

## Polyester resin grouts

### Uses

Lokfix are used for high strength corrosion resistant anchoring of bolts and bars from 12 - 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

BS5080

BS2782

### 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  $\leq 25$ mm.

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.

$$\text{Minimum hole depth (mm)} = \frac{0.6Y}{SPd_2} \cdot \frac{Pd_1^2}{4} = \frac{0.15Yd_1^2}{Sd_2}$$

where Y is characteristic yield strength of steel (460 N/mm<sup>2</sup>)

S is permitted shear stress in concrete (N/mm<sup>2</sup>)

d<sub>1</sub> is bar diameter (mm)

d<sub>2</sub> is hole diameter (mm)

This formula is used typically as shown in Table 1.

Table 1

## Minimum hole depth

Characteristic concrete strength (N/mm <sup>2</sup> ):						
Permitted concrete shear stress using Type One Bar (N/mm <sup>2</sup> ):						
Bar diameter (mm)						
Yield (tonnes)						
Hole diameter (mm)						
Minimum hole depth (mm)						
12	5.2	20	280	250	225	200
16	9.3	20	490	445	400	355
20	14.5	25	615	555	500	440
25	22.6	32	750	675	615	540
32	37.0	38	1035	930	845	745
40	57.8	45	1365	1225	1115	980

## 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/mm<sup>2</sup> and an ultimate compressive strength of 70N/mm<sup>2</sup> 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

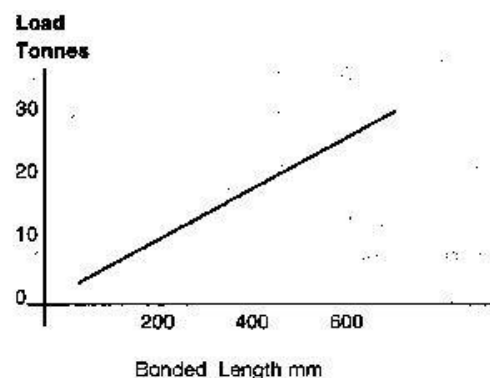
The version of Lokfix chosen will depend on anchor conditions ( see description)

### 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/mm<sup>2</sup> 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 the grout. Nitoflor Sol is available for this purpose.

**Table 1**

Quantity estimating guide

Table indicates volume of Lokfix polyester resin grout in cm<sup>3</sup> /100mm bond

Hole diameter mm	Bolt diameter mm					
	12	16	20	25	32	40
20	25					
25	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.

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					
	12	16	20	25	32	40
20	50					
25	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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