

Keygrout

High strength polyester grout for anchoring and fixing



Description

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

Applications

Keygrout 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, Keygrout H (Horizontal) and Keygrout 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

Colour:	Green liquid for Keygrout V Green paste for Keygrout H
Mixed density:	1.8 ± 0.1
Compressive strength: BS 6319, Part 2:1983	≥ 50 MPa @ 1 hr ≥ 80 MPa @ 24 hr ≥ 90 MPa @ 7 days
Flexural strength: BS 6319, Part 3:1990	≥ 18 MPa @ 7 days
Tensile strength: BS 6319, Part 7:1985	≥ 10 MPa @ 7 days
Working life:	50 min @ 10°C 35 min @ 20°C 20 min @ 30°C
Bond strength:	When applied properly, failure in pull will be in the concrete or steel, and not at the bond interface

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

Placing and Finishing

Vertical Application:

Keygrout 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:

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

Cleaning

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

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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

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

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

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

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 F_Y * Steel Bar Area. The Steel Bar Area is equal to:

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

then:

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

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

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

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.

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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 Force in Tension		
				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 Φ _B 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 Keygrout required in ML:

$$\text{Volume (ML)} = \frac{\pi}{4000} \cdot (\Phi_H^2 - \Phi_B^2) \cdot H_D$$

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

Table III		Volume of KEYGROUT 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

Packaging

Keygrout is available in 0.5, 1 and 2.5 kg bags.

Yield

1 kg mixed material will give about 0.56 litre.

Storage

Keygrout has a shelf life of 6 months from date of manufacture if stored at temperature of 30°C.

If these conditions are exceeded, DCP Technical Department should be contacted for advise.

Cautions

Health and Safety

Keygrout is irritant to eyes, skin and respiratory system. Wear suitable gloves and eye protection.

For further information refer to the Material Safety Data Sheet.

Fire

Keygrout and DCP solvent are flammable, and should be kept in a cool place.

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Note:

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