

# R-values for timber framed building elements - floors

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## PRESENTATION OF RESULTS

### Suspended Timber Floors, No Sub-floor Walls

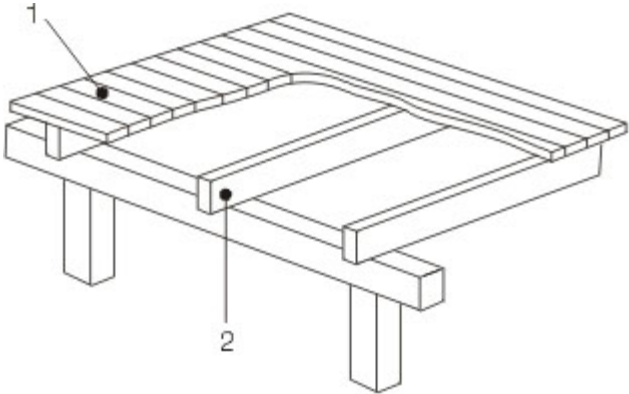
R-values of suspended floor elements are calculated using a modified CIBSE Method (CIBSE Guide, 1986). Values are given for heat flow *DOWN* and *UP* and two sub-floor heights.

It should be noted that conditions different to the assumptions used in the calculations would result in different R-values.

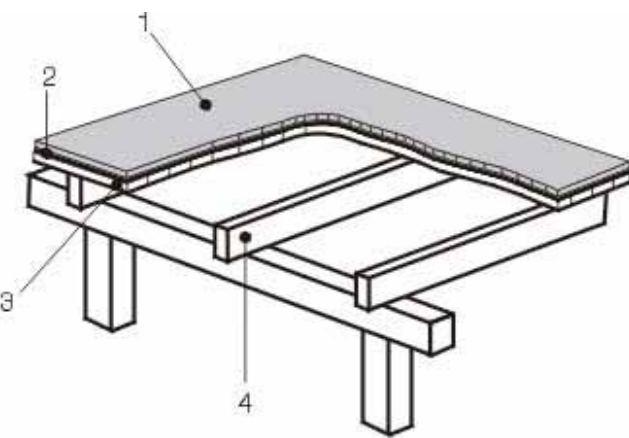
Description of Element	Total R-value for floor (m <sup>2</sup> K/W)		
	Heat flow <i>DOWN</i> (Cold Weather)	Heat flow <i>UP</i> (Hot Weather)	
<p>1. 19mm timber floor 2. Timber floor joist</p>	<b>Heat flow <i>DOWN</i></b>		
	<b>Softwood</b>		<b>Heat flow <i>UP</i></b>
	0.5m height	0.47	0.35
	2.5m height	0.47	0.35
	<b>Particleboard</b>		
	0.5m height	0.51	0.39
	2.5m height	0.51	0.39
	<b>Hardwood</b>		
	0.5m height	0.54	0.43
	2.5m height	0.54	0.42
	<b>Foil-backed particleboard</b>		
	0.5m height	1.12	0.52
2.5m height	1.12	0.52	

- Notes:
- 1) When the ground surface is sloping use the average under-floor height. For intermediate heights interpolate R-value between 0.5m and 2.5m.
  - 2) Heat flow **DOWN** means the heat flows *from* the internal spaces of the building.
  - 3) Heat flow **UP** means the heat flows *into* the internal spaces of the building.
  - 4) Joists at 450mm or 600mm centres.
  - 5) RFL may be corrugated as shown or sheets fixed to joists.

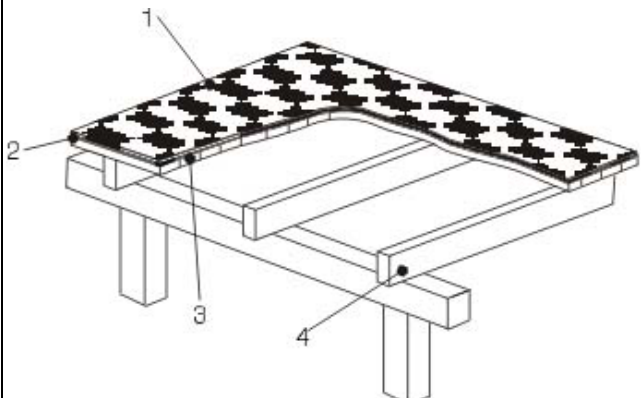
### F1. BARE TIMBER, NO SUB-FLOOR WALLS

 <p>1. 19mm timber floor 2. Timber floor joist</p>	Total R-value for floor (m <sup>2</sup> K/W)	
	<b>Heat flow DOWN</b>	<b>Heat flow UP</b>
<b>Hardwood</b>	0.5m height	0.35
	2.5m height	0.35
<b>Particleboard</b>	0.5m height	0.39
	2.5m height	0.39
<b>Softwood</b>	0.5m height	0.43
	2.5m height	0.42
<b>Foil-backed particleboard</b>	0.5m height	0.52
	2.5m height	0.52

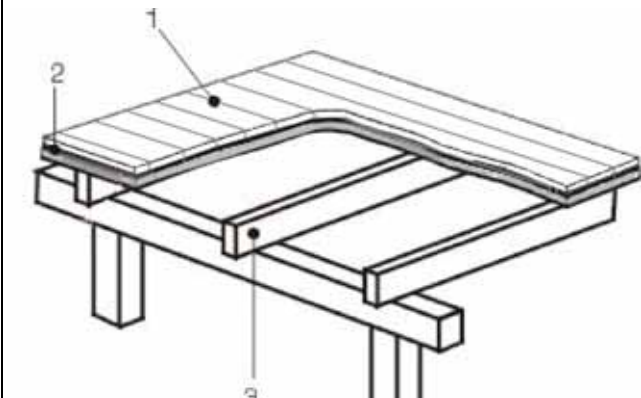
### F2. CARPETED TIMBER, NO SUB-FLOOR WALLS

 <p>1. 10mm carpet 2. 10mm underlay 3. 19mm timber floor 4. Timber floor joist</p>	Total R-value for floor (m <sup>2</sup> K/W)	
	<b>Heat flow DOWN</b>	<b>Heat flow UP</b>
<b>Hardwood</b>	0.5m height	0.76
	2.5m height	0.76
<b>Particleboard</b>	0.5m height	0.80
	2.5m height	0.80
<b>Softwood</b>	0.5m height	0.83
	2.5m height	0.83
<b>Foil-backed particleboard</b>	0.5m height	0.92
	2.5m height	0.92

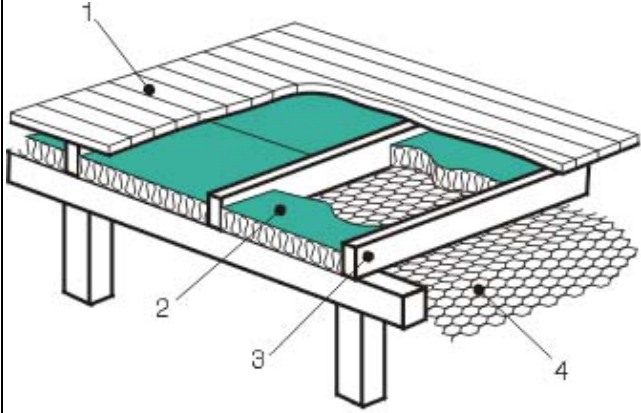
### F3. TILED TIMBER, NO SUB-FLOOR WALLS

 <p>1. Tiles 2. Tile underlay 3. 19mm timber floor 4. Timber floor joist</p>	Total R-value for floor (m <sup>2</sup> K/W)		
		<b>Heat flow DOWN</b>	<b>Heat flow UP</b>
	<b>Ceramic tiles (vinyl)</b>		
	softwood	0.55	0.44 (0.43)
	particleboard	0.52	0.40
	hardwood	0.48	0.36
	foil-backed particleboard	1.13	0.53
	<b>Cork tiles</b>		
	softwood	0.62	0.50
	particleboard	0.59	0.47
	hardwood	0.54	0.43
	foil-backed particleboard	1.20	0.59
	<b>Linoleum</b>		
	softwood	0.57	0.45
	particleboard	0.54	0.42
	hardwood	0.50	0.38
	foil-backed particleboard	1.15	0.55

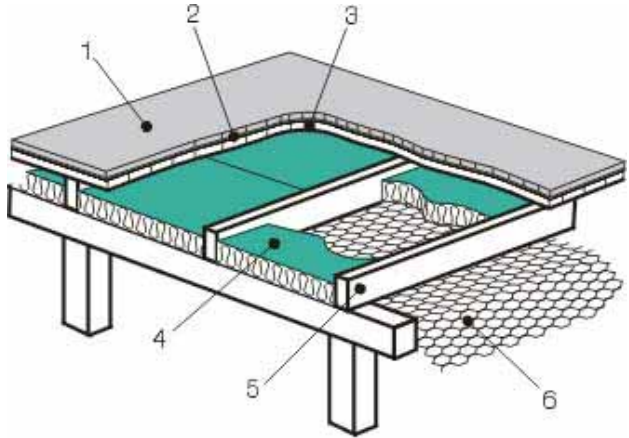
### F4. FLOATING TIMBER, NO SUB-FLOOR WALLS

 <p>1. 12mm floating timber 2. 19mm particleboard/plywood 3. Timber floor joist</p>	Total R-value for floor (m <sup>2</sup> K/W)		
		<b>Heat flow DOWN</b>	<b>Heat flow UP</b>
	<b>Plywood</b>		
	0.5m height	0.59	0.47
	2.5m height	0.59	0.47
	<b>Particleboard</b>		
	0.5m height	0.61	0.50
	2.5m height	0.61	0.49
	<b>Foil-backed particleboard</b>		
	0.5m height	1.22	0.62
	2.5m height	1.22	0.62

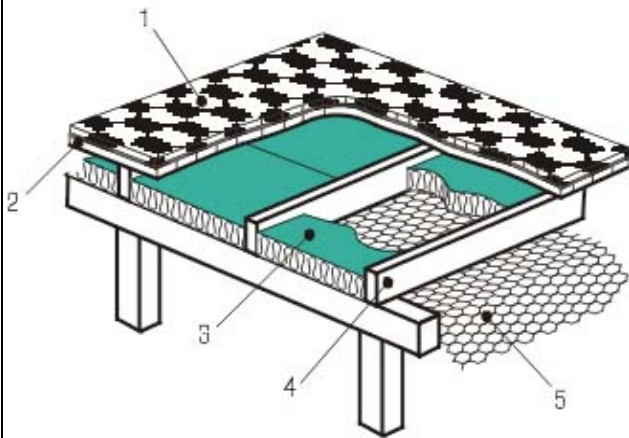
**F5. BARE TIMBER, NO SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS**

		Total R-value for floor (m <sup>2</sup> K/W)	
		Heat flow <i>DOWN</i>	Heat flow <i>UP</i>
 <p>1. 19mm timber floor 2. Bulk insulation 3. Timber floor joist 4. Mesh</p>	<b>Softwood</b>		
	R1.5	1.91	1.79
	R2.0	2.31	2.19
	R2.5	2.69	2.56
	R3.0	3.04	2.91
	<b>Particleboard</b>		
	R1.5	1.88	1.76
	R2.0	2.28	2.15
	R2.5	2.65	2.52
	R3.0	3.01	2.87
	<b>Hardwood</b>		
	R1.5	1.84	1.72
	R2.0	2.23	2.11
	R2.5	2.61	2.47
	R3.0	2.96	2.81

**F6. CARPETED TIMBER, NO SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS**

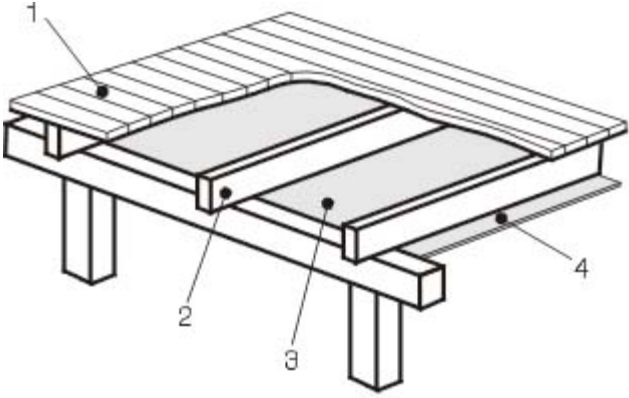
		Total R-value for floor (m <sup>2</sup> K/W)	
		Heat flow <i>DOWN</i>	Heat flow <i>UP</i>
<b>Softwood</b>	R1.5	2.32	2.21
	R2.0	2.74	2.62
	R2.5	3.13	3.01
	R3.0	3.51	3.39
<b>Particleboard</b>	R1.5	2.29	2.17
	R2.0	2.70	2.58
	R2.5	3.10	2.98
	R3.0	3.48	3.35
<b>Hardwood</b>	R1.5	2.25	2.13
	R2.0	2.66	2.54
	R2.5	3.06	2.93
	R3.0	3.43	3.30

**F7. TILED TIMBER, NO SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS**

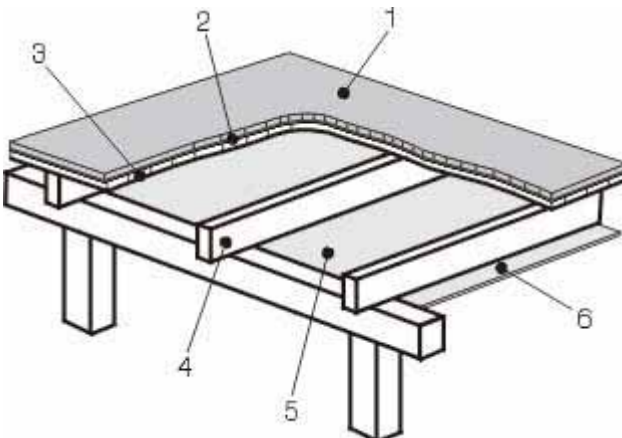
		Total R-value for floor (m <sup>2</sup> K/W)	
		Heat flow <i>DOWN</i>	Heat flow <i>UP</i>
<b>Softwood</b>			
R1.5	1.92	1.80	
R2.0	2.32	2.20	
R2.5	2.70	2.57	
R3.0	3.06	2.92	
<b>Particleboard</b>			
R1.5	1.89	1.77	
R2.0	2.29	2.17	
R2.5	2.66	2.53	
R3.0	3.02	2.88	
<b>Hardwood</b>			
R1.5	1.85	1.73	
R2.0	2.24	2.12	
R2.5	2.62	2.49	
R3.0	2.97	2.83	



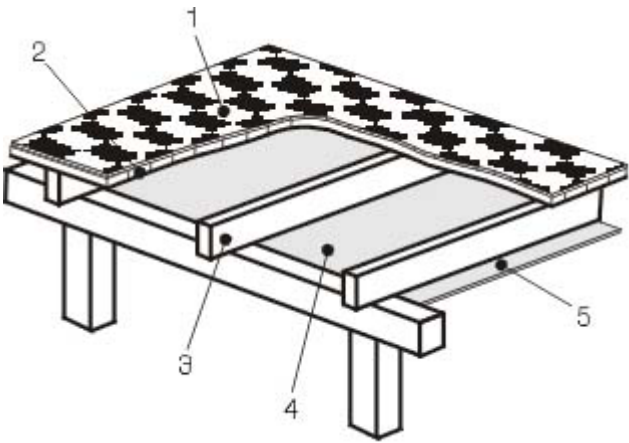
**F8. BARE TIMBER, NO SUB-FLOOR WALLS, PLYWOOD UNDER JOISTS**

 1. 19mm timber floor 2. Timber floor joist 3. Air space (non-reflective) 4. Underlining		Total R-value for floor (m <sup>2</sup> K/W)	
		Heat flow <i>DOWN</i>	Heat flow <i>UP</i>
<b>Softwood</b>			
0.5m height		0.75	0.58
2.5m height		0.74	0.58
<b>Particleboard</b>			
0.5m height		0.72	0.55
2.5m height		0.71	0.55
<b>Hardwood</b>			
0.5m height		0.67	0.51
2.5m height		0.68	0.51
<b>Foil-backed particleboard</b>			
0.5m height		2.06	0.9
2.5m height		2.06	0.9

**F9. CARPETED TIMBER, NO SUB-FLOOR WALLS, PLYWOOD UNDER JOISTS**

		Total R-value for floor (m <sup>2</sup> K/W)	
		Heat flow <i>DOWN</i>	Heat flow <i>UP</i>
<b>Softwood</b>	0.5m height	1.15	0.99
	2.5m height	1.15	0.99
<b>Particleboard</b>	0.5m height	1.12	0.96
	2.5m height	1.12	0.95
<b>Hardwood</b>	0.5m height	1.08	0.92
	2.5m height	1.08	0.91
<b>Foil-backed particleboard</b>	0.5m height	2.50	1.33
	2.5m height	2.50	1.33

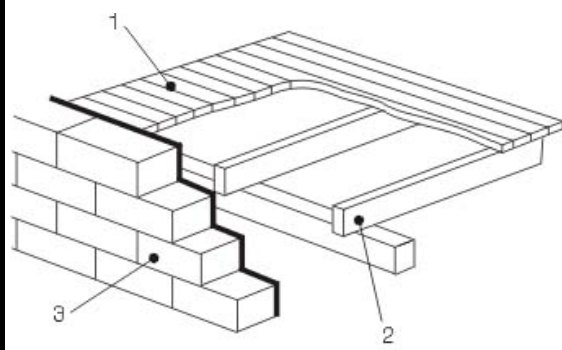
**F10. TILED TIMBER, NO SUB-FLOOR WALLS, PLYWOOD UNDER JOISTS**

		Total R-value for floor (m <sup>2</sup> K/W)	
		Heat flow <i>DOWN</i>	Heat flow <i>UP</i>
<b>Softwood</b>	0.5m height	0.76	0.59
	2.5m height	0.76	0.59
<b>Particleboard</b>	0.5m height	0.73	0.56
	2.5m height	0.72	0.56
<b>Hardwood</b>	0.5m height	0.69	0.52
	2.5m height	0.68	0.52
<b>Foil-backed particleboard</b>	0.5m height	2.08	0.91
	2.5m height	2.08	0.91

## Suspended Timber Floors, Enclosed sub-floor

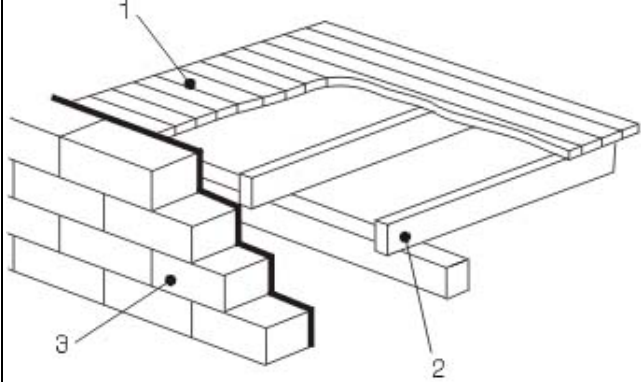
R-values of suspended floor elements are calculated using a modified CIBSE Method (CIBSE Guide, 1986). Values are given for heat flow *DOWN* and *UP* that correspond to open and enclosed sub-floors with three ventilation conditions (see BCA, Table 3.4.1.2), two sub-floor heights and two soil conditions.

It should be noted that conditions different to the assumptions used in the calculations would result in different R-values.

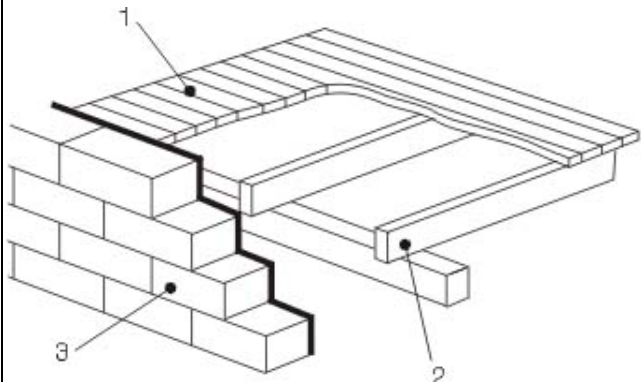
Description of element	Sub-Floor Ventilation [Zone1, Zone2, Zone3] (Cold Weather)		Sub-Floor Ventilation [Zone1, Zone2, Zone3] (Hot Weather)				
	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	
 <p>1. 19mm timber floor 2. Timber floor joist 3. Sub-floor wall</p>	<b>Softwood</b>						
	0.5m height	0.76	0.75	0.74	0.64	0.63	0.63
	2.5m height	0.68	0.67	0.67	0.56	0.56	0.56
	<b>Particleboard</b>						
	0.5m height	0.72	0.72	0.71	0.61	0.60	0.59
	2.5m height	0.65	0.64	0.64	0.53	0.53	0.52
<b>Hardwood</b>							
0.5m height	0.68	0.68	0.67	0.57	0.56	0.55	
2.5m height	0.60	0.60	0.60	0.49	0.49	0.48	

- Notes:
- 1) When the ground surface is sloping use the average under-floor height. For intermediate heights interpolate R-value between 0.5m and 2.5m.
  - 2) Zone 1, Zone 2 and Zone 3 refer to sub-floor ventilations rates from BCA Part 3.4.1. .
  - 3) Heat flow **DOWN** means the heat flows *from* the internal spaces of the building.
  - 4) Heat flow **UP** means the heat flows *into* the internal spaces of the building.
  - 5) Joists at 450mm or 600mm centres.
  - 6) RFL may be corrugated as shown or sheets fixed to joists.
  - 7) Calculations are based sub-floor walls of single brick. Sub-floor walls of other materials will affect the Total R-value.
  - 8) CAVITY CONNECTED refers to situations where air flow is possible from the sub-floor through the wallcavity.
  - 9) CAVITY DISCONNECTED refers to situations where air flow from sub-floor to cavity walls is prevented by cavity flashing or similar.

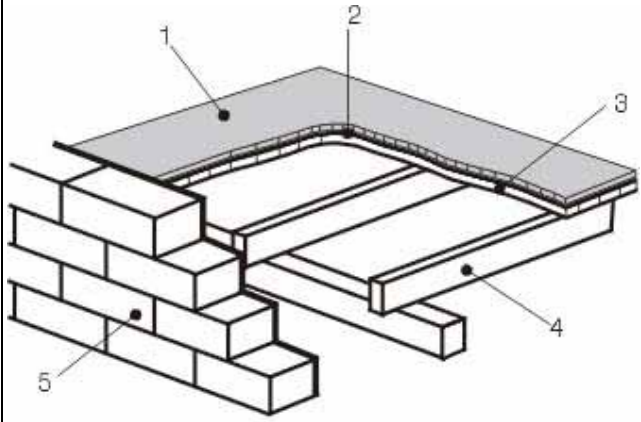
**F11. BARE TIMBER, SUB-FLOOR WALLS, CAVITY CONNECTED**

 <p>1. 19mm timber floor 2. Timber floor joist 3. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	0.76	0.75	0.74	0.64	0.63	0.63	
2.5m height	0.68	0.67	0.67	0.56	0.56	0.56	
<b>Particleboard</b>							
0.5m height	0.72	0.72	0.71	0.61	0.60	0.59	
2.5m height	0.65	0.64	0.64	0.53	0.53	0.52	
<b>Hardwood</b>							
0.5m height	0.68	0.68	0.67	0.57	0.56	0.55	
2.5m height	0.60	0.60	0.60	0.49	0.49	0.48	

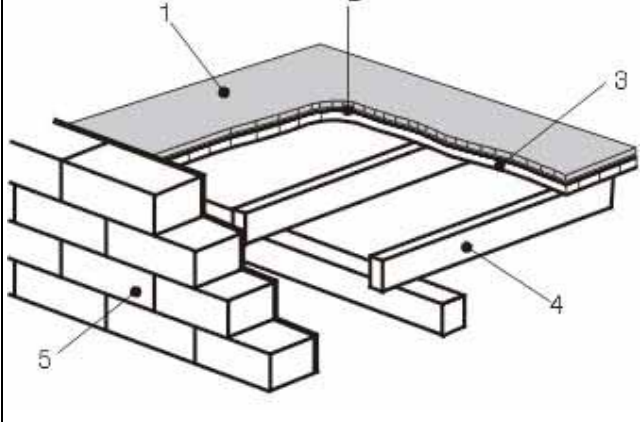
**F12. BARE TIMBER, SUB-FLOOR WALLS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 19mm timber floor 2. Timber floor joist 3. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	1.27	1.19	1.13	1.13	1.06	1.00	
2.5m height	0.82	0.81	0.79	0.70	0.69	0.68	
<b>Particleboard</b>							
0.5m height	1.23	1.16	1.10	1.10	1.03	0.97	
2.5m height	0.79	0.77	0.76	0.67	0.66	0.64	
<b>Hardwood</b>							
0.5m height	1.19	1.12	1.06	1.06	0.99	0.93	
2.5m height	0.75	0.73	0.72	0.63	0.61	0.60	

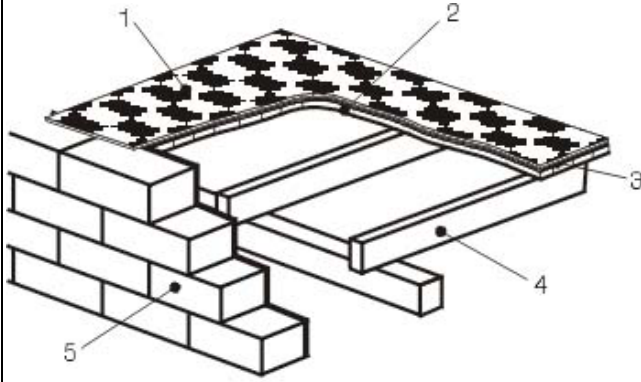
**F13. CARPETED TIMBER, SUB-FLOOR WALLS, CAVITY CONNECTED**

 <p>1. 10mm carpet 2. 10mm underlay 3. 19mm timber floor 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	1.16	1.16	1.15	1.05	1.04	1.03	
2.5m height	1.08	1.08	1.08	0.97	0.97	0.96	
<b>Particleboard</b>							
0.5m height	1.13	1.12	1.12	1.02	1.01	1.00	
2.5m height	1.05	1.05	1.05	0.94	0.93	0.93	
<b>Hardwood</b>							
0.5m height	1.09	1.08	1.08	0.98	0.97	0.96	
2.5m height	1.01	1.01	1.01	0.90	0.89	0.89	

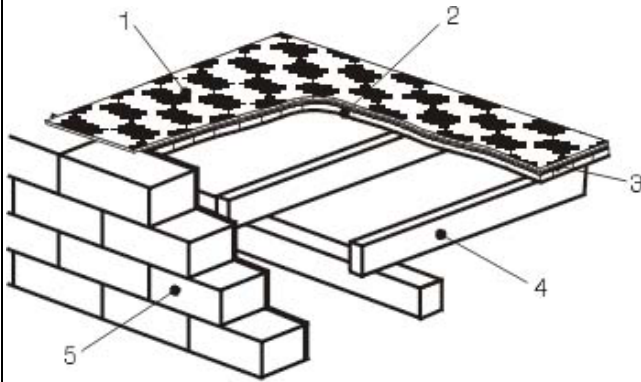
**F14. CARPETED TIMBER, SUB-FLOOR WALLS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 10mm carpet 2. 10mm underlay 3. 19mm timber floor 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	1.67	1.60	1.54	1.54	1.47	1.41	
2.5m height	1.23	1.21	1.20	1.11	1.10	1.08	
<b>Particleboard</b>							
0.5m height	1.64	1.57	1.50	1.51	1.43	1.38	
2.5m height	1.19	1.18	1.17	1.08	1.06	1.05	
<b>Hardwood</b>							
0.5m height	1.60	1.53	1.46	1.47	1.39	1.34	
2.5m height	1.15	1.14	1.13	1.04	1.02	1.01	

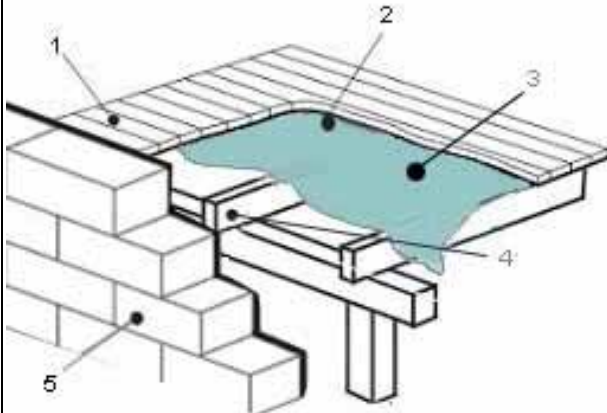
**F15. TILED TIMBER, SUB-FLOOR WALLS, CAVITY CONNECTED**

 <p>1. 6mm tiles 2. 19mm timber floor 3. Tile underlay 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	0.77	0.76	0.75	0.65	0.64	0.64	
2.5m height	0.69	0.68	0.68	0.57	0.57	0.57	
<b>Particleboard</b>							
0.5m height	0.74	0.73	0.72	0.62	0.61	0.60	
2.5m height	0.66	0.65	0.65	0.54	0.54	0.53	
<b>Hardwood</b>							
0.5m height	0.70	0.69	0.68	0.58	0.57	0.56	
2.5m height	0.62	0.61	0.61	0.50	0.50	0.49	

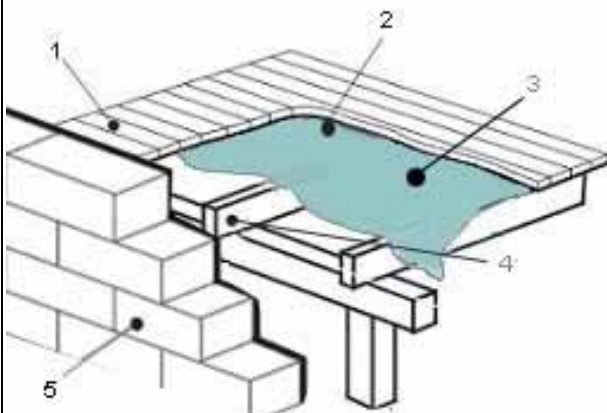
**F16. TILED TIMBER, SUB-FLOOR WALLS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 6mm tiles 2. 19mm timber floor 3. Tile underlay 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	1.30	1.22	1.16	1.16	1.09	1.03	
2.5m height	0.85	0.83	0.82	0.73	0.72	0.70	
<b>Particleboard</b>							
0.5m height	1.26	1.19	1.13	1.13	1.05	1.00	
2.5m height	0.82	0.80	0.79	0.70	0.68	0.67	
<b>Hardwood</b>							
0.5m height	1.22	1.15	1.08	1.09	1.01	0.96	
2.5m height	0.77	0.76	0.75	0.66	0.64	0.63	

**F17. BARE TIMBER, SUB-FLOOR WALLS, RFL OVER JOISTS, CAVITY CONNECTED**

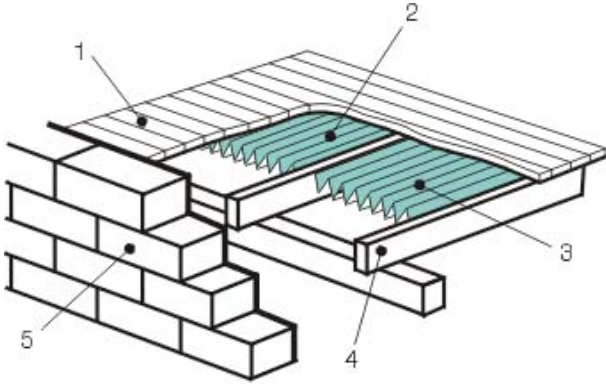
 1. 19mm timber floor 2. Air space (reflective) 3. RFL 4. Timber floor joist 5. Sub-floor wall	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	2.06	2.06	2.05	1.11	1.10	1.09
2.5m height	1.98	1.98	1.98	1.03	1.03	1.02
<b>Particleboard</b>						
0.5m height	2.03	2.02	2.02	1.08	1.07	1.06
2.5m height	1.95	1.95	1.94	1.00	1.00	0.99
<b>Hardwood</b>						
0.5m height	1.99	1.98	1.98	1.04	1.03	1.02
2.5m height	1.91	1.91	1.90	0.96	0.96	0.95

**F18. BARE TIMBER, SUB-FLOOR WALLS, RFL OVER JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

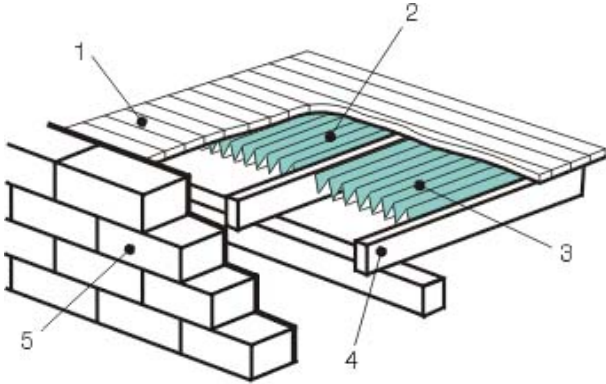
 1. 19mm timber floor 2. Air space (reflective) 3. RFL 4. Timber floor joist 5. Sub-floor wall	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	2.57	2.50	2.44	1.60	1.53	1.47
2.5m height	2.13	2.11	2.10	1.17	1.16	1.14
<b>Particleboard</b>						
0.5m height	2.54	2.46	2.40	1.57	1.50	1.44
2.5m height	2.09	2.08	2.07	1.14	1.12	1.11
<b>Hardwood</b>						
0.5m height	2.50	2.42	2.36	1.53	1.46	1.40
2.5m height	2.05	2.04	2.03	1.10	1.09	1.07



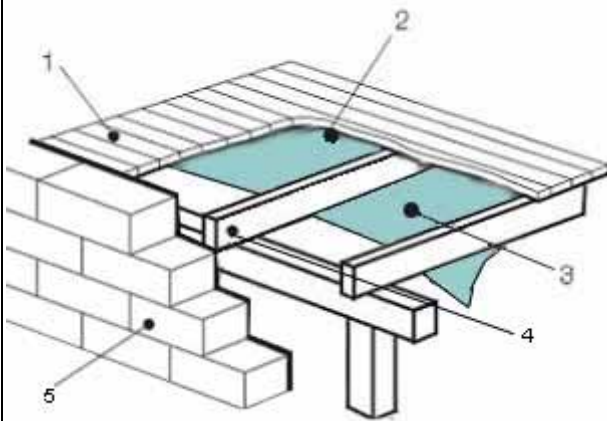
**F19. BARE TIMBER, SUB-FLOOR WALLS, RFL BETWEEN JOISTS, CAVITY CONNECTED**

 <p>1. 19mm timber floor 2. Air space (reflective) 3. RFL 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.24	2.23	2.22	1.19	1.18	1.18	
2.5m height	2.16	2.15	2.15	1.11	1.11	1.11	
<b>Particleboard</b>							
0.5m height	2.20	2.19	2.19	1.16	1.15	1.14	
2.5m height	2.12	2.12	2.12	1.07	1.07	1.07	
<b>Hardwood</b>							
0.5m height	2.16	2.15	2.15	1.11	1.11	1.10	
2.5m height	2.08	2.08	2.07	1.03	1.03	1.03	

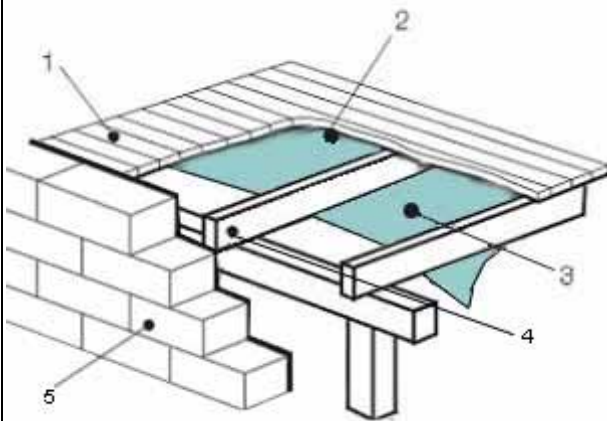
**F20. BARE TIMBER, SUB-FLOOR WALLS, RFL BETWEEN JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 19mm timber floor 2. Air space (reflective) 3. RFL 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.75	2.67	2.61	1.68	1.61	1.55	
2.5m height	2.30	2.28	2.27	1.25	1.24	1.23	
<b>Particleboard</b>							
0.5m height	2.71	2.64	2.57	1.65	1.57	1.52	
2.5m height	2.26	2.25	2.24	1.22	1.20	1.19	
<b>Hardwood</b>							
0.5m height	2.67	2.59	2.53	1.60	1.53	1.47	
2.5m height	2.22	2.21	2.20	1.17	1.16	1.15	

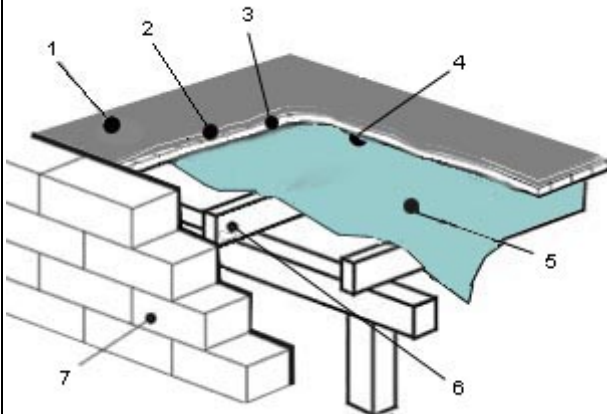
**F21. BARE TIMBER, SUB-FLOOR WALLS, RFL UNDER JOISTS, CAVITY CONNECTED**

 <p>1. 19mm timber floor 2. Air space (reflective) 3. RFL 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	2.67	2.66	2.66	1.24	1.23	1.23
2.5m height	2.59	2.59	2.58	1.16	1.16	1.16
<b>Particleboard</b>						
0.5m height	2.64	2.63	2.62	1.21	1.20	1.19
2.5m height	2.56	2.55	2.55	1.13	1.12	1.12
<b>Hardwood</b>						
0.5m height	2.60	2.59	2.58	1.16	1.16	1.15
2.5m height	2.52	2.51	2.51	1.08	1.08	1.08

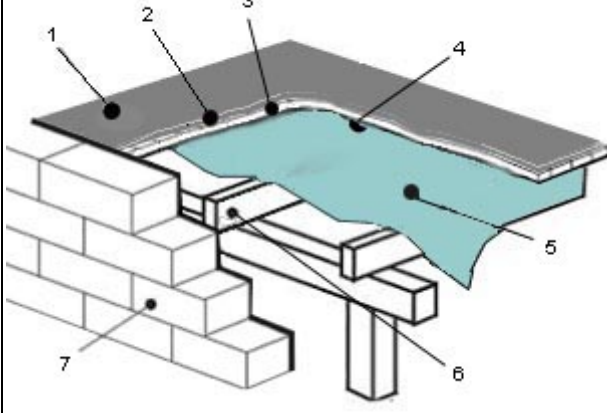
**F22. BARE TIMBER, SUB-FLOOR WALLS, RFL UNDER JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 19mm timber floor 2. Air space (reflective) 3. RFL 4. Timber floor joist 5. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	3.18	3.10	3.04	1.73	1.66	1.60
2.5m height	2.73	2.72	2.71	1.30	1.29	1.28
<b>Particleboard</b>						
0.5m height	3.15	3.07	3.01	1.70	1.62	1.57
2.5m height	2.70	2.69	2.67	1.27	1.25	1.24
<b>Hardwood</b>						
0.5m height	3.11	3.03	2.95	1.65	1.58	1.51
2.5m height	2.66	2.64	2.63	1.22	1.21	1.20

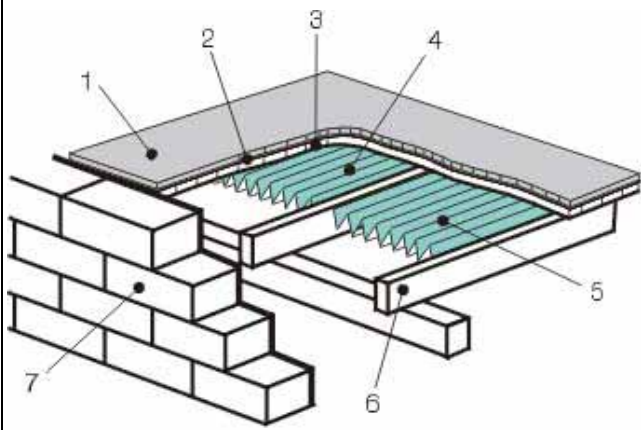
**F23. CARPETED TIMBER, SUB-FLOOR WALLS, RFL OVER JOISTS, CAVITY CONNECTED**

 <ol style="list-style-type: none"> <li>1. 10mm carpet</li> <li>2. 10mm underlay</li> <li>3. 19mm timber floor</li> <li>4. Air space (reflective)</li> <li>5. RFL</li> <li>6. Timber floor joist</li> <li>7. Sub-floor wall</li> </ol>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	2.47	2.47	2.46	1.51	1.50	1.49
2.5m height	2.39	2.39	2.39	1.43	1.43	1.42
<b>Particleboard</b>						
0.5m height	2.44	2.43	2.43	1.48	1.47	1.46
2.5m height	2.36	2.36	2.35	1.40	1.39	1.39
<b>Hardwood</b>						
0.5m height	2.40	2.39	2.39	1.44	1.43	1.42
2.5m height	2.32	2.32	2.31	1.36	1.35	1.35

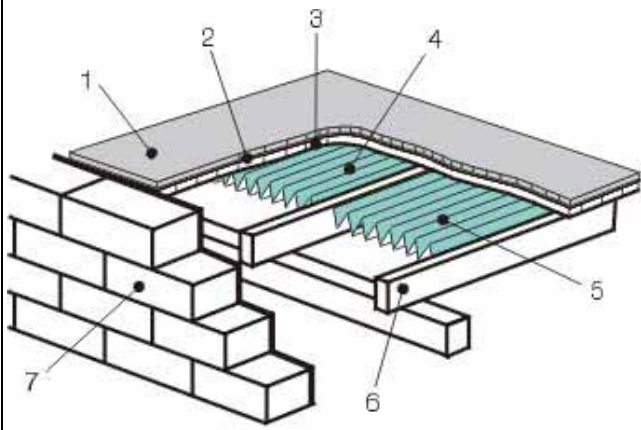
**F24. CARPETED TIMBER, SUB-FLOOR WALLS, RFL OVER JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <ol style="list-style-type: none"> <li>1. 10mm carpet</li> <li>2. 10mm underlay</li> <li>3. 19mm timber floor</li> <li>4. Air space (reflective)</li> <li>5. RFL</li> <li>6. Timber floor joist</li> <li>7. Sub-floor wall</li> </ol>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	2.98	2.91	2.85	2.00	1.93	1.87
2.5m height	2.54	2.52	2.51	1.57	1.56	1.54
<b>Particleboard</b>						
0.5m height	2.95	2.88	2.81	1.97	1.89	1.84
2.5m height	2.50	2.49	2.48	1.54	1.52	1.51
<b>Hardwood</b>						
0.5m height	2.91	2.88	2.77	1.93	1.86	1.80
2.5m height	2.46	2.45	2.44	1.50	1.48	1.47

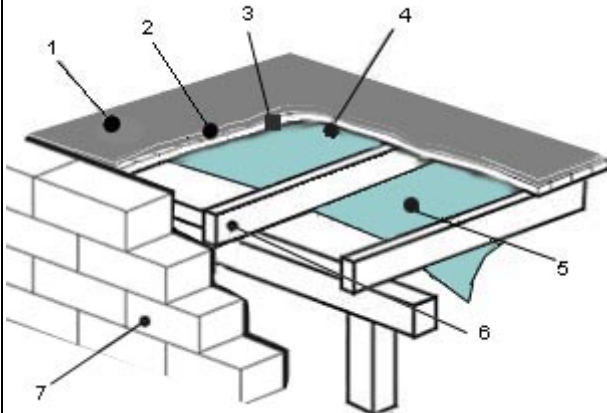
**F25. CARPETED TIMBER, SUB-FLOOR WALLS, RFL BETWEEN JOISTS, CAVITY CONNECTED**

 <ol style="list-style-type: none"> <li>1. 10mm carpet</li> <li>2. 10mm underlay</li> <li>3. 19mm timber floor</li> <li>4. Air space (reflective)</li> <li>5. RFL</li> <li>6. Timber floor joist</li> <li>7. Sub-floor wall</li> </ol>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.65	2.64	2.64	1.62	1.61	1.60	
2.5m height	2.57	2.57	2.56	1.54	1.54	1.53	
<b>Particleboard</b>							
0.5m height	2.62	2.61	2.60	1.58	1.58	1.57	
2.5m height	2.54	2.54	2.53	1.51	1.50	1.50	
<b>Hardwood</b>							
0.5m height	2.58	2.57	2.56	1.54	1.54	1.53	
2.5m height	2.50	2.49	2.49	1.46	1.46	1.46	

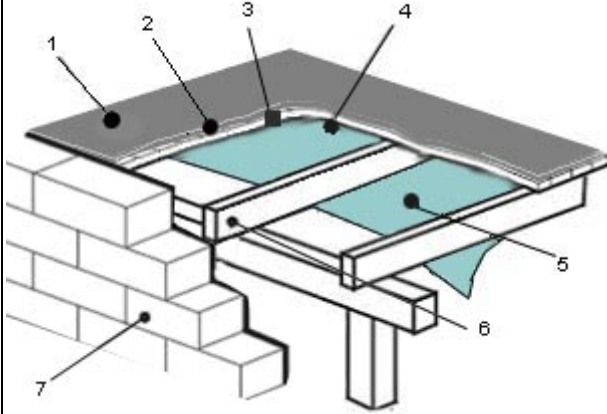
**F26. CARPETED TIMBER, SUB-FLOOR WALLS, RFL BETWEEN JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <ol style="list-style-type: none"> <li>1. 10mm carpet</li> <li>2. 10mm underlay</li> <li>3. 19mm timber floor</li> <li>4. Air space (reflective)</li> <li>5. RFL</li> <li>6. Timber floor joist</li> <li>7. Sub-floor wall</li> </ol>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	3.16	3.09	3.02	2.11	2.04	1.98	
2.5m height	2.71	2.70	2.69	1.68	1.67	1.65	
<b>Particleboard</b>							
0.5m height	3.13	3.05	2.99	2.07	2.00	1.94	
2.5m height	2.68	2.67	2.65	1.65	1.63	1.62	
<b>Hardwood</b>							
0.5m height	3.09	3.01	2.95	2.03	1.96	1.90	
2.5m height	2.64	2.63	2.61	1.60	1.59	1.58	

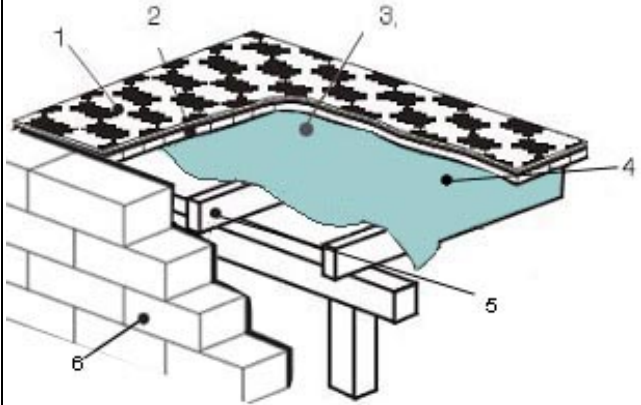
**F27. CARPETED TIMBER, SUB-FLOOR WALLS, RFL UNDER JOISTS, CAVITY CONNECTED**

 <ol style="list-style-type: none"> <li>1. 10mm carpet</li> <li>2. 10mm underlay</li> <li>3. 19mm timber floor</li> <li>4. Air space (reflective)</li> <li>5. RFL</li> <li>6. Timber floor joist</li> <li>7. Sub-floor wall</li> </ol>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	3.08	3.07	3.07	1.67	1.66	1.65	
2.5m height	3.00	3.00	2.99	1.59	1.59	1.58	
<b>Particleboard</b>							
0.5m height	3.05	3.04	3.03	1.64	1.63	1.62	
2.5m height	2.97	2.97	2.96	1.56	1.55	1.55	
<b>Hardwood</b>							
0.5m height	3.01	3.00	2.99	1.59	1.59	1.58	
2.5m height	2.93	2.93	2.92	1.51	1.51	1.51	

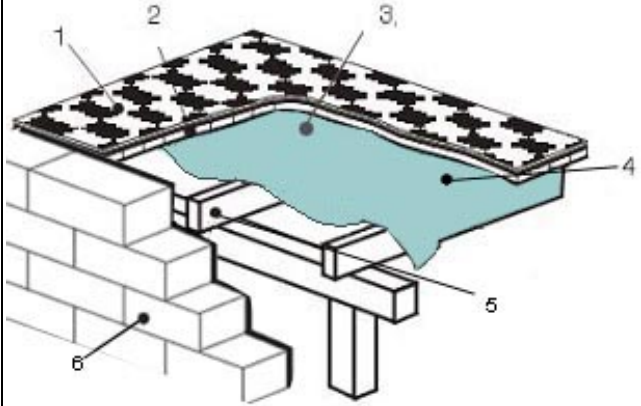
**F28. CARPETED TIMBER, SUB-FLOOR WALLS, RFL UNDER JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <ol style="list-style-type: none"> <li>1. 10mm carpet</li> <li>2. 10mm underlay</li> <li>3. 19mm timber floor</li> <li>4. Air space (reflective)</li> <li>5. RFL</li> <li>6. Timber floor joist</li> <li>7. Sub-floor wall</li> </ol>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	3.59	3.52	3.45	2.16	2.09	2.08	
2.5m height	3.14	3.13	3.12	1.73	1.72	1.70	
<b>Particleboard</b>							
0.5m height	3.56	3.48	3.42	2.13	2.05	2.00	
2.5m height	3.11	3.10	3.09	1.70	1.68	1.67	
<b>Hardwood</b>							
0.5m height	3.52	3.44	3.38	2.08	2.01	1.95	
2.5m height	3.07	3.06	3.05	1.65	1.64	1.63	

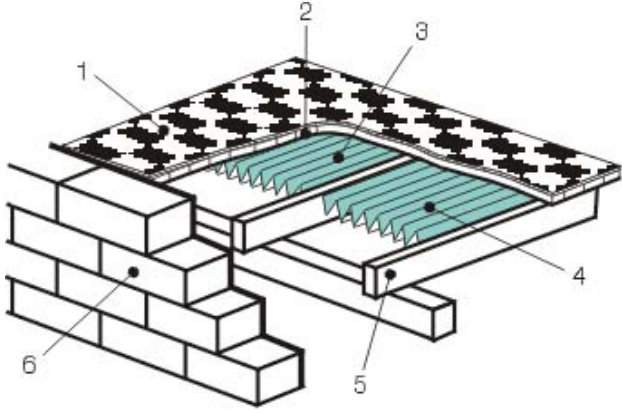
**F29. TILED TIMBER, SUB-FLOOR WALLS, RFL OVER JOISTS, CAVITY CONNECTED**

 <p>1. 6mm tiles 2. 19mm timber floor 3. Air space (reflective) 4. RFL 5. Timber floor joist 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.07	2.07	2.06	1.12	1.11	1.11	
2.5m height	1.99	1.99	1.99	1.04	1.04	1.03	
<b>Particleboard</b>							
0.5m height	2.04	2.03	2.03	1.09	1.08	1.07	
2.5m height	1.96	1.96	1.96	1.01	1.01	1.00	
<b>Hardwood</b>							
0.5m height	2.00	1.99	1.99	1.05	1.04	1.03	
2.5m height	1.92	1.92	1.91	0.97	0.97	0.96	

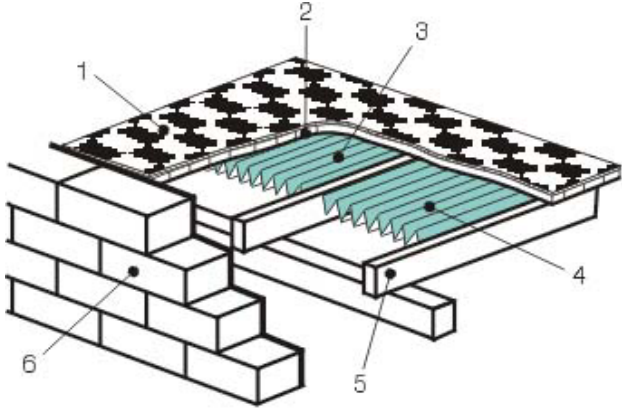
**F30. TILED TIMBER, SUB-FLOOR WALLS, RFL OVER JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 6mm tiles 2. 19mm timber floor 3. Air space (reflective) 4. RFL 5. Timber floor joist 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.58	2.51	2.45	1.61	1.54	1.48	
2.5m height	2.14	2.12	2.11	1.18	1.17	1.15	
<b>Particleboard</b>							
0.5m height	2.55	2.48	2.41	1.58	1.51	1.45	
2.5m height	2.10	2.09	2.08	1.15	1.14	1.12	
<b>Hardwood</b>							
0.5m height	2.51	2.43	2.37	1.54	1.47	1.41	
2.5m height	2.06	2.05	2.04	1.11	1.10	1.08	

**F31. TILED TIMBER, SUB-FLOOR WALLS, RFL BETWEEN JOISTS, CAVITY CONNECTED**

 <p>1. 6mm tiles 2. 19mm timber floor 3. Air space (reflective) 4. RFL 5. Timber floor joist 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.25	2.24	2.23	1.20	1.19	1.19	
2.5m height	2.17	2.16	2.16	1.12	1.12	1.12	
<b>Particleboard</b>							
0.5m height	2.21	2.21	2.20	1.17	1.16	1.15	
2.5m height	2.13	2.13	2.13	1.09	1.09	1.08	
<b>Hardwood</b>							
0.5m height	2.17	2.16	2.16	1.12	1.12	1.11	
2.5m height	2.09	2.09	2.09	1.05	1.04	1.04	

**F32. TILED TIMBER, SUB-FLOOR WALLS, RFL BETWEEN JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 6mm tiles 2. 19mm timber floor 3. Air space (reflective) 4. RFL 5. Timber floor joist 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
0.5m height	2.76	2.68	2.62	1.69	1.62	1.58	
2.5m height	2.31	2.30	2.28	1.26	1.25	1.24	
<b>Particleboard</b>							
0.5m height	2.72	2.65	2.59	1.66	1.59	1.53	
2.5m height	2.28	2.26	2.25	1.23	1.22	1.20	
<b>Hardwood</b>							
0.5m height	2.68	2.61	2.54	1.61	1.54	1.48	
2.5m height	2.23	2.22	2.21	1.19	1.17	1.16	

**F33. TILED TIMBER, SUB-FLOOR WALLS, RFL UNDER JOISTS, CAVITY CONNECTED**

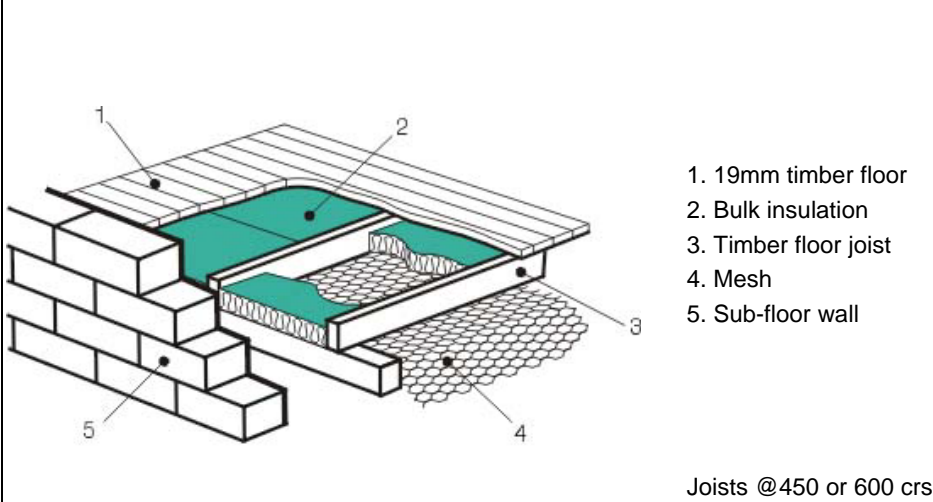
<p>1. 6mm tiles 2. 19mm timber floor 3. Air space (reflective) 4. RFL 5. Timber floor joist 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	2.68	2.67	2.67	1.25	1.24	1.24
2.5m height	2.60	2.60	2.59	1.17	1.17	1.17
<b>Particleboard</b>						
0.5m height	2.65	2.64	2.63	1.22	1.21	1.20
2.5m height	2.57	2.57	2.56	1.14	1.14	1.13
<b>Hardwood</b>						
0.5m height	2.61	2.60	2.59	1.17	1.17	1.16
2.5m height	2.53	2.52	2.52	1.10	1.09	1.09

**F34. TILED TIMBER, SUB-FLOOR WALLS, RFL UNDER JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

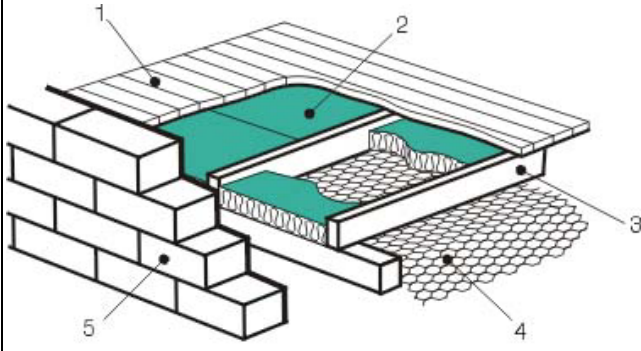
<p>1. 6mm tiles 2. 19mm timber floor 3. Air space (reflective) 4. RFL 5. Timber floor joist 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
0.5m height	3.19	3.12	3.05	1.74	1.67	1.61
2.5m height	2.74	2.73	2.72	1.31	1.30	1.29
<b>Particleboard</b>						
0.5m height	3.16	3.08	3.02	1.71	1.64	1.58
2.5m height	2.71	2.70	2.68	1.28	1.27	1.25
<b>Hardwood</b>						
0.5m height	3.12	3.04	2.98	1.66	1.59	1.53
2.5m height	2.67	2.66	2.64	1.24	1.22	1.21



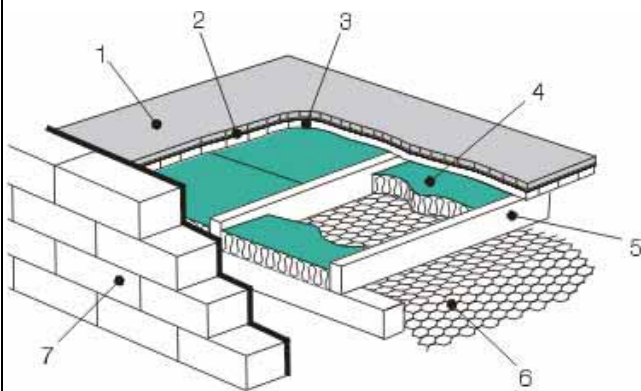
**F35. BARE TIMBER, SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS, CAVITY CONNECTED**

 <p>1. 19mm timber floor 2. Bulk insulation 3. Timber floor joist 4. Mesh 5. Sub-floor wall</p> <p>Joists @450 or 600 crs</p>	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
R1.5	2.13	2.12	2.11	2.01	2.00	1.99
R2.0	2.53	2.52	2.51	2.40	2.40	2.39
R2.5	2.90	2.90	2.89	2.77	2.77	2.76
R3.0	3.26	3.25	3.25	3.12	3.11	3.11
<b>Particleboard</b>						
R1.5	2.09	2.09	2.08	1.97	1.97	1.96
R2.0	2.49	2.49	2.48	2.37	2.36	2.35
R2.5	2.87	2.86	2.85	2.74	2.73	2.72
R3.0	3.22	3.21	3.21	3.08	3.07	3.07
<b>Hardwood</b>						
R1.5	2.05	2.04	2.04	1.93	1.93	1.92
R2.0	2.45	2.44	2.43	2.32	2.32	2.31
R2.5	2.82	2.81	2.81	2.69	2.68	2.67
R3.0	3.17	3.17	3.16	3.03	3.02	3.01

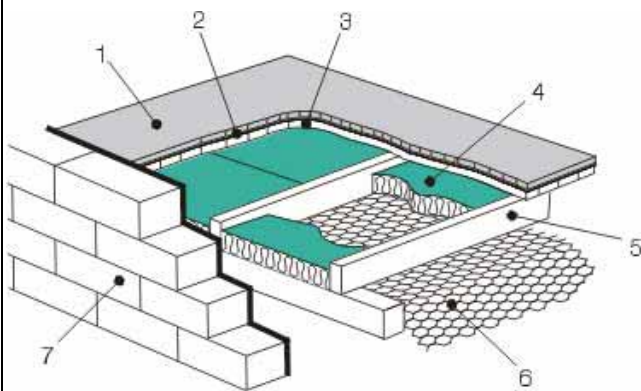
**F36. BARE TIMBER, SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 <p>1. 19mm timber floor 2. Bulk insulation 3. Timber floor joist 4. Mesh 5. Sub-floor wall</p> <p>Joists @450 or 600 crs</p>	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
R1.5	2.64	2.56	2.50	2.50	2.43	2.37	
R2.0	3.04	2.96	2.90	2.89	2.82	2.76	
R2.5	3.41	3.34	3.28	3.26	3.19	3.13	
R3.0	3.77	3.70	3.63	3.61	3.54	3.48	
<b>Particleboard</b>							
R1.5	2.60	2.53	2.47	2.46	2.39	2.33	
R2.0	3.00	2.93	2.86	2.86	2.79	2.73	
R2.5	3.38	3.30	3.24	3.28	3.15	3.10	
R3.0	3.73	3.66	3.59	3.57	3.50	3.44	
<b>Hardwood</b>							
R1.5	2.56	2.49	2.42	2.42	2.35	2.29	
R2.0	2.96	2.88	2.82	2.81	2.74	2.68	
R2.5	3.33	3.26	3.19	3.18	3.11	3.05	
R3.0	3.68	3.61	3.55	3.52	3.45	3.39	

**F37. CARPETED TIMBER, SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS, CAVITY CONNECTED**

 1. 10mm carpet 2. 10mm underlay 3. 19mm timber floor 4. Bulk insulation 5. Timber floor joist 6. Mesh 7. Sub-floor wall	Total R-value for floor (m <sup>2</sup> K/W)					
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>						
R1.5	2.54	2.53	2.52	2.42	2.41	2.41
R2.0	2.95	2.95	2.94	2.83	2.83	2.82
R2.5	3.35	3.34	3.34	3.23	3.22	3.21
R3.0	3.73	3.72	3.72	3.60	3.59	3.59
<b>Particleboard</b>						
R1.5	2.50	2.50	2.49	2.39	2.38	2.37
R2.0	2.92	2.91	2.90	2.80	2.79	2.79
R2.5	3.32	3.31	3.30	3.19	3.18	3.18
R3.0	3.69	3.69	3.68	3.56	3.56	3.55
<b>Hardwood</b>						
R1.5	2.46	2.46	2.45	2.35	2.34	2.33
R2.0	2.88	2.87	2.86	2.76	2.75	2.74
R2.5	3.27	3.26	3.26	3.15	3.14	3.13
R3.0	3.65	3.64	3.63	3.52	3.51	3.50

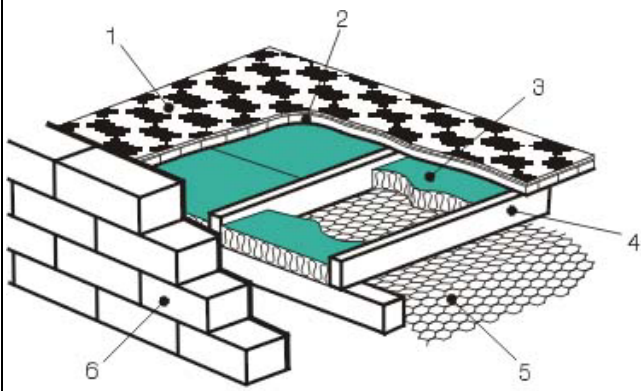
**F38. CARPETED TIMBER, SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 1. 10mm carpet 2. 10mm underlay 3. 19mm timber floor 4. Bulk insulation 5. Timber floor joist 6. Mesh 7. Sub-floor wall		Total R-value for floor (m <sup>2</sup> K/W)					
		Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>	R1.5	3.05	2.97	2.91	2.91	2.84	2.78
	R2.0	3.46	3.39	3.32	3.32	3.25	3.19
	R2.5	3.86	3.78	3.72	3.72	3.64	3.59
	R3.0	4.24	4.16	4.10	4.09	4.02	3.96
<b>Particleboard</b>	R1.5	3.01	2.94	2.88	2.88	2.81	2.75
	R2.0	3.43	3.35	3.29	3.29	3.22	3.16
	R2.5	3.83	3.75	3.69	3.68	3.61	3.55
	R3.0	4.20	4.13	4.07	4.05	3.98	3.92
<b>Hardwood</b>	R1.5	2.97	2.90	2.84	2.84	2.72	2.71
	R2.0	3.39	3.31	3.25	3.25	3.18	3.12
	R2.5	3.78	3.71	3.64	3.64	3.57	3.51
	R3.0	4.16	4.08	4.02	4.01	3.94	3.88

**F39. TILED TIMBER, SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS, CAVITY CONNECTED**

<p>1. 6mm tiles 2. 19mm timber floor 3. Bulk insulation 4. Timber floor joist 5. Mesh 6. Sub-floor wall</p>	Total R-value for floor (m <sup>2</sup> K/W)						
		Heat flow <i>DOWN</i>			Heat flow <i>UP</i>		
<b>Softwood</b>							
R1.5	2.14	2.13	2.12	-	2.02	2.01	2.00
R2.0	2.54	2.53	2.52		2.41	2.41	2.40
R2.5	2.92	2.91	2.90		2.79	2.78	2.77
R3.0	3.27	3.27	3.26		3.13	3.13	3.12
<b>Particleboard</b>							
R1.5	2.10	2.10	2.09		1.99	1.98	1.97
R2.0	2.50	2.50	2.49		2.38	2.37	2.37
R2.5	2.88	2.87	2.87		2.75	2.74	2.73
R3.0	3.24	3.23	3.22		3.09	3.09	3.08
<b>Hardwood</b>							
R1.5	2.06	2.06	2.05		1.94	1.94	1.93
R2.0	2.46	2.45	2.45		2.34	2.33	2.32
R2.5	2.83	2.83	2.82		2.70	2.69	2.69
R3.0	3.19	3.18	3.17		3.04	3.04	3.03

**F40. TILED TIMBER, SUB-FLOOR WALLS, BULK INSULATION BETWEEN JOISTS, CAVITY DISCONNECTED OR TIMBER FRAME**

 1. 6mm tiles 2. 19mm timber floor 3. Bulk insulation 4. Timber floor joist 5. Mesh 6. Sub-floor wall	Total R-value for floor (m <sup>2</sup> K/W)						
	Heat flow <i>DOWN</i>			Heat flow <i>UP</i>			
<b>Softwood</b>							
R1.5	2.65	2.57	2.51	2.51	2.44	2.38	
R2.0	3.05	2.97	2.91	2.90	2.83	2.77	
R2.5	3.43	3.35	3.29	3.28	3.20	3.15	
R3.0	3.78	3.71	3.65	3.62	3.55	3.49	
<b>Particleboard</b>							
R1.5	2.61	2.54	2.48	2.48	2.40	2.34	
R2.0	3.01	2.94	2.88	2.87	2.80	2.74	
R2.5	3.39	3.31	3.25	3.24	3.17	3.11	
R3.0	3.75	3.67	3.61	3.58	3.51	3.45	
<b>Hardwood</b>							
R1.5	2.57	2.50	2.43	2.43	2.36	2.30	
R2.0	2.97	2.89	2.83	2.83	2.75	2.70	
R2.5	3.34	3.27	3.21	3.19	3.12	3.06	
R3.0	3.70	3.62	3.56	3.53	3.46	3.40	