



OPUS CONSTRUCTION PRODUCT DATA

EASYPLUG

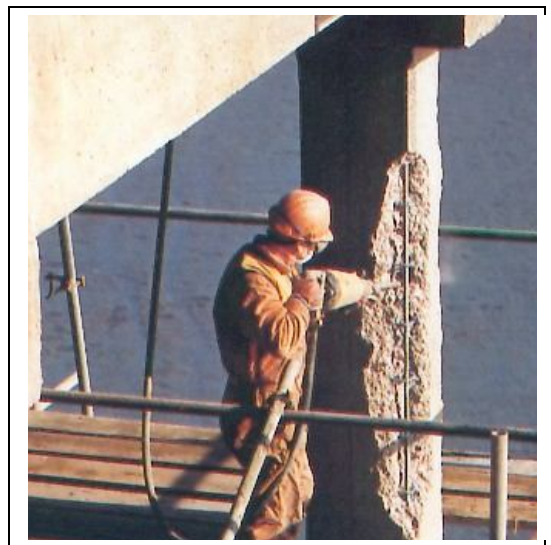
Description

A prepacked specialised Portland cement based on the latest polymer, fibre and cement technology. It provides a simple, cost effective rapid repair system for in-situ and precast concrete, leveling applications, patching water retaining structures or pipes, plugging voids and repair of damaged waterproof screeds.

Easyplug is a 'structural grade' repair product, being waterproof and slump free, with exceptional compressive adhesion strengths and shrinkage compensation. This product has many and varied applications with or without additional aggregate.

It can be used in vertical, overhead or other difficult areas of repair without the use of primer, special lightweight aggregates or support. To create a matched surface finish to any

Easyplug repair, **Easypatch** cements can be used, being totally compatible.



Advantages

- Ready to use, simply add clean water.
- A versatile cement which, when mixed with water and various aggregate combinations, can produce end product from a grout through to a structural concrete mix.
- Produces a shrinkage compensated, high strength (60N/mm²), rapid setting slump free, hardwearing mortar mix.
- Complete compatibility with existing cured concrete properties, ensuring excellent monolithic performance.
- Bond strength higher than tensile strength of standard concretes, no special primers necessary.
- Waterproof (ISAT). Free of chloride and alkali silica reactions.
- Polymer modified to provide superior.



Advantages ctd.

- Adhesion (50Nmm²) and give protection from acid gases, moisture ingress and chloride attack.
- Ideal for use in cold and damp conditions.
- Exceptional freeze/thaw resistance.
- Excellent finishing and feathering characteristics.
- A WRAS listed product.
- Dwi approved for use in contact with potable water
- Complies with clause 6 of the DTp Standard (BD 27/86) 'Materials for the repair of concrete highway structures'.
- CE Marked in accordance with BS EN 1504 Part 3.

Application Instructions

Surface Preparation

Ensure surface for repair is sound, clean and free from deleterious substances. Laitence should be removed by mechanical means and any oils or greases etc. can be cleaned off using Opus Degreasant. Exposed reinforcement steel should be fully exposed, checked and cleaned before repair commences. With Easyplug there is no requirement for excessive mechanical keying or rebating of edges, 5mm. minimum is sufficient, due to superior bond and feathering qualities.

NB. Do not attempt repairs at ambient temperatures below 5°C without protective measures, or to a substrate with a strength less than 20N/mm².

Priming

EASYPLUG cement does not use a separate primer system. It is only necessary to ensure the prepared surface is thoroughly damped with clean water.

Remove any excess surface water prior to application of the repair mix.

NB If concrete to be repaired is new (hours old) use warm water to prevent thermal shock.

Mixing

Mix Easyplug cements with clean water 14% by weight or 5.5 parts to 1 part water by volume.

Mix only sufficient material for use within 10-15 minutes, if aggregate is introduced this placing time is increased (assess by trial mix).

ADD CEMENTS TO WATER, this ensures easy hand mixing of a smooth mortar within a minute.

If larger quantities than 4 kilos are to be mixed, i.e. for a screed or aggregate filled mix, use mechanical mixer or hand drill paddle mixer to ensure economy of mixing time and speed of placement.

A normal concrete mixer is not suitable as it will entrain air into the mix. Use a forced action pan mixer for large mixes i.e. 25 kgs plus.

DO NOT attempt to remix mortars by addition of more water after initial mixing process is completed.

CLEAN equipment with water IMMEDIATELY after use.



Applications

1. Crack filling

For 'dead cracks' chase out to a minimum 5 mm depth, dampen down thoroughly with clean water, and remove any excess surface water prior to repairing. For horizontal crack repair use EASYPLUG at a grout consistency achieved with increased W/C ratio. For vertical cracks chase out to depth of crack and fill with EASYPLUG standard mix (putty consistency).

NB EASYPLUG can be used as putty filler in conjunction with proprietary crack injection systems.

For 'live cracks' contact our technical department for assistance.

2. Small repairs

Apply EASYPLUG standard mix onto prepared substrate using a compaction technique. This helps to remove entrapped air. Apply in layers not exceeding 50 mm in vertical and soffit situations or 100 mm in pockets. If necessary support with shuttering to allow for compaction if working to reveals.

For deeper repairs, subsequent layers can be applied, providing previous layers are well keyed and stable but not fully cured - usually 25 to 30 minutes dependent on temperature. This will ensure a complete monolithic bond. Interlayer pre-wetting is unnecessary.

For final profiling or finish to a high quality use a damped, clean steel trowel. If surface colour match is required refer to application No. 8.

3. Plugging and tie hole filling

Using the standard mix ratio a putty-like consistency is achieved (without additional aggregate) this is ideally suited to hand placement for most plugging applications.

All seepage or infiltration of water through the substrate must be temporarily stopped prior to the application of EASYPLUG filler.

For tie hole filling or other cast-in component applications, EASYPLUG or EASYSTOP (Fastset) can be plugged easily into a tie-hole after withdrawal of 'she' bolt and 'corking' procedures are completed. For 'through ties' ensure any plastic tube left in the wall is removed or drilled out back to 50 mm from the concrete face. Dampen down the hole surface concrete and plug with standard mix, compacting thoroughly to ensure a watertight fill. If a cosmetic finish is required leave last 20 mm of fill for EASYPATCH (refer to Section 8). These products are all Water Regulations Advisory Scheme certified for use on potable water structures. See EASYSTOP (Fastset) literature for full details on tie hole filling.

4. Repairs greater than 100 mm deep

Use preparation techniques as previously specified, except in the area of rebating edges which will now be dependent on the size of aggregates introduced.

A clean, coarse, hard aggregate (5-10 mm size) can be introduced in equal proportions by weight without adversely affecting the physical performance of EASYPLUG. For a deeper repair than 300 mm use a layer-build technique (as per specification in section 2) in 300 mm maximum layers. With addition of up to 50% by weight (2:1 approx) of aggregate there will be an extension of initial setting time (20-25 minutes) and a similar delay period (35-45 minutes) will be necessary between interlayer applications to ensure complete monolithic bond.

These figures are dependent on ambient temperature and the temperature of the substrate. If setting time is critical test by trial mix or contact our technical department for assistance.



5. Patching

EASYPLUG standard and aggregate mixes are ideal for use on roadways, bridges, reservoirs, water treatment tanks, deteriorated concrete or masonry structures, concrete pipes and sewage culverts. Deep repairs can be filled (as per section 4) with or without additional aggregate. In the case of porous substrates an initial slurry coat mix of EASYPLUG should be applied prior to the use of the repair mix. The use of EASYPLUG cement with its fibre reinforcement, fast setting time and high bond/compressive strength properties will allow traffic bearing patches to be in service within an hour (9-10 N/mm²). Other properties of freeze-thaw resistance, durability, shrinkage and slump characteristics are essential in this type of application.

6. Leveling

Manholes, runways, fixings, crane rails, floors, kerbs, stairs, copings and other areas where trafficking and speed of repair is important.

A slight increase in water content will give a more mobile mix without loss of waterproofing qualities and facilitate ease of placement.

Aggregates can be added to give increased yield and economy, ensure clean, hard and graded; dependent on application, use medium sand graded up to 5 mm aggregate.

For setting manhole rings and covers, EASYPLUG mixes have a consistency which permits the ring to be leveled even on a slope or curve allowing application of hot or cold applied asphalt coats and trafficking within 1-2 hours.

7. Repair of damaged waterproof screeds

EASYPLUG standard mix is ideally suited to spot and small repairs (ie less than 0.5 m² by 50 mm depth). Modification of the water: cement ratio can be implemented within the following criteria: - 5.4 to 5.6 parts EASYPLUG to 1 part water by volume.

Addition of up to 30% by weight (3:1 approx) of clean, hard, medium grade sand can also be considered for special finishes.

To achieve a strong monolithic repair, ensure the substrate has a clean, well 'keyed' surface and a step back lap joint of approximately 100mm onto the existing screed material. Additionally, lap joints as well as day joints must be well 'keyed' to enhance adhesion and provide a waterproof repair.

The minimum recommended thickness of EASYPLUG standard mix should be 12 mm with a maximum 50 mm in single layer applications.

Refer to layer build data (Section 2) for thicker repairs to screeds.

8. Colour and texture matching

For matching existing concrete surface texture and colour use EASYPATCH cements.

Supplied in grey and white formulations, used individually or mixed; in conjunction with fine aggregate from existing concrete mix (if necessary for colour) a perfect matched finish can be achieved.

EASYPATCH is fully compatible with EASYPLUG and can be used to finish off the last 20 mm depth (minimum) of any repair using the interlayer technique. It is also listed under the Water Regulations Advisory Scheme, and therefore is a suitable finish for any product or in-situ repair using EASYPLUG which will be in contact with potable water.



Curing

EASYPLUG cement repairs do not normally require curing assistance for small repairs. However for large repairs, screeds or its use in hot climatic conditions, normal concrete curing techniques are recommended, i.e. damp hessian or white polythene sheet.

Cleaning

Always keep equipment clean, washing off EASYPLUG mixes with water before cure. If left to cure mechanical cleaning will be necessary.

Compatibility and subsequent treatments

EASYPLUG repairs are compatible with concretes based on different types of hydraulic cement as well as OPC, sulphate resisting (SRPC), PFA modified, chemically resistant etc., its unique properties providing the necessary repair parameters in a majority of cases.*

It is also compatible with all recommended coatings and finishes as applied to concrete, application of these should be carried out after a cure period of 7 days minimum (concrete being 21 days minimum). The use of subsequent impregnating coatings however will not be as effective as the repair is already waterproof.

Cementitious based coatings can generally be applied within hours of a repair.

For confirmation on any of the above data please contact our technical department.

Potable Water Applications

Has DWI approval for use in contact with potable water and is listed under the Water Regulations Advisory Scheme.



- **Property tables**

Compressive strengths B.S. 4551: 1980

Age	Density BS1881 Pt 114(Kg/mm2)	Compressive Strength (N/mm2)
1hr	2148	9-15
2hr	2135	20-22
4hr	2117	28-32
24hr	2128	45-50
7days	2140	55-60
28days	2182	65-75

*All figures above based on averages of no. of sample cubes tested. W/C ratio 14%. 20°C at 100% R.H.



- **Flexural strengths BS4551: 1980**

Flexural Strength(N/mm²)	8.5-9.5
--	---------

Bond Strength to concrete BS6319 Pt4: 1984
(28 days slant/shear method)

Bond Strength (N/mm²)	45-55
---	-------

- **Coefficient of Thermal Expansion**

EASYPLUG material coefficients fully compatible
With concretes $15 \times 10^{-6}/^{\circ}\text{C}$

- **Temperature Limitations**

As with concretes, do not apply EASYPLUG below 5°C without protection system.

Only use at ambient temperatures below 30°C, contact our technical department for information on use of this type of product at temperatures outside these limitations.

Always apply good concrete curing practice and keep powdered material temperature below 25°C and above 5°C in storage and use.

Water permeability BS1881 Pt.5: 1970. (I.S.A.T.)

Time	Initial Absorption (ML/M ² /Sec		
	Easyplug Standard	Easyplug 50% Aggregate	4:1Mortar sand Cement
10 mins	Zero	Zero	1.140
2 hrs	Zero	Zero	0.6

All independent test certificates available on request

Water Permeability Pressure/Time Test

Taywood 'In House' method.

A specimen of EASYPLUG bulked out with medium grade sand (50% by wt) was cast and cured for 24 hours. It was then subjected to a hydrostatic pressure of 50 meters head (164 ft) which was maintained for 3 days before increasing pressure to 100 meters head (328 ft) for a further 3 days. Visual observations were taken and the permeability coefficient by penetration was calculated.



- **Visual observations**

Hydrostatic Pressure	Time Period	Observations
Zero	24 hrs	Initial curing period
5 bar	6 hrs	10-20% of surface damp
5 bar	24 hrs	10-20% of surface damp
5 bar	48 & 72 hrs	Surface dry
10 bar (142 psi)	72 hrs	Surface remained dry throughout

- **Permeability Coefficient**

Specimen Thickness: 51.1 mm

Depth of Penetration: 46 mm

Calculated voids content of the penetrated zone: 7.94%

Permeability Coefficient by penetration: 1.62×10^{-12} m/sec

i.e. 7.5 mm of Easyplug Mix = 1000 mm of good quality concrete.

Independent test carried out by Taywood Engineering research Laboratories Cert. No. 1976

Independent Site Test on Permeability

Test data is available on a site test programme carried out by the Materials Testing Station, Queens University, Belfast, using the same EASYSTOP Mix design as in the Taywood Engineering Research Laboratories report. In these tests water tightness of the repairs and the joints between the repairs and the original concrete were found to be superior to the parent concrete in all cases. A test report No. CD 441 Dec. 1990 refers.

Setting Times

Standard mix: 10-15 minutes.

Aggregate mixes: 20-25 minutes dependent on ambient temperature and water content.

NB During a plastic state just prior to initial set, EASYPLUG can be cut, shaped and smoothed - use clean, dampened steel spatula or trowel.

- **Shrinkage Compensation**

0.007% at 28 days without curing assistance in a free unrestrained situation.

- **Yield**

1 Kg EASYPLUG yields 500 cm^3 or 2.15 Kgs/mm^2 .

- **Packaging**

Sealed polybags inside

8 Kg self-seal Polybags

25 Kg self-seal Polybags



0086

Ferguson & Menzies Ltd, 312 Broomloan Road,
GLASGOW, G51 2JW

Tel: 0141 445 3555 / Fax: 0141 425 1079

E-Mail: info@fergusonmenzies.co.uk

Web: www.fergusonmenzies.co.uk

14

0086-CPR-602636

EN1504-3: Concrete repair product for structural repair
PCC (based on hydraulic cement polymer modified)

Compressive Strength:	Class R4 ≥ 45 Mpa
Adhesive Bond:	Class R4 ≥ 2.05 Mpa
Chloride Ion Content:	≤ 0.05%
Carbonation resistance:	Passes
Elastic Modulus:	26.1 Gpa
Thermal Capability Part 1:	Class R4 ≥ 2.0 Mpa
Capillary Absorption:	0.108kg.m⁻².h^{-0.5}
Dangerous Substances:	Complies with 5.4
Reaction to Fire:	Euroclass A2-s1,d0

Storage

No precautionary label requirements.

Store in dry conditions where possible and always reseal drums after use. EASYPLUG is supplied with double protection, polybags and sealed cans ideally suited to transportation and storage even in the most difficult climatic conditions.

See temperatures for use and do not subject powder to freezing conditions or flash setting may occur.

Health and Safety

Contains Portland cement which in contact with water or body fluids releases alkalis which may cause irritation, dermatitis or burns.

- Irritating to eyes, respiratory systems and skin.
- Risk of serious damage to eyes
- Keep out of reach of children
- In case of contact with eyes, rinse immediately with plenty of clean water and seek medical advice.
- After contact with skin, wash immediately with plenty of clean water
- Wear suitable protective clothing, gloves and eye/face protection

Ingestion - drink plenty of water and obtain medical advice.

Fire - Water based. No flash point or ignition temperature.

Refer to CIRIA Health and Safety literature for use of Portland cement and Polymer products

Revision Date: October 2016

Ferguson & Menzies Ltd

312 Broomloan Road

GLASGOW

G51 2JW

Tel: 0141 445 3555

Fax: 0141 425 1079

E-Mail: info@fergusonmenzies.co.uk

Web: www.fergusonmenzies.co.uk