

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

PERFORMANCE OVERVIEW - PROPOSED FINAL*



PROJECT NO.	15-130
PROJECT NAME	Freezer Floor Heating
INSTALLER	Plumbcraft
DATE	7/09/2015
DESIGN BY	REHAU Design Team

5 106 3897.2

Floor layer:	<u>L (mm)</u>
Concrete	175
Insulation	200
Concrete Cover	20
Pipe center	
Concrete Cover	80
Sand	2000

Floor layer

N/A

N/A

<u>L (mm)</u>

Floor layer

N/A

N/A

L (mm)

HYDRAULICS			PERFORMANCE SU	JMMARY
Pipe type	RAUTHERM S 16		No. of zones	5
Heating Flow temp	21	°C	No. of circuits	106
Cooling Flow temp	NA	°C	Conditioned Area	3897.2

			Room Parame	eters								Heating	Perforn	nance								Cooling	g perforn	nance			
Room(s)	Zone	Area	Room Thermostat	Floor System	Floor type	Floor Covering	Pipe spacing	maide	outside		rate	Floor Surface Temp	Target Heat Output	Heat output up	Heat output down	Percent Covered	Total Slab Output		outside	∆T flow/ return	rate	Floor Surface Temp	Cooling Output	up	output down	Percent Covered	Total Slab Output
		m²					mm	°C	°C		L/h.m ²	°C	W/m ²	W/m ²	W/m ²	%	W	°C	°C	°C	L/h.m ²	°C	W/m ²	W/m ²	W/m ²	%	W
Freezer 1	1	1838.6	None	Ground Floor	Slab on ground		300	-20.0		5.0	2.5	-19	6	6	7	105	24997			-							
Freezer 2	2	1031.2	None	Ground Floor	Slab on ground		300	-20.0	10.0	4.9	2.5	-19	6	6	7	105	14072			-							
Chiller 1	3	1027.4	None	Ground Floor	Slab on ground	None	300	-20.0	10.0	4.5	2.8	-19	6	6	8	105	14226			-							
																				-							
																				-							
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																				-							
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																				-							
																				-							
	3	3897.2															53295										

* This design and the associated data have been prepared in accordance with the information provided by the requesting party. Please check if the parameter suits to your project. For minimum insulation requirements for the floor refer to the Building Code of Australia / New Zealand Building Code. When considering to use Tacker sheet, please check that the thermal and physical properties (eg. compressive stress) suit to your project. The advice is based on experience and the most recent know how but does not represent any obligation on our part.

Explanatory Notes:

PIPE SPACING Proposed pipe laying distance. Laying the pipes in a different spacing will influence the performance of the system. TEMPERATURE ABOVE/INSIDE Target temperature for the conditioned area above the slab (typically "Room Temperature"). TEMPERATURE BELOW/OUTSIDE Temperature of the area below the slab (ie. ground temperature or room below). ΔT FLOW/RETURN Temperature difference between supply and return for the conditioned area. NO. OF CIRCUITS Number of circuits required to cover the conditioned area. FLOOR SURFACE TEMPERATURE Surface temperature of the finished floor.

TARGET HEAT/COOLING OUTPUT HEAT/COOLING OUTPUT UP HEAT/COOLING OUTPUT DOWN

PERCENT COVERED TOTAL SLAB OUTPUT

Target Heat/Cooling output as per the information provided by the requesting party. Heating/Cooling performance upwards in Watts per square meter. Heating/Cooling performance downwards in Watts per square meter (in slab-on-ground constructions = "Downward losses") Coverage of Target Heating/Cooling output in % Output (upwards + downwards) of the conditioned slab in Watts.

REHAU HYDRONIC SYSTEM





	A	В	С	D	Е	F	G	н	I	J	к	L	М	Ν	0
1		15-130					Project Name:	Freezer Floor Heati	ng		Installer:	Plumbcraft			
2	Manifol	-	Ground	Floor						<u></u>				Date	7/09/2015
3		uit Fluid Pro		00		ircuit Pipe D Brass Flow		Flow and			Nium	RESULTS nber of circuits:	- Manifold 9	-	
4		Temperature Temperature	21.0 NA	°C °C		RAUTHER		Length Flow/Ret pipe) M ITAN Dipk 25	-	ngth of circuits:	9 1039	m	
5	0	in water temp	18.6	°C				Flow rate	770	I/h	TOLAT LE	Total Flow:	770	l/h	
7		hylene Glycol		%		None	otuno	V	0.8	m/s	Pressure Los	s @ Manifold:	12.9	kPa	
8		viscosity	0.0018		Supply t		°C	ΔPf/r	7.9	kPa		e including F/R	20.8	kPa	
9		,			,			%Fitting losses	20%	(estimate)		Ū			
10	I N P U T - Manifo	old								Ř E S	ULTS-Flo	or Circuits			
11			Circuit						Hea	d Losses			Balancing		
12	Note: ** pressure d	lrop when valves	length	FI	ow			Pipe		nd Retun Valves		-	urn direction:		
13	fully ope	en!	Σ	v	v	Velocity	Head Loss	Δp_{pipe}	Δp Flow/	Return valves, full open	Δp_{total}^{**}	Clo	osed => Ope	n	
14	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa		Pa	Pa	Pa	Kv	Turns	
15													m³/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		116	1.4	0.024	0.211	103	11,987		529	12,516	879	0.92	1 1/4	
24	Circuit		117	1.4	0.024	0.213	105	12,269		539	12,807	597	1.12	2	
24	Circuit				0.027	0.210		.2,200			12,007			_	
25	Circuit														
20	Circuit														
	Circuit														
28	Circuit														
29															
30	Circuit														
31	Circuit														
32	Circuit	M1.17													
33				40.0											
				12.8										CT ANZ	/ syd536

This design and the associated date have been prepared in accordance with the information proveded be the requesting party.



	А	В	С	D	E	F	G	н	1	J	к	L	М	Ν	0
1	Project Nº: 15	5-130				1	Project Name:	Freezer Floor Heati	ng	1	Installer:	Plumbcraft			
2	Manifold N		Ground I	Floor										Date	7/09/2015
3		t Fluid Prop				ircuit Pipe D		Flow and				RESULTS-	Manifold		
4	0	emperature	21.0	°C		Brass Flov		Length) m	-	nber of circuits:	9	_	
5	, v	emperature	NA	°C		RAUTHER		Flow/Ret pipe			Total Le	ngth of circuits:	1039	m	
6		water temp	18.6	°C		ixing Unit D	oetails	Flow rate	770	l/h		Total Flow:	770	l/h	
7	% Ethyl	ene Glycol	20.0	%		None		v	0.8			s @ Manifold:	12.9	kPa	
8	vi	scosity	0.0018	Pa.s	Supply t	21.0	°C	ΔPf/r	7.9	kPa	Total pressur	e including F/L	20.8	kPa	
9								%Fitting losses	20%	(estimate)					
10	I N P U T - Manifold	l					1				SULTS-Flo				
11			Circuit					D .		d Losses			Balancing		
12	<u>Note:</u> ** pressure drop	when valves	length Σ	FI V	ow	Velocity	Head Loss	Pipe		nd Retun Valves	Total Loss ∆ptotal**	-	urn direction:		
13 14	fully open! Circuit Name	0	 	V I/min	v I/s	m/s	Pa/m	∆p _{pipe} Pa	$\Delta p Flow/$	Return valves, full open Pa	 Pa	Pa	sed => Ope Kv	Turns	
14		0.			1/5	111/5	F d/III	га		Fa	Fa	Ta	m³/h	Turns	
16	Circuit M	2 1	117	1.4	0.024	0.213	105	12,326		540	12,866	540	1.18	2 1/4	
17	Circuit M		116	1.4	0.024	0.211	103	12,043		531	12,574	823	0.95	1 1/4	
17	Circuit M		115	1.4	0.024	0.211	104	11,792		523	12,315	1,074	0.82	1 1/4	
10	Circuit M		114	1.4	0.024	0.208	102	11,518		514	12,032	1,348	0.73	3/4	
	Circuit M		114	1.4	0.024	0.200	101	11,328		508	11,835	1,538	0.68	3/4	
20	Circuit M		114	1.4	0.023	0.207	100			500	· · · · · ·	· · · ·	0.00	3/4	
21		-						11,463		-	11,975	1,403	-	-	
22	Circuit M		115	1.4	0.024	0.209	102	11,737		521	12,258	1,129	0.80	3/4	
23	Circuit M		116	1.4	0.024	0.211	103	11,987		529	12,516	879	0.92	1 1/4	
24	Circuit M		117	1.4	0.024	0.213	105	12,269		539	12,807	597	1.12	2	
25	Circuit M														
26	Circuit M														
27	Circuit M	2.12													
28	Circuit M	2.13													
29	Circuit M	2.14													
30	Circuit M	2.15													
31	Circuit M	2.16													
32	Circuit M	2.17													
33															
	I			12.8	1	1	1	1			1	I I		CT ANZ /	syd536

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	A	В	С	D	E	F	G	н	1	J	К		м	N	0
1		5-130		5	-		-	Freezer Floor Heat	ina	Ū		Plumbcraft			
2	Manifold	M3 -	Ground I	Floor					5					Date	7/09/2015
3	Circu	it Fluid Prop	perties		C	ircuit Pipe D	Details	Flow and	l Return	Pipe		RESULTS	- Manifold		
4	Heating T	emperature	21.0	°C	Manifold	Brass Flov	v Meter	Length	10) m	Nun	nber of circuits:	10		
5	Cooling T	emperature	NA	°C		RAUTHER		Flow/Ret pipe		TTAN Pink 25	Total Lei	ngth of circuits:	1153	m	
6		water temp	18.6	°C		lixing Unit D	etails	Flow rate		l/h		Total Flow:	875	l/h	
7		lene Glycol	20.0	%		None	20	V				s @ Manifold:	16.1	kPa	
8	V	riscosity	0.0018	Pa.s	Supply t	21.0	°C	ΔPf/r	0.0	kPa	I otal pressur	e including F/L	26.0	kPa	
9	I N P U T - Manifold	4						%Fitting losses	20%	(estimate)	ULTS-Flo				
10 11		u	Circuit						Hea	d Losses			Balancing		
12	Note: ** pressure dro	p when valves	length	FI	ow			Pipe		nd Retun Valves	Total Loss		urn direction	:	
13	fully open!		Σ	v	v	Velocity	Head Loss	Δppipe	Δp Flow/	Return valves, full open	Δp_{total}^{**}	Clo	osed => Ope	en	
14	Circuit Name	NO.	m	l/min	l/s	m/s	Pa/m	Pa		Pa	Pa	Pa	K٧	Turns	
15													m³/h		
16	Circuit N	//7.1	109	1.4	0.023	0.202	96	10,420		486	10,906	5,715	0.34	1/4	
17	Circuit N	<i>N</i> 7.2	110	1.4	0.023	0.205	98	10,814		499	11,314	5,320	0.36	1/4	
18	Circuit N	<i>Л</i> 7.3	111	1.4	0.023	0.208	100	11,191		512	11,703	4,944	0.38	1/4	
19	Circuit N	Л7.4	113	1.4	0.024	0.210	103	11,576		525	12,101	4,559	0.40	1/4	
20	Circuit N	<i>Л</i> 7.5	114	1.4	0.024	0.213	105	11,968		538	12,507	4,167	0.42	1/4	
21	Circuit N	/17.6	116	1.5	0.024	0.216	107	12,399		552	12,951	3,736	0.45	1/4	
22	Circuit N	Л7.7	117	1.5	0.025	0.218	109	12,809		566	13,375	3,326	0.49	2/4	
23	Circuit N	<i>Л</i> 7.8	117	1.5	0.025	0.217	108	12,632		560	13,192	3,503	0.47	1/4	
24	Circuit N	Л7.9	121	1.5	0.025	0.225	115	13,903		601	14,504	2,232	0.61	2/4	
25	Circuit N	Л7.10	126	1.6	0.026	0.234	123	15,484		651	16,135	651	1.18	2 1/4	
26	Circuit N	//3.11													
27	Circuit N														
28	Circuit N	//3.13													
29	Circuit N	ЛЗ.14													
30	Circuit N	-													
31	Circuit N														
32	Circuit N														
33															
	I			14.6	1	1	1	1	1			1		CT ANZ /	syd536

This design and the associated data have been prepared in accordance with the information provided by the requesting party.



	A	В	с	D	E	F	G	Н	I	J	к	L	М	N	0
1		5-130	-	_	_		-	Freezer Floor Heati	ing	-		Plumbcraft			
2	Manifold	M4 -	Ground F	loor					<u> </u>			•		Date	7/09/2015
3	Circu	it Fluid Pro	perties		C	ircuit Pipe D	Details	Flow and	l Return	Pipe		RESULTS-	Manifold		
4	0	emperature		°C		Brass Flov		Length) m		nber of circuits:	7		
5	-	emperature		°C		RAUTHER		Flow/Ret pipe			Total Ler	ngth of circuits:	1059	m	
6		water temp		°C		lixing Unit D	etails	Flow rate		l/h		Total Flow:	888	l/h	
7		lene Glycol	20.0	%		None	20	V			Pressure Loss		36.4	kPa	
8	V	iscosity	0.0018	Pa.s	Supply t	21.0	°C	ΔPf/r			Total pressur	e including F/L	46.6	kPa	
9 10	I N P U T - Manifold	4						%Fitting losses	20%		ULTS-Flo	or Circuite			
10		u	Circuit						Hea	d Losses			Balancing		
12	Note: ** pressure drop	n when values	length	FI	ow			Pipe		nd Retun Valves	Total Loss		urn direction		
13	fully open!	' I	Σ	v	v	Velocity	Head Loss	Δppipe		Return valves, full open	Δp_{total}^{**}		sed => Ope		
14		I O.	m	l/min	l/s	m/s	Pa/m	Pa		Ра	Pa	Pa	Kv .	Turns	
15													m³/h		
16	Circuit M	/10.1	160	2.2	0.037	0.329	220	35,154		1,283	36,437	1,283	1.18	2 1/4	-
17	Circuit N	/10.2	155	2.2	0.036	0.319	209	32,302		1,206	33,508	4,135	0.64	2/4	
18	Circuit N	/10.3	150	2.1	0.035	0.308	197	29,442		1,126	30,568	6,996	0.47	1/4	
19	Circuit N	/10.4	151	2.1	0.035	0.312	201	30,413		1,153	31,566	6,024	0.52	2/4	
20	Circuit N	/10.5	150	2.1	0.035	0.310	199	29,871		1,138	31,009	6,566	0.49	2/4	
21	Circuit N	/10.6	148	2.1	0.034	0.304	192	28,386		1,096	29,482	8,052	0.44	1/4	
22	Circuit N	/10.7	146	2.0	0.034	0.301	189	27,610		1,074	28,684	8,828	0.41	1/4	
23	Circuit N	/14.8													
24	Circuit N	/14.9													
25	Circuit N	/14.10													
26	Circuit M	//4.11													
27	Circuit M	/4.12													
28	Circuit M	//4.13													
29	Circuit M	/4.14													
30	Circuit M	/4.15													
31	Circuit M	//4.16													
32	Circuit M	/4.17													
33															
				14.8										CT ANZ	/ syd536

This design and the associated data have been prepared in accordance with the information provided by the requesting party.



	A	В	с	D	E	F	G	н	I	J	к	L	М	N	0
1	Project Nº:	15-130			1		Project Name:	Freezer Floor Heat	ing		Installer:	Plumbcraft		- 1	
2	Manifol	d M5 -	Ground	Floor										Date	7/09/2015
3		uit Fluid Pro	•			ircuit Pipe [Flow and	l Return	Pipe		RESULTS-	Manifold		
4	0	Temperature		°C		Brass Flow		Length) m		nber of circuits:	8	-	
5	0	Temperature		°C		RAUTHEF		Flow/Ret pipe			Total Lei	ngth of circuits:	1207	m	
6		n water temp		°C		lixing Unit D	etails	Flow rate				Total Flow:	1012	l/h	
7		nylene Glycol	20.0 0.0018	% Da a		None	°C	ν ΔPf/r	1.1 12.8	m/s kPa		s @ Manifold:	36.4 49.2	kPa kDa	
8	_	viscosity	0.0018	Pa.s	Supply t	21.0	SC .	%Fitting losses			rotal pressul	re including F/L	49.2	kPa	
9 10	INPUT-Manifo	old			ļ			%Filling iosses	20%		ULTS-Flo	or Circuits			
10			Circuit						Hea	d Losses			Balancing		
12	Note: ** pressure d	rop when valves	length	F	low			Pipe		nd Retun Valves	Total Loss		urn direction	:	
13	fully ope		Σ	v	v	Velocity	Head Loss	Δppipe	Δp Flow/	Return valves, full open	Δp_{total}^{**}	Clo	sed => Ope	en	
14	Circuit Name	No.	m	l/min	l/s	m/s	Pa/m	Pa		Pa	Pa	Pa	Kv	Turns	
15													m³/h		
16	Circuit	M11.1	160	2.2	0.037	0.329	220	35,154		1,283	36,437	1,283	1.18	2 1/4	
17	Circuit	M11.2	155	2.2	0.036	0.319	209	32,359		1,207	33,566	4,078	0.64	2/4	
18	Circuit	M11.3	151	2.1	0.035	0.310	199	29,979		1,141	31,120	6,459	0.50	2/4	
19	Circuit	M11.4	151	2.1	0.035	0.312	201	30,413		1,153	31,566	6,024	0.52	2/4	
20	Circuit	M11.5	150	2.1	0.035	0.309	198	29,709		1,134	30,843	6,728	0.48	2/4	
21	Circuit	M11.6	149	2.1	0.035	0.306	195	28,911		1,111	30,022	7,527	0.45	1/4	
22	Circuit	M11.7	147	2.1	0.034	0.303	192	28,177		1,090	29,268	8,260	0.43	1/4	
23	Circuit	M11.8	146	2.0	0.034	0.300	188	27,405		1,068	28,473	9,032	0.41	1/4	
24	Circuit	M5.9													
25	Circuit	M5.10													
26	Circuit	M5.11													
27	Circuit	M5.12													
28	Circuit	M5.13													
29	Circuit	M5.14													
30	Circuit	M5.15													
31	Circuit	M5.16													
32	Circuit	M5.17													
33															
	•			16.9)						-	· ·		CT ANZ	/ syd536

This design and the associated data have been prepared in accordance with the information provided by the requesting party.

REHAU HYDRONIC SYSTEM

BILL OF MATERIAL - PROPOSED FINAL*



 PROJECT NO.
 15-130
 Date
 7/09/2015

 PROJECT NAME
 Freezer Floor Heating
 Department
 Construction

 INSTALLER
 Plumbcraft
 Construction

 PROJECT OVERVIEW:
 Commercial
 System
 in-slab

 Pipe
 RAUTHERM S 16
 RAUTHERM S 16
 Construction

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

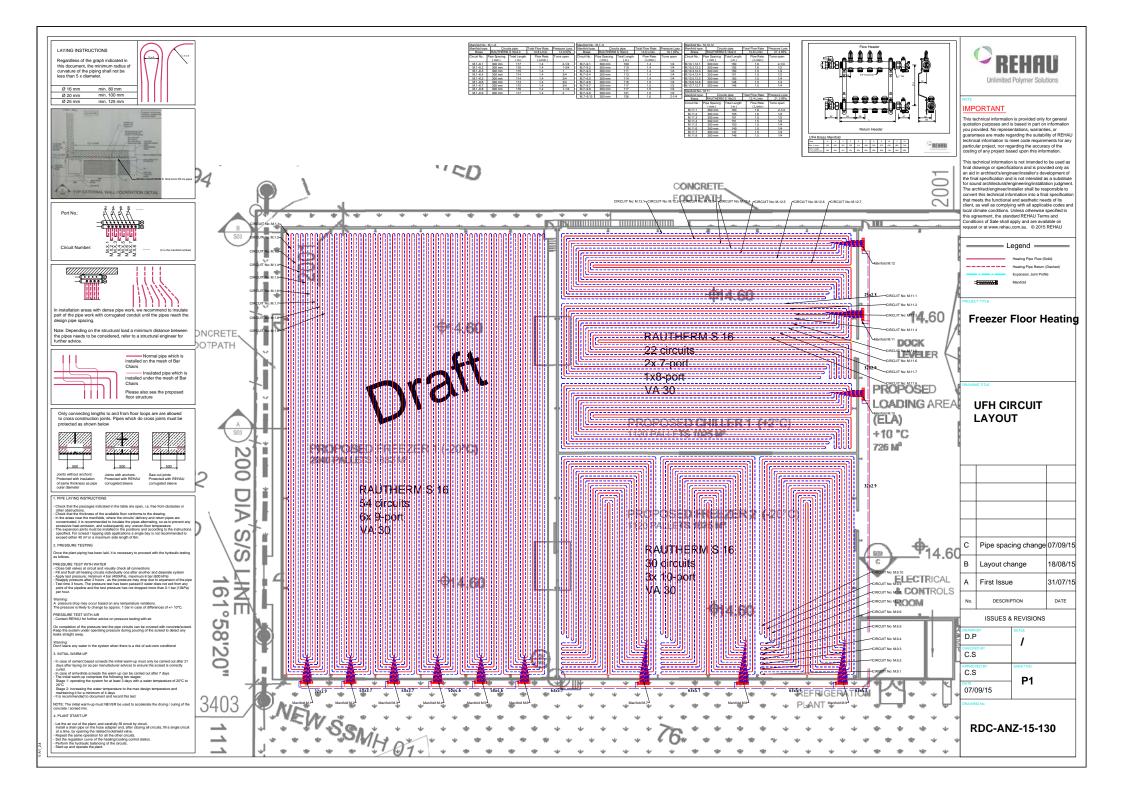
- Other

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.

ĺ	Category	Sub Category	Product Description	Availability	Article	Units	Est.	Order
	Calegory	Sub Calegoly	Froduct Description	Availability	Number	Units	Qty	Quantity

*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.



RAUTHERMEX Pipe Sizing Sheet

Description of the programm:

1. To Calculate data is entered in cells marked blue

2. With Each line a section can be calculated

3. Heating supply and return temperatures are to be entered below

4. In the column "Pipe Length", length of the flow pipe is entered

5. Heat Load supplied by the pipe is entered in column named "Heat Load"

6. In the column named "Pipe Size", select a pipe size and ensure that the corresponding pressure loss is less than 200 Pa/m

7. The pressure drop is calculated for the flow and return pipe length in Bar using a Zeta value of 1.3

The Calculations are based on the following parameters					
Surface Roughness (mm):	0.007				
Viscosity (10hoch6):	0.81				
Density (kg/m ³):	998				
Flow Temperature (°C):	25				

Return Temperature (°C): 20 5

Temperature Difference (K):

Nr.	Pipe Length (Flow)	Heat Load	Volumetric Flow Rate	Pipe Size	Pressure Loss	Pressure Drop	v
	m	KW	l/hr	mm	Pa/m	bar	m/s
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
SECTION SOUTH:			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
Freezer 1 Man 1	5	4.5	774	32 x 2,9 (DN 25)	88.9	0.01	0.4
Freezer 1 Man 2	5	9	1548	40 x 3,7 (DN 32)	106.1	0.01	0.5
Freezer 1 Man 3	5	13.5	2322	40 x 3,7 (DN 32)	218.2	0.03	0.8
Freezer 1 Man 4	5	18	3096	50 x 4,6 (DN 40)	124.0	0.02	0.7
Freezer 1 Man 5	5	22.5	3870	50 x 4,6 (DN 40)	184.7	0.03	0.8
Freezer 1 Man 6	5	27	4644	63 x 5,7 (DN 50)	82.7	0.01	0.6
Freezer 2 Man 1	10	32.2	5538	63 x 5,7 (DN 50)	113.4	0.03	0.7
Freezer 2 Man 2	10	37.4	6433	63 x 5,7 (DN 50)	148.3	0.04	0.9
Freezer 2 Man 3	16	42.6	7327	63 x 5,7 (DN 50)	187.5	0.07	1.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
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			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0

RAUTHERMEX Pipe Sizing Sheet

5

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Temperature Difference (K):

Nr.	Pipe Length (Flow)	Heat Load	Volumetric Flow Rate	Pipe Size	Pressure Loss	Pressure Drop	v
	m	KW	l/hr	mm	Pa/m	bar	m/s
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
SECTION EAST			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
Chiller 1 Man 1	10	5.2	894	40 x 3,7 (DN 32)	40.4	0.01	0.3
Chiller 1 Man 2	10	11.2	1926	50 x 4,6 (DN 40)	53.4	0.01	0.4
Chiller 1 Man 3	40	16.4	2821	50 x 4,6 (DN 40)	105.0	0.09	0.6
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
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			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
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			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0
			0	160 x 14,6 (DN 160)	0.0	0.00	0.0