ISOLCUPOLEX®

PATENTED

MAXIMUM COMFORT with the INSULATED VENTILATED CRAWL SPACE

IN EPS TWINPOR™

- HEIGHT FROM 11 CM TO 250 CM;
- INSULATION COATED CRAWL SPACE;
- FLAT DOME OF VARIABLE THICKNESS ACCORDING TO THE THERMAL PERFORMANCE REQUIRED;
- EXCELLENT WALKABILITY AND PASSAGE OF SYSTEMS OR UNDERFLOOR HEATING;
- THREE FEET PER M^2 IN SINGLE PIECES WITH VARIABLE HEIGHT TO REDUCE THERMAL BRIDGES, SETTING TIMES AND CONCRETE CONSUMPTION.

PONTAROLO® ENGINEERING

IsolCupolex® is the most effective and sustainable technology for the construction of insulated ventilated crawl spaces with variable heights up to 2,5 metres.
The elements act as formwork for the reinforced concrete casting, giving the slab a structure capable of supporting high loads and leaving an empty cavity below.
Made of EPS Twinpor™, an innovative high-performance material that guarantees **high thermal insulation** and **maximum living comfort**.
The EPS insulation, placed towards the cold part, allows the concrete mass to perform the function of thermal accumulator, contributing to the maintaining of a constant temperature within the environment, guaranteed in any case by the plant engineering part.
In this way, the elimination of any thermal bridge and the constant value of radiant temperature are obtained, fundamental requisites for a high level of comfort.

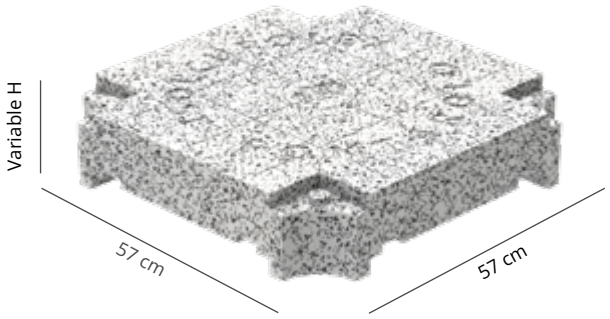
FEATURES AND BENEFITS

- Quick and easy to lay with a variety of possible configurations;
- Structure and thermal insulation in a single action;
- Self-extinguishing material;
- High insulation value;
- Low environmental footprint (2% material and 98% air);
- Absence of thermal bridges;
- Material that is durable and unalterable over time;
- Reduced flooring package;
- Can be used for underfloor systems or heating.

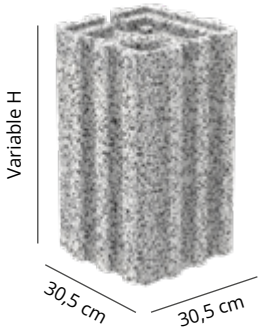
APPLICATIONS

- Ventilated crawl spaces with thermal insulation;
- Buildings with high thermal performance (NZEB, passive houses, cold rooms);
- Simultaneous casting of slab and foundation;
- Renovation and elevation of existing floors;
- Replacement of filling material;
- Buildings that require ventilation and the evacuation of gases originating from the ground (e.g. Radon).

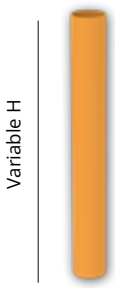
THE ELEMENTS OF THE ISOLCUPOLEX® SYSTEM



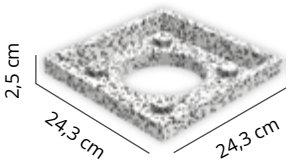
IsolCupolex®
ISOLDOME



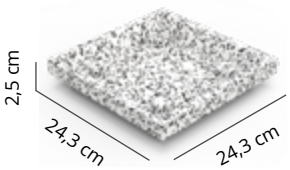
IsolCupolex®
ISOLFOOT



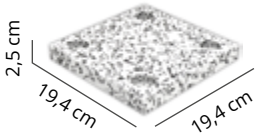
TUBE



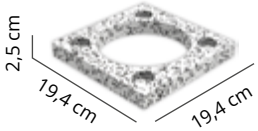
IsolCupolex®
BLOCK



IsolCupolex®
CLOSED BLOCK

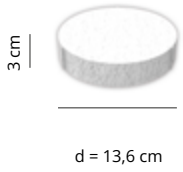


IsolCupolex®
UPPER CUP

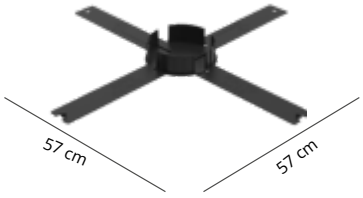


IsolCupolex®
CROWN

IsolCupolex®
ISOLFOOT support element
high resistance



IsolCupolex®
ISOLFOOT support element



IsolCupolex®
BASE

IsolCupolex®
SPACER

IT IS NEVER POSSIBLE TO PLACE TWO ISOLPIEDI ON TOP OF EACH OTHER FOR SAFETY REASONS. THIS ALSO APPLIES TO THE BLOCKS.
If stacked, the Isolfoot will cause the concrete to flow out during pouring and consequently they cannot be stacked.
Always use only one insulating element. Any greater heights are obtained with the tube inserted into the Isolfoot.

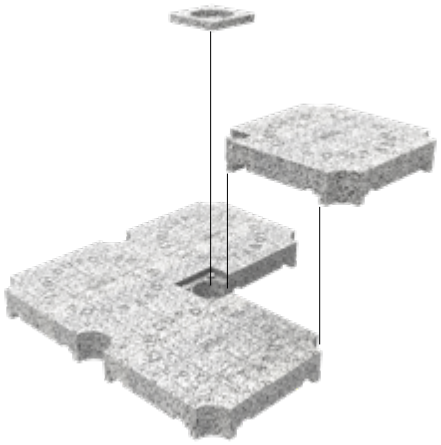
Isolfoot can be used as a lateral closure element, allowing IsolCupolex® to be adapted to the measurements of the plan without the need to use the cast retaining edge.
The tube is used for heights from 58 to 250 cm. It is possible to use any plastic tube with a diameter of 125 mm and a thickness from 2 mm to 3.2 mm;
any supply by us will be charged separately.

INSTALLATION

The **IsolCupolex® system** has several possible configurations.
The measurements indicated consider the standard dome with a nominal height of 8,5 cm and an insulation thickness of 7,3 cm.

1.

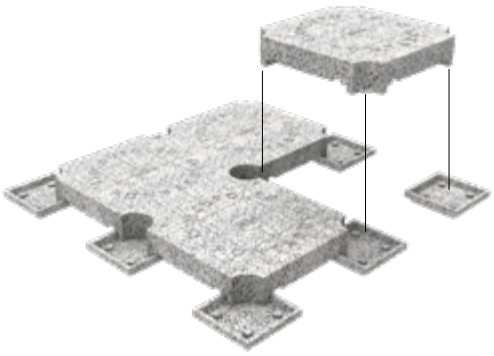
ISOLDOMES
CROWN



- Insulated crawl space with a minimum thickness of 11 cm;
- 2,5 cm of crawl space and 8,5 cm minimum of Isoldome.

2.

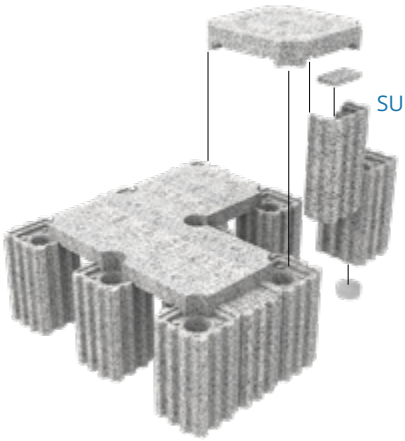
ISOLDOMES
CLOSED/OPEN BLOCK



- Insulated crawl space with a thickness of 13,5 cm;
- 5 cm of crawl space and 8,5 minimum of Isoldome.

3.

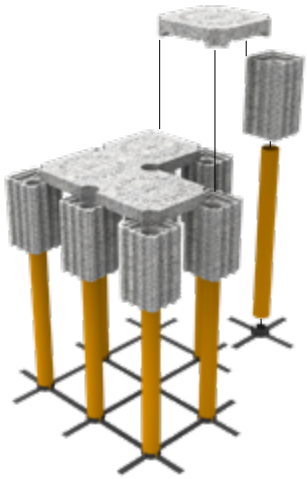
ISOLDOMES
ISOLFOOT
SUPPORT ELEMENT
CAP



- Height from 17 cm to 58 cm (minimum thickness of Isoldome 8,5 cm);
- Isolfoot + cap (also cut in half) allows the perimeter of the crawl space to be closed laterally;
- Easily shaped and adaptable to any plan;
- The constant thickness of EPS is able to guarantee a high level of insulation;
- The variable thickness of the Isoldome means high thermal performances can be achieved.

4.

ISOLDOMES
ISOLFOOT
TUBE
BASE



- Height from 58 cm to 250 cm (minimum thickness of Isoldome 8,5 cm);
- For heights greater than 58 cm, the use of the tube allows the crawl space to be raised up to the project level without additional thermal bridges;
- The base element acts as a spacer for correct installation.

FREQUENT SIZINGS

The following table shows the reinforcement required for the most frequently used applications, in the hypothesis of soil with kW = 1 kg/cm^3 and per 10 cm of lean concrete.
The underfoot contact pressure has been calculated considering the loads being uniformly distributed, a system height of 35 cm filling concrete up to dome level, a nominal dome height of 8.5 cm and an insulation thickness of 7,3 cm.
Higher loads or concentrated loads can be sized upon request by our Technical Department, as well as for soils or lean concrete different from the hypotheses.

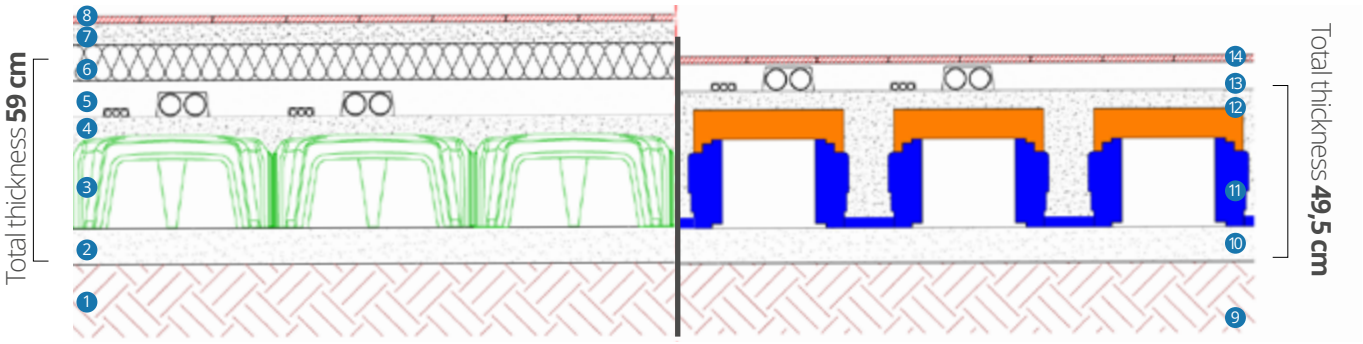
STRUCTURE USE	PERMANENT OVERLOAD (Kg/m^2)	ACCIDENTAL OVERLOAD (Kg/m^2)	SLAB THICKNESS (cm)	METALLIC REINFORCEMENT	CONTACT PRESSURE (kg/cm^2)
CIVIL HOUSING	200	200	5	ø 5/20x20	1,34
OFFICES	200	300	5	ø 5/20x20	1,57
GARAGES	300	700	6	ø 6/20x20	2,76
LIGHT INDUSTRY	300	1200	7	ø 8/20x20	3,95
INDUSTRY	300	1600	8	ø 8/15x15	4,91
COLD ROOMS	300	7200	15	2 x ø 12/20x20	10,9

COMPARISON BETWEEN ISOLCUPOLEX AND THE TRADITIONAL CRAWL SPACE

Ventilation chamber 26 cm high

Cupolex Elements H 26 cm

Isolcupolex Elements H 34,5 cm



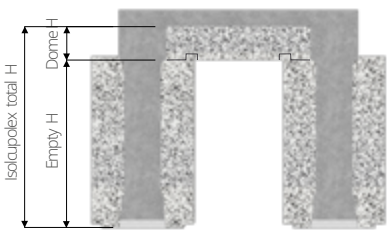
Legend

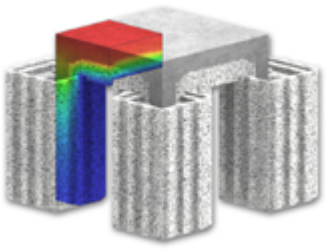
1. Soil
2. Lean Concrete
3. Ventilated crawl space Cupolex H26
4. Reinforced concrete completion slab (th = 5cm)
5. Lightened screed with systems passage th = 10 cm
6. Extruded polystyrene panel th= 8 cm
7. Reinforced screed th. = 6 cm
8. Flooring
9. Soil
10. Lean Concrete
11. Ventilated crawl space IsolCupolex H 34.5 cm
12. Reinforced concrete completion slab (th = 5 cm)
13. Screed with systems passage (th = 8 cm)
14. Flooring

CRAWL SPACE THERMAL PERFORMANCE WITH SLAB

The tables show, based on the configuration and heights of the elements, the correct Transmittance U of the system, which takes into account the thermal bridges created by the feet. The value of the point thermal bridge of the individual foot is also reported

Isoldome H (cm)	Empty H (cm)	Isolcupolex $_{total}$ H (cm)	With support element		Without support element	
			Transmittance U_{eq} [W/(m²K)]	Thermal bridge X [W/K]	Transmittance U_{eq} [W/(m²K)]	Thermal bridge X [W/K]
8,5	5	13,5	0,420	0,012	-	-
	10	18,5	0,424	0,019	-	-
	15,5	24	0,436	0,018	0,530	0,048
	25,5	34	0,451	0,022	0,514	0,043
	40,5	49	0,464	0,026	0,489	0,035
	49,5	58	0,468	0,027	0,476	0,030
10	5	15	0,366	0,015	-	-
	10	20	0,372	0,017	-	-
	15	25	0,384	0,020	0,472	0,048
	25	35	0,399	0,025	0,458	0,044
	40	50	0,410	0,028	0,434	0,037
	50	60	0,414	0,029	0,422	0,032
15	5	20	0,269	0,019	-	-
	10	25	0,277	0,021	-	-
	15	30	0,286	0,024	0,355	0,047
	25	40	0,298	0,028	0,347	0,043
	40	55	0,308	0,031	0,327	0,038
	50	65	0,310	0,032	0,317	0,034
19,5	5	24,5	0,224	0,020	-	-
	10	29,5	0,233	0,023	-	-
	15,5	35	0,238	0,025	0,295	0,043
	25,5	45	0,256	0,029	0,292	0,041
	40,5	60	0,263	0,031	0,279	0,036
	49,5	69	0,265	0,032	0,265	0,034





Example of the temperature trend obtained with the three-dimensional thermal analysis with the finite elements of Isocupolex®

MATERIAL – HIGH PERFORMANCE EPS

TWINPOR™ is the composition of EPS (Sintered Expanded Polystyrene) with **high insulating performance** identified by the Pontarolo Engineering researchers.
The particular mix of white and graphite pearls, in fact, gives it a high insulating property and at the same time resolves the problems of light reflection and crystallisation of the material due to sun exposure on site.

λ=0,031 (W/m*K)

ISOLCUPOLEX® TO CREATE COLD ROOM

With the already insulated **ISOLCUPOLEX®** system it is possible to integrate crawl space and an important layer of thermal insulation to the system, minimising the exchange of heat and wasted energy due to the use of cold rooms and guaranteeing high capacity and durability of the structure.

- Laying of insulation and creation of the sanitary space in a single action with consequent reduction of construction times and costs;
- Dry structure thanks to the ventilation of the crawl space which removes rising damp by capillarity and prevents freezing and breaking of the industrial floor;
- High bearing capacity of the structure thanks to the presence of support elements capable of withstanding loads up to 30,000 kg/m2, without causing deformation of the floor over time.

RENOVATION

NEW CONSTRUCTION

STRUCTURAL STRENGTH

The reinforced concrete slabs that are created with the Cupolex systems have been tested with load tests in collaboration with the CNR and the University of Padua and the results obtained have been used for the implementation of the calculation code of the "Easy Cupolex" software which can be requested from our Technical Department.

CONCRETE CONSUMPTION

- **0.006776 m³/m²** for Isolfoot H15 + 0.000293 m³/m² for each additional centimetre of height of Isolfoot
- **0.0099 m³/m²** for the Isoldome H10 + 0.000488 m³/m² for each additional centimetre of height of the Isoldome
- **0.01 m³/m²** for every centimetre of upper structural slab

SYSTEM HEIGHT* (cm)	11	20	30	40	50	70	100	150	200
CONSUMPTION OF CONCRETE FOR FILLING UP TO DOME LEVEL (m³/m²)	0,010	0,016	0,018	0,021	0,024	0,029	0,038	0,053	0,067

* Values calculated for an Isoldome height of 10 cm

CERTIFICATIONS: with reference to the UNI EN 13163 standard, the IsolCupolex® EPS is equipped with the relative CE

ISOLCUPOLEX® SPECIFICATION ITEM

Supply and installation, on a preformed surface, of ventilated crawl space with insulation coating such as Isolcupolex or similar with low thermal conductivity (0.031 W/m2*K) produced with EPS such as Twinpor or similar.
The system includes flat insulating elements with a nominal thickness of ..... cm
(from 8.5 cm upwards), designed to form a perfectly horizontal plane to reduce concrete consumption and to allow easy installation of the systems.
These isolated horizontal elements are of variable thickness depending on the required insulation and are laid on monolithic feet insulated with an average thickness of 10 cm in EPS type Twinpor or similar. On average there are 3 feet per square meter to reduce thermal bridges, laying times and concrete consumption.
These isolated feet provide the height of the crawl space, equal to ..... cm and are placed on support elements (in 200 or high resistance EPS, non-deformable up to 10,000 kg/m2) which act as a thermal break at the base of the crawl space and do not affect the height of the sanitary space. Once installation has taken place, the metallic reinforcement will be placed according to the project which is excluded and paid for separately. Subsequently, concrete will be cast with resistance class C25/30 (Rck 30), proceeding initially with filling of the feet and then with the formation of the upper structural slab of the flat elements, which will be of the thickness envisaged by the project.
Price on site including the supply and installation of concrete with a superior finish by means of a concrete leveller and any other charge with the exclusion of the reinforcing rods and the formation of the underlying support surface.
Price: ..... €/mq

CUSTOMER SERVICE

Our technical department is also always available to provide you with assistance during the design phase.
Send the foundation plan by e-mail in .dwg.dxf.pdf format to **assistenza@pontarolo.com**
The CAD applications can be found on the **www.pontarolo.com** website while the calculation software for the Cupolex crawl spaces can be requested from our Technical Department. For telephone information: **+ 39 0434.857010**

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PONTAROLO® ENGINEERING

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IsolCupolex® is produced in Friuli Venezia Giulia, Italy