



constructive solutions

Conplast® PA21(S)

Water reducing air entraining agent

Uses

To Improve the quality and long term durability of concrete exposed to severe weathering conditions. It Increases the resistance of concrete to damage by sea water, frost and de-icing salts and also makes concrete structures less prone to cracking.

Reduces the permeability of low cement content concrete for mass pours such as dams and breakwaters.

Improves the cohesion and workability of concrete where poorly graded or harsh sands and aggregates have to be used and minimises bleeding.

As an ideal pumping aid to maintain cohesiveness and to minimise segregation where concrete is placed mechanically.

Advantages

- **Improved quality** : Increased workability and cohesion assist in producing a dense, uniform, close - textured surface, free from segregation, sand runs and surface water and improves impermeability of concrete structures and also makes it less prone to cracking.
- **Increased cohesion** : Entrained micro-bubbles of air assist in producing cohesive concrete significantly reducing segregation and bleeding, even when poor aggregate or sand gradings have to be used.
- **Increased durability** : Improved workability increases compaction whilst the controlled air entrainment considerable enhances resistance to attack by frost or salts by reduction of initial surface absorption of the hardened concrete.

Standards compliance

Conplast PA21(S) conforms to IS-9103 - 1999.

Description

Conplast PA21(S) is supplied as a dark brown liquid based on selected sugar reduced lignosulphonates in combination with compatible surface active agents.

Conplast PA21(S) is a chloride free admixture used to entrain a controlled volume of air in a concrete mix whilst permitting, through its plasticising action, significant reduction in the free water content of the mix.

Conplast PA21(S) acts at the interface of the cement aggregate particles and mixing water to be distributed throughout the concrete. The entrained air bubbles are of the optimum

diameter and spacing to give durability under freeze-thaw or salt attack conditions whilst enhancing lubrication during placing and produce impervious concrete.

Technical support

Fosroc offers technical support service to specifiers, end users and contractors, as well as onsite technical assistance in locations all over the country.

Properties

Calcium chloride content : Less than 0.05% by weight as per IS: 456-2000 and BS 5075.

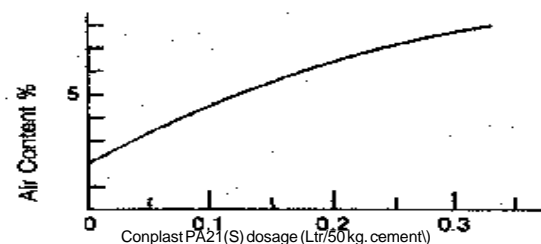
Specific gravity : 1.140 - 1.160 at 27°C

Air entrainment : The following graph illustrates how air content varies with dosage of Conplast PA21(S) at constant workability.

The graph gives typical results for the following mix:

	Wt Kg/m ³
OP Cement	305
Zone II sand	605
5 - 20mm aggregate	1250
Water	160
Slump	65 - 70mm

Air content determined in accordance with IS :1199: 1999. A number of factors will affect the degree of air entrainment, such as :



Sand content : The quantity of air entrained will increase with increasing sand content - typically an increase in sand content from 35 to 45% will raise the air content from 4.5 to 6.0%.

Cement fineness and content : The amount of air entrained reduces with an increase in cement fineness or content.

Aggregate quality : Silt content variations can adversely affect the degree of air entrainment. This is particularly relevant to the use of crushed aggregate during inclement weather. Excessive silt content may render Conplast PA21(S) ineffective.

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Organic impurities : Carbon can reduce the effectiveness of Conplast PA21(S). This does not normally create a blem, but caution should be exercised when using PFA or some pigments, where this type of material is to be used alternative admixtures are available.

Concrete temperature : A temperature increase will reduce air content. In practice, daily fluctuations are much smaller and do not cause significant variation.

Mixing and pumping : Air content will increase with increased time of mixing up to about two minutes in stationary mixers and about 15 minutes in transit mixers. Thereafter, the air content generally remains constant for a considerable period. Small losses of air may occur during pumping. With long pipelines, air content in excess of 5% may seriously reduce the efficiency of the pump.

Compaction of concrete : Prolonged vibration should be avoided.

For specific technical assistance and advice on any of the above aspects, please contact Fosroc.

Setting time : Negligible effect at normal dosage rate.

Compatibility : Conplast PA21(S) can be used with all types of Portland cements and is generally compatible with other admixtures. It is recommended that all admixtures be added to concrete separately.

Reduced permeability : The microscopic air bubbles introduced by use of Conplast PA21(S) break up the capillary structure within concrete and hence reduce water permeability.

Durability : Reducing the water permeability of concrete offers increased resistance to weather exposure and attack in aggressive environments.

Frost resistance : The addition of Conplast PA21(S) produces controlled air space.

Compressive strength : A 15% free water reduction is often possible with Conplast PA21(S). This resultant increased compressive strength normally offsets the anticipated strength loss associated with air entrainment, thus producing air entrained concrete with no increase in cement content.

Resistance to salts : Air entrainment increases the resistance of concrete to surface scaling, which is an adverse effect associated with repeated exposure to marine salts or application of de-icing salts to the concrete surface.

Application instructions

Dosage

The optimum dosage is best determined by site trials with the actual concrete mix which enables the effect of workability and air content to be measured. The rate of addition is generally within the range of 0.10 - 0.20 litres of Conplast PA21(S) per 50 kg cement according to the air content required. A dosage of 0.15 litres for 50Kg cement is normally sufficient to obtain 5% air entrainment.

Dispensing

The use of dispensing equipment is strongly recommended and wherever possible Conplast PA21(S) should be added to the gauging water as it enters the mixer. Fosroc should be consulted regarding suitable equipment and installation. A number of factors previously mentioned will affect the degree of air entrainment and once the rate of application has been established, care should be taken to ensure consistency of raw material supplied, mixing and delivery procedures.

Conplast PA21(S) dosage level litres/50kg cement	Cement content kg/m ³	Total W/C	% water reduction	% of sand	Slump mm	Air content%	Compressive strength			Density kg/m ³ (weighed in air)
							3d	7d	28d	
Nil.	311	0.55	-	34	60	0.8	16.2	24.0	32.7	2494
0.125	253	0.55	-	31	55	5.4	13.2	20.2	28.9	2404
0.125	311	0.447	18.6	31	60	5.2	16.9	25.0	34.0	2403

In these mixes advantage was taken of the entrained air to reduce the fine aggregate content of the mix

Type of material used in the above mixes : OPC, Sand Zone-2, MSA is 40mm granite

Note : 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 result should only be taken as typical of the performance to be expected.



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Mix design

Where Conplast PA21(S) is used in an existing mix design, the cement and aggregate proportions should be adjusted to take into account the increase in yield. The sand content can normally be reduced by about 20kg/m² for each additional 1% of air entrained.

Curing

Efficient concrete curing is essential and is best achieved by use of Concure WB spray applied curing compound. If traditional methods such as water spray or wet hessian are used, they must be carried out thoroughly.

Bleeding / segregation :

The addition of Conplast PA21(S) produces a more cohesive mix, and with good mix design reduces bleeding and segregation allowing even harsh mixes to be placed and compacted easily. The following table illustrates the reduction of bleeding by using Conplast PA21(S) and the sample mix as previously described. Tests were carried out in accordance with IS 9103 - 1999.

Admixture	Slump mm	Air content(%)	Total W/C	Bleed water Percent
None	60	1.10	0.55	3.23
Conplast PA21(S)	60	4.9	0.447	Nil

Cleaning

Spillages of Conplast PA21(S) can be removed with water.

Overdosing

An overdose of double the recommended measure of Conplast PA21(S) will increase workability and air content and can result in slight set retardation of the concrete. The ultimate strength of the concrete should not be impaired if advantage is taken of the water reduction and the concrete is adequately cured.

Precautions

Health & Safety

Conplast PA21(S) is non-toxic. Any splashes should be rinsed thoroughly with water. Splashes to the eyes should be washed immediately with water and medical advice should be sought.

Fire

Conplast PA21(S) is non-flammable.

Estimating

Packing

Conplast PA21(S) is supplied in 5, 20 and 200 litre drums.

Storage

Conplast PA21(S) has a minimum shelf life of 12 months in unopened containers under normal warehouse conditions.

Additional information

The Fosroc range of associated products includes high strength cementitious, epoxy grout, polyester resin based mortar for rapid presetting of steel shims to level or for direct bedding of small base plates; Resin anchoring systems for same day anchoring of bolts in drilled holes in concrete or rock. Also available a range of products for use in construction; viz., admixtures, curing compounds, release agents, flooring systems and repair mortars.

Separate data is available on these products.



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