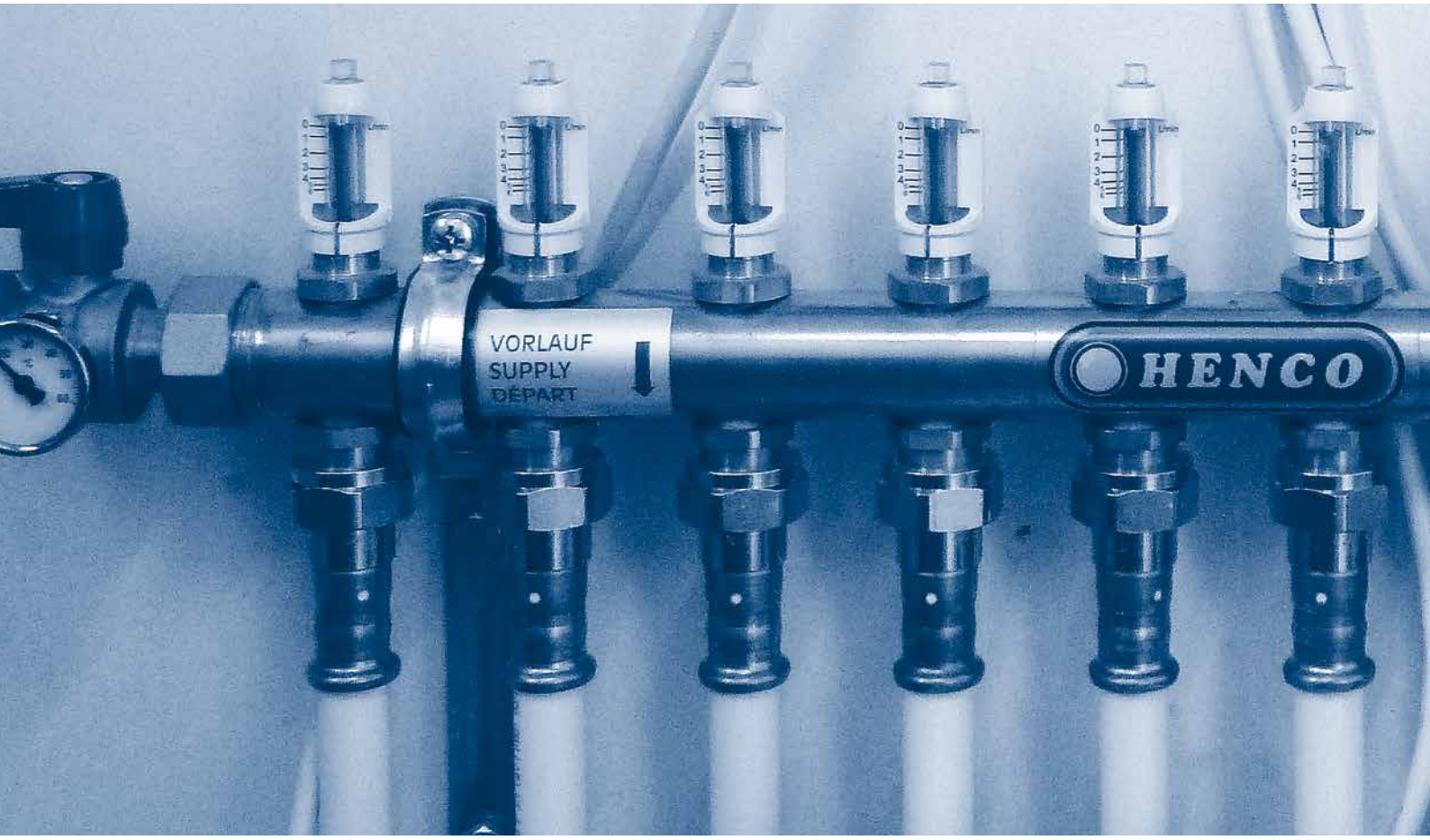
LONDON UNDERFLOOR HEATING SUPPLIERS

SIZING AN UNDERFLOOR HEATING SYSTEM



LONDON UNDERFLOOR HEATING SUPPLIERS
Curles Manor | Pelham Road |Clavering | Essex | CB11 4PW
Tel: 0207 112 9077 | Email: sales@londonunderfloorheatingsuppliers.com
Web: www.londonunderfloorheatingsuppliers.com

Sizing an underfloor heating system

When determining how an underfloor heating system must be designed, there are fixed guidelines to follow.

- The basis is a correct heat loss calculation.
- The floor construction is determined.
- The supply temperature is determined on the basis of the heat source.
- The pipe spacing is determined on the basis of the supply temperature and the heat loss to be compensated.

The final design of a project is done by Hencofloor's engineering department. If there is a preliminary design, a heat loss table (calculated according to prEN 1264-2) can be consulted that gives an indicative power per m². Some important information regarding an underfloor heating project is further explained below:

Screed

The screed contains the pipe network and distributes the heat to the room. The screed is floating (a separate whole) and is fully insulated from the supporting construction and the surrounding walls. The weight load of a screed for residential use is between 2 and 4 kN/m² in function of the screed thickness and the compressibility of the underlying insulation (prEN 13163). The advice from Hencofloor assumes a cement-bound screed with minimal coverage of 4.5 cm above the pipe. Reinforcement must be applied in the form of wire with mesh size 50x50-3 mm). This reinforcement can also consist of fibres that are incorporated into the screed. For industrial floors (e.g. concrete) and flowing floors (e.g. anhydrite floors), consultation with the Hencofloor engineering department is always necessary. Other standards may apply with regard to the Hencofloor recommendations.
You must therefore ensure that the specifications of the screed meet these standards.

Centre to centre distance (c.t.c.)

This is the distance between the underfloor heating pipes, measured to the centre points. This distance is determined in relation to the desired heat emission, the desired response time and the foreseen supply water temperature (heat source). The lower the required heat emission, the greater the centre-to-centre distance. The smaller the centre-to-centre distance of the pipe network, the more easily the heat transmission can take place between the medium (water) and the space to be heated. This will also enable the system to react more quickly.

Edge zone

This is a zone where the pipes are placed at a smaller centre-to-centre distance from each other. The purpose of this is to obtain a higher floor temperature, giving higher heat emission. This is applied as standard at a cold bridge at an outer wall (e.g. windows and doors) in order to compensate the heat loss in this area. An edge zone preferably consists of a separate group and may be a maximum of 1 m wide with regard to the outside wall.

In contemporary residential construction in which residences must meet high insulation and energy requirement, edge zones are not necessary.

- Cold bridges do not occur in today's new construction and renovation.
- The floor temperature is limited.
- When using low temperature sources, the centre-to-centre distance is generally set at the minimum.

Floor temperature

The floor temperature may not become too high, as this can have a negative effect on the human body. With an excessively high floor temperature, the body cannot release sufficient heat at the level of the feet, which causes unnecessary discomfort (swollen feet). That is why the floor temperature is limited according to the function of the space.

Local	***maximum floor temperature***
• *Living room*	*29 °C*
• *Passageway/edge zone*	*33 °C*
• *Bathroom*	*33 °C*

Sizing an underfloor heating system

LONDON UNDERFLOOR HEATING SUPPLIERS

Delta T

This is the temperature difference between supply and return. The lower the supply temperature, the smaller the delta T and the greater the required flow will be through a group. For sizing, it is therefore necessary to take into account the working regime of the chosen heat source.

Rtb value (m²K/W)

This value gives the thermal resistance measured above the underfloor heating pipe to the top side of the floor covering. The better the heat conductivity of the screed and the floor covering, the lower the Rtb value will be. Hencofloor recommends always limiting this value to a maximum of 0.20 m²K/W.

The Rt value is the heat resistance of the floor covering. This resistance has a large share in the total thermal resistance Rtb. It is therefore recommended to use a floor covering with good heat conduction properties.

A number of floor finishes are given below with the associated Rt values.

Floor covering	*Rt (max. 0.15m²K/W, (Hencofloor recommendation)*
• *tile (8 mm)*	*0.015m²K/W (average)*
• *linoleum (3 mm)*	*0.02m²K/W (average)*
• *glued parquet (10 mm)*	*0.05m²K/W (average)*
• *laminate (8 mm)*	*0.07m²K/W (average)*
• *carpet (7 mm)*	*0.1m²K/W (average)*

Remark When a parquet floor is combined with underfloor heating, it is necessary to verify whether the parquet is actually suitable for this and whether or not special requirements need to be met. Hencofloor will always limit the surface temperature of a parquet floor to 27°C.

Supply water temperature

This is the temperature of the supply water that circulates through the groups via the manifold. Changing this temperature has a major effect on the final heat emission. This temperature is determined in relation to the heat source. The supply temperature is always limited. Too high temperatures can cause damage to the screed and floor covering.

Application	*Supply water temperature (prEN1264-4)*
• *underfloor heating*	*55°C (maximum)**
• *wall heating*	*50°C (maximum)**

**In practice this value seldom reaches more than 45°C.*

Construction height

This is the height measured from the structural floor to the top side of the finished floor. This includes a concrete slab, an insulation layer, the screed and the floor covering. When sprayed insulation is applied, this may also serve as the levelling layer. In the design of a residence, it is important that the necessary construction height of an underfloor heating system is taken into account.

Floor insulation

The floor insulation is the insulation under the screed. This must be continuous and meet the set requirements. If there is a heated space below, thermal resistivity of 0.75 m²K/W is enough. If the space below is not heated or there is direct contact with the ground, then this value must be at least 1.25 m²K/W. In the case that there is an outside temperature under the screed, a thermal resistivity of at least 2m²K/W is required. (prEN 1264-4).

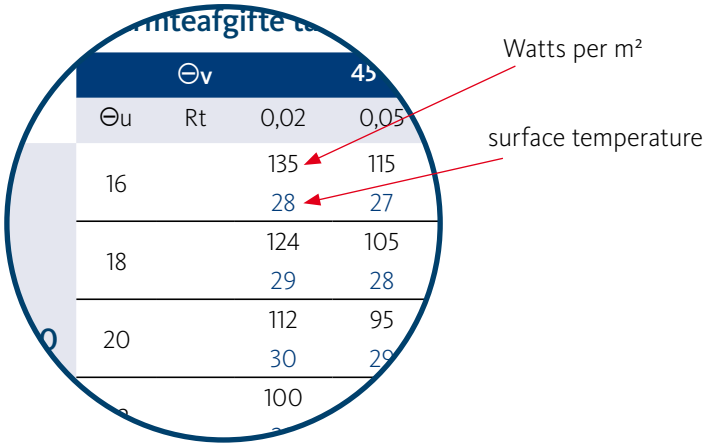
Sizing an underfloor heating system

Heat emission table

The parameters to ensure correct use are given here. The heat emission table is **indicative** , the actual heat emission is calculated by the Hencofloor engineering department.

The table gives the heat emission in Watts per m² with the corresponding surface temperature below.

Θv	*supply water temperature in °C / delta T in °C*
Rt	*thermal resistivity of the floor finishing in m²K/W*
Θu	*room temperature in °C*
T	*centre-to-centre distance in cm*



Sizing an underfloor heating system

LONDON UNDERFLOOR HEATING SUPPLIERS

Heat emission table for PE-Xc/AL/PE-Xc multilayer pipe 16 mm

	Θv	45°C / ΔT 10°C				40°C / ΔT 8°C				35°C / ΔT 5°C			
	Θu	Rt	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15
T10	16		135	115	90	75	113	96	75	62	94	80	62	52
			28	27	25	23	27	25	23	22	25	24	22	21
	18		124	105	82	68	101	86	67	56	82	70	55	45
			29	28	26	25	28	26	25	24	26	25	24	23
	20		112	95	74	62	90	76	60	50	71	60	47	39
			30	29	27	26	29	28	26	25	27	26	25	24
	22		100	85	66	55	78	66	52	43	59	50	39	33
			32	30	29	28	30	29	27	27	28	27	26	26
	24		89	75	59	49	66	56	44	37	47	40	31	26
			33	31	30	29	31	30	29	28	29	28	28	27

	Θv	45°C / ΔT 10°C				40°C / ΔT 8°C				35°C / ΔT 5°C			
	Θu	Rt	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15
T15	16		121	105	81	68	101	88	68	57	84	73	56	47
			27	26	24	23	26	24	23	22	24	23	22	21
	18		110	96	74	63	90	79	61	51	73	64	49	42
			28	27	25	24	27	26	24	23	25	24	23	23
	20		100	87	67	68	80	70	54	45	63	55	42	36
			30	28	27	27	28	27	26	25	26	26	25	24
	22		90	78	60	51	70	60	47	39	53	46	35	30
			31	30	28	27	29	28	27	26	28	27	26	25
	24		79	69	53	45	59	51	40	33	42	37	28	24
			32	31	30	29	30	29	28	28	29	28	27	27

	Θv	45°C / ΔT 10°C				40°C / ΔT 8°C				35°C / ΔT 5°C			
	Θu	Rt	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15
T20	16		108	96	73	63	90	80	61	52	75	67	51	43
			26	25	23	22	25	24	22	21	23	23	21	21
	18		99	88	69	57	81	72	55	47	66	58	44	38
			27	27	25	24	26	25	24	23	25	24	23	22
	20		90	80	60	52	72	64	48	41	56	50	38	33
			29	28	26	25	27	26	25	25	26	25	24	24
	22		80	71	54	46	62	55	42	36	47	42	32	27
			30	30	28	27	28	28	27	26	27	27	26	25
	24		70	63	48	41	53	47	36	31	38	34	26	22
			31	30	29	28	30	29	28	28	28	28	27	27

	Θv	45°C / ΔT 10°C				40°C / ΔT 8°C				35°C / ΔT 5°C			
	Θu	Rt	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15	0,02	0,05	0,1	0,15
T22.5	16		102	92	69	60	85	77	58	50	71	64	48	41
			26	25	23	22	24	24	22	21	23	22	21	21
	18		94	84	64	55	77	69	52	45	62	56	42	36
			27	26	24	24	26	25	23	23	24	24	23	22
	20		85	76	57	50	68	61	46	40	53	48	36	31
			28	28	26	25	27	26	25	24	26	25	24	24
	22		76	68	52	45	59	53	40	34	45	40	30	26
			30	29	27	27	28	28	26	26	27	26	26	25
	24		67	60	45	40	50	45	34	29	36	32	24	21
			31	30	29	28	29	29	28	27	28	28	27	27