Universität Stuttgart

IGE
Institut für
GebäudeEnergetik

Lehrstuhl für
Heiz- und
Raumlufttechnik

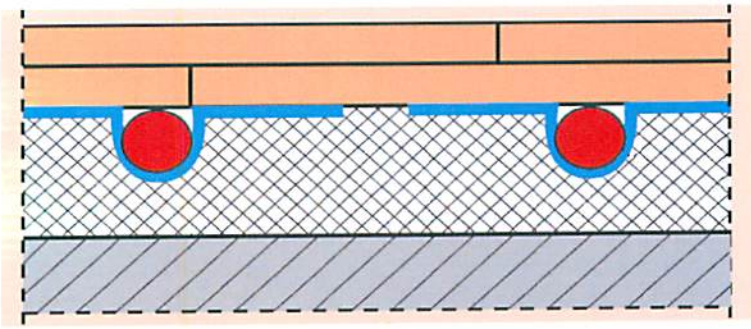
test report for specific thermal output of floor heating construction in acc. to EN 1264

Freeheat SAS

caleosol tradi 2E11

Prüfbericht

HB15 P414



This report consits of 4 pages and 1 page appendix.

The test results relate only to the items tested.

The test laboratory is accredit in acc. to ISO/IEC 17025 by DAkkS.
Acceptances from certification bodies:
DINCERTCO / RAL / AFNOR / BSI / AENOR

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11027-01-00
D-IS-11027-01-00

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specific thermal output, floor heating system in acc. to DIN EN 1264-2 and DIN EN 1264-4

1. **test method:** intial test of floor heating system

2. **Institut:**
Institut für GebäudeEnergetik
Lehrstuhl für Heiz- und Raumlufttechnik
der Universität Stuttgart
Pfaffenwaldring 35
70550 Stuttgart

3. **client:**
Freeheat SAS
6, route des boutonnière
41000 St. Denis sur Loire (France)

4. **manufacturer:** the client

5. **system description:**

trademark:	**caleosol tradi 2E11**		
construction:	dry system		(construction tye B in acc. to DIN 18560 T.2)
	(Option)		
spacing in m:	0,100	**0,200**	
test sample:			
pipe:	GIACOMIN PE-RT/EVOH/PE-RT 16x1.5mm (sauerstoffdicht)		
material:	PE-RT		
diameter:	0,016	m	
thickness:	0,0015	m	
eff. heat conductivity:	0,400	W/m K	(--> data sheet of manufacturer / Giacomini France)
covering:	-		
diffuser plates:	diffuser plates of aluminium		
thickness:	0,50	mm	
heat conductivity:	200	W/m K	
width:	0,090	m resp.	**0,190** m
	(Option)		**(act. product)**
covering / load distribution layer:			
material:	dry plate (Fabr. Fermacell, type 2E11)		
thickness:	0,020	m	
heat conductivity:	0,33	W/m K	(--> data sheet of manufacturer / Fermacell)

Documents for examination: The basis for the testing and certification are the following documents in their current version.

DIN EN 1264-2 version: Mrz 13	Raumflächenintegrierte Heiz- und Kühlsysteme mit Wasserdurchströmung – Teil 2: Fußbodenheizung: Prüfverfahren für die Bestimmung der Wärmeleistung unter Benutzung von Berechnungsmethoden und experimentellen Methoden.
DIN EN 1264-4 Nov 09	Raumflächenintegrierte Heiz- und Kühlsysteme mit Wasserdurchströmung – Teil 4: Installation
DIN CERCTO	Zertifizierungsprogramm Stand November 2009 "Raumflächenintegrierte Heiz- und Kühlsysteme mit Wasserdurchströmung"

6. **Information about test methods**

The system has been tested with calcualtion method (version HB15 P414.xls).
An additional experimental testing is not required.

7. **test results:**

	(Option)	
Limit specific thermal output in W/m²:	97,7	**87,5**
Limit temperature difference in K:	17,1	**18,4**

Stuttgart, 25.06.2015

i.A. Prof. Dr.-Ing. M. Schmidt

Dr.-Ing. Chr. Beck

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8. calculation results:

parameter data: appendix A

characteristic curves:

$q = k_H * \Delta\vartheta_H$

	add. floor covering	0,00	0,05	0,10	0,15	m² K/W
	spacing T	equivalent coefficient for heat transfer k_H				
(Option)	0,100 m	5,707	4,307	3,459	2,889	W/m² K
	0,200 m	4,753	3,700	3,029	2,565	W/m² K

limit curves:

Option: This spacing is not in the actual product offer

		spacing T =			0,100	m
$\Delta\vartheta_{fmax}$	floor covering	0,00	0,05	0,10	0,15	m² K/W
9 K	Limit temperature difference.	17,1	22,8	28,4	34,1	K
	Limit specific thermal output	97,7	98,0	98,3	98,5	W/m²
15 K	Limit temperature difference.	30,0	40,1	50,1	60,1	K
	Limit specific thermal output	171,0	172,5	173,2	173,7	W/m²

This spacing is the actual product offer

		spacing T =			0,200	m
$\Delta\vartheta_{fmax}$	floor covering	0,00	0,05	0,10	0,15	m² K/W
9 K	Limit temperature difference.	18,4	24,0	29,6	35,3	K
	Limit specific thermal output	87,5	88,7	89,7	90,5	W/m²
15 K	Limit temperature difference.	31,9	42,7	52,9	63,3	K
	Limit specific thermal output	151,7	158,0	160,4	162,3	W/m²

diagrams:

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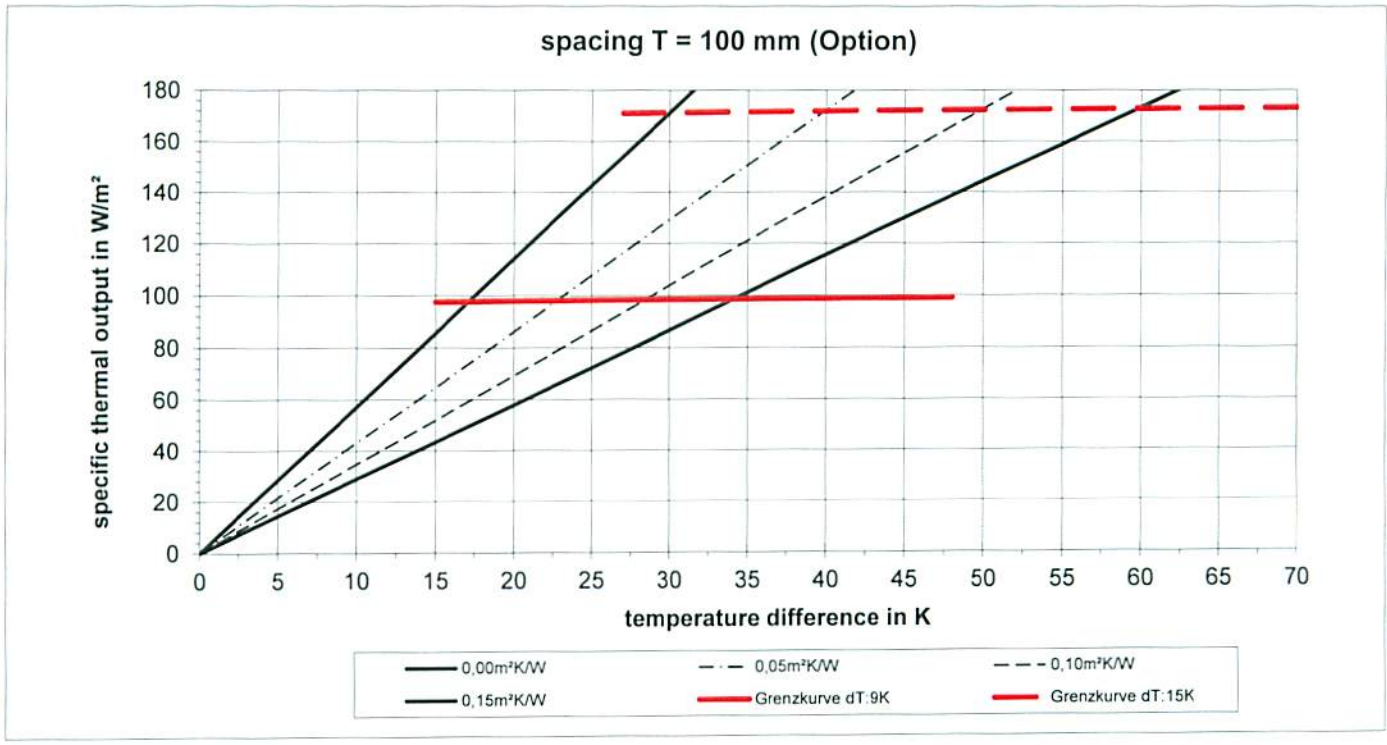

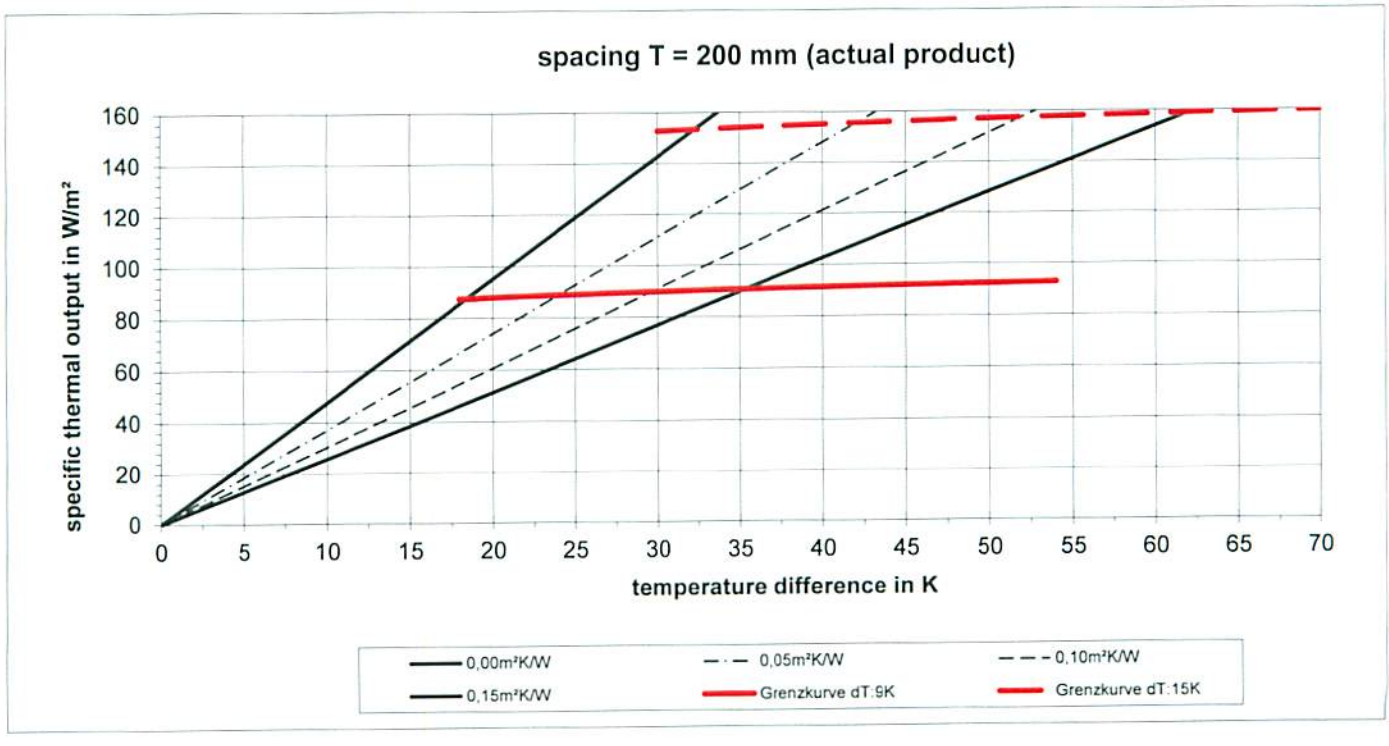

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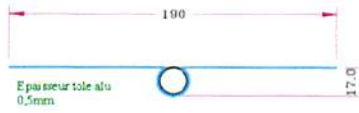
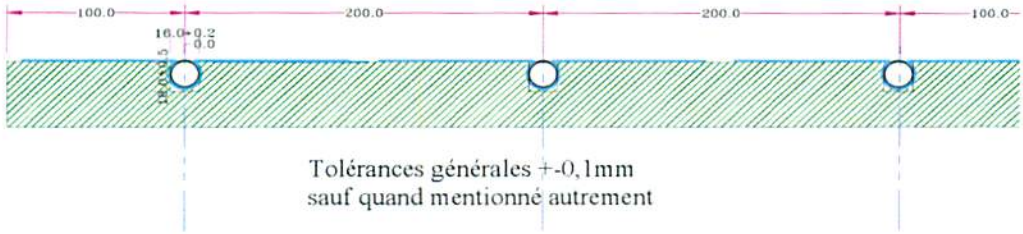
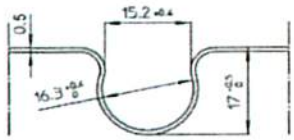
9. construction drawing of test sample:





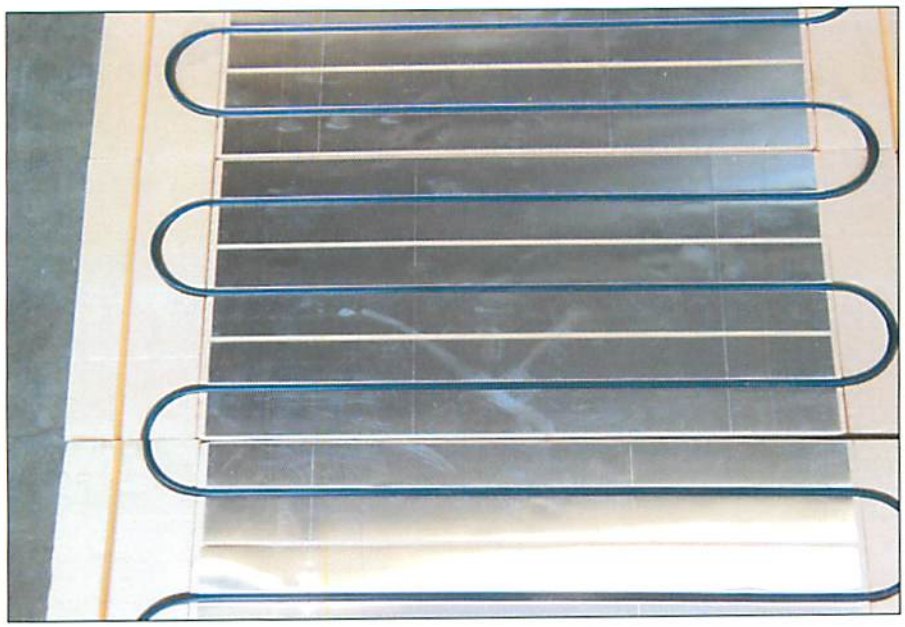


Groove detail

detail covering:
Fermacell 2E11

10. Picture of test area:

The test area was built on 25.6.2015 in the Institut. The used material was sended directly by the client. The construction is equal to the nominal construction of the drawing and the technical documents.



11. conformity of the technical documents

The system is type B of DIN 18560 part 2.

The sketch of the technical documents are in acc. to EN 1264 part 4.

The official technical documents should be sended to the Institut within 6 months.

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APPENDIX

A calculation factors:

Option: This spacing is not in the actual product offer

	spacing T =	0,100	m		
resistance of floor covering:	0,000	0,050	0,100	0,150	m² K/W
factor B:	6,697	6,648	6,619	6,600	W/m² K
factor a_B:	1,000	0,760	0,613	0,514	
spacing factor a_T:	1,088				
spacing exponent m_T:	-0,333				
covering factor a_U:	0,901				
factor b_U:	1,000				
value k_{wl}:	0,853				
factor a_{wl}:	0,992				
factor a_K:	0,980				
limit curve coefficient B_G:	94,111				
limit curve exponent n_G:	0,013				

This spacing is the actual product offer

	Rohrabstand T =	**0,200**	**m**		
resistance of floor covering:	0,000	0,050	0,100	0,150	m² K/W
factor B:	6,828	6,755	6,709	6,677	W/m² K
factor aB:	1,000	0,787	0,649	0,552	
spacing factor aT:	1,088				
spacing exponent mT:	-1,667				
covering factor aÜ:	0,901				
factor bÜ:	0,500				
value kwl:	0,827				
factor awl:	0,966				
factor aK:	0,920				
limit curve coefficient B_G:	74,854				
limit curve exponent n_G:	0,053				