THE FLOOR RENOVATION SYSTEM WP

INTRODUCTION

COMFORT OF AN UNDERFLOOR HEATING

In general there are three kinds of heat transfer - conduction, convection and radiation.

With an underfloor heating the heat is transmitted through radiation. This has the advantage that all room confining areas show a homogenous temperature allocation.

The use of an underfloor heating also avoids the raise of dust as known from radiator heatings and this way improves the room hygiene. Since dust often causes allergies, a panel heating can create a healthier surrounding. In general the room shows less hot and dry air due to the even heat distribution. The respiratory system of the residents is less irritated and the risk of inflammations and the growth of bacteria and viruses is minimised.

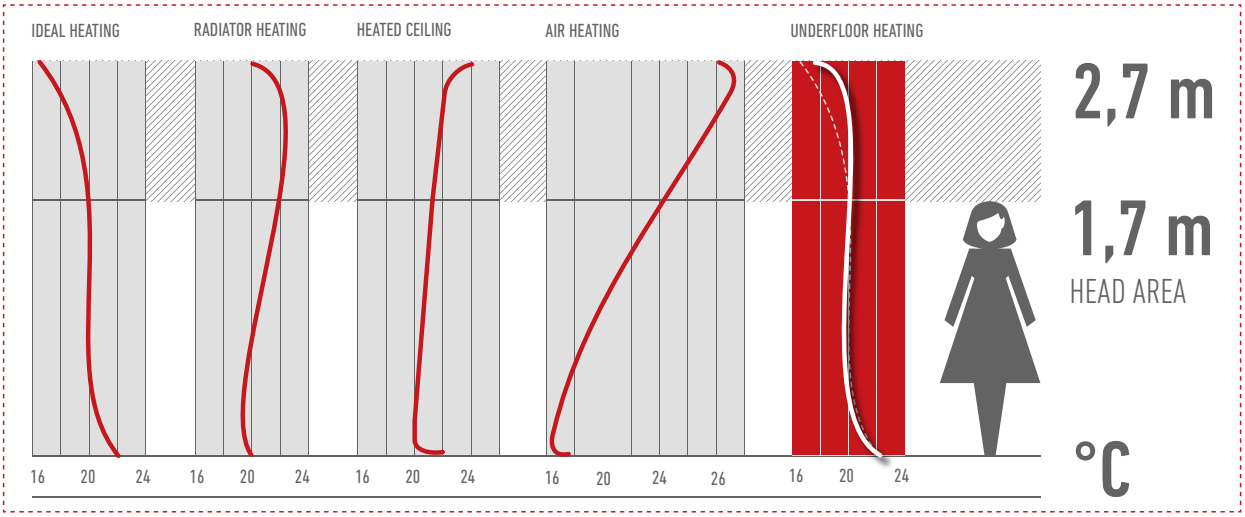
Furthermore, there are no humid zones on the heated area and therewith no mould is formed. As comfortable side effect there is no cleaning of radiators necessary. Additionally, more floor space is available since there is no space required for radiators.

Thermal comfort means the comfort of people in a set room climate. An „acceptable thermal room climate“ is defined under DIN EN ISO 7730 as a surrounding that 80 % of its residents sense as comfortable. In general a room is comfortable if the temperature differences between

- wall surfaces and the ambient air is less than 4 Kelvin
- foot to head level is less than 3 Kelvin
- various wall surfaces (radiation asymmetry) is less than 5 Kelvin

and if the air speeds and their turbulences within closed rooms are small to avoid air draught. Hereby different uses of a room influence the individual temperature requirements.
From experience the following temperatures are comfortable»

Living room» 20 °C to 22 °C / bed room» 16 °C to 18 °C / bath room» 24 °C to 26 °C

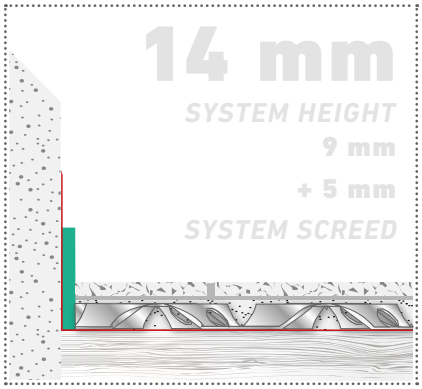
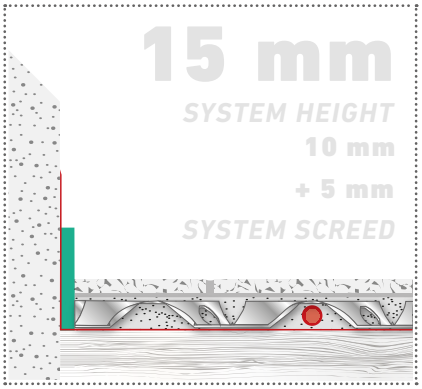
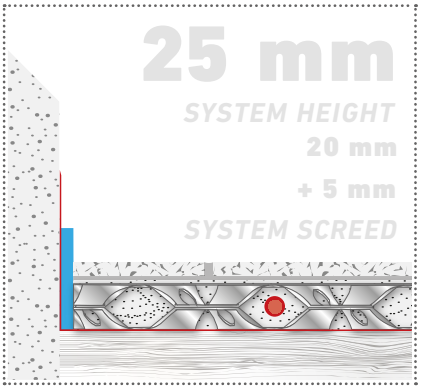


An underfloor heating is closest to an ideal heating regarding the vertical heat differences. Panel heatings are energy efficient and ideally suited for the use of renewable energies due to their very low flow temperature level. They create a maximum of comfort.

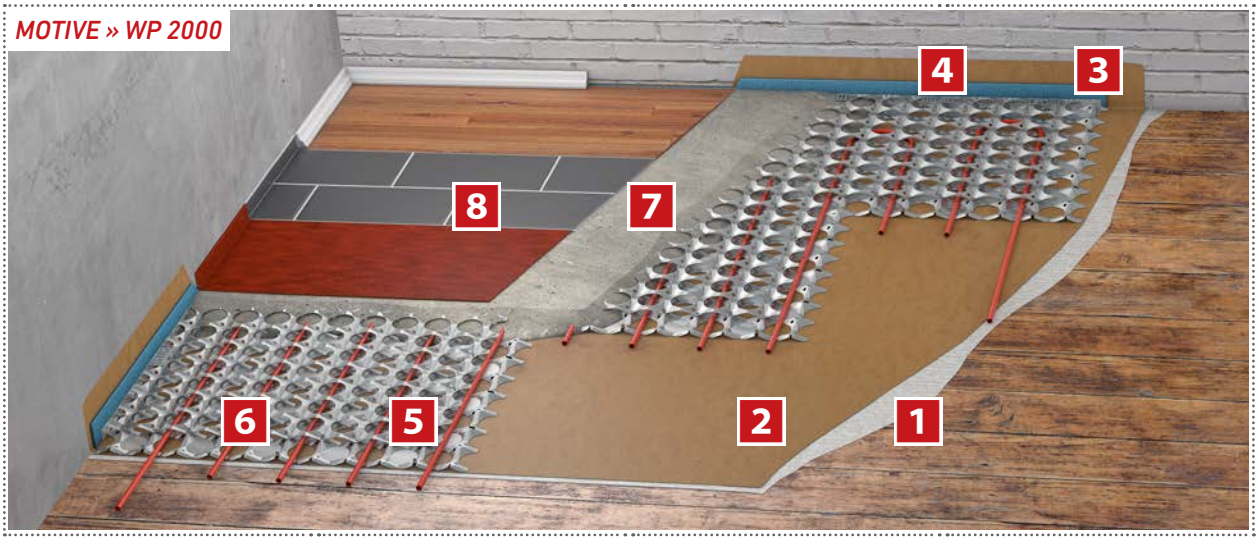
BASIC PRINCIPLE OF COMB PANELS

EFFIDUR floor systems WP consist of two preformed steel sheets that are firmly connected to each other to form a honeycomb shaped panel. These comb panels (WP) are fit as floating floor area without connection to the sub-floor, if necessary equipped with pipes and backfilled with screed with a minimum overlap in height of only 5 mm. This way an innovative, highly stable floor system is created, that can be used as floor reinforcement or equipped with pipe for heating or cooling just as required.

THE COMB PANEL SYSTEM CONSISTS OF THREE TYPES

WP 900 [14 mm total]	WP 1000 [15 mm total]	WP 2000 [25 mm total]
BASIS WITHOUT HEATING	**CLIMATE** HEATING / COOLING	**CLIMATE** HEATING / COOLING
		
system height 9 mm [+ 5 mm SFM] Applicable for reinforcement of the old sub-floor without heating of the new floor.	**system height 10 mm** [+ 5 mm SFM] Especially suited for the retrofit of old buildings, where an underfloor heating is only feasible with a low building height.	**system height 20 mm** [+ 5 mm SFM] Advantage here» Heating pipes ø 8 mm can be crossed and other media might be integrated.

MOTIVE » WP 2000



1 Impact Sound Insulation	2 Separation Layer	3 Border Insulation Tape	4 Bracket
5 Comb Panel	6 Heating Pipe	7 System Screed	8 Floor Covering

Each comb panel type is delivered to the building site in handy measurements of 1192 x 556 mm (length x width) or in a specific case with a variable length including all components through qualified wholesalers / craftsmen. The packages containing 10 comb panels can easily be carried to the building site (1200 x 560 x 1 resp. 200 mm) weighing about 30 kg.

ADVANTAGES AT A GLANCE

» Low building height from 9 mm* flush floor finish possible for barrier-free access.

» widely independent from sub-floor - unevenness of up to 20 mm can be balanced out without further works.

» Reinforcement of sub-floor - highly load-bearing traffic areas feasible.

» Excellent controllability - comparable to radiators through fast heat spreading of the steel panel and heating pipe close to the surface this way very short heating-up periods, ideal for temporarily used rooms, fast reaction to external heat input (solar irradiation).

» Homogeneous head spreading - low temperature ripple at the floor surface already from a system size of only 15 mm, confirmed through testing according to DIN CERTCO Nr. 7F257.

» Highly energy-efficient through low flow temperatures - up to 5 K lower than conventional underfloor heating, i.e. savings on heating costs of up to 10 %

» Low material input - this way low static impact on the building through weight of the floor system.

» Quickly ready for floor covering already after 5 days, when using system WP1000 heated, system screed SFM with a thickness of 10 mm* and under ideal ambient conditions.

» Ideal for modern low temperature heating facilities, condensing boiler technology and heat pumps.

*[*without screed overlap flushed for flooring with tiles and flags in middle-bed method, see detailed information at installation instructions under chapter "Backfilling with system screed SFM".]*

PARAMETER	WP 900	WP 1000	WP 2000	NOTES
system height	9 mm	10 mm	20 mm	without screed (SFM) overlap and sub- or super-structure
building height	14 mm	15 mm	25 mm	comb panel with 5 mm screed (SFM) overlap
dimensions in mm	1080 x 480 ≈ 0,52 m²	1080 x 480 ≈ 0,52 m²	1080 x 480 ≈ 0,52 m²	usable area per comb panel
weight without screed	approx. 5 kg/m²	approx. 5 kg/m²	approx. 5 kg/m²	one packing unit = 5 m² (10 comb panels)
weight with screed	approx. 29 kg/m²	approx. 30 kg/m²	approx. 45 kg/m²	comb panel with 5 mm screed (SFM) overlap, at even subfloor
heat flow density	- - -	60 - 90 W/m²	60 - 90 W/m²	at a pipe distance of 120 mm and a pipe ø 8 - 10 mm for ϑi = 20 °C
cooling flow density	- - -	20 - 40 W/m²	20 - 40 W/m²	at a pipe distance of 120 mm and a pipe ø 8 - 10 mm for ϑi = 26 °C einem Rohr ø 8 - 10 mm für ϑi = 26 °C
maximum field size without joints	up to 200 m² for heated areas up to 300 m² for unheated areas			using system screed SFM

LOAD-BEARING BEHAVIOUR OF THE FLOOR SYSTEMS *(EXCERPT FROM SURVEY REPORT OF MPA STUTTGART)*

effidur comb panel in combination with effidur system screed upon separation layer / various insulation		licit traffic loads in kN/m²***	licit point loads in kN***
	15 mm made of 10 mm WP 1000 with 5 mm system screed SFM overlap, directly borne on reinforced concrete floor	up to 5,0	up to 4,0
	15 mm made of 10 mm WP 1000 with 5 mm system screed SFM overlap,upon acoustic fleece 4 mm (CP 2)	up to 2,0	up to 2,0
	25 mm made of 20 mm WP 2000 with 5 mm system screed SFM overlap, upon acoustic panel 25 mm (CP 5)	up to 2,0	up to 1,0
	25 mm made of 20 mm WP 2000 ith 5 mm system screed SFM overlap, upon acoustic fleece 4 mm (CP 2)	up to 3,0	up to 3,0
	35 mm made of 20 mm WP 2000 with 15 mm system screed SFM overlap, upon acoustic fleeces 4 mm (CP 2)	up to 5,0	up to 4,0
	When avoiding point loads in corner and border areas and subject to the applied insulation material load-bearing capacity of up to 8 kN/m² feasible		

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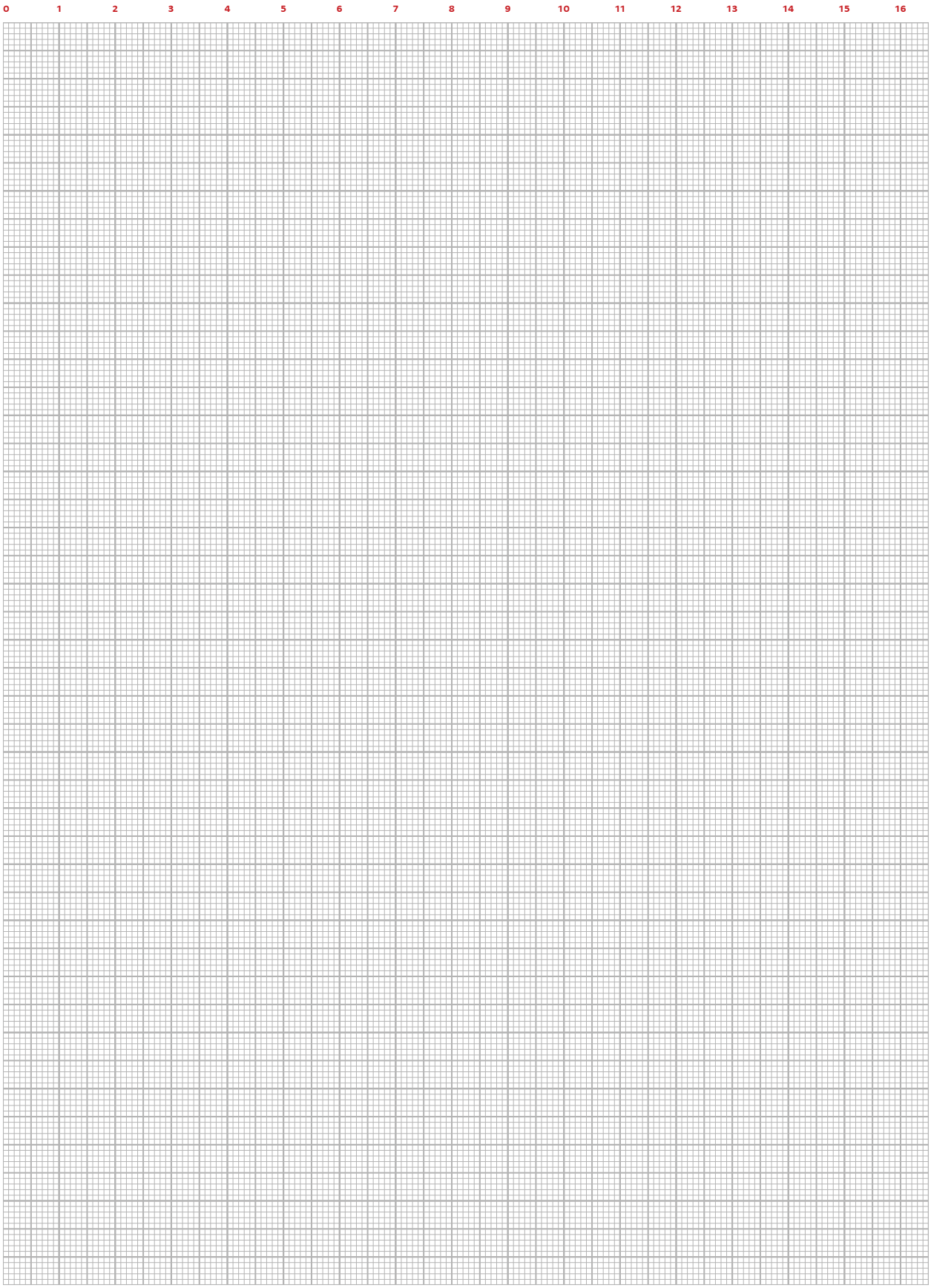
** ϑi = Indoor temperature / *** application fields acc. to DIN 1055 part 3, edition 2002



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