



CONSTRUCTION CHEMISTRY

Expangrout* Fix

Mix and place polyester resin anchoring grouts

Uses

High strength corrosion resistant heavy duty anchoring. These anchors include bolts, tendons or dowels in drilled or formed holes located in concrete masonry, brickwork, asphalt concrete & natural rock.

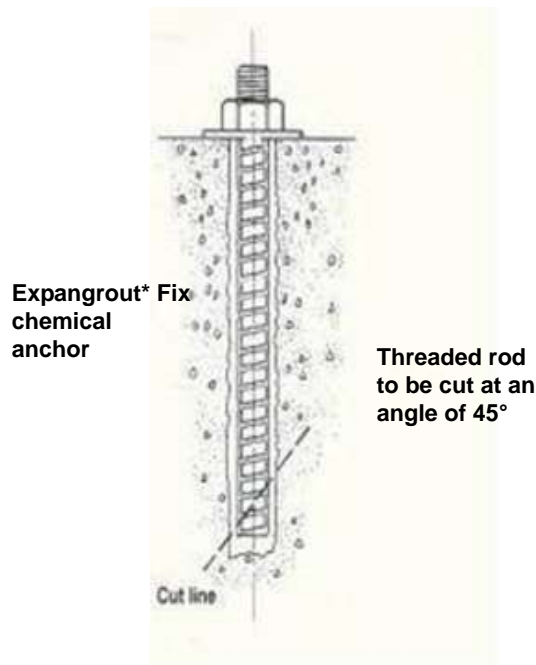
Permanent installation of reinforcement starter bars, foundation bolts, ballustrading, barriers and safety fences, railway tracks, ground anchors for towers, cranes, dock sills etc.

Advantages

- Ultra rapid strength gain
- Vibration resistant
- Corrosion resistant
- Tolerant of wet and damp conditions
- Can be placed underwater and in damp conditions
- Non expansive
- Pre-weighed components ensure consistent performance of the grout

Typical permanent fixing

Figure 1: Threaded bar anchored with Expangrout* Fix



Description

The Expangrout* Fix range consists of pre-measured, two pack, filled polyester resin grouts. The two components are polyester resin and a catalysed filler. The standard version, having longer gel times suited to hot weather working conditions, comprises of Expangrout* Fix S80 for vertical downward holes and Expangrout* Fix P80 for horizontal and overhead holes.

Typical semi-permanent fixing

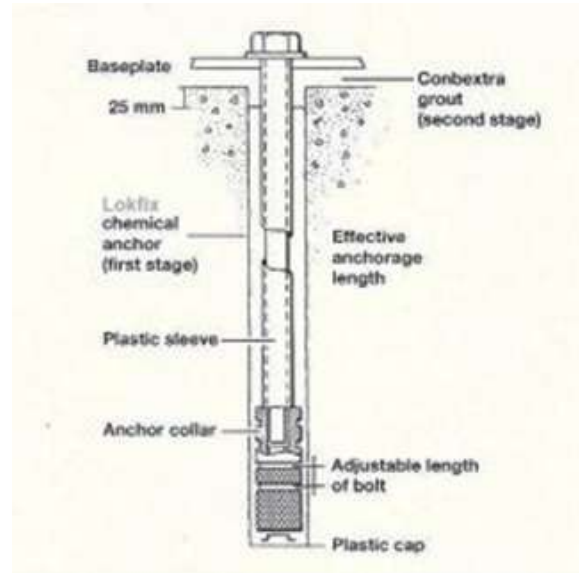


Figure 2: Hexagon headed bolt with removable nut and tie bar anchored with Expangrout* Fix

Technical support

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

**Design criteria**

The version of Expangrout* Fix 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.

$$\text{Minimum hole depth (mm)} = \frac{0.6Y \cdot Pd_2}{SPd_2 \cdot 4} = \frac{0.15Yd_2}{Sd_2}$$

where Y is characteristic yield strength of steel (460 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/mm²):						
		20	25	30	>40	
Permitted concrete shear stress using Type One Bar (N/mm²):						
		1.8	2.0	2.2	2.5	
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**Typical results**

Gel time	:@ 20°C	35 Minutes
	:@ 30°C	20 Minutes

Compressive strength

BS 6319 part 2 1983	@23°C	@35°C
1 hour	:60 N/mm ²	70 N/mm ²
3 hours	:65 N/mm ²	80 N/mm ²
1 day	:75 N/mm ²	100 N/mm ²
3 days	:85 N/mm ²	105 N/mm ²
7 days	:100 N/mm ²	110 N/mm ²

Tensile strength

BS 6319 part 7: 1985	
7 days	:14 N/mm ²

Flexural strength

BS 6319 part 3 1990	
7 days	:22 N/mm ²

Specification clauses

Where shown on the contract documents, the mix and place grout shall be Expangrout* Fix manufactured by Expanchem Fospak. It shall be used in accordance with the manufacturer's current application instructions.

The grout where shown on the drawings shall be a two component polyester resin system. When fully cured it shall exhibit a compressive strength in excess of 90 N/mm², a flexural strength in excess of 20 N/mm² and a tensile strength in excess of 12 N/mm² at 7 days.

The storage, handling and placement of the grout must be in strict accordance with the manufacturer's instructions.

Application instructions**Hole preparation and formation**

Three methods of hole formation are possible.

1. Optimum performance of Expangrout* Fix grouts requires rough sided, dust free holes. These can be made by using rotary percussive drills followed by oil-free air or water flushing.
2. Diamond drilled holes should be underreamed.
3. Cast holes should be of inverse dovetail configuration. If parallel sided holes are cast, they should be rough enough to provide an adequate mechanical key.



CONSTRUCTION CHEMISTRY

Bar preparation

1. All bars should be deformed. This will ensure good bond between the bar and the grout.
2. Bars should be degreased and any mill scale or flaky rust removed.

Mixing

Only a complete pack of resin and catalysed filler should be mixed in one operation. Mixing may be carried out manually or mechanically. When a smooth, even consistency is achieved, the grout is ready for use. It must be placed well within the gel time of the grout.

Placing

The mixed grout should be poured or pumped steadily into the prepared anchor holes. The anchor bar should then be pressed into the hole to the required depth. Slight agitation of the bar will greatly assist in achieving a complete bond. The bar should be left undisturbed in the required position until the grout has hardened fully.

Cleaning

Any mixing drums, pumps etc should be cleaned within the pot life of the grout. Expanchem Solvent 102 is recommended for this purpose.

Limitations

1. At permanent operating temperatures above 40°C, creep of the cured grout may become significant.
2. Resin anchors should not be used where structural load bearing performances have to be maintained in anchors subjected to fire conditions.
3. For use at temperatures below 5°C, seek advice from Expanchem Fospak.

Estimating

Supply

Expangrout* Fix S80, P80 : 1 litre packs

P80

Volume of Expangrout* Fix grout required in ml for each 100 mm of bond length.

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.

Note: 75 - 100 mm bond length is the minimum recommended.

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 1 litre pack of Expangrout* Fix

Hole diameter (mm)	Bolt size (mm)					
	12	16	20	25	32	40
20	20					
25	10	12	20			
32	6	7	8	12		
38		5	5	6	10	
45			3	3	5	10
50			2	3	3	5

Storage

Shelf life

All products have a shelf life of 12 months at 20°C if kept in a dry store in the original, unopened packs.

The shelf life will be reduced at higher ambient temperatures.



CONSTRUCTION CHEMISTRY

Storage conditions

Store in dry conditions away from high temperatures and high humidity. Keep away from sources of heat and naked flames.

Precautions

Health and safety

Expangrout* Fix products and Expanchem Solvent 105 are flammable. Keep away from sources of ignition - no smoking. In the event of fire extinguish with CO2 or foam.

Some people are sensitive to resins and solvents. Avoid contact with skin and eyes. Ensure adequate ventilation and avoid inhalation of vapours. Wear suitable protective clothing, gloves and eye/face protection. Barrier creams provide additional skin protection. Should accidental skin contact occur, wash immediately with a resin removing cream, followed by soap and water. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice - do not induce vomiting.

For additional information see the relevant Material Safety Data Sheet.

Additional Information

Expanchem Fospak manufactures a wide range of complementary products which include :

- waterproofing membranes & waterstops
- joint sealants & filler boards
- cementitious & epoxy grouts
- specialised flooring materials

Expanchem Fospak additionally offers a comprehensive package of products specifically designed for the repair and refurbishment of damaged concrete. Expanchem Fospak's 'Systematic Approach' to concrete repair features the following :

- hand-placed repair mortars
- spray grade repair mortars
- fluid micro-concretes
- chemically resistant epoxy mortars
- anti-carbonation/anti-chloride protective coatings
- chemical and abrasion resistant coatings

For further information on any of the above, please consult your local Expanchem Fospak office - as below.

* Denotes the trademark registered.

REGIONAL SALES OFFICES IN PAKISTAN:

Fospak (Pvt) Ltd.

Head Office

702, Business Avenue,
Block-6, PECHS., Shahra-e-Faisal,
Karachi, Pakistan.

Tel # +92-21-34528477, 34529859

Fax # +92-21-34522436

Email : info.khi@fospak.com.pk

Lahore Sales Office

2nd Floor Sarwar Shaheed Plaza,
Cavalry Ground,
Main Boulevard, Lahore Cantt,
Lahore, Pakistan.

Tel # +92-42-36675773

Fax # +92-42-36675838

Email : info.lhr@fospak.com.pk

Rawalpindi Sales Office

1st Floor,
Al-Harmain Plaza,
Main Murree Road,
Rawalpindi, Pakistan.

Tel # +92-51-39290592

Fax # +92-51-39290590

Email : info.isb@fospak.com.pk

Important note

Expanchem Fospak products are guaranteed against defective materials and manufacture and are sold subject to its standard terms and conditions of sale, copies of which may be obtained on request. Whilst Expanchem Fospak endeavours to ensure that the technical information on this data sheet is correct at the time of printing, it is the customer's responsibility to satisfy himself, by checking with the company that this information is still current at the time of use, that the product is suitable for the intended application, and that the actual conditions of use are in accordance with those recommended. Because Expanchem Fospak has no control over the conditions of use of its products, all recommendations or suggestions regarding the use of these products are made without guarantee.

www.fospak.com