FLEXEL the proven radiant heating system (since 1965)

Installation Instructions for Under Floor Heating Cables

Before commencement of any work check that the specified floor insulation has been installed and that the necessary covering screed thickness can be achieved. The entire floor area must be swept clean and free from any sharp projections.

The usable floor area should be calculated allowing a 75mm wide margin around the perimeter of the room and avoidance of fixed fittings, bearing in mind that cables should not be laid under any fittings that will enclose the floor surface and prevent or restrict heat dissipation.

Referring to the installation schedules and by applying the following formula the result will give in mm the distance between cables no matter what shape or size the area may be or how many cables are used.

$$\frac{\text{Usable floor area (m}^2\text{) x 1000}}{\text{Cable(s) length (m)}}$$

Example:
1600 Watts, 10 Watts / lin metre cable installed over a usable floor area of 12m²

$$\frac{12 \times 1000}{160} = 75\text{mm spacing (133 W/m}^2\text{)}$$

For guidance purposes and to avoid excessive floor surface temperatures, the cable spacings should not be less than 50mm.

Allowing the 75mm edge margin secure the PV or PSV strips as illustrated in the typical cable layout at opposite edges of the room. Where cables span more than 2 metres further intermediate strips should also be laid to prevent movement of the cables during floor screeding.
When laying 17 Watts / lin metre over insulation a 15 – 25mm thick screed separating layer must be provided between the cables and the insulation.

10 Watts / lin metre cable laid directly onto insulation can be fixed using high impact adhesive tape. Intermediate taping every 300mm should be provided where flowing floor screeds are laid.

Having done this the cables can be laid to the calculated spacings.

Notes

1. Heating cables must NEVER touch or cross each other or be covered with insulation material.

2. Ensure that the cables are securely attached to the fixing strips provided before screed covering.

3. When handling cables during installation avoid straining connection joints or termination by pulling cables. Referring to regulations covering the use of electricity at work, then if a local 230v supply is available cables can be unrolled before installation and voltage applied for a brief period until the cable becomes workable. This will assist during laying the cable at very low temperatures when cables may be difficult to handle.

4. Single conductor Flexel heating cables are supplied with 3 metres long cold tails fitted at both ends to the heating wire through water resistant connectors. The heating cable MUST NEVER BE CUT OR SHORTENED but the end cold tails can be reduced in length if necessary to accommodate their final connection to the termination boxes.

5. Referring to section 601-09-04 of the 2001 edition IEE wiring regulations heating cables installed in 'wet areas such as shower and bathrooms must incorporate an integral earth braid (type PSV). This will allow connection to the local supplementary equipotential bonding as specified in regulation 601-04-02.
   A secondary metallic grid will be required in areas surrounding swimming pools as described in section 602.

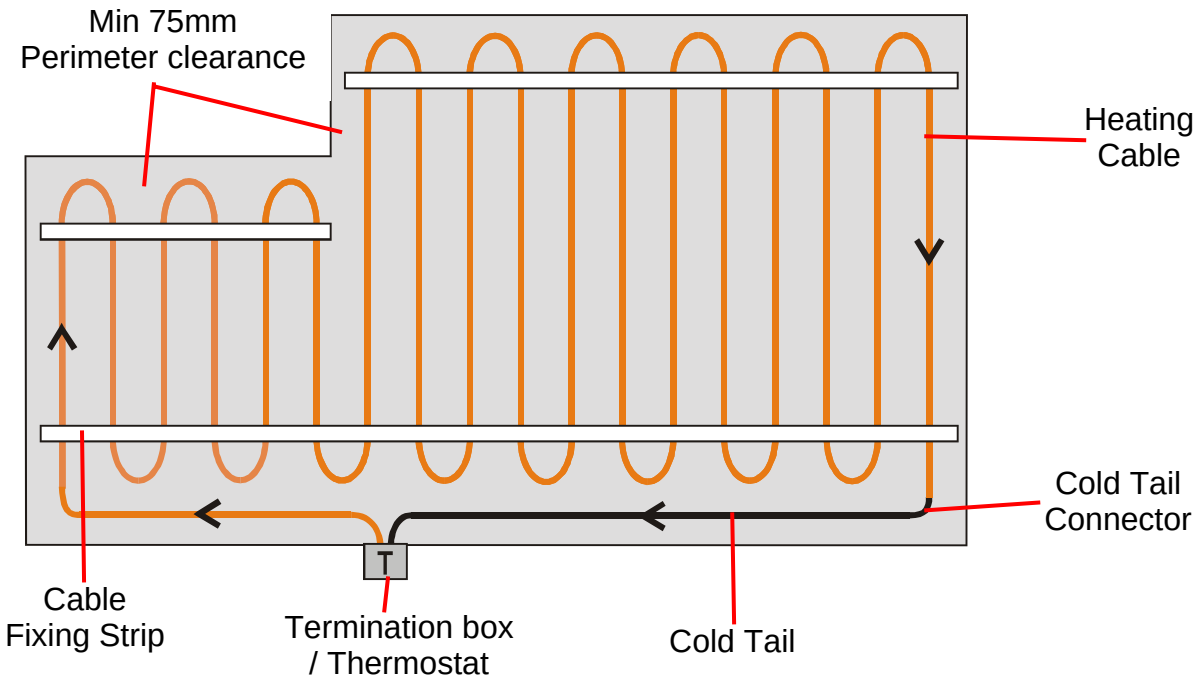
6. Floor screeders must take suitable care during screed laying which should be spread in the same direction as the cable runs. Wheel barrows must have pneumatic tyres. Wheel barrows must be run on timber boards and contents tipped on to timber boards that are free from nails and other sharp objects.

7. During floor screeding a 500 volt *mega* insulation tester should be used to monitor and warn of insulation damage. Immediately on completion a further resistance check should be made and recorded on the test certificate. A further second fix test to be carried out and verified by the electrical contractors.

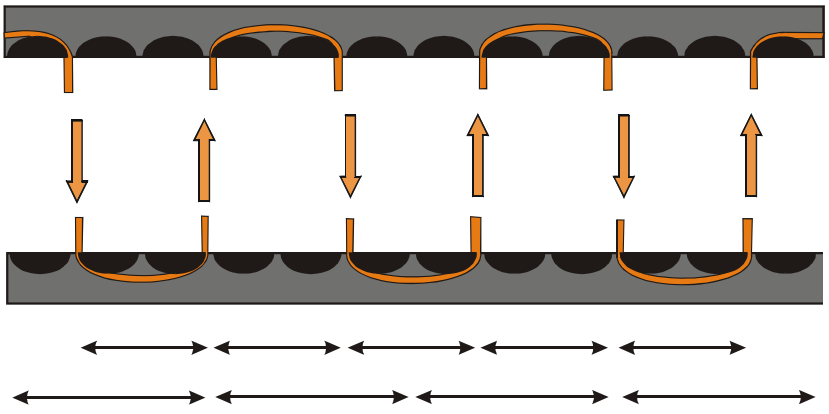
8. The builder must be fully aware of the correct screed constituency, curing, drying out periods and subsequent application of floor finishes.

9. Should any other installation method be proposed (eg power floated floor) contact the Flexel Technical Department for further advice:
   Tel: 01592 757313 | Fax: 01592 754535 | e-mail: sales@flexel.co.uk

Typical Cable Layout



Fixing Strips for Cables



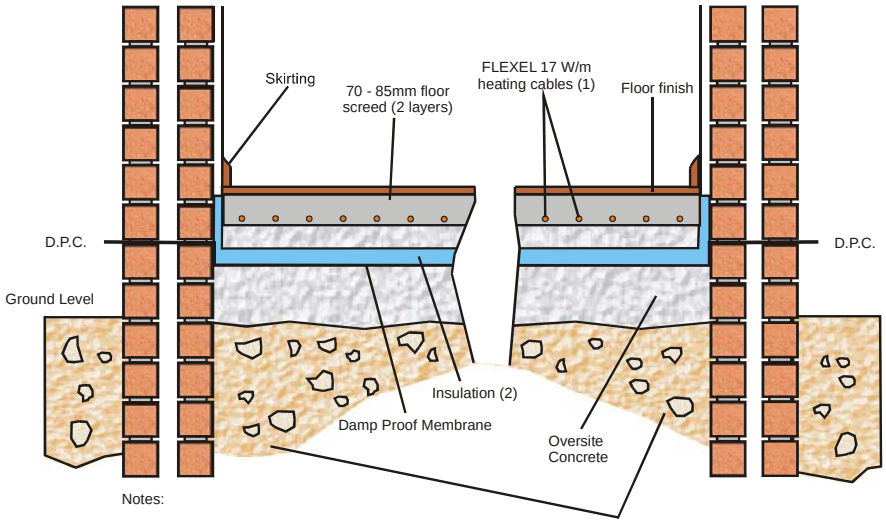
Runs of cable of more than 2.5 metres should have an intermediate fixing strip to maintain regular spacings.

7cm spacing 160 W/m²

11cm spacing 100 W/m²

Storage and Direct Heating Cross Sections

Fig. 1 Ground Floor Detail For storage (Accumulative) Heating

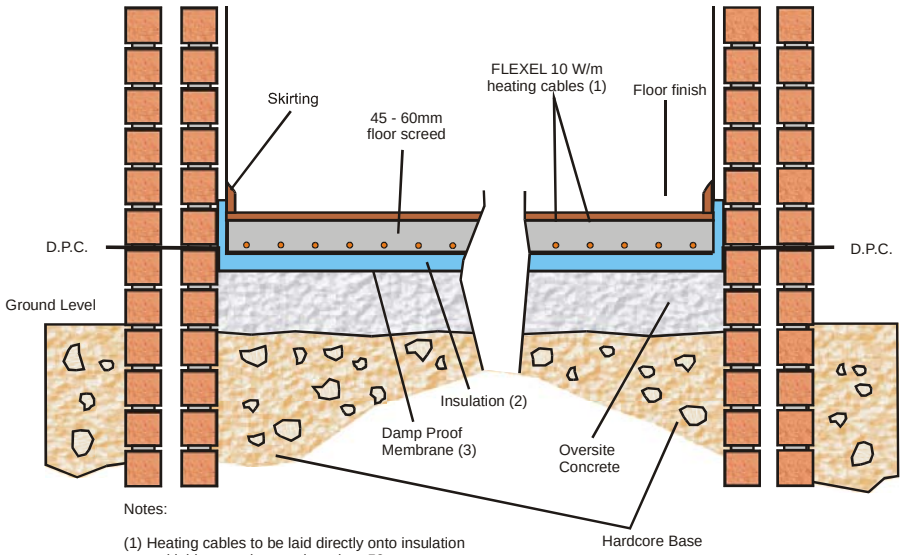


Notes:

(1) Heating cables must be fixed to first screed layer 45 - 50mm from surface and laid at spacings no less than 50mm apart.

(2) Insulation to be provided across the total floor area with external wall upstands.

Fig. 2 Ground Floor Detail For Direct Acting Heating



Notes:

(1) Heating cables to be laid directly onto insulation and laid at spacings no less than 50mm apart.

(2) Insulation to be provided across the total floor area with external wall upstands.

(3) Anhydrate (liquid) floor screeds will require a further DPM above the insulation.

Under Floor Heating Cables Type PV and PSV

Description:

Double insulated, single conductor core, 3m length cold tails fitted at both ends.

Type PV - pex insulation with 105°C pvc outer insulation sheath.
Type PSV - as type PV with additional integral steel earth braid.

Standard Range: 230 volts
10 Watts lin metre (204) - Suitable for fixing onto floor insulation to provide a direct acting quick response system in a thin profile or flowing floor screed. Loadings must not exceed 190 Watts / m² across the net usable floor area.
17 Watts lin metre (207) - For direct acting systems in traditional floor screeds when not in contact with thermal insulation and also storage (accumulative) systems. Loadings must not exceed 275 Watts / m² across the net usable floor area.

Type PV/PSV - 10watts lin metre				Type PV/PSV - 17watts lin metre			
Code	Output (watts)	Length (metres)	Resistance (ohms)	Code	Output (watts)	Length (metres)	Resistance (ohms)
204 - 9	130	13.0	402	207 - 9	170	10.0	311
204 - 13	140	14.0	378	207 - 13	190	11.2	278
204 - 17	160	16.0	331	207 - 17	210	12.3	252
204 - 21	200	20.0	265	207 - 21	260	15.3	203
204 - 25	270	27.0	196	207 - 25	360	21.2	147
204 - 29	340	34.0	156	207 - 29	450	26.5	118
204 - 33	450	45.0	118	207 - 33	590	34.7	90
204 - 37	540	54.0	98	207 - 37	710	41.8	74
204 - 41	640	64.0	83	207 - 41	830	48.8	64
204 - 45	730	73.0	73	207 - 45	950	55.9	56
204 - 49	770	77.0	69	207 - 49	1000	59.0	53
204 - 53	870	87.0	61	207 - 53	1150	67.6	46
204 - 57	980	98.0	54	207 - 57	1300	76.5	41
204 - 61	1081	108.0	49	207 - 61	1400	82.3	38
204 - 69	1300	130.0	41	207 - 69	1700	100 0	31
204 - 73	1600	160.0	33	207 - 73	2050	120.6	26
204 - 77	1850	185.0	29	207 - 77	2400	141.2	22
204 - 81	2300	230.0	23	207 - 81	3000	176.5	18
204 - 85	2800	280.0	19	207 - 85	3650	214.7	15
204 - 89	3050	305.0	17	207 - 89	4000	235.3	13

Ecofloor - Cable Kits

Description:
Complete installation kit comprising thin profile double insulated and earth braided twin conductor cable, fixings, spacing guide and electronic controller.

Kit sizes 10200,10250 & 10320 supplied with multifunction EB100 electronic thermostat.
10400 to 103700 supplied with combined floor/air temperature sensing programmable controller.

Outputs over 2000 Watts supplied as EK cable kit plus additional (AD) cable and fixings.

Code	Output (Watts)	Heated Floor area coverage(m^2) Cable spacing - cm and heat output(w/m^2)					Resistance (ohms)
		7 (160)	8 (145)	9 (130)	10 (115)	11 (100)	
EK 10200	200	1.2	1.4	1.6	1.8	2.0	264
EK 10250	250	1.6	1.8	2.0	2.3	2.5	212
EK 10320	320	2.0	2.3	2.6	2.9	3.2	165
EK 10400	400	2.5	2.9	3.2	3.6	4.0	132
EK 10450	450	2.8	3.2	3.6	4.1	4.5	118
EK 10600	600	3.7	4.3	4.8	5.4	6.0	88
EK 10750	750	4.7	5.4	6.1	6.8	7.5	70
EK 10950	950	5.9	6.8	7.7	8.6	9.5	56
EK 101100	1100	6.9	7.9	8.9	10.0	11.0	48
EK 101300	1300	8.1	9.3	10.5	11.8	13.0	41
EK 101700	1700	10.6	11.9	13.1	15.1	17.0	31
EK 102000	2000	12.5	14.4	16.2	18.1	20.0	26
EK 102300 (EK1700+AD600)	2300	14.3	15.9	17.7	20.0	23.0	23
EK102600 (EK2000+AD600)	2600	16.2	17.9	20.0	22.6	26.0	20
EK102950 (EK2000+AD950)	2950	18.4	20.3	22.7	25.7	29.5	18
EK103300 (EK2000+AD1300)	3300	20.6	22.8	25.4	28.7	33.0	16
EK103700 (EK2000+AD1700)	3700	23.1	25.5	28.5	32.2	37.0	14

Variable cable spacings (7cm to 11cm) allow options from background heating (and for use under timber floors) at 100 W/m² to optimum heat output at 160w/m². (heating cables must never touch each other and apart from the cold tail connection lead cannot be reduced in length).

Example to calculate the correct cable kit requirement:

Kitchen:
Gross floor area 15m²
Usable floor area after allowance for all fixed floor units 10m².
Deduct 5% for perimeter fixing clearance 9.6m²
Select nearest size down:

For optimum heat	EK10 1300 (9.3m² at 8cm)	OR
For background heat	EK10 950 (9.5m² at 11cm)	

All Flexel underfloor heating cable products are CE compliant and manufactured to international standard IEC 800. Full installation instructions provided with Ecofloor cable mat and cable kit systems.

Ecofloor - Cable Mats

Description:

Thin profile double insulated and earth braided single conductor cable attached to an open weave matting at standard 160 W/m² output.

Type '5' at 5cm spacing to stitched weave construction.

Type '10' at 7cm spacing taped to mesh with adhesive backing.

Calculate usable floor area as for cable kits and select nearest size down (return feed to the thermostat is required).

Code	Output (watts)	Dimensions (m) width	length	Area (m^2)	Code	Output (watts)	Dimensions (m) width	length	Area (m^2)
12180-163	180	0.3	3.60	1.10	12950-165	950	0.5	11.80	5.90
12300-163	300	0.3	6.10	1.80	121150-165	1150	0.5	14.40	7.20
12360-163	360	0.3	7.60	2.30	121700-165	1700	0.5	21.40	10.70
12500-163	500	0.3	9.90	3.00	122000-165	2000	0.5	24.90	12.40
12700-165	700	0.5	8.60	4.30	122500-165	2500	0.5	31.30	15.70
12850-165	850	0.5	10.60	5.30	123000-165	3000	0.5	37.60	18.80

Control options:

Type FL PC Anticipatory controller for storage heating with external sensor.

Type 132AF 16amp programmable/thermostat fitted with dual floor and air sensing sensors. Functions include optimum start, 4 daily programmes with separate day, night and holiday settings.

Type:EB100 12amp electronic multifunction thermostat allowing optional floor or air temperature sensing.

Type:RTR 3521 l0amp mechanical air temperature thermostat.

Type RTR 6121 As 3521 with min/max temperature locking.

Type RTR 3545 10amp tamperproof air sensing thermostat suitable for installation in bathrooms.

Preparation of Timber or Concrete sub floors.

Existing floor boards should be sound and level and generally require an overlayment of Weyroc moisture resistant chipboard or WBP plywood, screw fixed and primed if required. It is strongly recommended that uninsulated floors are first overlaid with a cementacious faced insulated tile backer board such as Isofoam, Knauf Aquapanel thermal, Marmox, WEDI-board or Tuflite.

6mm thickness Depron insulation is also offered by Flexel International Ltd. as a cost effective alternative and particularly suitable with existing and retrofit floors with limited floor levels. This material firstly needs fixing to the prepared sub floor using a proprietary PVA floor adhesive such as Unibond or Stick a Tack. The adhesive should also be applied to the top surface of the Depron to act as a bonding primer and allow direct application of a suitable quickset flexible cement based adhesive and flexible tile grout. For floors requiring carpet or wood laminate floors after laying of the Ecofloor heating cables a 5-10mm slurry of self levelling compound is poured to cover the cables and provide a suitable floor base.

All Flexel underfloor heating cable products are CE compliant and manufactured to international standard IEC 800. Full installation instructions provided with Ecofloor cable mat and cable kit systems.

General guidelines for preparation of subfloors and UK manufacturers adhesive products suitable for use in conjunction with Flexel Ecofloor undertile heating cables and cable mats. (To be read in conjunction with the installation instructions supplied).

Manufacturer	Surface	Primer	Tile Adhesive	Grout
Ardex	Concrete Timber	No primer required Ardion 82 primer	Ardu-Flex 500 Ardurit S16 + Ardion 90 admix	Arduflex-FL
Bal	New Concrete Existing concrete Timber	No primer required on a sound surface.Use a slurry bonding coat if unsound Slurry bonding coat 2 parts portland cement 1 part Bal-Bond SBR Bal Bond SBR.	Bal-Rapidset Flexible Bal-Rapidset Flexible rapid Bal-Rapidset Flexible	Bal Flexgrout Bal Flexgrout Bal Flexgrout
Howtex	Concrete & Timber	Howtex universal primer	Howtex single part Flexible rapid	Howtex-ceramic widejoint flexigrout
Mapei	Timber	Mapeprim SP primer	Ultraplan-self levelling compound over cable, then Kerabond with Asolastic flexible additive/Granirapid.	Mapei Ultracolor Polmer modified grout
Mira	Concrete Timber	Mira 7110 base cleaner Mira 4800 antifire fluid primer. Use Mira 4120 and 4440 multicoat for wet areas. Mira 4800 antifire fluid primer	Mira X-Plan self Levelling acrylic and Fibre reinforced levelling compound. Mira 3250 superplan Fix acrylic reinforced cement based quick curing tile adhesive mira 3600 multicrete highly elastic two part adhesive.	Mira mastic Mira mastic
Nicobond	Concrete Timber	1 pt Nicobond primer to 4 pt water or 1 pt Nicobond primer to 1 pt water if porous. 1pt Nicobond primer to 1 pt water	Nicobond fast floor and wall adhesive Nicobond fast floor and wall adhesive + Nicobond 2002.	Nicobond tilers grout + Nicobond enhancer 2002 Nicobond tilers Grout + Nicobond enhancer 2002
PCI	Concrete Timber	No primer required. No primer required	Fliebspachtel 15 self levelling compound, then any flexible cement based adhesive Timberflex or Sontex Woodflex with Sontex RS2.	Any flexible grout. Groutflast. Sontex grey grout and Grout Admix.
RMC Biscem	Concrete & Timber	No primer required.	Biscem fast set adhesive with Flexibond additive	Bisgrout Floor Grouting
Sovereign	Concrete Timber	If unsound use 50:50 SBR bonding agent and warter. SBR bonding agent	Sovereign Quick Fix tile adhesive Sovereign Quick Fix tile adhesive	Sovereign water resistant tile grout. Sovereign grey tile Grout with 1 part SBR-3 parts water

Note: Ensure tile adhesive has no air spaces. Dab fixing of tiles should be avoided.

For further technical information and advice contact:
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