

## Conplast UW

### Underwater concrete admixture

#### Uses

- To minimise washout of concrete placed underwater

#### Advantages

- Increases internal cohesion of the concrete mix, reducing the tendency of cement and other particles to be washed out of the concrete mix during placement
- Facilitates the placement of concrete underwater by normal methods such as tremie pipe delivery
- Once placed, concrete is more resistant to the action of moving water
- Allows the production of higher quality and higher strength concrete underwater
- Contains workability and setting control agents to assist in providing the levels of workability and working life necessary to allow control of placing

#### Standards compliance

Conplast UW complies with the requirements of the United Kingdom Water Byelaws Scheme and is listed in the Water Fittings and Materials Directory as suitable for use in contact with potable water.

#### Description

Conplast UW underwater concrete admixture is a chloride free blend of selected polymers supplied as a fine brown powder.

When added to concrete, Conplast UW produces a gel in the water phase which surrounds the cement particles and other fine components of the concrete mix and protects them from excessive washout both during placement and once the concrete is finally in position. Unlike other antiwashout materials, Conplast UW also contains plasticizing agents which counteract the effects of the increased cohesion necessary to minimise washout and allow normal workability levels to be maintained without the addition of extra water.

Conplast UW provides a degree of retardation to the concrete mix, allows longer journey times from batching to placement and better control of the placing process.

#### Technical support

Fosroc provides a technical advisory service for on-site assistance and advice on admixture selection, evaluation trials and dispensing equipment. Technical data and guidance can be provided for admixtures and other products for use with fresh and hardened concrete.

#### Typical dosage

The optimum dosage of Conplast UW to meet specific requirements must always be determined by trials using the materials and conditions that will be experienced in use. This allows the optimisation of admixture dosage and mix design and provides a complete assessment of the concrete mix.

Such trials should start at a dosage of 1.00 kg / 100 kg of cement. After initial trials at this dosage, further trials at reduced dosage may be performed to determine the most cost effective dosage level that will also give the level of anti-washout protection required. Lower dosages will tend to reduce the degree of washout protection obtained. In normal use dosages below 0.6 kg / 100 kg of cement will not normally be found effective.

#### Use at other dosages

Dosages outside the typical range suggested above may be used if necessary and suitable to meet particular mix requirements, provided that adequate supervision is available. Compliance with requirements must be assessed through trial mixes. Contact the Fosroc Customer Service Department for advice in these cases.

#### Properties

**Appearance:** Light brown powder

**Bulk density:** Typically 600 kg/m<sup>3</sup>

**Chloride content:** Nil to BS 5075

**Alkali content:** Typically less than 6.0 g. Na<sub>2</sub>O equivalent / kg of admixture. A fact sheet on this subject is available.

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### Setting times

At the normal dosages recommended on this data sheet a retardation of typically 3 to 6 hours beyond a normal control mix will be obtained. This will depend on the dosage used, cement chemistry and other mix characteristics. At lower temperatures this retardation will be further increased.

### Cement washout

Washout resistance can be assessed by filling a perforated basket with the proposed concrete mix and allowing it to drop five times through a specified depth of water. Normal concrete will show a high level of washout in such a test. The loss of weight of samples with and without Conplast UW can be compared. Further information on this test method is available from the Fosroc Customer Service Department.

### Instructions for use

#### Mix design

Industry standard recommendations for the production of concrete for placement underwater, such as those contained in the UK Concrete Society Technical Report No. 3 'Underwater concreting', should be followed. This data sheet in general follows the Concrete Society recommendations on mix design but the figures quoted below are intended to give increased margins of confidence. Initial trials should be carried out at these higher levels. If the trial procedure shows that changes to the mix design can be made with no adverse effect on the properties of the concrete then these can be made if appropriate to meet specifications. Contact the Fosroc Customer Service Department for further advice in this situation.

Concrete for underwater placement needs to be cohesive and flowable. Mix proportions suitable for a pumped concrete will normally be found suitable, with workability levels of at least 180 mm slump or 500 mm flow to BS 1881 Part 105.

A fines content of 40 - 55% of the total aggregate is recommended to provide the internal cohesion required. Normally a maximum aggregate size of 40 mm should be used to avoid potential problems of bridging in tremie pipes. If conditions are more restrictive then lower maximum aggregate sizes should be used. In addition, it is recommended that initial trials commence with a cementitious content of above 400 kg/m<sup>3</sup>.

### Mixing and dispensing

The correct quantity of Conplast UW should be measured by means of a suitable dispenser. Contact the Fosroc Customer Service Department for advice regarding selection of equipment and its installation. Where concrete is mixed using a forced action (power paddle) type of mixer, Conplast UW should be added towards the end of the mixing cycle. Addition should be made slowly and with care and mixing should then continue for a further one to two minutes to ensure complete dispersion and activation of the admixture.

At ready-mixed plants Conplast UW may be added by sprinkling onto the sand or aggregate feed belt.

Where concrete is truck mixed it is essential that the truck mixer is in good condition. Agitator trucks are not suitable. Conplast UW should be added after the mixing of the base concrete is complete. This may be carried out either at the batching plant or on-site. In either case Conplast UW should be added slowly and the concrete mixed for a further 5 to 10 minutes at high speed to ensure dispersion of the admixture throughout the load of concrete.

It may be necessary to finally adjust the workability of the concrete after the addition of the Conplast UW. This can be done by the addition of a small amount of water or a suitable plasticising admixture.

### Placing techniques

After mixing, the concrete should be continuously agitated until placing commences. Placement through a concrete pump is normally the most suitable method. Placement by skip or tremie may also be used.

Where a tremie method of placement is used it is essential that the fresh concrete received into the hopper at the head of the tremie pipe is always in sufficient volume to provide an uninterrupted and steady flow down the pipe. The tremie pipe should be of such a diameter to ensure that the concrete flow down it is not faster than the feed from the hopper. If these precautions are not followed water will be drawn into the pipe and forcibly mixed with the concrete.

Flow of concrete from the tremie should always be carefully controlled by moving the end of the pipe within the placed concrete. The tremie

should be smooth bored and of a suitable diameter compared to the maximum aggregate size, typically 150 mm maximum diameter for 20 mm aggregate.

If concrete is to be placed in preformed reinforcement cages, allowances should be made in the reinforcement design to ensure that the tremie pipe or concrete pump has access into the lower sections of the cage.

### **Compatibility**

Conplast UW is compatible with other Fosroc admixtures used in the same concrete mix but it is not usually necessary to add other materials to the mix. All admixtures should be added to the concrete separately and must not be mixed together prior to addition. The resultant properties of concrete containing more than one admixture should be assessed by the trial mix procedure recommended on this data sheet to ensure that undesired effects are not produced.

Conplast UW is suitable for use with all types of ordinary Portland cement. Cement replacement materials can be used in the mix. Where PFA is used it should normally only be considered as a filler and will not generally contribute to the compressive strength of the mix, particularly at normal concrete testing ages up to 60 days. Contact the Fosroc Customer Service Department for further advice.

### **Effects of overdosing**

An overdose of double the intended amount of Conplast UW will result in a significant increase in air entrainment, which will tend to reduce strength, and a significant increase in the level of retardation. The degree of this effect will depend on the particular mix design and overdose level. The cohesion and anti-washout properties of the concrete will be increased which is likely to lead to an increased water demand to obtain a usable workability.

### **Curing**

As with all structural concrete, good curing practice should be maintained. If concrete remains underwater then the water itself will provide the curing necessary. If concrete is placed near the water line and is likely to remain exposed for significant periods of time then the provision of alternative curing should be considered.

### **Typical performance examples**

Many variables in concreting materials and conditions can affect the selection and use of an admixture. Trials should be carried out using relevant materials and conditions and placing techniques to determine the optimum mix design and admixture dosage to meet specific requirements.

Typical performance examples from evaluation studies of Conplast UW are included on this data sheet. The values quoted are representative of results obtained and are provided as illustrations of performance in different situations. Because of the variability of concreting materials, the results should only be taken as typical of the performance to be expected. Results quoted in individual examples should not be taken as necessarily directly comparable with other examples given here or results obtained elsewhere for Conplast UW or other products. Unless otherwise specified, all testing was carried out to the relevant parts of applicable British Standards. Washout was determined by the plunge method described in the paper 'Laboratory method of testing concrete for placement underwater.', by B A Davies at the International Conference on Concrete in the Marine Environment, London, 1986.

### **Limitations**

Conplast UW will not provide protection against washout in situations where there is a large amount of water turbulence such as where concrete is poured directly into water from a ready-mix truck or where incorrect use of a tremie produces interrupted concrete flow. In such situations water is forcibly mixed with the concrete.

**Example 1: Comparison of performance of mixes with and without Conplast UW**

Mix design: OPC 460 kg/m<sup>3</sup>; 20-5 mm gravel 885 kg/m<sup>3</sup>; fine aggregate, Zone M, 750 kg/m<sup>3</sup>

Mix	Dosage kg/m <sup>3</sup>	Washout after 5 drops,%	W/C ratio	Slump mm	Compressive strength, N/mm <sup>2</sup>		
					3 day	7 day	28 day
Control	—	60	0.47	155	34.5	48.5	57.5
Conplast UW	4.5	9	0.47	215	34.0	47.0	55.5

**Estimating - packaging**

Conplast UW is available in 25 kg bags.

**Storage**

Conplast UW has a minimum shelf life of 12 months provided the product is kept in a dry store in the original, unopened packaging.

**Precautions**

**Health and safety**

Conplast UW does not fall into the hazard classifications of current regulations\*. However, it should not be inhaled, swallowed or allowed to come into contact with skin and eyes.

Suitable protective gloves and goggles and dust masks should be worn.

Splashes on the skin should be removed with water. In case of contact with eyes rinse immediately with plenty of water

and seek medical advice. If swallowed seek medical attention immediately. **do not** induce vomiting.

**Fire**

Conplast UW is combustible.

**Cleaning and disposal**

Spillages of Conplast UW should be swept up in the dry state and transferred to suitable containers. Spillage will form a slippery gel when in contact with moisture.

The disposal of excess or waste material should be carried out in accordance with local legislation under the guidance of the local waste regulatory authority.

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