KingGrout ® PE10

High strength polyester grout for anchoring and fixing.

DESCRIPTION

KingGrout PE10 is a two components, high strength, fast cure, polyester resin anchoring grout.

APPLICATIONS

KingGrout PE10 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, railway tracks and ground anchors.

ADVANTAGES

- Exceptional rapid strength development.
- Resistant to dynamic loading.
- Damp tolerant. The product will cure under damp conditions and is resistant to immersion underwater.
- Exceptional high compressive, flexural and tensile strengths.
- Extremely dense.
- Exceptional bond to concrete and steel surfaces.
- Good chemical resistance.
- High ultimate and early strengths. Available into two grade, KingGrout PE10 H (Horizontal) and KingGrout PE10 V (Vertical).

METHOD OF USE

Substrate preparation

Substrate should be sound, clean and free from grease or any contamination. Bars should be free from any loose rust deposits. Holes are best made using rotary percussive drill to provide rough sides followed by air or water flushing. If hole is cast, it should be of inverse dovetail configuration or mechanically roughened to provide a key. Deformed or ribbed bars will give a higher performance than smooth or other bar types.

Mixing

To ensure proper mixing, a mechanically powered mixer or drill fitted with suitable paddle should be used. The entire content of the resin should be transferred to a plastic container.

TECHNICAL PROPERTIES

Compressive strength: BS6319, Part 2 : 1983	≥ 70 MPa @ 1 hr ≥ 100 MPa @ 24 hr ≥ 115 MPa @ 7 days
Flexural strength: BS6319, Part 3 : 1990	≥ 25 MPa @ 7 days
Tensile strength: BS6319, Part 7 : 1985	≥ 14 MPa @ 7 days
Working life:	90 min @ 10°C 35 min @ 20°C 14 min @ 30°C
Bond strength:	When applied properly, failure in pull will be in the concrete or steel, and not at the bond interface.

Mixing shall continue for 3 minutes or until a uniform consistency is obtained.

PLACING AND FINISHING

Vertical Application

KingGrout PE10 V should be used for vertical applications. The mixed material should be poured into the prepared holes. The bar/bolt should then be pressed and twisted into the grout.

Horizontal Application

KingGrout PE10 H should be used for horizontal applications. Grouting can be carried out by filling the materials into plastic Cartridges and then injected using a skeleton gun. Once the grout is injected, the bar/bolt should be pressed and twisted into the grout.

Care should be taken to ensure that the bottom and the side are thoroughly scraped and transferred. The filler shall be gradually added to the plastic container containing the resin while mixing.

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KingGrout ® PE10

TABLE I												
FY (N/mm^2)	**FC (N/mm^2)**	**Φ_B (mm)**	**Φ_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

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

TABLE II			
Dar Diameter ΦB mm	**Bar Area mm**	**FY N/ mm^2**	**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

D)To calculate volume of Keyfix P required in ML:
Volume (ML) = $\frac{\pi}{4000} . (\Phi_H^2 - \Phi_B^2) . H_D$

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TABLE III									
Volume of KEYFIX 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.

DESIGN CONSIDERATION

A)Minimum Hole Depth HD

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

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

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

Noting that:

F_Y: Yield strength of the steel (N/mm²)
F_C: Concrete bond stress (N/ mm²)
Φ_B: Bar Diameter (mm)
Φ_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:

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

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

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

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

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 F_C at 2.5 N/ mm².

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:

$$\text{Volume of grout (ml)} = \frac{3.14}{4} * (D_h^2 - D_b^2) * H$$

Where:
D_h is hole diameter in mm.
D_b is bar diameter in mm.
H is hole depth in mm

CLEANING

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

PACKAGING

KingGrout PE10 is available in 1.2 litre packs.

STORAGE

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

QUALITY AND CARE

All products originating from KingKrete's manufacturing 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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