

# CELLOCRETE

SYNTHETIC-BASED FOAMING AGENT FOR USE  
IN THE PRODUCTION OF LIGHTWEIGHT  
INSULATING CONCRETE



## DRACO

### CONCRETE

LINE

FOAMING AGENT FOR  
LIGHTWEIGHT CELLULAR  
CONCRETE



**CELLOCRETE** is a foaming agent specifically formulated with synthetic surfactants for the preparation of Lightweight Cellular Concrete (LCC) used for the heat insulation of roofs and attics, heat-insulating substrates of floors for civil and industrial use, soundproofing, insulating filling of underground tanks, filling of tunnels, caves and reclamation of marshes. **CELLOCRETE** is a neutral non aggressive product. When added to 1 ÷ 2% water, **CELLOCRETE** creates a fluid that through a compressed air system makes it possible to produce a micronized, compact foam suitable for mixing with cementitious grouts and/or fluid mortars for the preparation of Lightweight Cellular Concrete (LCC). The foaming agent **CELLOCRETE** complies with ASTM C 869-80.



## ADVANTAGES

**CELLOCRETE** is a foaming agent for the preparation of insulating lightweight cellular concrete. The product has the following characteristics:

- ✓ **Non-polluting and non-harmful:** **CELLOCRETE** is made of new generation non-toxic and non-hazardous surfactants.
- ✓ **High yield:** "cellular concrete" can be prepared by using 0.61 to 1.22 kg of **CELLOCRETE** per cubic metre of concrete.
- ✓ **High thermal insulation:** **CELLOCRETE** is added to water and fed to a suitable foam generator; the mix entrains air micro-bubbles which are evenly distributed and produce a cohesive and elastic foam for the preparation of LCC having high insulation properties and thermal inertia.
- ✓ **Volume stability of foam:** the foam obtained using **CELLOCRETE** features long-lasting elasticity and volume stability.
- ✓ **Does not prevent concrete hydration:** **CELLOCRETE** is specifically formulated to be compatible with all types of concrete; it does not prevent hydration and the development of mechanical strength.
- ✓ **Easy mixing, pumping and application:** "cellular concrete" prepared with or without light insulating aggregates, water, cement and **CELLOCRETE** can be easily mixed, pumped and applied; being fluid, they can easily fill complex voids like holes and areas around pipes.
- ✓ **CELLOCRETE** is resistant to freeze-thaw cycles and fire.
- ✓ **CELLOCRETE** does not deteriorate when exposed to sunlight or in contact with water; on the contrary, strength and duration properties increase.
- ✓ **CELLOCRETE** can be used with all types of aggregates to increase insulation properties or mechanical strength.



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## AREAS OF APPLICATION

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CELLOCRETE is a foaming agent for the preparation of lightweight cellular concrete even with light composite aggregates. Liquid "cellular concrete" is used for void filling and insulating:

- ✓ Thermal insulating screeds for residential and industrial flooring
- ✓ Insulating waterproofing filling of underground tanks, backfilling over pipes etc. with static consolidation.
- ✓ Filling of cavities, tunnels and shafts.
- ✓ Filling of cavities and holes in soil, rock and tuff.
- ✓ Filling, thermal insulation and sound absorption of flat balconies, rooftops and covers in general.
- ✓ Manmade reservoirs.
- ✓ Material used for light filling in static rehabilitation work.
- ✓ Firewalls, protection of underground structures against explosions, aftershocks, earthquakes, protection shields etc.
- ✓ In all applications where the material must withstand very low temperatures, even caused by cryogenic liquids.
- ✓ Prefabricated elements, panels, blocks etc.
- ✓ Onsite casting using waterproof formworks for the construction of single-storey structures.

## SPECIAL AREAS OF APPLICATION

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### Mixing with virtual aggregates

It is possible to add polystyrene beads of a variable diameter from 2 to 4 mm to LCC in order to obtain a superlight material. It has the same density as LCC but the mechanical strength is twice that of traditional LCC. Such a cellular/polystyrene concrete mix is known as Policem. The use of cellular concrete makes it possible to significantly reduce the amount of polystyrene beads. Minimum recommended density of Policem is 250 kg/m<sup>3</sup>. This type of mix can be used for screeds even on sloped surfaces to ensure high insulating properties; and for special void filling in ancient wooden, brick or stone structures to be renovated.

### Mixing with composite aggregates

CELLOCRETE makes it possible to prepare LCC by adding composite aggregates like expanded clay, pumice grains etc. Such a mix has higher mechanical strength than LCC, which however varies depending on density. Light aggregates have a structural bonding with the cementitious binder so as to obtain highly insulating non-segregating concrete. A mix containing expanded clay has improved impermeability (lower absorption).

- ✓ LCC prepared with synthetic admixtures like CELLOCRETE does not cause direct or indirect corrosion of rebars or water pipes, heating pipes etc. Only a suitable earthing system must be foreseen, as it is the case for any structure containing reinforcement steel, pipes etc. LCC being an alkaline-based cementitious product, install an adequate protection when necessary. For example, in waterproofing works, when a PVC sheath is installed, always place a polyester woven non woven fabric between LCC and PVC.

## HOW TO USE CELLOCRETE

CELLOCRETE has been specifically formulated to prepare stable foam that is mixed with cementitious grout for the production of LCC. The foam can be prepared by feeding CELLOCRETE diluted with water to a foam generator which is fitted with an air compressor. The mix of water and admixture is transferred into a bucket by 5-6 ATM compressed air; stable density foam is produced by dynamic turbulence. The foam entrains small homogeneous air bubbles characterised by elasticity and resistance to mixing. Mix the foam slowly with the cementitious grout to make the mix lightweight, easy to level and stable for the time needed by concrete to set and reduce volume loss. Foam stability, compactness and density ( $65 \pm 10$  g/l) are crucial for the preparation of high quality LCC. In case of large surfaces, apply several coats – 15cm per coat maximum. If this is not possible or in case of a sloped surface, you may use *CELLOCRETE TIXO*.

## DOSAGE

The amount of CELLOCRETE required per  $m^3$  depends on the density of the final product. The lower the density, the higher the amount of foam to be mixed. Table 1 below shows the rated consumptions of CELLOCRETE according to LCC density. Water consumption for the preparation of the foam and the mix, as well as cement consumption for every density value are also indicated.

However consumptions may vary depending on cement type, machinery used for the preparation and application of LCC, foam density, ambient temperature.

**NOTE:** at a temperature below  $+10^\circ\text{C}$ , foam consumption increases of just a few percent points.

**TAB.1 - RATED CONSUMPTIONS**  
**EXAMPLE OF LCC PREPARED WITH CELLOCRETE (indicative values)**

LCC DRY DENSITY	RATED CONSUMPTION OF 425 PORTLAND CEMENT	RATED CONSUMPTION OF MIXING WATER	RATED CONSUMPTION OF CELLOCRETE	WATER USED FOR FOAM PRODUCTION
kg/m <sup>3</sup>	kg/m <sup>3</sup>	L/m <sup>3</sup>	L	L
400	330	160	0.61-1.22	approx. 61
500	420	200	0.58-1.16	approx. 58
600	500	240	0.54-1.08	approx. 54

CELLOCRETE foaming agent is compatible with all cement types; however use Portland cement to obtain the highest strength.

## PRODUCT CHARACTERISTICS

APPEARANCE	Dark colour aqueous solution
pH (+20°C) - UNI EN ISO 4316	$10 \pm 1$
SOLUBILITY IN WATER	fully soluble
DRY MATERIAL CONTENT (105°C) - EN 480-8	$13\% \pm 1$
CHLORIDE CONTENT (+20°C) EN 480-10	$< 0.05\%$
PACKAGING	20 kg can 200 kg drum 1000 kg tank Bulk in tanker
STORAGE CONDITIONS/SHELF LIFE	12 months if stored in a dry place

## APPLICATION SPECIFICATIONS

REFERENCE STANDARD	ASTM C 869-80
APPLICATION TEMPERATURE	+5°C to +40°C
DENSITY (+20°C) - ISO 758	1.006 kg/l
CONSUMPTION	1 to 2% by weight of water
FREEZING TEMPERATURE	-10°C

## PACKAGING AND STORAGE

CELLOCRETE is available in:

- 20 kg cans - 200 kg drums - 1000 kg tank - bulk in tanker

If properly stored in a sheltered, dry place in its original container, the product maintains its properties for 12 months..



## TAB.2 - OVERVIEW OF LCC WEIGHT, STRENGTH AND APPLICATIONS

LCC kg/m <sup>3</sup>	CAST WEIGHT kg/m <sup>3</sup>	COMPONENTS		STRENGTH (MPA)			APPLICATIONS
		Cement	Sand	28 days	6 months	1 year	
350	400	1	-	0.8	1.2	1.6	Insulation
500	540	1	1	1.6	2.0	2.2	Insulation
600	635	1	2	1.2	2.0	2.4	Insulation
800	850	1	2	2.0	3.5	4.5	Insulation
800	835	1	3	1.6	2.8	3.3	Insulation
1400	1465	1	2	5.7	10.0	12.8	Structural
1400	1450	1	3	4.7	8.1	10.2	Structural
1600	1675	1	2	7.7	13.2	16.7	Structural
1600	1660	1	3	6.1	10.4	13.3	Structural

Average results obtained using Portland cement 42.5 and W/C ratio = 0.5. As shown in the table above, LCC mechanical strength doubles after one year. This being a property of LCC.

## SPECIFICATION ITEM

The foaming admixture for use in the preparation of LCC shall comply with ASTM C 869-80, as it is the case for CELLOCRETE. The foaming agent shall be used following the instructions of the manufacturer DRACO Italiana SpA. Upon request DRACO Italiana SpA can also provide technical support with qualified staff.

## THERMAL CONDUCTIVITY AND ADMITTANCE

Structural cellular concrete has low thermal conductivity, which along with lightness, fire resistance and capacity to remain unchanged over time, make it ideal for insulation, where thin coats ensure however high protection.  $\gamma$  and  $k$  values, in case of different cellular concrete density, are calculated based on equivalent areas. Thermal conductivity expressed in  $W/(m \cdot K)$  refers to dry cellular concrete – not dehydrated – as it is found in structures in operating condition.

The heat transfer coefficient ( $k$ ) is calculated considering the thickness and density ( $\gamma$ ) most commonly used in both residential and industrial construction sectors.

**TAB.3 - THERMAL CONDUCTIVITY ( $\lambda$ ) AND HEAT TRANSFER COEFFICIENTS ( $k$ ) DEPENDING ON DENSITY ( $\gamma$ ), OF A CELLULAR CONCRETE SLAB AND DIFFERENT SLAB THICKNESSES\***

DENSITY ( $\gamma$ ) kg/m <sup>3</sup>	LAMBDA VALUE ( $\lambda$ ) W/(m·K)	HEAT TRANSFER COEFFICIENT ( $k$ ) W/(m <sup>2</sup> ·K)					
		5cm	8cm	10 cm	15 cm	20 cm	25 cm
300	0.092	1.3	0.9	0.8	0.5	0.4	0.3
400	0.127	1.7	1.2	1.0	0.7	0.5	0.4
500	0.156	1.9	1.4	1.2	0.8	0.7	0.5
600	0.191	2.1	1.6	1.4	1.0	0.8	0.6
700	0.220	2.4	1.9	1.6	1.2	0.9	0.8
800**	0.294	2.7	2.1	1.8	1.4	1.1	0.0
900**	0.327	2.8	2.2	2.0	1.5	1.2	1.0
1000**	0.360	2.9	2.4	2.1	1.6	1.3	1.1
1200**	0.430	3.1	2.6	2.3	1.8	1.5	1.3
1400**	0.506	3.3	2.8	2.5	2.0	1.7	1.4
1600**	0.580	3.5	2.9	2.7	2.2	1.9	1.6

\*W/C = 0.6 under continuous steady flow.

\*\*Values refer to F/C ratios = 3/1 in weight.

### Legal notes - SLCMP version of 01.03.2017

Draco Italiana s.p.a. has adopted the parameters indicated in this data sheet and the related standards for the calculation of the values and technical data contained herein.

Customers shall verify that this data sheet and the values indicated herein apply to their product batch and have not been superseded by later editions. If in doubt, verify that the data sheet corresponds to the one available on the website [www.draco-edilizia.it](http://www.draco-edilizia.it) at the time the sales contract was executed and/or by previously contacting the Technical Department.

Any suggestions on the use of the Products provided by our personnel either orally or in writing upon the Customer's request do not constitute additional obligations to the purchase contract and do not imply a contractual obligation for the company. They are based on our experience and limited to the current state of practical and/or scientific knowledge. They are not binding for the client or for the installer. It is the Customer's responsibility to test our products and verify they are suitable for the intended application and purpose.