



indecal®

Underfloor heating and cooling radiant system
with low thickness









Indecal is a company specialised in the production of plasterboard and gypsum fibre board for radiant heating and cooling systems with low thermal inertia that can be used in ceilings, walls and floors.

INDECAL proposes the SLIM 18 underfloor radiant solution for heating and/or cooling with low thermal inertia, thus overcoming traditional radiant systems that adopt a continuous running to get the full operating power. It allows any type and size of covering (stoneware, parquet, natural stone, etc.) to be laid in a very short time in just 18 mm together with 5 mm of self-levelling screed.

A traditional underfloor radiant system requires approximately 90 mm thickness for the floor covering to be laid, whereas with the INDECAL Slim 18 solution, **a thickness of 23 mm is sufficient**.

Carrying out a building renovation in the traditional way involves demolishing the old system, long processing times, and costs for transport, disposal and delivery of building aggregates, all of which can be avoided without further burdening the structure with the INDECAL SLIM 18 dry system.

INDECAL SLIM 18 is the best installation solution in renovations; as it has a reduced thickness, it can be applied directly on top of the existing floor without removing the old one, resulting in considerable cost and time savings. The installation of our system is dry and **it is very fast**; the pipe spacing is 100 mm while the diameter of the pipe laying in the panels is 12 mm with an oxygen barrier with lifetime guarantee.
The length of the circuits does not exceed 70 m, thus avoiding the installation of additional circulators.

In order to optimise the space occupied by the manifold, it is possible to equip each of its output with a splitter, thus allowing two circuits to be linked in one connection.

ADVANTAGES

- Overall thickness including screed 23 mm
- No need of masonry work and no costs for dismantling existing flooring, transport and debris disposal
- Laying on existing flooring
- Full operating time within minutes
- High energy savings
- No restrictions on coating types and formats
- Use of the system in both heating and cooling mode

APPLICATION FIELD

- Building construction
- Industrial building
- Service industry

It is ideal in rooms that are occasionally occupied, where there is no available height or where the structure must not be overloaded.

INDECAL Slim 18 consists of gypsum fibre board, edge insulating strip, manifold cabinet, manifold, Euroquick fittings, 12 mm diameter Pe-XC pipe with oxygen barrier, self-levelling screed (optional). For the cooling mode, it also includes isothermal wall or ceiling dehumidifiers, home automation temperature control or thermostats and humidistats and chiller.



Product data sheet

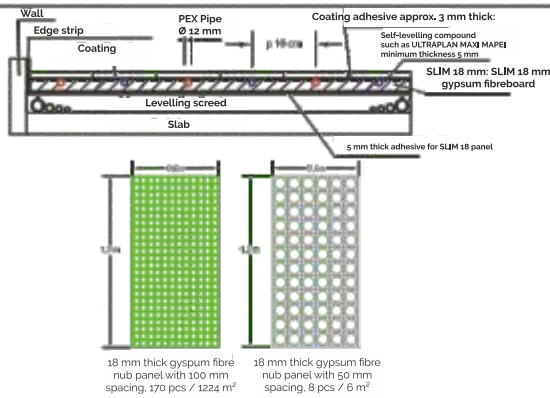




DESCRIPTION	
MATERIAL	Gypsum fibre
EDGE	Square edge
THICKNESS	Panel: 18 mm - screed: 5 mm
LENGTH	300 mm – 600 mm
WIDTH	1200 mm – 300 mm
WEIGHT	22 kg/m^2 for 18 mm thick panels
DENSITY	1100 kg/m^3
LAYING	Dry laying
POSSIBLE PIPE SPACINGS	50 mm – 100 mm
PIPE DIAMETER	10-12-14 mm
MAX. CIRCUIT LENGTH	70-75 m
MAX. FLOW RATE OF THE SYSTEM	140-160 l/h

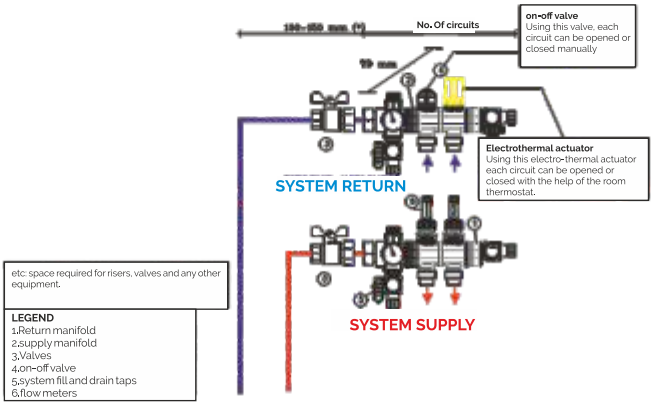
Use	Application	Performance
Radiant floor heating and cooling with low thickness	Renovations, new buildings, timber houses, prefabricated buildings	Good thermal conductor, excellent acoustic insulation, non-combustible, biocompatible.

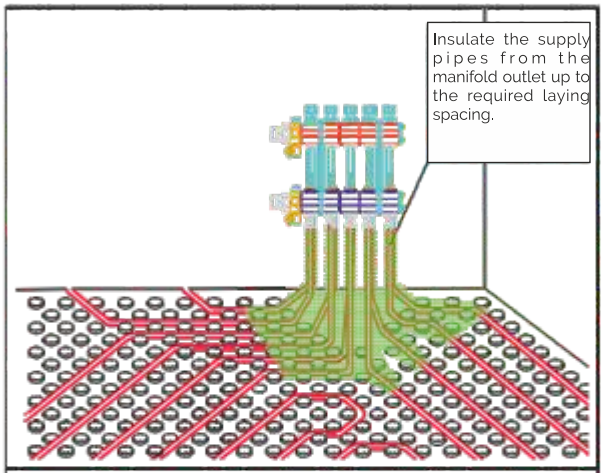
TYPICAL DRY RADIANT FLOOR SECTION



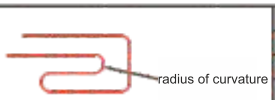
CALCULATED NET AREA: 128.4 m² **PANEL SURFACE: 128.4 m²**

Details: distribution manifolds





LAYING NOTE
Regardless of the graphical layout shown in this drawing, the minimum bending radius of the pipe must not be less than 5 times the diameter.



Ø 12 mm	min. 60 mm
Ø 14 mm	min. 70 mm
Ø 16/17 mm	min. 85 mm
Ø 20 mm	min. 100 mm
Ø 25 mm	min. 125 mm

Note:
As per current regulations, this executive must be approved by a qualified technician, who may make any changes deemed appropriate.

TECHNICAL NOTES FOR THE INSTALLER

1.INSTALLATION GUIDE
- Place the under-plaster manifold cabinet at the correct height, taking into account the total space to be taken up, and appropriately protruding the back with anti-shrinkage mesh to allow proper adhesion of the plaster, as well as ensuring the correct bending radius of the pipe.
Check that the passages indicated in the figure are practically passable, i.e. free of obstructions or other hindrances.
-Check that the available floor thickness is as per drawing.
-Near the manifolds, where the outgoing and return pipes of the circuits gather, in order to avoid excessive heat emission and consequent unevenness of the floor temperature, it is advisable to insulate the pipes alternately (insulation thickness 3 mm)
-Expansion joints must be installed at the positions and in the ways indicated. The surface area of individual sections must not exceed 40 m² with a maximum side length of 8 m.
-The manifold is equipped with fill/drain taps, open these and fill one circuit at a time by opening the corresponding lockshield. Degassing the circuits. Repeat the same operation for all other circuits.

2.SYSTEM TESTING
Once the installation of the system piping has been completed, it will be carried out hydraulic testing as follows:

PRELIMINARY TEST
-Fill the various circuits of the system, connecting to the distribution manifold, in order to vent any air pockets
-Connect the hand pressure pump to the manifold and test each circuit at 2 times the working pressure with min. 6 bar, check and restore the pressure to the point where the fluctuation depends only on the daily climatic variability of the site. At the end of the pre-test, the hydrostatic pressure should be stable (maximum variation of 0,2 bar from the nominal test value)

3.LAYING THE SELF-LEVELLING SCREED
-The system must be kept under pressure during the screed laying phases.
After the hydraulic test, it will be possible to coat the pipes with premixed mixture.
-Insulating panels and piping should be preserved from any damage may occur before and during the laying of the screed; provide planks or equipment to prevent the passage of wheelbarrows or installers form deteriorating them. Excessive stresses on the panels should be avoided so that their insulating effect is not compromised.

4.COMPOSITION OF SELF-LEVELLING SCREED WITH VERY LOW THICKNESS
Mapei brand mortar, Ultraplan Maxi model, with high mechanical resistance and suitable for heating floors, Composed of fast-setting and hydrating special cements, controlled grain size silica sands and special resins/additives,
It has characteristics of high substrate adhesion and fast setting; water-mixed mortar has very low shrinkage properties, thus preventing the formation of cracks and achieving a very high resistance to compression, bending, imprint and scraping. Substrate must be level, dry and free of dust and removable parts. It is recommended to use EP primer before laying the levelling mortar.
Minimum thickness of screed laying: 3 mm (recommended an average thickness of 5 mm);
setting time: 1 hour
walkable in 3 hours
waiting time before thermal test: 72 hours
After installation is completed the screed should be protected form drying, direct sunlight and the bad effect of heat and drafts to prevent the formation of cracks or abnormal shrinkage. If the climatic condition requires it, windows and doors must already be closed when laying the screed.

5.THERMAL TESTING
-To be carried out before laying the coatings
-Make a gradual turn-on of the system starting from a temperature of 25° C, increasing by 5°C every 3 days, until the flow temperature of 50°C is reached.
-Cool the flow temperature progressively by 10 degrees per day, until the equilibrium temperature is reached

6.CALIBRATION OF THE SYSTEM
-Before adjusting, turn on
- the system and bring it to its full capacity
Perform hydraulic/thermal balancing of the circuits by calibrating them to the design flow rate and verifying the operating temperature of the floor using a thermal imaging camera or laser temperature probe.

DIRECTIONS FOR LAYING THE PANELS

Pose the panels from the fixed wires identified in the plan for each room. Use a milling machine to groove sections if needed.

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Subject: Laying execution of Indecal Slim 18 underfloor radiant with low thickness laying execution

Client:

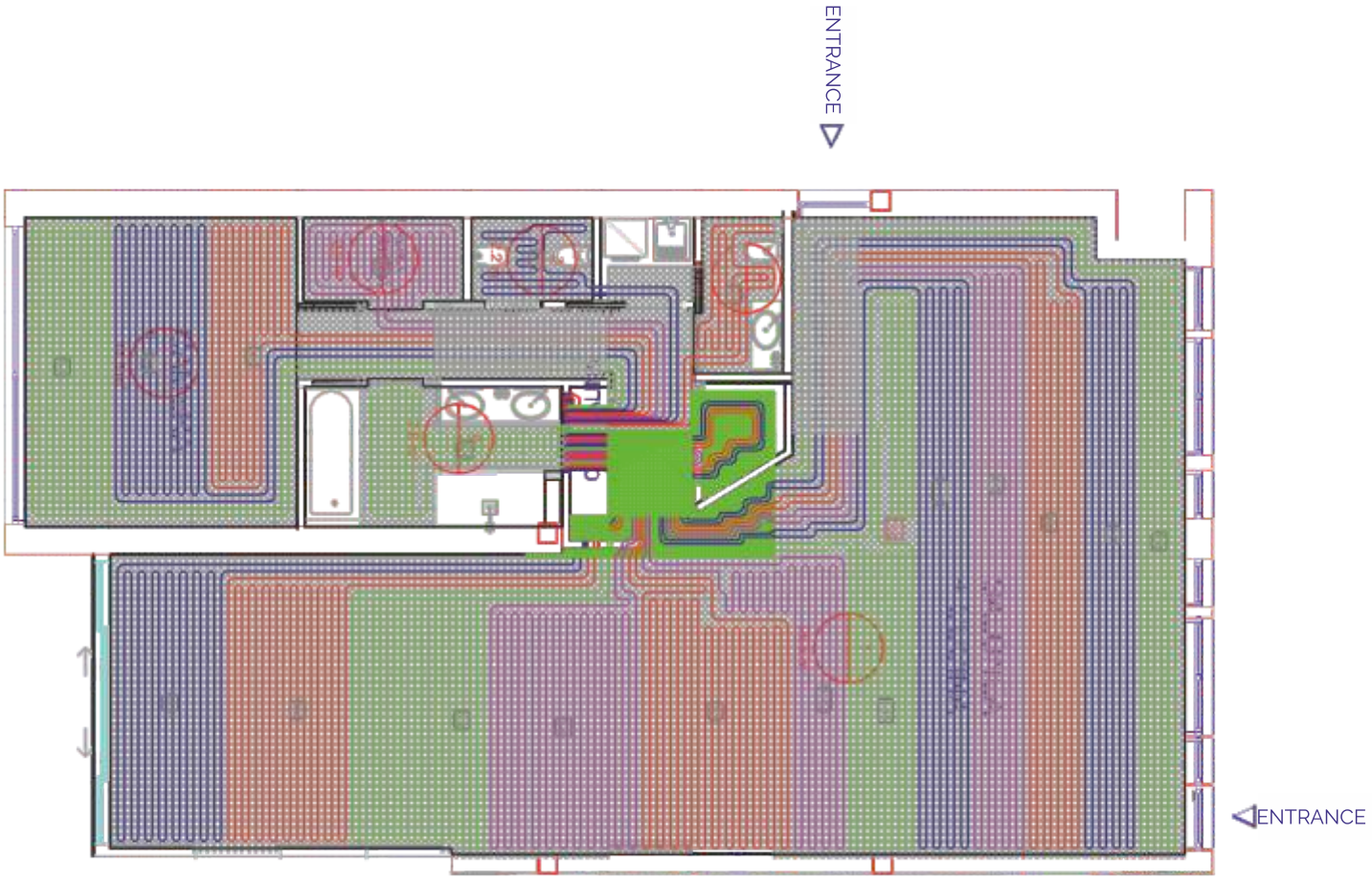
Site reference:

Installing firm:

Scale	Figure nuber
1:100	1

Ref. fig. 01	-------
Designer	INDECAL srl
Date	

Fig. rev.	Date
1	
2	



ROOM NUMBER	ROOM AREA	PANEL NUMBER	PIPE LENGHT (M+R)	PIPE SPACING	FLOW RATE l/h
1	95.5 mq	1-1	82 m	10 cm	105 l/h
		1-2	84 m	10 cm	107 l/h
		1-3	85 m	10 cm	107 l/h
		1-4	87 m	10 cm	109 l/h
		1-5	88 m	10 cm	110 l/h
		1-6	87 m	10 cm	99 l/h
		1-7	101 m	10 cm	118 l/h
		1-8	99 m	10 cm	115 l/h
		1-9	93 m	10 cm	112 l/h
		1-10	88 m	10 cm	107 l/h
		1-11	79 m	10 cm	93 l/h
		1-12	52 m	10 cm	58 l/h
2	2.7 mq	2-1	22 m	10 cm	23 l/h
3	2.2 mq	3-1	22 m	10 cm	20 l/h
4	2.9 mq	4-1	40 m	10 cm	40 l/h
5	17.5 mq	5-1	74 m	10 cm	87 l/h
		5-2	79 m	10 cm	92 l/h
		5-3	54 m	10 cm	57 l/h
6	7.6 mq	6-1	27 m	10 cm	35 l/h

MAINFOLD NO	CONNECTIONS NO	FLOW RATE l/h	HYDRAULIC NEAD mbar
C1	19 + 19	1593	901

TECHNICAL LAYING INSTRUCTIONS

RECOMMENDED SCREED TYPE

In radiant systems with low thickness and reduced thermal inertia, we recommend the application of appropriate self-levelling screeds such as Leca's PARIS SLIM, Maxi's NOVOPLAN or Knauf's NE499 levelling screed, which have the following features:

- thickness of only 5 mm pipe/nub
- resistance to compression of 300kg/cm^2
- excellent thermal conductivity of 1.45 W/mk
- rapid curing, first start-up after only 4 days
- fast drying within 8 days for parquet (without thermal cycle) and 5 days for ceramic (without thermal cycle)
- suitable for laying all types of floor coverings, including resilient coverings (rubber, PVC, linoleum) and large ceramic floor tiles
- coverage approx. 2 kg/sq.m. for 1 mm thickness



Install the cabinet in the positions shown on the plan and secure the manifold inside it.



Place the edge strip.





Lay the panels according to the received designs in the executive project

Warnings for installing the system on the existing floor

Clean the floor and check the flatness, stability and mechanical strength of the existing floor. In ceramic, stoneware and marble flooring, primer must be used to clean and degrease the surface in order to allow good adhesion between the gypsum fibre boards and the flooring using the bonding agent.



Shape the panels where necessary



When the system is laid, the panels must be bonded to each other and to the walls without leaving any major cracks.





After cleaning any dust residue, apply the primer by brush or airless over the entire surface of the panels.

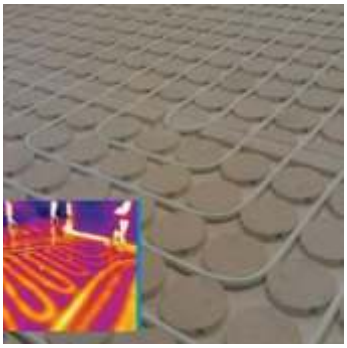





After 48 hours, the backfill can be spread and levelled off to a minimum thickness of 5 mm above the nub.
The maximum screed thickness that can be achieved is 15 mm.

Wait 24 hours for perfect drying. The floor must be dry and perfectly flat.






Proceed with bonding the floor. - Cut the edge band. - Apply the baseboard.

NOTES:

- The bonding of the surface finish must be done using elastic products suitable for floor systems.
- For the finishing of ceramic tiles, it is recommended to keep joints of at least 3 mm.
- For other types of finish, it is advisable to consult the manufacturer of the finish.
- It is advisable that the finish bonded to the screed has standard dimensions. If the aesthetic choice is for large formats (50 x 50 cm and more) or consists of valuable materials (natural stone / natural wood parquet with high thickness, etc.) the bonding agents recommended by the suppliers of the finish must be used.

Indicative heat emission and pipe pressure drop tables

Tab. 1 Panel heat emission (tiles)

Temp. difference ΔT 8°C		Room temperature							
		15°C		18°C		20°C		22°C	
Flow temperature °C	Spacing in cm	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°
35	10,5	103,9	22,4	85,8	23,7	73,7	24,5	61,6	25,2
40	10,5	134,0	24,5	116,0	26,1	103,9	26,8	91,8	27,9
45	10,5	164,0	26,5	146,0	28,0	134,0	29,0	122,0	29,7

Tab.2 - Panel heat emission (parquet, linoleum)

Temp. difference ΔT 8°C		Room temperature							
		15°C		18°C		20°C		22°C	
Flow temperature °C	Spacing in cm	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°
35	10,5	75,9	20,0	62,6	21,6	53,7	23,2	44,9	24,12
40	10,5	97,7	22,0	84,6	23,4	75,8	24,8	66,9	26,19
45	10,5	119,7	23,9	106,5	25,6	97,7	26,6	89,0	27,5

Tab.3 - Panel heat emission (carpet, thick parquet >10 mm)

Temp. difference ΔT 8°C		Room temperature							
		15°C		18°C		20°C		22°C	
Flow temperature °C	Spacing in cm	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°	Output in w/m²	Average floor temp. C°
35	10,5	59,7	19,3	49,2	20,8	42,3	22,1	35,4	23,3
40	10,5	77,1	20,8	66,8	22,6	59,76	23,7	52,9	24,9
45	10,5	94,4	22,2	84,0	24,0	77,1	25,3	70,2	26,1



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