

FEBFLOW STANDARD

WATER REDUCING PLASTICISER FOR CONCRETE

Description:

Febflow Standard is a powerful plasticiser, which disperses and deflocculates the cement particles within a concrete mix. It can be used to improve workability, without the addition of extra water, or allow reductions in free water content of the concrete mix. Due to the improved dispersal of the cement particles, the process of hydration proceeds under the most favourable conditions. Febflow Standard complies with NZS 3113 Type WR.

Primary Uses:

- To increase workability.
- To increase compressive strength.
- To effect cement economies.
- For hot weather concreting.

Typical Applications:

- In pre-stressed concrete.
- In thin-shell concrete.
- In areas of congested reinforcement where high workability is of benefit.
- In pre-cast concrete manufacture.
- Wherever reduced water contents would be of benefit for the sake of increasing impermeability and decreasing drying shrinkage.
- In hot weather concreting to extend workability, thus enabling concrete to be placed and compacted successfully.

Advantages:

- Significantly improves the workability, therefore easing placing and improving both the plastic and hardened properties of all types of concrete mixes.
- Improves the cohesive properties of the concrete helping to reduce segregation and bleeding. Of particular value with crushed rock aggregates.
- Allows water reduction in the region of 10% to be achieved whilst maintaining workability, thereby increasing strength, durability and impermeability.
- Of particular benefit in hot climatic conditions when used to extend workability, thereby enabling concrete to be placed and compacted over much longer periods.
- Enable economies in mix designs to be achieved, therefore saving cement.
- Improves surface finish.

Properties:

Febflow Standard is a liquid admixture based upon refined lignosulphonates.

Colour: Dark brown/black liquid

Specific Gravity: 1.19 at 20°C

Air Entrainment: 1-2% dependent on grading of sand and water content.

Chloride Content: Nil

Nitrate Content: Nil

Freezing Point: 0°C. Can be reconstituted if stirred after thawing

Storage Life: Up to 2 years when stored in accordance with manufacturer's instructions.

Packaging: Supplied in 5 litre, 20 litre and 200 litre drums.

Flashpoint: None

Directions for Use:

Febflow Standard should be added to the concrete mix during the mixing cycle at the same time as the water or the aggregates. Never add Febflow Standard to the dry cement. No extension to normal mixing times is necessary.

Test Mixes:

Examples of test mixes, showing different effects obtained by the use of Febflow Standard:

During the period of more than 25 years the Febflow Standard has been used in site mixed, ready-mixed and pre-cast concrete considerable experience and data as been acquired about its properties and effects.

The following examples are given as being illustrative of the effects that can be expected in typical (average) conditions of the concrete production.

The extent to which these results are reproducible in any given circumstances must depend on the particular materials being used in the mix. The fact that they might comply with a British or other recognised standard is not sufficient reason to expect a given result from either the plain or the admixture-treated concrete. It is for this reason it is urged that wherever possible trial mixes should be carried out using the materials available for the work itself.

In spite of this qualification the examples that follow may be seen as applying to the majority of situations where the ingredients of the concrete satisfy specification requiring the production of high-grade, durable concrete.

Concrete Mix:

The control mix proportions were selected as representative of a large proportion of concrete batched-throughout the world by site and ready-mixed concrete producers.

Quantities per cu. Metre

Coarse aggregates (20-10mm)	1220kg
Sand (Zone 2)	660kg
Cement (Ordinary Portland)	300kg
Water	195 litres

Properties:	
Slump	75mm
Air content	0.8%
Plastic density	2375kg/m ³
Compressive Strength:	
1 day	8.5N/mm ²
3 days	22.0 "
7 days	32.0 "
28 days	44.0 "
90 days	56.5 "
180 days	59.0 "
1 year	60.5 "

Using this as reference concrete, a series of tests were performed on Febflow Standard in order to determine the results when used to achieve the benefits referred to infer the heading above – "Primary Uses".

1. Febflow Standard used to increase workability.

Mix proportions: Same as Control Mix with addition of Febflow Standard at rate of 140ml per 50kg of cement.

Properties:	
Slump	130mm
Air content	1.4%
Plastic density	2415kg/m ³
Compressive Strength:	
1 day	9.0N/mm ²
3 days	23.0 “
7 days	34.5 “
28 days	46.5 “
90 days	59.0 “
180 days	62.0 “
1 year	64.0 “

2. Febflow Standard used to increase compressive strength:

Mix proportions: Control Mix adjusted by:

1. Adding Febflow Standard at rate of 140ml per 50kg of cement.
2. Reducing water content to produce same workability as Control Mix
3. Increasing total aggregates to maintain constant cement content.

Quantities per cu. Metre

Coarse aggregates	1270kg
Sand	680kg
Cement	300kg
Water	180 litres
Febflow Standard	840ml

Properties of treated concrete	
Slump	75mm
Air content	0.8%
Plastic density	2430kg/m ³
Compressive Strength:	
1 day	9.5N/mm ²
3 days	24.5 “
7 days	36.0 “
28 days	50.5 “
90 days	63.0 “
180 days	66.0 “
1 year	67.5 “

3. Febflow Standard used to effect cement economy:

Mix proportions: Control Mix adjusted by:

1. Adding Febflow Standard at rate of 140ml per 50kg of original cement content.
2. Reducing cement content by 10%.
3. Reducing water content to maintain constant water/cement ratio.
4. Increasing total aggregates to maintain constant yield.

Quantities per cu. Metre

Coarse aggregates	1255kg
Sand	680kg
Cement	270kg
Water	175 litres
Febflow Standard	840ml

Properties of treated concrete	
Slump	75mm
Air content	0.8%
Plastic density	2375kg/m ³
Compressive Strength:	
1 day	8.0 N/mm ²
3days	21.5 “
7 days	33.0 “
28 days	45.0 ”
90 days	58.0 “
180 days	60.5 “
1 year	62.0 “

4. Febflow Standard used to prolong workability in conditions of high temperature:

Throughout this test series the temperature of the concrete and the curing was controlled at 40°C + 2°C. The same Control mix was used as that for the series reported above except that it was necessary to increase the water content to obtain a slump of 75mm. The same amount of water was then used in the two test mixes which contained Febflow Standard at rate of 140ml/50kg and 210/50kg of cement respectively.

Mix	Slump	Time to reach slump of 25mm	Compressive strength in N/mm ²	
			7 days	28 days
Control	75mm	30 min	24.0	33.0
Febflow 280cc	125mm	65min	28.0	36.0
Febflow 420cc	Collapse	110 min	28.5	36.5

It is seen that, under conditions of high temperature, the effect of increasing the dosage of Febflow Standard is to enable concrete to remain workable – therefore suitable for placing and compacting – for a significantly longer time without prejudice to the compressive strength.

Dosage:

Field trials should be conducted to determine the optimum addition of rates of Febflow Standard. As a guide to these trials, a dosage range of 140ml to 280ml per 50kg of cement is recommended as an initial starting point. Dependent on the desired properties, a dosage of up to 420cc per 50kg of cement can be used. For hot weather concreting where Febflow Standard is to be used to extend workability, a dosage of 200ml to 250ml per 50kg of cement is recommended.

TYPICAL RESULTS**Compatibility:**

Febflow Standard can be used with all types of Portland cement including Sulphate Resisting.

Febflow Standard should not be pre-mixed with other admixtures. If other admixtures are to be used in concrete containing Febflow Standard they must be dispensed separately.

Effect of Over-Dosage:

A severe over-dosage of Febflow Standard will result in the following:

- Retardation of initial set.
- Increase in air entrainment.
- Increase in workability.

Providing concrete is properly cured, the ultimate strength of the concrete will not be adversely affected and will generally be higher than for normal concrete. It is unlikely that the stripping times of formwork will be affected.

Packaging:

Febflow Standard is available in 5, 20 and 200 litre drums.

AGITATE WELL BEFORE USE.