# KingGrout ® AE10

**Epoxy acrylate resin cartridge system for anchoring.**

## DESCRIPTION

KingGrout AE10 is a high strength, fast cure, styrene free, epoxy acrylate resin anchoring grout supplied in a pre- packed cartridge system. It is suitable for use with different types of substrates such as concrete, hard natural stone, solid rock and solid masonry.

## APPLICATIONS

KingGrout AE10 is ideally designed for use in the following applications:

- Permanent installation of reinforcement starter bars and dowel bars.
- Permanent installation of hand rails, safety fence, wall ties, rail way tracks and ground anchors.
- Bonding concrete reinforcing bars and securing profiled sections and bars.

## ADVANTAGES

- Use standard sealant application gun.
- Exceptional rapid strength development.
- Styrene free.
- Resistant to dynamic loading.
- Exceptional bond to concrete and steel surfaces.
- High ultimate and early strengths.
- Applicable at low temperature from -5ºC.
- Low waste, reusable and easily recycled cartridge.

## METHOD OF USE

**Substrate preparation**

Substrate should be sound, clean and free from grease or any contaminants. Bars should be free from any loose rust deposits. Holes can be drilled using a hammer drill to produce a rough surface or by coring to produce a smooth surface. Deformed or ribbed bars will give a higher performance than smooth or other bar types. After drilling, holes should be brushed and blown out twice, to remove all drilling debris.

| Resin Cartridge Temperature | Working time | Base material temperature | Loading time |
|---|---|---|---|
| Min 5ºC | 12 min | -5 to 0ºC | 24 hr |
| | | 0 to 5ºC | 180 min |
| 5 to 10ºC | 8 min | 5 to 10ºC | 100 min |
| 10 to 20ºC | 4 min | 10 to 20ºC | 70 min |
| 20 to 25ºC | 3 min | 20 to 25ºC | 40 min |
| 25 to 30ºC | 2 min | 25 to 30ºC | 40 min |
| +30ºC | 1 min | +30ºC | 40 min |

*Notes: Working time is set at the highest base material temperature in the range.*
*Loading time is set at the lowest base material temperature in the range.*
*May be used at low temperatures (minimum application of -5°C) if the cartridge/resin temperature is kept above 5°C.*

**Application**

Unscrew the protective cap, cut the film to remove the metal clip and attach the static mixing nozzle. Insert the cartridge into the cartridge gun and dispense sufficient material until an even colour is achieved. Usually 10 ml of extruded material should be adequate.

Insert the nozzle into the base of the hole, apply pressure to the gun and slowly withdraw the nozzle as the hole fills. Normally it is enough to fill the hole approximately half to two thirds full. Insert the stud/steel bar into the hole with a twisting action, ensuring that is fully embedded. Allow the resin to cure fully before loading.

When filling holes overhead or in porous block work, the use of plastic sleeves is recommended. Partly used cartridge are reusable, Remove the static mixer and surplus base and catalyst components from the cartridge nozzle, insert the plug and screw on the protective cap.

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| TABLE I | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_Y$ (N/mm²) | $F_C$ (N/mm²) | $\Phi_B$ (mm) | $\Phi_H$ (mm) | Calculated Pullout Force F(KN) in tension with 40% safety margin at a certain hole depth ($H_D$) | | | | | | | Ultimate Pullout Force in tension | |
| For steel bar | For concrete | Bar diameter | Hole diameter | 100 | 120 | 160 | 200 | 250 | 300 | 350 | Hole Depth (mm) | F (KN) |
| 420 | 2.5 | 8 | 12 | 16 | 19 | 25 | | | | | 134 | 21 |
| 420 | 2.5 | 10 | 14 | 18 | 22 | 29 | 37 | | | | 180 | 33 |
| 420 | 2.5 | 12 | 16 | 21 | 25 | 33 | 42 | 52 | | | 227 | 47 |
| 420 | 2.5 | 14 | 18 | 24 | 28 | 38 | 47 | 59 | | | 275 | 65 |
| 420 | 2.5 | 16 | 20 | 26 | 31 | 42 | 52 | 65 | 78 | | 323 | 84 |
| 420 | 2.5 | 18 | 22 | 29 | 35 | 46 | 58 | 72 | 86 | 101 | 371 | 107 |
| 420 | 2.5 | 20 | 24 | 31 | 38 | 50 | 63 | 78 | 94 | 110 | 420 | 132 |
| 420 | 2.5 | 22 | 26 | 34 | 41 | 54 | 68 | 85 | 102 | 119 | 469 | 160 |
| 420 | 2.5 | 25 | 30 | 39 | 47 | 63 | 78 | 98 | 118 | 137 | 525 | 206 |
| 420 | 2.5 | 32 | 36 | 47 | 56 | 75 | 94 | 118 | 141 | 165 | 717 | 338 |

| TABLE II | | | |
|---|---|---|---|
| Dar Diameter $\Phi_B$ mm | Bar Area mm | $F_Y$ N/mm² | Ultimate Pullout Force (F) KN |
| 8 | 50.24 | 420 | 21 |
| 10 | 78.5 | 420 | 33 |
| 12 | 113.04 | 420 | 47 |
| 14 | 153.86 | 420 | 65 |
| 16 | 200.96 | 420 | 84 |
| 18 | 254.34 | 420 | 107 |
| 20 | 314 | 420 | 132 |
| 22 | 379.94 | 420 | 160 |
| 25 | 490.625 | 420 | 206 |
| 32 | 803.84 | 420 | 338 |

| TABLE III | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Volume of KINGGROUT REQUIRED (ML) Hole Depth (mm) | | | | | | | | | |
| Bar Dia mm | Hole Dia mm | 100 | 140 | 160 | 200 | 250 | 300 | 350 | 400 |
| 8 | 12 | 6 | 9 | 10 | 13 | 16 | 19 | 22 | 25 |
| 10 | 14 | 8 | 11 | 12 | 15 | 19 | 23 | 26 | 30 |
| 12 | 16 | 9 | 12 | 14 | 18 | 22 | 26 | 31 | 35 |
| 16 | 20 | 11 | 16 | 18 | 23 | 28 | 34 | 40 | 45 |
| 20 | 25 | 18 | 25 | 28 | 35 | 44 | 53 | 62 | 71 |
| 25 | 32 | 31 | 44 | 50 | 63 | 78 | 94 | 110 | 125 |
| 32 | 40 | 45 | 63 | 72 | 90 | 113 | 136 | 158 | 181 |
| 40 | 50 | 71 | 99 | 113 | 141 | 177 | 212 | 247 | 283 |

*Table III shows an estimate of materials required for each bar for a given hole depth and diameter.*

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## DESIGN CONSIDERATION

**A)Minimum Hole Depth $H_D$**

As per BS8110, minimum Hole Depth $H_D$ (or length of embedment) is shown below, allowing for 40% factor of safety.

$$H_D = \frac{0.6\ F_Y}{\pi\ \Phi_H} \cdot \frac{\pi\ \Phi_B^2\ F_C}{4}$$

$$H_D = \frac{0.6}{4} \cdot \frac{F_Y}{F_C} \cdot \frac{\Phi_B^2}{\Phi_H}$$

Noting that:
$F_Y$: Yield strength of the steel (N/mm²)
$F_C$: Concrete bond stress (N/mm²)
$\Phi_B$: Bar Diameter (mm)
$\Phi_H$: Hole Diameter (mm)
$H_D$: Minimum Hole Depth (length of Embedment) (mm)
π: 3.14

**B)Calculation of the Pullout Force (F) in tension using the minimum hole depth ($H_D$) shown in A is as follows:**

$$H_D = \frac{0.6}{4} \cdot \frac{F_Y}{F_C} \cdot \frac{\Phi_B^2}{\Phi_H}$$

$$F_C\ \pi\ \Phi_H\ H_D = 0.6\ FY \cdot \frac{\pi\ \Phi_B^2}{4}$$

The Pullout Force (F) is equal to FY * Steel Bar Area. The Steel Bar Area is equal to:

$$\frac{\pi\ \Phi_B^2}{4}$$

then:

$$F_C\ \pi\ \Phi_H\ H_D = 0.6\ F$$

$$F\ (N) = \frac{\pi}{0.6} \cdot F_C \cdot \Phi_H \cdot H_D$$

$$F\ (KN) = (5.23 \cdot F_C \cdot \Phi_H \cdot H_D^1) \div 1000$$

Table I is a summary of the forces (F) that each steel reinforcement bar can take for a certain hole depth ($H_D$).

Calculations are based on steel grade 60 and 25 N/mm² concrete compressive strength with FC at 2.5 N/mm².

**C)Table II shown below shows the Ultimate Pullout Force that each steel reinforcement bar grade 60 can take**

**D)To calculate volume of KingGrout AE10 required in mL: Volume (mL) = $\frac{\pi}{4000} \cdot (\Phi_H^2 - \Phi_B^2) \cdot H_D$**

## CLEANING

All tools should be cleaned immediately after finishing. Hardened materials can be cleaned mechanically.

## ESTIMATING

The required quantity of grout needed is dependent on hole diameter, bar diameter and hole depth. This can be estimated by using the following formula:

$$\text{Volume (ML)} = \frac{\pi}{4000} \cdot (\Phi H^2 - \Phi B^2) \cdot HD$$

Where:
ΦH is hole diameter in mm.
ΦB is bar diameter in mm. H is hole depth in mm.

## PACKAGING

KingGrout AE10 is available in 300 ml.

## STORAGE

Shelf life is 1 year when stored under cover, out of direct sunlight and protected from extremes of temperature.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice consult KingKrete's Technical Services Department.

## HEALTH AND SAFETY

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs. Treat splashes to eyes and skin immediately. If accidentally ingested, seek medical attention. Reseal containers after use. Use in well ventilated areas and avoid inhalation.

## NOTE

Field service, where provided, does not constitute supervisory responsibility. For additional information

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contact your local KingKrete representative. KingKrete Inc. reserves the right to have the true cause of any difficulty determined by accepted test methods.

facilities are manufactured under a management system independently certified to conform to the requirements of the quality standard ISO 9001.

* Properties listed are based on laboratory-controlled tests.

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## QUALITY AND CARE

All products originating from KingKrete's manufacturing

**K KK-NA-07.4-GR-AE10-R3-2601**

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