

Polyester resin grouts

Uses

Lokfix are used for high strength corrosion resistant anchoring of bolts and bars from 10 - 51mm diameter into concrete, rock, masonry or brickwork where high speed of installation and early application of load is required.

Permanent installation of reinforcement starter bars, foundation bolts, base plates, balustrading, barriers and safety fences, railway tracks, tie-back anchors, reinforcement dowelling abutments, ground anchors for towers, cranes, dock sills.

Advantages

- Rapid strength gain
- Vibration resistant
- Corrosion resistant
- Non expansive
- Can be placed under water

Standards and specifications

Materials tested in accordance with

BS 4551

BS 5080

BS 2782

Description

The three versions of Lokfix polyester resin grout are all pre-measured, two part, filled polyester resin grouts. After hardening the grout produces anchorages of consistent reproducible values.

The versions are :

Lokfix L (Large aggregate)

Lokfix S (Small aggregate)

Lokfix P (Pumpable grade)

Lokfix L is used where hole diameter exceeds bar diameter by 25 to 50mm.

Lokfix S is used where the difference between the hole diameter and bar diameter is < 25mm.

Lokfix P is used in overhead or horizontal holes where bar / hole relationship conforms to Lokfix polyester resin grout S. The thixotropic nature of Lokfix polyester resin grout P reduces flow of grout out of the hole.

Properties

Specific gravity

Lokfix 'S': 1.9 g/cc

Lokfix 'P': 2.9 g/cc

Technical support

Fosroc offers a comprehensive range of high performance, high quality concrete repair and construction products. In addition, Fosroc offers technical support service to specifiers, end-users and contractors, as well as on-site technical assistance in locations all over the country.

Design criteria

The version of Lokfix grout to be used will depend upon ambient temperature and anchor conditions.

The high strength of the cured resin permits strong anchors to be created. The ultimate bond strength developed depends upon:

Strength of host material

Length of resin bond to bar

Hole preparation and formation

Type and dimension of bar

The following formula may be used to determine the minimum depth of installation for Type 1 rebar bolts, to ensure the shear stress within the concrete is kept within the limits set out in BS 8110.

$$\text{Minimum hole Depth (mm)} = \frac{0.6Y_1 d_1^2}{S \pi d_2} = \frac{\pi d_1^2}{4} = \frac{0.15 Y_1 d_1^2}{S d_2}$$

where Y is characteristic yield strength of steel (545 N/mm²)

S is permitted shear stress in concrete (N/mm²)

d₁ is bar diameter (mm)

d₂ is hole diameter (mm)

This formula is used typically as shown in Table 1.

Table 1

Minimum hole depth							
Characteristic concrete strength (N/mm ²):		20	25	30	40		
Permitted concrete shear stress using Type One Bar (N/mm ²):		1.8	2.0	2.2	2.5		
Bar diameter (mm)	Yield (tonnes)	Hole diameter	Minimum hole depth (mm)				
10	4.4	18	255	228	210	182	
12	6.3	20	330	295	270	236	
16	11.2	24	485	440	400	350	
20	17.5	28	650	590	531	468	
25	27.3	33	860	775	704	620	
32	44.7	40	1165	1050	951	838	
40	69.9	48	1515	1365	1240	1090	

Properties

Gel time Temp(°C)	Gel time (min)	Minimum time required before loading (hours)
20	80	7
30	40	3
40	15	1

Compressive strength : After the minimum time required before loading the grout typically attains a compressive strength in excess of 20N/mm² and an ultimate compressive strength of 70N/mm² in 7 days (50mm x 50mm x 50mm) when tested as per BS 6319 Part 2 : 1983.

Chemical resistance : The cured resin is resistant to fresh and salt water, petrol, oils, grease and most acids, alkalis and solvents.

Application instructions

Selection of grout version

The version of Lokfix chosen will depend on anchor conditions (see description)

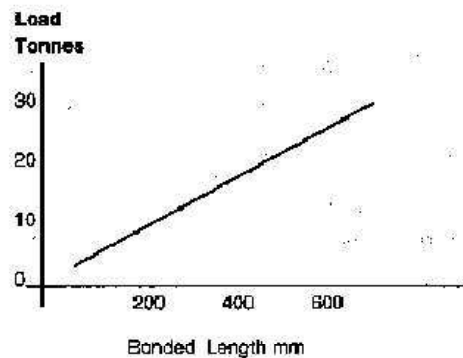
Parameters of anchor design

The high strength of the cured resin permits strong anchors to be created. Ultimate strength is determined by :

- Strength of host material
- Length of resin bond to bar
- Hole preparation and formation
- Type and dimension of bar



Fig.1 Typical loads attained



Concrete : 20N/mm² unreinforced

Bar : 25mm dia Deformed rebar to IS:1786

32mm dia hole: Air-flushed rotary percussive drilled

Note : The graph illustrates typical failure loads.

Minimum safety factors of 1.5 in non critical and of 2 in critical cases should be considered for design purposes. Wherever relevant, the local code of practice or standard must also be considered in relation to anchorage length.

Hole preparation and formation

Optimum performance of Lokfix requires rough sided, dust free holes. Uses of rotary percussive drills with air or water flushing is recommended.

Diamond drilled holes should be under-reamed unless necessary safety factors are incorporated.

Cast holes should preferably be inverse dovetail configuration. If parallel sided holes are cast they should be rough to provide adequate keying.

Bar preparation

All bars should preferably be degreased and all flaky rust removed.

Mixing

A complete pack of resin and catalysed filler should be mixed in one operation. Mixing may be carried out mechanically. When a smooth, even consistency is achieved the grout is ready for use and should be placed well within the gel time of the grout (See properties).

Packs have been designed to produce practical and economic volumes of grout.

Do not attempt to mix partial pack components.

Installation

Lokfix polyester resin grout S & L

Using the calculated volume of grout based on Table 1, the grout should be poured steadily into the prepared holes. The anchor bar is then pressed into the hole to the required depth. Slight agitation of the bar will assist in achieving a complete bond. The bar should then be left undisturbed in the required position until the resin is set.

Lokfix polyester resin grout P

The grout should be injected to the rear of the hole to avoid air entrapment. The thixotropic nature of Lokfix P will prevent significant flow of resin out of the hole.

Cleaning

Any mixing drums, pumps, etc. should be cleaned within the pot life of of the grout. Nitoflor Sol is available for this purpose.

Table 1

Quantity estimating guide

Table indicates volume of Lokfix polyester resin grout in cm³ /100mm bond

Hole diameter mm	Bolt diameter mm						
	10	12	16	20	25	32	40
18	25						
20	32	25					
25	47	50	40	25			
32		80	70	60	40		
38			100	100	75	45	
45				150	130	100	45
50					180	150	90
62						280	225

These figures allow for a 25% wastage factor.

*Consumption mentioned in above table are based on theoretical calculations and may vary due to wastage & variation in dimensions

If the anchor is in very old concrete, masonry or brickwork the wastage factor should be increased.

No of bolts/200 mm deep hole which can be fixed using a 2.5 litre pack of Lokfix

Hole diameter mm	Bolt size mm						
	10	12	16	20	25	32	40
18	50						
20	40	50					
25	47	25	31	50			
32		15	17	21	31		
38			12	12	16	27	
45				8	9	12	27
50				6	8	9	13
62				4	4	5	5

Estimating

Packaging

Lokfix S/P	:	0.5 and 2.5 L Packs
Lokfix L	:	18 L
Nitoflor Sol	:	5 litres and 20 litres.

Storage

The product should be stored away from high temperature.6 months shelf life when stored below 25°C in original unopened containers.

Precautions

Fire resistance and creep

At operating temperatures above 40°C, the creep of Lokfix polyester resin grout resin under load may become significant. Resin anchors should not be used where structural load bearing performance has to be maintained in anchors subjected to fire conditions.

Health and safety instructions

Confined areas must be well ventilated and no naked flames allowed. Contact with the skin should be avoided as certain sensitive skins may be affected by contact with the polyester resin. In such cases if contact with the resin occurs, the skin should be washed immediately with soap and water - not solvent. Gloves and barrier creams should be used when handling these products. Eye contamination must be immediately washed with plenty of water and medical treatment sought.

Fire

Lokfix polyester resin grout resin is flammable. Confined areas must be well ventilated and no naked flames allowed. Do not smoke during use.

Flash point

Lokfix S,L, P	29°C
Nitoflor Sol	33°C

Additional information

The Fosroc range of associated products includes high strength cementitious grouts, epoxy grouts. Also available a range of products for use in construction; viz., admixtures, curing compounds, release agents, flooring systems and repair mortars.

Separate datasheets are available on these products.



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Important note :

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