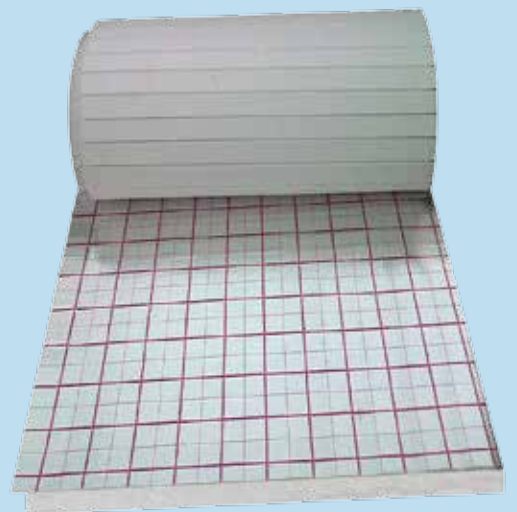
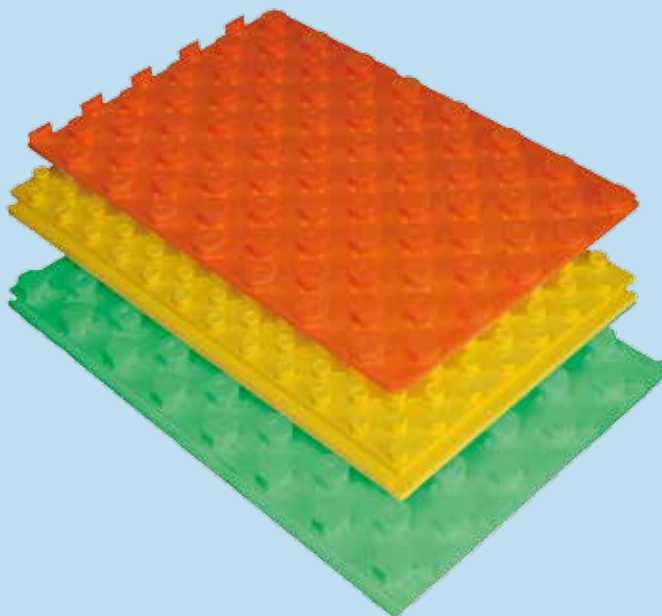
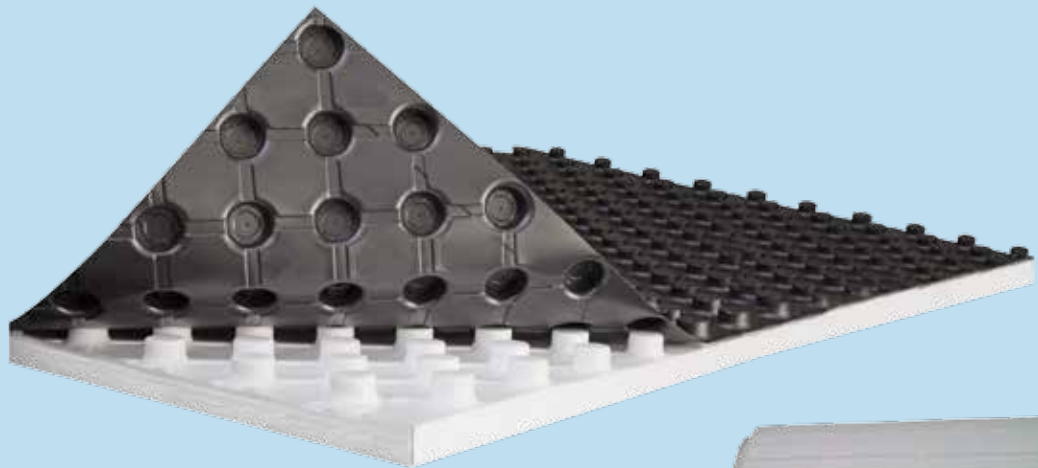


## The floor heating system with radiant panels

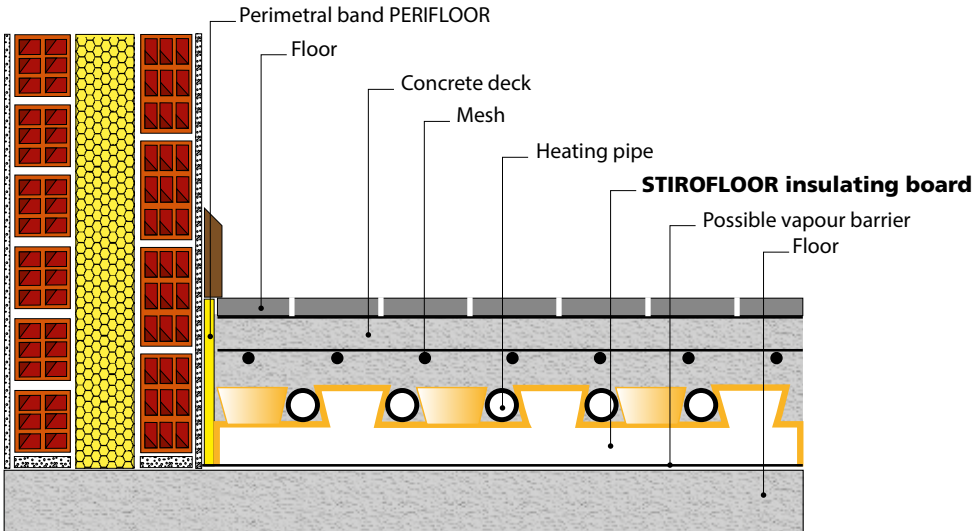


# The floor heating system with radiant panels

The floor heating with radiant panels is the system with the highest energetic efficiency widely spread in all European countries, which allows to design and build buildings in high Energy Class (Gold Class, Class A Plus etc.).

**The principle of operation** of the system with radiating panels is based on the circulation of hot water at low temperature, typically between 30 °C and 40 °C, in a closed circuit, which is spread by covering a very high radiating surface.

## AN EXAMPLE OF STRATIGRAPHY OF THE RADIANT PANEL

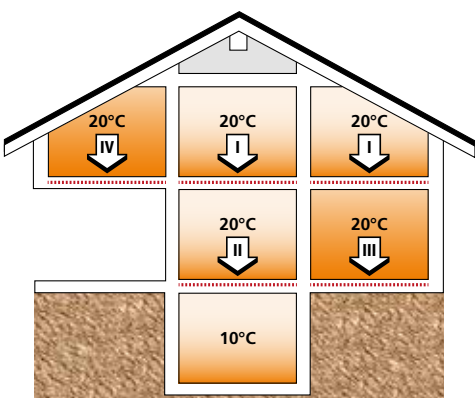


The European **Norm** governing the design and installation of heating floor is **EN 1264** (waterbased surface embedded heating and cooling system), which applies to all residential buildings, offices and other buildings the use of which corresponds or it is similar to that of residential buildings (eg. hotels, nursing houses, colleges, convents, barracks, etc.). This Norm covers the main definitions and their symbols, related to the installations with underfloor heating, fed with hot water, used in residential or similar. It does not apply to heating systems with wooden floor, while it can be used in the case where other heating means are used instead of water.

## The Norm EN 1264 is structured into 5 parts:

- EN 1264-1: 2011 Definitions and symbols
- EN 1264-2: 2008, A1:2012 Floor heating: prove methods for the determination of the thermal output using calculation test methods
- EN 1264-3: 2009: Dimensioning of both heating and cooling system - effective thickness
- EN 1264-4: 2009 Installation
- EN 1264-5: 2008 Heating and cooling surfaces embedded in floors, ceilings and walls - Determination of the thermal output

The NORM EN 1264-4, at paragraph 4.1.2.2.1 table1, recommends what should be the minimum values of thermal resistance ( $R_D$ ) of the insulating panels used in the underfloor heating systems, distinguishing five different cases, based on the conditions existing under the heated rooms. These minimum values of thermal resistance ( $R_D$ ) translate in EFFECTIVE THICKNESSES reported in the following tables for the various types of insulating boards used.



## Minimum values of thermal resistance $R_D$ according to the Norm EN 1264-4

Thermal Resistance $R_D$	Heated room below or adjacent	Unheated or intermittent heated room below, adjacent or directly on the ground	External air temperature below or adjacent		
			External design temperature $T \geq 0^\circ\text{C}$	External design temperature $0^\circ\text{C} > T \geq -5^\circ\text{C}$	External design temperature $-5^\circ\text{C} > T \geq -15^\circ\text{C}$
	0,75 m <sup>2</sup> K/W	1,25 m <sup>2</sup> K/W	1,25 m <sup>2</sup> K/W	1,50 m <sup>2</sup> K/W	2,00 m <sup>2</sup> K/W



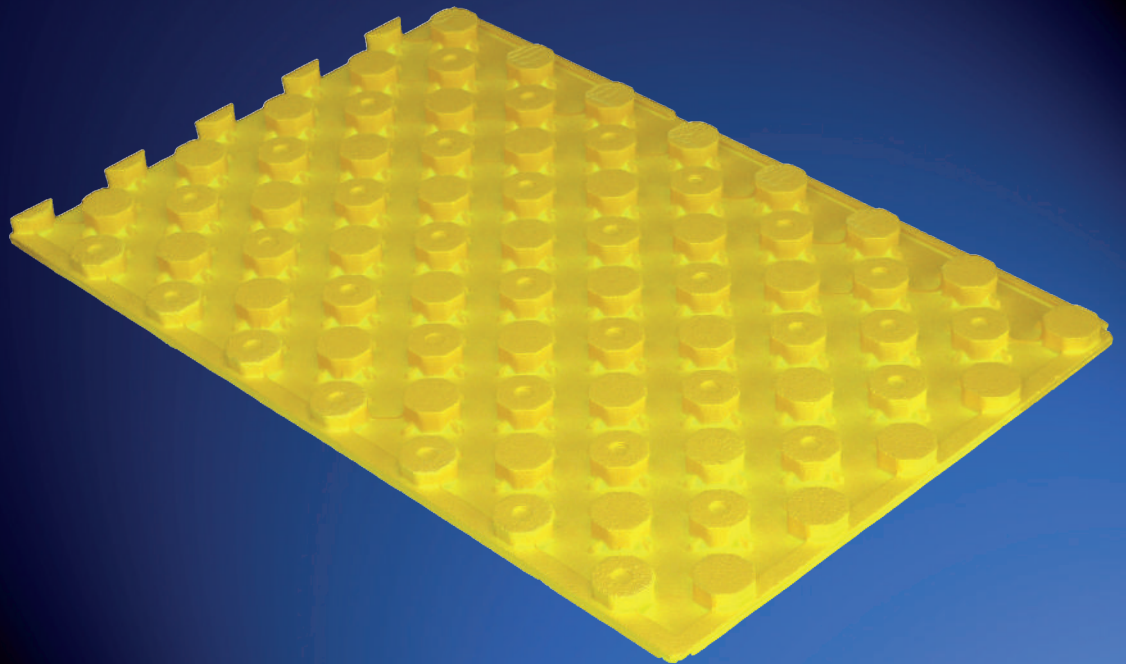
Sirap Group

**Sirap Insulation**

Associated with Italcementi Group

# PAVIFLOOR®

Insulating boards for radiant floor heating and cooling systems





# PAVIFLOOR®



## PAVIFLOOR

PAVIFLOOR thermoformed expanded polystyrene boards have a high-impact polystyrene film (HIPS), bonded onto its upper face, which protects the board from mechanical damage during its installation and acts as a vapour barrier.

### Advantages of a radiant floor heating/cooling system

- Improved temperature distribution
- Preservation of a lower air temperature with little heat loss
- Decreases the formation of dust by increasing air circulation
- Possibility using the system to reduce internal temperature during the summer months
- No visible radiators, with no damage to wall coverings and, most importantly, lower maintenance costs.

### Advantages of PAVIFLOOR

- Reinforced boards
- Zero cold bridges due to the hook joints in the boards
- Quick and easy installation of the piping
- Various mounting possibilities:
  - By integrated stubs (PAVIFLOOR F)
  - By fixing clips (PAVIFLOOR P)
- Environmentally friendly, both CFC and HCFC free with a zero OPD, manufactured from one basic raw material (Polystyrene).

Technical properties	Norm	Measure Unit	Results		
			EPS 120	EPS 150	EPS 200
Dimensions: Length Width Thickness	EN 822	mm	1350±3 mm	1350±3 mm	1350±3 mm
	EN 822		750±2 mm	750±2 mm	750±2 mm
	EN 822		45-50-60±2 mm	45-50-60±2 mm	45-50-60±2 mm
Flatness	EN 825	mm	≤ 5	≤ 5	≤ 5
Compressive strength $R_c$ at 10% max deformation	EN 826	kPa	120	150	200
Dimensional stability (70°C / 48 h.)	EN 1604	%	± 0,5	± 0,5	± 0,5
Declared Thermal conductivity $\lambda_D$	EN 12667	W/mk	0,035	0,034	0,033
Fire reaction	EN ISO 11925-2	Euro Class according to EN 13501-1	Ed2	Ed2	Ed2



## EPS

Thermoformed expanded polystyrene boards with stubs covered with a HIPS film for radiant floor heating and cooling systems



Sirap Group

**Sirap Insulation**

Associated with Italcementi Group

### Sirap Insulation S.r.l.

via Kennedy, 54 - 25028 Verolanuova - (BS) - Italia  
T. +39. 030.9368.342 - F. +39. 030.9368.257  
info.insulation@sirapgroup.com - www.sirapgroup.com

## SCHEDA TECNICA PAVIFLOOR® (passo 75 mm)

### DESCRIZIONE DEL PRODOTTO:

pannello in polistirene espanso sinterizzato stampato, esente da CFC e HCFC, rivestito all'estradosso con film HIPS, per la **coibentazione in sottopavimento con riscaldamento a pannelli radianti**, conforme alla norma UNI EN 13163.

CARATTERISTICHE PRODOTTO								
Proprietà	Unità	Norma	Valore				Tolleranza	
Classe	-	EN 13163	120	150	200	300		
Formato (Lunghezza X Larghezza)	mm	EN 822	1373 x 773				± 0,6%	
Lunghezza utile x Larghezza utile	mm	EN 822	1350 x 750				± 0,6%	
Spessore totale	mm	EN 823	45 - 50 - 60 - 65 - 70 - 90				±2	
Diametro tubo riscaldante (medio consigliato)	mm	-	16 ÷ 18 mm					
Passo (interasse di posa in opera)	mm	-	75					
Planarità	mm	EN 825	≤ 5					
Ortogonalità	mm/m	EN 824	± 2					
Resistenza a compressione R <sub>c</sub> al 10% di deformazione max	kPa	EN 826	120	150	200	300	-	
Conduttività termica λ <sub>D</sub>	W/mK	EN 12667	0,035	0,034	0,033	0,032	-	
Res. termica R <sub>D</sub> spessore 45 mm	su spess. ponderato 23,6 mm	m <sup>2</sup> /KW	EN 1264-3	0,65	0,70	0,70	0,70	-
Res. termica R <sub>D</sub> spessore 50 mm	su spess. ponderato 28,6 mm			0,80	0,85	0,85	0,90	-
Res. termica R <sub>D</sub> spessore 60 mm	su spess. ponderato 38,6 mm			1,10	1,10	1,15	1,20	-
Res. termica R <sub>D</sub> spessore 65 mm	su spess. ponderato 43,6 mm			1,25	1,25	1,30	1,35	
Res. termica R <sub>D</sub> spessore 70 mm	su spess. ponderato 48,6 mm			1,35	1,40	1,45	1,50	
Res. termica R <sub>D</sub> spessore 90 mm	su spess. ponderato 68,6 mm			1,95	2,00	2,05	2,10	
Stabilità dimensionale a caldo (48h a 70°C)	%	EN 1604	± 0,5				± 1	
Assorbimento d'acqua per immersione parziale	Kg/m <sup>2</sup>	EN 12087	W <sub>lp</sub> (≤ 0,5 kg/m <sup>2</sup> )				-	
Assorbimento d'acqua a lungo periodo per immersione totale	%	EN 12087	WL(T)3 (≤ 3%)				-	
Fattore di resistenza alla diffusione del vapore d'acqua (pannello nudo)	μ	EN 12086	30 ÷ 70		40 ÷ 100		-	
Permeabilità al vapore d'acqua δ (pannello nudo)	mg/Pa.h.m	EN 12086	0,010 ÷ 0,024		0,007 ÷ 0,018		-	
Permeabilità al vapore d'acqua del film HIPS	g/m <sup>2</sup> -24h	ASTM F1249	9,8				-	
Reazione al fuoco	Euroclasse secondo EN 13501-1	EN ISO 11925-2	Ed2				-	
Temperatura max di esercizio	°C	-	70				-	
Calore specifico	J /kgK (a 20°C)	EN 10456	1450					

Codice di designazione secondo EN 13163:

Classe 120: EPS-EN 13163-T1-L1-W1-S2-P4-CS(10)120- DS(70,-)1 - WL(T)3

Classe 150: EPS-EN 13163-T1-L1-W1-S2-P4-CS(10)150- DS(70,-)1 - WL(T)3

Classe 200: EPS-EN 13163-T1-L1-W1-S2-P4-CS(10)200- DS(70,-)1 - WL(T)3

Classe 300: EPS-EN 13163-T1-L1-W1-S2-P4-CS(10)300- DS(70,-)1 - WL(T)3

CONFEZIONE						
Scatola in cartone, aperta sui 2 lati, dimen. 760 x 460 x 1380 mm						
Spessori	45 mm (15 base + 10 secondo livello + 20 bugna)	50 mm (20 base + 10 secondo livello + 20 bugna)	60 mm (30 base + 10 secondo livello + 20 bugna)	65 mm (35 base + 10 secondo livello + 20 bugna)	70 mm (40 base + 10 secondo livello + 20 bugna)	90 mm (60 base + 10 secondo livello + 20 bugna)
N° pannelli per confezione	14	12	10	8	8	6
Superficie di posa per confezione	14,16 m <sup>2</sup>	12,14 m <sup>2</sup>	10,12 m <sup>2</sup>	8,10 m <sup>2</sup>	8,10 m <sup>2</sup>	6,07 m <sup>2</sup>

