



## DUBOND FGP 2

### High Performance Cementitious Precision Grout

Dubond's Ducon FGP 2 is supplied as a ready to use dry powder. The addition of a controlled amount of clean water produces a free flowing, non-shrink grout for gap thicknesses up to 100mm. Ducon FGP 2 is a blend of Portland cement, graded fillers and chemical additives which impart controlled expansion in the plastic state whilst minimizing water demand. The low water demand ensures high early strength. The graded fillers are designed to assist uniform mixing and produce a consistent grout.

#### Uses

- Ducon FGP 2 is used for precision grouting where it is essential to whilst the Static and Dynamic loads.
- Typical applications would be the grouting of base plates of turbines, compressors, boiler feed pumps etc.
- It can also be used for anchoring a wide range of fixings. These include masts, anchor bolts and fence posts.

#### Advantages

- Gaseous expansion system compensates for shrinkage and settlement in the plastic state
- No metallic iron content to cause staining
- Pre-packed material overcomes onsite batching variations
- Develops high early strength without the use of chlorides
- High ultimate strength ensure the durability of the hardened grout

#### Application Instructions

##### Preparation

- **Foundation surface**  
The substrate surface must be free from oil, grease or any loosely adherent material. If the concrete surface is defective or has laitance, it must be cut back to a sound base.
- **Bolt Pockets**  
Depending on the size of the bolt pockets, 50% -100% cleaned 10 mm sound aggregates by weight of grout consumption may be incorporated to economies on grout and also to keep the heat of hydration low. When the thickness exceeds 100 mm -150 mm our technical department may be contacted for advise. There must be at least 12 hours gap between bolt pocket and under base plate grouting sequence.
- **Pre-soaking**  
Several hours prior to placing, the concrete substrates should be saturated with clean water. Immediately before grouting takes place any free water should be removed with particular care being taken to blow out all bolt holes and pockets.
- **Base plate**  
It is essential that this is clean and free from oil, grease or scale. Air pressure relief holes should be provided to allow venting of any isolated high spots.
- **Levelling shims**  
If these are to be removed after the grout has hardened, they should be treated with a thin layer of grease.
- **Formwork**  
The formwork should be constructed to be leakproof. This can be achieved by using foam rubber strip or mastic sealant beneath the constructed formwork and between joints. In some cases it is practical to use a sacrificial semi-dry sand and cement formwork. The formwork should include outlets for pre-soaking.



- **Unrestrained Surface Area**

This must be kept to a minimum. Generally the gap width between the perimeter formwork and the plate edge should not exceed 150mm on the pouring side and 50mm on the opposite side. It is advisable, where practical, to have no gap at the flank sides.

## ■ **Mixing and Placing**

- **Mixing**

For best results a mechanically powered grout mixer should be used. When quantities up to 50 kg are used, a heavy duty slow speed drill (400-500 rpm) fitted with a paddle is suitable. Larger quantities will require a heavy duty mixer. To enable the grouting operation to be carried out continuously, it is essential that sufficient mixing capacity and labour are available. The use of a grout holding tank with provision to gently agitate the grout may be required.

- **Consistency of Grout Mix**

The quantity of clean water required to be added to a 25kg bag to achieve the desired consistency is given below:

**Pourable : 4.125 liters**

**Flowable : 4.75 liters**

The selected water content should be accurately measured into the mixer. The total content of the Ducon FGP 2 grout bag should be slowly added and continuous mixing should take place for 5 minutes. This will ensure that the grout has a smooth even consistency.

- **Placing**

At 30°C place the grout within 20 minutes of mixing to gain full benefit of the expansion process. Ducon FGP 2 can be placed in thicknesses up to 100mm in a single pour when used as an under plate grout. For thicker sections it is necessary to fill out Ducon FGP 2 grout with well graded silt free aggregate to minimize heat build up. Typically a 10mm aggregate is suitable. 50-100% aggregate by weight of Ducon FGP 2 can be added. Any bolt pockets must be grouted prior to grouting between the substrate and the base plate. Continuous grout flow is essential. Sufficient grout must be prepared before starting. The time taken to pour a batch must be regulated to the time to prepare the next one.

- **Typical Hopper System**

Removable hopper : For large pours the grout may be hand placed or pumped into a removable hopper (trough). Pouring should be from one side of the void to eliminate any air or pre soaked water becoming trapped under the base plate. It is advisable to pour the grout across the shortest distance of travel. The grout head must be maintained at all times so that a continuous grout front is achieved. Where large volumes have to be placed Ducon FGP 2 grout may be pumped. A heavy duty diaphragm pump is recommended for this purpose. Screw feed and piston pumps may also be suitable.

- **Curing**

On completion of the grouting operation, exposed areas should be thoroughly cured. This should be done by the use of Hydrobuild CC Wax curing membrane, continuous application of water and/or wet hessian.

- **Cleaning**

Ducon FGP 2 grout should be removed from tools and equipment with clean water immediately after use. Cured material can be removed mechanically, or with reebaklens.

## Technical Information

Compressive Strength Age (days)	(BS 1881 : Part 116, 1983) Compressive strength (N/mm <sup>2</sup> ) consistency (W/P - 0.19) Flowable (W/P 0.18)	Pourable (W/P 0.165)
1	24	27
3	45	54
7	55	66
28	65	78

Compressive strength with addition of aggregates Age(days)	Compressive Strength (N/mm <sup>2</sup> ) W/P 0.18 % of aggregates ( IS 516 - 1959)		
	50%	75%	100%
1	28	30	32
3	50	52	55
7	60	62	68
28	70	75	78

Tensile Strength (W/P - 0.18)	3.5N/mm <sup>2</sup> @ 28 days
Pullout bond strength (W/P - 0.18)	17 N/mm <sup>2</sup> @ 7 days 20 N/mm <sup>2</sup> @ 28 days
Time for expansion (after mixing )	Start : 20 minutes Finish : 120 minutes
Fresh wet density	Approximately 2220kg/m <sup>3</sup> depending on actual consistency used
Young's modulus (ASTM D469 - 94)	28 kN/mm <sup>2</sup>
Dynamic load resistance	Specimens of Ducon FGP 2 remained undamaged even after subjecting them to alternate loads of 5N/mm <sup>2</sup> & 25N/mm <sup>2</sup> at the rate of 500 cycles / minute for two million cycles.
Coefficient of thermal expansion	11 x 10 <sup>-6</sup> / 0 C
Unrestrained expansion	2 - 4 % in the plastic state enables to overcome shrinkage.
Pressure to restrain	0.004 N/mm <sup>2</sup> approx.
Flow Characteristics	The maximum distance of flow is governed by the gap width and the head of the grout. Typical data for flow design assuming grout is poured immediately after mixing is given in the table below :

### Max flow distance in mm

Grout Consistency	Gap width (mm)	50mm Head	100mm Head	250mm Head
Flowable	30	350	1000	1500
	40	500	1500	2000
	50	900	2000	3000+

**Note :** This table is based on the following factors temperature - 30°C ; Water saturated substrate; Minimum unrestricted flow width is 300mm.

## ■ Limitations

### Low temperature working

When the air or contact surface temperatures are 10°C or below on a falling thermometer, warm water ( 30°C - 40°C) is recommended to accelerate strength development. For ambient temperature below 10°C the formwork should be kept in place for at least 36 hours. Normal precautions for winter working with cementitious materials should then be adopted.

### High temperature working

At ambient temperatures above 40°C, cool water ( below 20°C) should be used for mixing the grout prior to placement.

## ■ Packaging

25 kg moisture resistant bags.

## ■ Yield

Allowance should be made for wastage when estimating quantities required. The approximate yield per 25 kg bag for different consistency is :

Consistency	Pourable	Flowable
Yield ( litres)	12.5	13.3

## ■ Storage Shelf Life

Ducon FGP 2 has a shelf life of 6 months if kept in a dry store in sealed bags. If stored in high temperature and high humidity locations, the shelf life may be reduced.

## ■ Health and Safety Instructions

Ducon FGP 2 is non toxic, but alkaline in nature. Gloves should be worn while handling this product. Splashes of grout on the skin or eyes should be washed off with clean running water. In the event of prolonged irritation, medical attention shall be sought immediately.



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