contact: Immediately wash with water and soap and rinse thoroughly.
· After eye contact: Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· After swallowing: If symptoms persist consult doctor.
5 Fire fighting measures · Suitable extinguishing agents: CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam
· For safety reasons unsuitable extinguishing agents: Water spray Extinguishing powder ·
Protective equipment: Wear self-contained respiratory protective device.
6 Accidental release measures
· Person-related safety precautions: Mount respiratory protective device. Remove persons from danger area. · Measures for environmental protection: Inform respective authorities in case of seepage into water course or sewage system. Do not allow to enter sewers/ surface or ground water. · Measures for cleaning/collecting: Large spills: In a clean area, dike and recover for reuse. Keep out of swears and waterways. Dispose of contaminated material. Small spills: Use absorbent pad or mix with absorbent material and dispose
7 Handling and storage · Handling:
· Information for safe handling: Store in cool, dry place in tightly closed receptacles. ·
Information about protection against explosions and fires: Protect from heat. · Storage: ·
Requirements to be met by storerooms and receptacles: Store only in the original receptacle. Store in a cool location. · Information about storage in one common storage facility: Do not store together with oxidizing and acidic materials. Store away from oxidizing agents. · Further information about storage conditions: Keep receptacle tightly sealed. 8 Exposure controls and personal protection
· Additional information about design of technical systems: No further data; see item 7. ·
Components with limit values that require monitoring at the workplace: Not required

**Material Safety Data Sheet (MSDS)**
DATE:
BCP Pest Low viscosity Insulation Epoxy Resin M-4140 BATCH NO: 120923
DATE:
BCP Pest Low viscosity Insulation Epoxy Resin M-4140 (Part-A)
Description: BCP pest 4140 is a general purpose low viscosity modified liquid Epoxy Resin,
Applications BCP pest is suitable for formulating priming coats, solvent-free self-leveling coatings, Italian Marble , Granites

• Protective Coatings
• Sealing of cracks

| Product Data Property | Unit | BCP pest 4140Resut |
|---|---|---|
| Appearance | | Clear liquid |
| Color (pink red) | | ≤ 2 5 |
| Epoxy Index | eq/kg | 5.20 – 5.50 |
| | | 5.15 |
| Epoxy equivalent | g/eq | 182 – 192 |
| | | 185 |
| Viscosity at 25°C | mpa s | 500 – 600 |
| | cp@ | 515 |
| Density at 20°C | g/cm3 | ~1.08 |
| Flash Point | | |

°C
~120
GEL TIME
30 To 35 minute
35 min
TACKY FREE AT 50 º C
90 To 95 Minits
90 Min
RATIO OF MIXING
4:1
Tensile Strength
55.2 N/mm
Compression Strength
113 N/mm
Flexural Strength
95.45 N/mm
SHELF LIFE @ 25º C
24 Month
Properties
Liquid epoxy resin with several applications:
• Versatile, low viscosity, good workability with wide range of hardeners
• Excellent mechanical properties and chemical resistance
• Very good processing properties
Mix Ratio
Components
Parts by Weigh
Components
Parts by Weight
BCP Resin 4140
100
BCP pest hardener 4140 25
Storage
BCP pest Resin should be stored in a dry place, preferably in the sealed original
container, at temperatures between 2°C to 40°C. It should not be exposed to direct sun light. should not be exposed to
direct sun light.

# BANTEK RE-500 PLUS V2

## Handing precautions

It is harmful if ingested or absorbed through the skin and causes sensitization. It can cause severe irritation in contact with eyes and skin. Wash thoroughly after handling. Adequate ventilation is essential. Containers should be tightly closed when not in use or during transportation. Do not inhale mist or vipers. It is recommended to use gloves, safety goggles and protective clothing for safe handling.

## Additional information:

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## BATCH NO: 120923

DATE:
BCP Pest Low viscosity Insulation Epoxy Resin M-4140 BATCH NO: 120923
DATE:
BCP Pest Low viscosity Insulation Epoxy Resin M-4140 (Part-A)
Description: BCP pest 4140 is a general purpose low viscosity modified liquid Epoxy Resin,
Applications BCP pest is suitable for formulating priming coats, solvent-free selfleveling
coatings, Italian Marble , Granites
• Protective Coatings
• Sealing of cracks
Product Data Property
Unit
BCP pest 4140

Resut
Appearance
Clear liquid
Colour (Gardner)
≤ 2 5
Epoxy Index
eq/kg
5.20 – 5.50
5.15
Epoxy equivalent
g/eq
182 – 192
185
Viscosity at 25°C
mpa s
500 – 600
cp@ 515

Density at 20°C
g/cm3
~1.08
Flash Poin
°C
~120
GEL TIME
30 To 35 Minite
35 min
TACKY FREE AT 50 º C
90 To 95 Minits
90 Min
RATIO OF MIXING
4:1
Tensile Strength
55.2 N/mm
Comprssion Strength
113 N/mm
Flexural Strength
95.45 N/mm
SHELF LIFE @ 25º C
24 Month
Properties
Liquid epoxy resin with several applications:
• Versatile, low viscosity, good workability with wide range of hardeners
• Excellent mechanical properties and chemical resistance
• Very good processing properties
Mix Ratio
Components
Parts by Weigh
Components
Parts by Weight
BCP Resin 4140
100
BCP pest Hardeer 4140 25
Storage
BCP pest Resin should be stored in a dry place, preferably in the sealed original
container, at temperatures between 2°C to 40°C. It should not be exposed to direct sun light. should not be exposed to
direct sun light.
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