

Department Construction
Name Linda Mellish
Phone 09 272 2264
Email Linda.Mellish@rehau.com
Date 7/09/2015

Plumbcraft
Todd Bowmast
5 Waimana Rd
Takanini 2244

REHAU Hydronic System detailed design - Heating
Project: 15-130 Freezer Floor Heating

Dear Todd,

We have pleasure in submitting our detailed design documents for your above mentioned project. This design and the associated data have been prepared according to the information, diagrams and/or drawings provided. Please check and confirm all parameters and results prior to using them.

By utilising our design service and the results you recognise the current REHAU Terms and Conditions of Sale, which are available on request or at www.rehau.com/LZB.

In case this design requires amendments, please send an email with all required changes to FHDesign.ANZ@rehau.com

Additional charges may apply for design changes or required corrections not caused by us.

We thank you for your interest in the REHAU Hydronic System detailed design and look forward to the application of our products.

Please do not hesitate to contact us if you require any further clarification or assistance.

Kind regards

Linda Mellish
REHAU Pty Ltd

Attachments: Performance overview (proposed final)
 Hydraulic Balancing Data for each manifold
 Bill Of Material (proposed final)
 Circuit layout as CAD drawing

REHAU HYDRONIC SYSTEM

MANIFOLD VALVE SETTINGS - HYDRAULIC BALANCING



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Project N°:	15-130					Project Name:	Freezer Floor Heating				Installer:	Plumbcraft			
2	Manifold M1 - Ground Floor													Date	7/09/2015	
3	Circuit Fluid Properties				Circuit Pipe Details				Flow and Return Pipe				RESULTS - Manifold			
4	Heating Temperature	21.0	°C	Manifold Brass Flow Meter				Length	10 m			Number of circuits: 9				
5	Cooling Temperature	NA	°C	Pipe RAUTHERM S 16				Flow/Ret pipe	RAUTITAN Pink 25			Total Length of circuits: 1039 m				
6	Mean water temp	18.6	°C	Mixing Unit Details				Flow rate	770 l/h			Total Flow: 770 l/h				
7	% Ethylene Glycol	20.0	%	Type None				v	0.8 m/s			Pressure Loss @ Manifold: 12.9 kPa				
8	viscosity	0.0018	Pa.s	Supply t 21.0 °C				ΔP/r	7.9 kPa			Total pressure including F/R 20.8 kPa				
9									%Fitting losses	20% (estimate)						
10	INPUT - Manifold							RESULTS - Floor Circuits								
11	<i>Note: ** pressure drop when valves fully open!</i>		Circuit length Σ	Flow		Velocity	Head Loss	Head Losses			Balancing					
12				v	v			Pipe	Flow and Return Valves	Total Loss	Turn direction:					
13							ΔP _{pipe}	ΔP _{Flow/Return valves, full open}	ΔP _{total**}	Closed => Open						
14	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Kv	Turns			
15												m ³ /h				
16	Circuit	M1.1	117	1.4	0.024	0.213	105	12,326	540	12,866	540	1.18	2 1/4			
17	Circuit	M1.2	116	1.4	0.024	0.211	104	12,043	531	12,574	823	0.95	1 1/4			
18	Circuit	M1.3	115	1.4	0.024	0.210	102	11,792	523	12,315	1,074	0.82	1			
19	Circuit	M1.4	114	1.4	0.024	0.208	101	11,518	514	12,032	1,348	0.73	3/4			
20	Circuit	M1.5	114	1.4	0.023	0.207	100	11,328	508	11,835	1,538	0.68	3/4			
21	Circuit	M1.6	114	1.4	0.023	0.208	100	11,463	512	11,975	1,403	0.71	3/4			
22	Circuit	M1.7	115	1.4	0.024	0.209	102	11,737	521	12,258	1,129	0.80	3/4			
23	Circuit	M1.8	116	1.4	0.024	0.211	103	11,987	529	12,516	879	0.92	1 1/4			
24	Circuit	M1.9	117	1.4	0.024	0.213	105	12,269	539	12,807	597	1.12	2			
25	Circuit	M1.10														
26	Circuit	M1.11														
27	Circuit	M1.12														
28	Circuit	M1.13														
29	Circuit	M1.14														
30	Circuit	M1.15														
31	Circuit	M1.16														
32	Circuit	M1.17														
33	12.8													CT ANZ / syd536		

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REHAU HYDRONIC SYSTEM

MANIFOLD VALVE SETTINGS - HYDRAULIC BALANCING



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Project N°:	15-130					Project Name:	Freezer Floor Heating			Installer:	Plumbcraft				
2	Manifold M2 - Ground Floor													Date	7/09/2015	
3	Circuit Fluid Properties				Circuit Pipe Details				Flow and Return Pipe			RESULTS - Manifold				
4	Heating Temperature	21.0	°C	Manifold Brass Flow Meter				Length	10 m		Number of circuits: 9					
5	Cooling Temperature	NA	°C	Pipe RAUTHERM S 16				Flow/Ret pipe	RAUTITAN Pink 25		Total Length of circuits: 1039 m					
6	Mean water temp	18.6	°C	Mixing Unit Details				Flow rate	770 l/h		Total Flow: 770 l/h					
7	% Ethylene Glycol	20.0	%	Type None				v	0.8 m/s		Pressure Loss @ Manifold: 12.9 kPa					
8	viscosity	0.0018	Pa.s	Supply t 21.0 °C				ΔPf/r	7.9 kPa		Total pressure including F/L 20.8 kPa					
9									%Fitting losses		20% (estimate)					
10	INPUT - Manifold							RESULTS - Floor Circuits								
11			Circuit length	Flow				Head Losses			Balancing					
12	<i>Note: ** pressure drop when valves fully open!</i>		Σ	v	v	Velocity	Head Loss	Pipe	Flow and Return Valves	Total Loss	Turn direction:					
13								Δp _{pipe}	Δp _{Flow/Return valves, full open}	Δp _{total} **	Closed => Open					
14	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Kv	Turns			
15												m ³ /h				
16	Circuit	M2.1	117	1.4	0.024	0.213	105	12,326	540	12,866	540	1.18	2 1/4			
17	Circuit	M2.2	116	1.4	0.024	0.211	104	12,043	531	12,574	823	0.95	1 1/4			
18	Circuit	M2.3	115	1.4	0.024	0.210	102	11,792	523	12,315	1,074	0.82	1			
19	Circuit	M2.4	114	1.4	0.024	0.208	101	11,518	514	12,032	1,348	0.73	3/4			
20	Circuit	M2.5	114	1.4	0.023	0.207	100	11,328	508	11,835	1,538	0.68	3/4			
21	Circuit	M2.6	114	1.4	0.023	0.208	100	11,463	512	11,975	1,403	0.71	3/4			
22	Circuit	M2.7	115	1.4	0.024	0.209	102	11,737	521	12,258	1,129	0.80	3/4			
23	Circuit	M2.8	116	1.4	0.024	0.211	103	11,987	529	12,516	879	0.92	1 1/4			
24	Circuit	M2.9	117	1.4	0.024	0.213	105	12,269	539	12,807	597	1.12	2			
25	Circuit	M2.10														
26	Circuit	M2.11														
27	Circuit	M2.12														
28	Circuit	M2.13														
29	Circuit	M2.14														
30	Circuit	M2.15														
31	Circuit	M2.16														
32	Circuit	M2.17														
33	12.8												CT ANZ / syd536			

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REHAU HYDRONIC SYSTEM

MANIFOLD VALVE SETTINGS - HYDRAULIC BALANCING



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Project N°:	15-130					Project Name:	Freezer Floor Heating				Installer:	Plumbcraft			
2	Manifold M3 - Ground Floor													Date	7/09/2015	
3	Circuit Fluid Properties				Circuit Pipe Details			Flow and Return Pipe			R E S U L T S - Manifold					
4	Heating Temperature	21.0	°C	Manifold Brass Flow Meter			Length	10 m		Number of circuits:		10				
5	Cooling Temperature	NA	°C	Pipe RAUTHERM S 16			Flow/Ret pipe	RAUTITAN Pink 25		Total Length of circuits:		1153 m				
6	Mean water temp	18.6	°C	Mixing Unit Details			Flow rate	875 l/h		Total Flow:		875 l/h				
7	% Ethylene Glycol	20.0	%	Type None			v	1.0 m/s		Pressure Loss @ Manifold:		16.1 kPa				
8	viscosity	0.0018	Pa.s	Supply t 21.0 °C			ΔPf/r	9.9 kPa		Total pressure including F/L		26.0 kPa				
9							%Fitting losses	20% (estimate)								
10	I N P U T - Manifold							R E S U L T S - Floor Circuits								
11			Circuit length	Flow				Head Losses			Balancing					
12	<i>Note: ** pressure drop when valves fully open!</i>		Σ	v	v	Velocity	Head Loss	Pipe	Flow and Return Valves	Total Loss	Turn direction:					
13								Δp _{pipe}	Δp _{Flow/Return valves, full open}	Δp _{total**}	Closed => Open					
14	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Kv	Turns			
15												m ³ /h				
16	Circuit M7.1	109	1.4	0.023	0.202	96	10,420	486	10,906	5,715	0.34	1/4				
17	Circuit M7.2	110	1.4	0.023	0.205	98	10,814	499	11,314	5,320	0.36	1/4				
18	Circuit M7.3	111	1.4	0.023	0.208	100	11,191	512	11,703	4,944	0.38	1/4				
19	Circuit M7.4	113	1.4	0.024	0.210	103	11,576	525	12,101	4,559	0.40	1/4				
20	Circuit M7.5	114	1.4	0.024	0.213	105	11,968	538	12,507	4,167	0.42	1/4				
21	Circuit M7.6	116	1.5	0.024	0.216	107	12,399	552	12,951	3,736	0.45	1/4				
22	Circuit M7.7	117	1.5	0.025	0.218	109	12,809	566	13,375	3,326	0.49	2/4				
23	Circuit M7.8	117	1.5	0.025	0.217	108	12,632	560	13,192	3,503	0.47	1/4				
24	Circuit M7.9	121	1.5	0.025	0.225	115	13,903	601	14,504	2,232	0.61	2/4				
25	Circuit M7.10	126	1.6	0.026	0.234	123	15,484	651	16,135	651	1.18	2 1/4				
26	Circuit M3.11															
27	Circuit M3.12															
28	Circuit M3.13															
29	Circuit M3.14															
30	Circuit M3.15															
31	Circuit M3.16															
32	Circuit M3.17															
33	14.6													CT ANZ / syd536		

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REHAU HYDRONIC SYSTEM

MANIFOLD VALVE SETTINGS - HYDRAULIC BALANCING



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Project N°:	15-130					Project Name:	Freezer Floor Heating			Installer:	Plumbcraft				
2	Manifold M4 - Ground Floor													Date	7/09/2015	
3	Circuit Fluid Properties				Circuit Pipe Details				Flow and Return Pipe				RESULTS - Manifold			
4	Heating Temperature	21.0	°C	Manifold Brass Flow Meter				Length	10 m			Number of circuits: 7				
5	Cooling Temperature	NA	°C	Pipe RAUTHERM S 16				Flow/Ret pipe	RAUTITAN Pink 25			Total Length of circuits: 1059 m				
6	Mean water temp	18.6	°C	Mixing Unit Details				Flow rate	888 l/h			Total Flow: 888 l/h				
7	% Ethylene Glycol	20.0	%	Type None				v	1.0 m/s			Pressure Loss @ Manifold: 36.4 kPa				
8	viscosity	0.0018	Pa.s	Supply t 21.0 °C				ΔPf/r	10.2 kPa			Total pressure including F/L 46.6 kPa				
9									%Fitting losses	20% (estimate)						
10	INPUT - Manifold							RESULTS - Floor Circuits								
11			Circuit length	Flow				Head Losses			Balancing					
12	<i>Note: ** pressure drop when valves fully open!</i>		Σ	v	v	Velocity	Head Loss	Pipe	Flow and Return Valves	Total Loss	Turn direction:					
13								ΔP _{pipe}	ΔP _{Flow/Return valves, full open}	ΔP _{total**}	Closed => Open					
14	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Kv	Turns			
15												m ³ /h				
16	Circuit	M10.1	160	2.2	0.037	0.329	220	35,154	1,283	36,437	1,283	1.18	2 1/4			
17	Circuit	M10.2	155	2.2	0.036	0.319	209	32,302	1,206	33,508	4,135	0.64	2/4			
18	Circuit	M10.3	150	2.1	0.035	0.308	197	29,442	1,126	30,568	6,996	0.47	1/4			
19	Circuit	M10.4	151	2.1	0.035	0.312	201	30,413	1,153	31,566	6,024	0.52	2/4			
20	Circuit	M10.5	150	2.1	0.035	0.310	199	29,871	1,138	31,009	6,566	0.49	2/4			
21	Circuit	M10.6	148	2.1	0.034	0.304	192	28,386	1,096	29,482	8,052	0.44	1/4			
22	Circuit	M10.7	146	2.0	0.034	0.301	189	27,610	1,074	28,684	8,828	0.41	1/4			
23	Circuit	M4.8														
24	Circuit	M4.9														
25	Circuit	M4.10														
26	Circuit	M4.11														
27	Circuit	M4.12														
28	Circuit	M4.13														
29	Circuit	M4.14														
30	Circuit	M4.15														
31	Circuit	M4.16														
32	Circuit	M4.17														
33	14.8												CT ANZ / syd536			

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REHAU HYDRONIC SYSTEM

MANIFOLD VALVE SETTINGS - HYDRAULIC BALANCING



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Project N°:	15-130					Project Name:	Freezer Floor Heating				Installer:	Plumbcraft			
2	Manifold M5 - Ground Floor													Date	7/09/2015	
3	Circuit Fluid Properties				Circuit Pipe Details			Flow and Return Pipe			R E S U L T S - Manifold					
4	Heating Temperature	21.0	°C	Manifold Brass Flow Meter			Length	10 m		Number of circuits: 8						
5	Cooling Temperature	NA	°C	Pipe RAUTHERM S 16			Flow/Ret pipe	RAUTITAN Pink 25		Total Length of circuits: 1207 m						
6	Mean water temp	18.6	°C	Mixing Unit Details			Flow rate	1012 l/h		Total Flow: 1012 l/h						
7	% Ethylene Glycol	20.0	%	Type None			v	1.1 m/s		Pressure Loss @ Manifold: 36.4 kPa						
8	viscosity	0.0018	Pa.s	Supply t 21.0 °C			ΔPf/r	12.8 kPa		Total pressure including F/L 49.2 kPa						
9							%Fitting losses	20% (estimate)								
10	I N P U T - Manifold							R E S U L T S - Floor Circuits								
11	<i>Note: ** pressure drop when valves fully open!</i>		Circuit length Σ	Flow		Velocity	Head Loss	Head Losses			Balancing					
12				Δp _{pipe}	Δp _{Flow/Return valves, full open}			Δp _{total**}	Turn direction: Closed => Open							
13	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Kv	Turns			
14												m ³ /h				
15	Circuit	M11.1	160	2.2	0.037	0.329	220	35,154	1,283	36,437	1,283	1.18	2 1/4			
16	Circuit	M11.2	155	2.2	0.036	0.319	209	32,359	1,207	33,566	4,078	0.64	2/4			
17	Circuit	M11.3	151	2.1	0.035	0.310	199	29,979	1,141	31,120	6,459	0.50	2/4			
18	Circuit	M11.4	151	2.1	0.035	0.312	201	30,413	1,153	31,566	6,024	0.52	2/4			
19	Circuit	M11.5	150	2.1	0.035	0.309	198	29,709	1,134	30,843	6,728	0.48	2/4			
20	Circuit	M11.6	149	2.1	0.035	0.306	195	28,911	1,111	30,022	7,527	0.45	1/4			
21	Circuit	M11.7	147	2.1	0.034	0.303	192	28,177	1,090	29,268	8,260	0.43	1/4			
22	Circuit	M11.8	146	2.0	0.034	0.300	188	27,405	1,068	28,473	9,032	0.41	1/4			
23	Circuit	M5.9														
24	Circuit	M5.10														
25	Circuit	M5.11														
26	Circuit	M5.12														
27	Circuit	M5.13														
28	Circuit	M5.14														
29	Circuit	M5.15														
30	Circuit	M5.16														
31	Circuit	M5.17														
32																
33																
													16.9	CT ANZ / syd536		

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REHAU HYDRONIC SYSTEM

BILL OF MATERIAL - PROPOSED FINAL *



PROJECT NO. 15-130
 PROJECT NAME Freezer Floor Heating
 INSTALLER Plumbcraft

Date 7/09/2015
 Department Construction

PROJECT OVERVIEW:

Project Type Commercial
 System in-slab
 Pipe RAUTHERM S 16
 Heat Source Condensing boiler
 Total output Heating 53.3 kW
 Cooling Source None
 Total output Cooling 0 kW
 Covered Floor Area 3897.2 m²
 Number of Zones -
 Number of manifolds 12
 Number of circuits 106
 Manifold type Brass Flow Meter
 Flow Temp. system None

Further details see page "Performance Overview"

Category	Sub Category	Product Description	Availability	Article Number	Units	Est. Qty	Order Quantity
Floor Systems	RAUTITAN Pink	Pipe 25 x 3.5 mm - 6m straight	Standard	136062-006	m	25	30
Floor Systems	RAUTHERM S	Pipe 16 x 2.0 mm - 500m coil	Standard	136130-500	m	13016	13500
Floor Systems	Brass Manifold	Brass Manifold 8-port	Standard	240081-003	ea	3	3
Floor Systems	Brass Manifold	Brass Manifold 10-port	Standard	240101-003	ea	9	9
Floor Systems	Manifold	Manifold Stand	Standard	216636-001	ea	12	12
Accessories	Manifold	Manifold Union 16 x 2.0mm, 16 x 2.2 mm	Standard	266352-001	ea	212	212
Accessories	Conduit	Conduit for RAUTITAN Pipe 16 mm (yellow)	Standard	180252-050	m	172	200
Accessories	RAUTITAN PX Fittings	No. 1 Straight Coupler 16 mm	Standard	160011-001	ea	27	27
Accessories	RAUTITAN PX Fittings	Compression Sleeve 16 mm	Standard	160001-001	ea	54	54
Accessories	RAUTITAN Fittings	Polymer Profile Bend Bkt 90 Deg 16 mm	Standard	297891-001	ea	212	212

Further Hydronic Components that may be required*:

- Suitably sized energy source(s)
- Suitably sized supply and return pipe work from the energy source to the manifold(s)
- An external pump (check the internal energy source pump curve)
- Suitably sized expansion vessel
- Safety Valves and Isolating Valves
- Air Bleeding Valve
- Other

The above are only suggestions from REHAU and a proper design considering the whole hydraulic system is required to determine if the above material estimation will be sufficient to condition the space adequately.

Category	Sub Category	Product Description	Availability	Article Number	Units	Est. Qty	Order Quantity
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**This is an estimate only based on the information provided to us at the time of completing this proposal. The estimate assumes the building has sufficient thermal insulation to meet local building requirements, e.g. NZBC, BCA or BASIX, prior to the installation of the REHAU components. REHAU does not accept any liability for omissions of hydronic components, installation tools and accessories, or for any discrepancy in terms of quantity of materials (overestimate or underestimate) compared to the actual requirements. This material list terminates at the UFH manifold and may not include all components required to condition the space adequately. The amount and sizes for each article may change during the final design.*

Our verbal and written advice relating to technical applications and this quote is based on experience and is to the best of our knowledge correct but is given without obligation.

