

	<h2>DIOPERLI</h2>
	<h3>Expanded Perlite</h3>

Description

Expanded lightweight perlite. It is an inorganic, natural mineral that is environmentally friendly. Its characteristics include excellent thermal and sound insulation properties and fire retarding and non-combusting abilities. It does not deteriorate through the years, exhibits extended shelf life, is resistant to rot or decay and does not react with mineral and organic acid at all temperatures. When used in horticulture, perlite promotes drainage and aeration of the soil, providing optimum moisture retention for highly successful plant growth.

It's uniquely versatile and adaptive characteristics, enable **DIOPERLI** to be used in a significant number of applications, such as:

- In the construction field, as an aggregate to lightweight concrete, lightweight concrete blocks or bricks, plasters, mortars and other similar products.
- Insulating concrete pool bases.
- In horticulture and agriculture, as a soil conditioner or growing medium, for plant rooting, patio planting, roof gardening etc.

Technical Specifications

Colour	: White to off white
Physical state	: Granules
Odour	: Odorless
Softening point	: 890-1000°C
Fusion point	: 1250-1350°C
pH	: 6,6-8,0
Specific heat	: 0,2 cal/g°C
Thermal Conductivity	: 0,04 Kcal/m/h°C (<i>source: Perlite Institute</i>)
Bulk Density	: ~0.13 kg/L (see Table 1)
Refractive index	: 1,5
Free moisture	: max 0,5%
Fire retardant	: Up to 5 hours

SOLUBILITY (source: *Perlite Institute*)

Slightly soluble (<3%) in mineral acids (1N solution)
Soluble in hot concentrated alkali and HF solutions
Moderately soluble (<10%) in 1N NaOH solution
Very slightly soluble (<1%) in water or weak acids

TYPICAL CHEMICAL ANALYSIS

Silicon oxide (SiO ₂)	:	72-76%
Aluminum oxide (Al ₂ O ₃)	:	11-15%
Potassium oxide (K ₂ O)	:	2-5%
Sodium oxide (Na ₂ O)	:	3.5-5.5%
Calcium oxide (CaO)	:	1.0-2.0%
Iron oxide (Fe ₂ O ₃)	:	0,5-1,5%
Magnesium oxide (MgO)	:	0,1-0,5%
Loss of ignition (due to combined water)	:	2.0-3.5%

Instructions
for Use

DIOPERLI has a wide variety of applications and uses, depending on its bulk density and its grade (particle size).

TABLE 1: Available DIOPERLI grades and their typical applications

DIOPERLI GRADE	BULK DENSITY (kg/m ³)	TYPICAL APPLICATION
Dioperli No 3	Max. 120 kg/m ³	Pool bases
Dioperli No 4	Max. 130 kg/m ³	Construction, Horticulture, Agriculture

For Horticulture applications, **DIOPERLI** can be used:

- As a soil conditioner.
- In plant rooting.
- In green roofs.
- In hydroponic and other similar applications.

In the construction field, **DIOPERLI** can have a wide variety of uses as a lightweight aggregate, like:

- Production of lightweight concrete, plasters or mortars, concrete floor fill, concrete blocks etc.
- Casting on rooftops.
- Floors.
- Fireproofing enhancement in doors, rooms, chimneys etc.
- Improvement of the acoustic insulation properties of plasters, mortars, plaster boards, highway sound absorbing walls etc.

MIXING

Mixing ratios for producing lightweight concrete mix

DIOPERLI can be mixed with Portland cement in order to produce lightweight perlite/cement concrete mix. Variation on the mixing ratios (perlite/cement), will determine the properties of the final mixture, such as the dry bulk density or the density of the fresh mixture, the mechanical strength, as well as the insulating properties (thermal, acoustic etc.). Therefore, utilizing perlite as the main or the primary aggregate, a mix design can be customized for any given application, in order to obtain specific characteristics.

Typical mixing ratios of perlite/cement and the respective properties of the obtained mixture, are given in Table 2:

TABLE 2: Typical mixing perlite/cement ratios

CEMENT (kg)	DIOPERLI (m ³)	WATER (L)	PELENIT (Note 1) (L)	DENSITY		COMPRESSIVE STRENGTH (N/mm ²)	THERMAL CONDUCTIVITY (W/mk)
				DRY (Note 2) (kg/m ³)	MIXTURE (Note 3) (kg/m ³)		
200	1	200	2	~245	~330	20-24	~0,130
250	1	230	2	~330	~430	22-26	~0,145
300	1	250	2	~380	~490	24-28	~0,160
400	1	300	2	~490	~630	26-30	~0,200

Notes:

1. PELENIT is an air entraining and plasticizing agent, product of PELETICO (please refer to Technical Data Sheet).
2. All above declared values are indicative and given as guide to contractors. In any case, we strongly advise our customers to test and confirm their final mix design, as to the requirements relating to the intended use of the mixture.
3. 1m³ of DIOPERLI, when mixed according to the mixing ratio's given in table 2, will yield approx. 0,85-0,95m³ lightweight perlite/cement concrete mix.

For typical construction applications, it is advisable that a mixture with 250kg of cement is prepared following the relevant mixing ratios given in Table 2 above.

DIOPERLI may also be used in cement-sand mixtures. In such a case, it is advisable that the characteristics of the final mix design are confirmed prior to use.

Mixing Procedure for lightweight concrete

Ideally mixing in batches is done using a concrete-mixer lorry. This will ensure uniformity and maximum yield. Low shear, low RPM mixers are recommended for best results.

Depending on the desired end result and load, firstly add to the mixer the appropriate amount of clean water and then the correct amount of PELENIT and cement. Mix until the slurry is fairly homogeneous (approx. 2 minutes) and while stirring, add the appropriate amount of DIOPERLI. Continue mixing for further 2-3 minutes, until a homogeneous, free of lumps mixture is obtained and the right consistency is achieved. If the workability or the consistency of the mixture after 2-3 minutes is insufficient, then add a small quantity of water and continue mixing for a further 1-2 minutes. Over-mixing should be avoided, as this may degrade DIOPERLI and increase concrete's density, reducing yield.

The slump of the mixture, after mixing, should be approximately 18cm. In case the slump is less, continue mixing for another 1-2 minutes, without adding additional water.

APPLICATION for lightweight concrete

All surfaces should be clean, free of dust, oil, residues of other building materials, etc. before applying the lightweight concrete. The substrate must be sprayed with water, especially in periods of hot weather. In such case, surface film should be allowed to dry after spraying, so as not to inhibit adhesion of the mortar. Pipes or ducting should be installed or mounted in place before applying lightweight concrete.

Perlite lightweight concrete can be applied as conventional concrete, by pumping or by hand. Rooftop inclinations can be casted using the mixture. Layer thickness must not be lower than 5cm. In case a pump is used, it is advisable to be a worm pump type. A piston pump is not recommended, as this will cause separation of perlite from the rest of the mixture.

Water sealing of lightweight concrete

The perlite lightweight concrete is poured onto the base area in one or two layer application, and screed to the desired thickness. Following perlite lightweight concrete, conventional concrete can be applied on top. In case where light or non-foot traffic is expected (rooftops etc.), a more fluid conventional concrete can be prepared (cement:water ratio 1:3). For rooftop applications, it is highly recommended that a waterproofing material is applied on top of the concrete.



Expansion Joints for lightweight concrete

At all points of contact between perlite lightweight concrete and walls or other framing parts, it is essential that an expansion joint of approx. 2cm thick is formed. The joint can be formed using polystyrene sheets or planks, and back-filled using dry bulk **DIOPERLI**.

In such cases, expansion joints should be formed at every 20-25 cm² of surface.

Laying Floors on lightweight concrete

Marbles or Mosaics can be directly applied over perlite lightweight concrete, using cement adhesives. For floors which shall be covered with ceramic tiles, wooden flooring or fitted carpets, then a thick layer (up to 4-5cm) of screed is required. In such a case, expansion joints should also be formed using polystyrene sheets.

Curing of lightweight concrete

Perlite lightweight concrete must be allowed to cure for at least 3 days before foot traffic or light works are allowed on top of it. Ensure that it is sprayed with water during curing period, especially in periods of hot weather.

Allow at least 4 weeks for complete curing of the concrete.

Protecting Building Reinforcement

DIOPERLI does not affect in any way the construction steel. However, oxidization may occur by moisture due to broken pipes, poor waterproofing installation etc. For this reason, it is recommended that all steel surfaces which will come in contact with the perlite lightweight concrete are painted with an appropriate anticorrosion agent.

PACKAGING

100L multiwall paper bags.

STORAGE

Store under dry conditions and away from direct sunlight, in a sheltered, free from water and moisture area. Store in closed bags preferably in the original packaging, onto a pallet or generally without direct contact with the floor.

Health and Safety Measures

- Avoid dust formation.
- Where possible, provide sufficient ventilation of the working area, as to keep the dust at low levels.
- Keep out of reach of children.
- Wash body and clothes thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Wear respiratory protection.
- Please refer to Safety Data Sheet for more information and advices regarding the safe handling, storage, use and disposal of the material.

Note 1: All Technical Data provided are based on laboratory trials and tests, under conditions which may significantly differ from the ambient application conditions. Therefore, the actual technical characteristics may vary due to conditions or circumstances beyond company's control.

Note 2: The information provided by our Technical Data Sheets or given by our employees, agents or distributors concerning the use of our products, is based upon extensive research and experience and are provided in good faith in order to help you. We guarantee the consistent high quality of our products; however, as we have no control over site conditions of the executions of work, we cannot accept any liability for any loss or damage, which may arise as a result thereof.

Note 3: All perlite based products, must be stored in dry sheltered places, on wooden pallets. Even under these circumstances, the products are influenced by the atmospheric moisture after a period of time. Since this period is not defined or standard, we strongly advise our customers not to use hardened products or if, generally, its quality due to storage is uncertain.