PENATECH HES GROUT

High early strength, Class C, fast setting, non-shrink construction grout

DESCRIPTION

Penatech HES Grout is a high early strength gain, flowable, shrinkage compensated, Class C grout for use where rapid strength gain is required.

Penatech HES Grout complies with US Corps of Engineers specification CRDC 621-82A and ASTM C1107-91 for Class C Grout

Penatech HES Grout comprises a blend of Portland cements, graded fillers and chemical additives which impart controlled expansion in the plastic and hardened states whilst minimising water demand and maximizing early compressive strength gain.

Penatech HES Grout is supplied as a ready to use powder, requiring only the addition of clean water to produce a flowable consistency non-shrink grout.

TYPICAL USES

- Cementitious grouting where high early strength is required
- Heavy duty support grout high load machine base plates
- Precast grouting applications
- Anchoring bolt holes
- Bridge bearing pads
- Crane rail plates
- Cavities gaps and recesses
- Rapid reinstatement of equipment (minimise downtime)
- Grouting requiring dynamic load bearing and applications subject to continuous vibration

ADVANTAGES

- High early strength, even at low temperatures.
- Dual stage expansion compensates for shrinkage in both the plastic and hardened states.
- High ultimate strength (28 days)
- Exceptional flow characteristics
- Rapid strength gain and set times
- Variable consistency obtainable
- Equipment and machinery can be reinstated after 24 hours
- Non metallic iron eliminates staining
- Good impact and thermal resistance
- Complies with US Corps of Engineers specification CRD-C—621-82A and ASTM C1107-91 for expansion

ADVANTAGES

- Prepackaged material requires only the addition of clean water on site
- Grouting from 10mm to 120 mm in a single application

TYPICAL PERFORMANCE PROPERTIES		
Appearance	Light grey powder (grey when mixed)	
Application Temp	Min	5°C
	Max	30°C
Expansion Characteristics	Expands 1 – 2 % in plastic state	
Time for Expansion	Start	5 mins
	Finish	25 mins
Bleed	0%	
Young's Modulus	28 GPa	

Strength Gain
Compressive strength tested to AS1012.9, AS2350.11
Flexural strength tested to C348-86 (20°C)

	Compressive Strength (MPa)		Flexural Strength (MPa)	
Age	Trowel	Flow	Trowel	Flow
2 hrs	>35	>25	-	-
4 hrs	>45	>30	-	-
8 hrs	>50	>36	-	-
24 hrs	>60	>44	>5.3	>3.6
3 days	>65	>48	-	-
7 days	>75	>50	>8.8	>7.0
28 days	>85	>65	>9.8	>10.0

Setting Times (@ 20°C)

	Trowelable	Flowable
Initial	20 minutes	25 minutes
Final	35 minutes	40 minutes

Bond Strength (ASTM 882-1987 slant shear method)

Trowelable (MPa)	Flowable (MPa)
>9.5	>10

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. Scabbling or water blasting can be used to remove laitance and provide a mechanical key.

Bolt holes or fixing pockets must be blown clean of any dirt or debris. Any cracked or weakened concrete should be removed to provide a solid foundation.

Presoaking

Several hours prior to grouting, the area of cleaned foundation should be flooded with fresh 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 grease, oil or scale. Air 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 suitable release agent.

Formwork

The formwork should be constructed to be leak proof. 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 sacrificial semi-dry sand and cement formwork. The formwork should contain outlets for presoaking.

Unrestrained surface area

This must be kept to a minimum. Generally the gap width between the formwork and the plate edge should not exceed 150mm on the pouring side and 50mm on the opposite side. It is advisable 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 40kg are used, a slow speed drill fitted with a high shear mixer is suitable. Larger quantities will require a high shear vane mixer. Do not use a colloidal impeller 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 mixed grout

The quantity of clean water required to be added to a 20kg bag to achieve the desired consistency is given below.

Consistency:	Trowelable	Flowable
Water required:	2.5 – 2.8 litres	3.2 – 3.5 litres

The water content should be accurately measured into the mixer.

The total contents of the Penatech HES 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 20°C, place the grout within 10 minutes of mixing to gain the full benefit of the expansion process.

Penatech HES Grout can be placed in thickness up to 120mm in a single pour when used as an under-plate grout. For thicker sections it is necessary to fill out Penatech HES Grout with well graded silt free aggregate to minimise heat buildup.

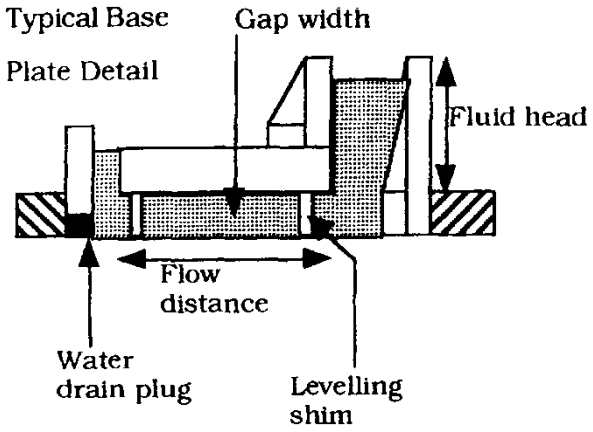
Typically Epilox Fillers F4 is suitable for this, added at the rate of 10kg per 20kg bag of Penatech HES Grout.

Do not add excess aggregate as this will affect the water requirement and ultimate strength gain of the grout.

NOTE: Adding aggregate may create a heat sink effect which will retard the set of the grout. This will slow strength development slightly in the first few hours after placement of the filled grout.

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 of grout must be regulated to the time to prepare the next one.



Pouring should be from one side of the void to eliminate any air or presoaking water from being trapped under the baseplate.

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, Penatech HES 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 an Aftek liquid curing membrane, continuous application of water and/or wet hessian.

CLEAN UP

Penatech HES Grout should be removed from tools and equipment immediately after use. Cured material can only be removed mechanically.

LIMITATIONS

Low temperature working

When the air or contact surface temperatures are 5°C or below on a falling thermometer, warm water (30-40°C) is recommended to accelerate strength development. For ambient temperatures 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 35°C cool water (below 20°C) should be used for mixing the grout prior to placement.

Store bags of Penatech HES Grout under cover and keep as cool as possible.

ESTIMATING

Packaging

Penatech HES Grout is supplied in 20 kg poly-lined bags.

Estimating Data

Consistency:	Trowelable	Flowable
Yield per bag:	10.3 litres (approx.)	11 litres (approx.)
Fresh Wet Density	2220 kg/m^3	2200 kg/m^3
No. Bags to cast one cubic metre:	97	91

NOTE: These figures are intended to be used as a guide only. Variations in water content and wastage on site may cause yields to fluctuate.

STORAGE

Penatech HES Grout is a cement based product which must be stored in a dry area off the ground.

Penacrete should be used within 12 months of date of manufacture

HEALTH AND SAFETY

Penatech HES Grout is non-toxic, but it is alkaline in nature. Any contact with eyes or skin should be washed off with clean water. Protective gloves and clothing should be worn.

For more detailed information, please read the MSDS for this product.

TECHNICAL SUPPORT

ITLS manufactures a comprehensive range of high quality, high performance construction products. In addition, ITLS offers technical support and on-site advice to specifiers, end users and contractors.

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Concrete Repair

Concrete Curing

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