Project			
Project number:	1	Project version:	
Description:	Sample project of ceiling heating/cooling system		
Street:	Zjednoczenia 2		
Postal code and city:	Chorzów	Telephone:	(+48) 32 750 52 01
Country:	Poland	Fax:	
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Comment			

Project developer			
Name:	InstalSoft s.c.		
Street:			
Postal code and city:		Telephone:	
Country:		Fax:	
WWW:			
E-mail:			
VAT-id:			
Comment			

Designer			
Name:	InstalSoft s.c.		
Street:			
Postal code and city:		Telephone:	
Country:		Fax:	
WWW:			
E-mail:			
VAT-id:			
Comment			

File info	
File name:	D:\Support\Installation-with-ceiling-heating-and-cooling-system-in-commercial-building.isproj
Program version:	5.0 (Rev. 15.10.1)

General results heating

No. of sources		1
Total number of terminal units		17
Total number of pipe-runs		30
Total number of manifolds		4
Total number of pumps		0
Spec. total rooms heat loss Φ_H		**20687 W**
Spec. total req. heat output of other TU's		**0 W**
Spec. total rooms req. heat output Φ_{req}		**20687 W**
Calculation standards:		
Radiators sizing standard	EN 442-2	
Floor heating standard	EN 1264-1,2,3:1999, EN 1264-4:2003	

Source: Other (hor.): 1, Application: Heating engineering/Refrigerating engineering, Medium: Water

Source elevation	-2,8 m
Supply and return temperature	**40,8 / 28,0 °C**
Total output	**19251 W**
Total output of convectors $\Phi_{conv,H}$	0 W
Total output of radiant heaters $\Phi_{rh,H}$	16500 W
Total output of other heaters	0 W
Heat gains from pipe-runs accounted for in balance	0 W
Not utilized heat loss of pipe-runs	258 W
Losses of radiant heating (outside building)	2492 W
Losses of radiant heating (inside buidling)	0 W
Available pressure	**54,6 kPa**
Pressure drop along critical route	54,6 kPa
Pressure drop on critical terminal unit	11,7 kPa
Press. drop on source	0,0 kPa
Flow rate in source	1293,6 kg/h
Critical receptor: 0,8-4-4	
Critical TU route length	79,7 m
Capacity of system incl. terminal units	**226,8 dm³**

Radiant heating general results

Source/Source: 1	Application: Heating engineering/ Refrigerating engineering	Medium: Water
Temperatures $\theta_{s,H}$ and $\theta_{r,H}$ [°C]	40,8	28,0

Temperature source for control circuits	Source/1	
Temperatures $\theta_{s,H}$ and $\theta_{r,H}$ [°C]	40,8	28,0
Required heat capacity $\Phi_{req,H}$ [W]	16500	
Obtained heat output Φ_H [W]	16500	
Heat capacity lost $\Phi_{OS,H}$ [W]	2492	
Mass flow rate m [kg/h]	1293,6	

Manifold symbol	Storey symbol	Number of heating/ cooling zones fed	Obtained heat output of heat./cool. zone (heating mode)	Output lost of heat./ cool. zone (heating mode)	Return temperature on manifold (heating mode)	Temperature difference on manifold (heating mode)	Mass flow rate	Required min. pressure difference	Resultant pressure difference	Total pipe length
Manifold	**Stor.**	**N**	**Φ_H**	**$\Phi_{OS,H}$**	**$\theta_{r,H}$**	**$\Delta\theta_H$**	**m**	**Δp_{min}**	**Δp**	**L_{tot}**
			W	**W**	**°C**	**K**	**kg/h**	**kPa**	**kPa**	**m**
M1	2	6	5556	849	27,5	13,2	417,9	7,6	15,0	610,1
M2	2	5	5540	846	27,5	13,1	419,2	13,1	13,1	592,2
M3	2	3	2895	427	28,8	11,9	239,8	9,2	10,4	266,4
M4	2	3	2509	370	29,1	11,5	216,7	9,1	9,1	238,3

Radiant cooling general results

Source/Source: 1	Application: Heating engineering/ Refrigerating engineering	Medium: Water
Temperatures $\theta_{s,C}$ and $\theta_{r,C}$ [°C]	17,0	???

Temperature source for control circuits	Source/1	
Temperatures $\theta_{s,C}$ and $\theta_{r,C}$ [°C]	17,0	???
Required heat capacity $\Phi_{req,C}$ [W]	13500	
Obtained heat output Φ_C [W]	8574	
Heat capacity lost $\Phi_{OS,C}$ [W]	112	
Mass flow rate m [kg/h]	1293,6	

Manifold symbol	Storey symbol	Number of heating/ cooling zones fed	Obtained heat output of heat./cool. zone (cooling mode)	Output lost of heat./ cool. zone (cooling mode)	Return temperature on manifold (cooling mode)	Temperature difference on manifold (cooling mode)	Mass flow rate	Required min. pressure difference	Resultant pressure difference	Total pipe length
Manifold	**Stor.**	**N**	**Φ_C**	**$\Phi_{OS,C}$**	**$\theta_{r,C}$**	**$\Delta\theta_C$**	**m**	**Δp_{min}**	**Δp**	**L_{tot}**
			W	**W**	**°C**	**K**	**kg/h**	**kPa**	**kPa**	**m**
M1	2	6	2890	41	22,9	-5,9	417,9	7,6	15,0	610,1
M2	2	5	2882	41	22,9	-5,9	419,2	13,1	13,1	592,2
M3	2	3	1501	16	22,4	-5,4	239,8	9,2	10,4	266,4
M4	2	3	1301	14	22,2	-5,2	216,7	9,1	9,1	238,3

Detailed radiant heating results

Heating/cooling zone symbol	Area	Occupied / peripheral zone	Surface temperature	Thermal resistance of covering	Power required for heating	Output gained	Output lost	Unit power	Pipe spacing	Temp. diff. supply-return	Area occupied by passing feeds	Heating power from passing feeds	Length of circuit feeds	Overall circuit length (feeds + loop)	Mass flow rate	Flow velocity	Pressure loss in circuit	Pressure drop on regulating valves	Total pressure loss	Valve setting
HCZ	**A**	**Type**	**$\theta_{surface,H}$**	**$R_{\lambda,B}$**	**$\Phi_{req,H}$**	**Φ_H**	**$\Phi_{OS,H}$**	**q_H**	**VA**	**$\Delta\theta_H$**	**A_{feed}**	**$\Phi_{feeds,H}$**	**L_{feeds}**	**L_{tot}**	**m**	**v**	**Δp**	**$\Delta p_{reg,z}$ $\Delta p_{reg,p}$**	**Δp_{tot}**	**n**
	m²		**°C**	**(m²·K)/W**	**W**	**W**	**W**	**W/m²**	**mm**	**K**	**m²**	**W**	**m**	**m**	**kg/h**	**m/s**	**kPa**	**kPa**	**kPa**	
Double apartment manifold: M1; Storey: 2; Bld. unit: NONE; $\theta_{s,H}$: 40,8 °C;																				
Room: 0,8; $\theta_{i,H}$: 20,0 °C; Φreq,H: 11096 W; Φ surplus: 0 W;																				
0,8-1-1	17,7	OZ	28,5	0,000	973	973	149	55,0	200	13,2	0,0	0	5,7	94,2	73,1	0,18	5,2	6,4 3,4	15,0	3,00
0,8-1-2	17,7	OZ	28,5	0,000	973	973	149	55,0	200	13,2	0,0	0	11,8	100,2	73,1	0,18	5,6	6,4 3,0	15,0	3,00
0,8-1-3	17,7	OZ	28,5	0,000	973	973	149	55,0	200	13,2	0,0	0	18,1	106,6	73,1	0,18	5,9	6,4 2,7	15,0	3,00
0,8-1-4	17,7	OZ	28,5	0,000	973	973	149	55,0	200	13,2	0,0	0	24,2	112,6	73,1	0,18	6,3	6,4 2,3	15,0	3,00
0,8-1-5	17,7	OZ	28,5	0,000	973	973	149	55,0	200	13,2	0,0	0	30,5	118,9	73,1	0,18	**6,6**	**6,4 2,0**	**15,0**	3,00
0,8-2-1	12,6	OZ	28,5	0,000	692	692	106	55,0	200	13,1	0,0	0	14,7	77,6	52,4	0,13	1,6	11,0 2,4	15,0	1,50
Double apartment manifold: M2; Storey: 2; Bld. unit: NONE; $\theta_{s,H}$: 40,8 °C;																				
Room: 0,8; $\theta_{i,H}$: 20,0 °C; Φreq,H: 11096 W; Φ surplus: 0 W;																				
0,8-3-1	12,5	OZ	28,5	0,000	686	686	105	55,0	200	13,1	0,0	0	13,2	75,6	51,9	0,13	1,6	10,8 0,8	13,1	1,50

HCZ	A	Type	$\theta_{surface,H}$	$R_{\lambda,B}$	$\Phi_{req,H}$	Φ_H	$\Phi_{OS,H}$	q_H	VA	$\Delta\theta_H$	A_{feed}	$\Phi_{feeds,H}$	L_{feeds}	L_{tot}	m	v	Δp	$\Delta p_{reg,z}$ $\Delta p_{reg,p}$	Δp_{tot}	n
	m²		°C	(m²·K)/W	W	W	W	W/m²	mm	K	m²	W	m	m	kg/h	m/s	kPa	kPa	kPa	
0,8-4-1	22,1	OZ	28,5	0,000	1214	1214	185	55,0	200	13,1	0,0	0	7,1	117,5	91,8	0,23	9,7	2,7 0,7	13,1	5,00
0,8-4-2	22,1	OZ	28,5	0,000	1214	1214	185	55,0	200	13,1	0,0	0	14,9	125,2	91,8	0,23	10,4	2,2 0,6	13,1	5,50
0,8-4-3	22,1	OZ	28,5	0,000	1214	1214	185	55,0	200	13,1	0,0	0	22,7	133,1	91,8	0,23	11,0	1,4 0,7	13,1	6,50
0,8-4-4	22,1	OZ	28,5	0,000	1214	1214	185	55,0	200	13,1	0,0	0	30,5	140,8	91,8	0,23	**11,7**	**0,9** **0,6**	**13,1**	8,00
Double apartment manifold: M3; Storey: 2; Bld. unit: NONE; $\theta_{s,H}$: 40,8 °C;																				
Room: 0,1; $\theta_{i,H}$: 20,0 °C; Φreq,H: 5404 W; Φ surplus: 0 W;																				
0,1-1-1	18,3	OZ	29,0	0,000	1077	1077	159	58,7	200	12,0	0,0	0	8,7	100,5	89,0	0,22	**7,8**	**2,0** **0,6**	**10,4**	5,50
0,1-1-2	18,3	OZ	29,0	0,000	1077	1077	159	58,7	200	12,0	0,0	0	2,8	94,5	89,0	0,22	7,4	2,0 1,0	10,4	5,50
0,1-2-1	12,6	OZ	29,0	0,000	740	740	109	58,7	200	11,8	0,0	0	8,4	71,4	61,9	0,15	3,0	6,9 0,5	10,4	2,50
Double apartment manifold: M4; Storey: 2; Bld. unit: NONE; $\theta_{s,H}$: 40,8 °C;																				
Room: 0,1; $\theta_{i,H}$: 20,0 °C; Φreq,H: 5404 W; Φ surplus: 0 W;																				
0,1-3-1	6,2	OZ	29,0	0,000	365	365	54	58,7	200	9,1	0,0	0	13,5	44,6	39,7	0,10	0,7	6,3 2,1	9,1	1,50
0,1-4-1	18,3	OZ	29,0	0,000	1072	1072	158	58,7	200	12,0	0,0	0	8,4	99,7	88,5	0,22	**7,7**	**0,8** **0,5**	**9,1**	8,00
0,1-4-2	18,3	OZ	29,0	0,000	1072	1072	158	58,7	200	12,0	0,0	0	2,8	94,1	88,5	0,22	7,3	1,0 0,8	9,1	7,00

Detailed radiant cooling results

Heating/cooling zone symbol	Area	Occupied / peripheral zone	Surface temperature	Thermal resistance of covering	Power required for cooling	Power gained	Output lost	Unit power	Pipe spacing	Temp. diff. supply-return	Area occupied by passing feeds	Cooling output of passing pipe feeds	Length of circuit feeds	Overall circuit length (feeds + loop)	Mass flow rate	Flow velocity	Pressure loss in circuit	Pressure drop on regulating valves	Total pressure loss	Valve setting
HCZ	**A**	**Type**	**$\vartheta_{surface,C}$**	**$R_{\lambda,B}$**	**$\Phi_{req,C}$**	**Φ_C**	**$\Phi_{OS,C}$**	**q_C**	**VA**	**$\Delta\theta_C$**	**A_{feed}**	**$\Phi_{feeds,C}$**	**L_{feeds}**	**L_{tot}**	**m**	**v**	**Δp**	**$\Delta p_{reg,z}$ $\Delta p_{reg,p}$**	**Δp_{tot}**	**n**
	m²		**°C**	**(m²·K)/W**	**W**	**W**	**W**	**W/m²**	**mm**	**K**	**m²**	**W**	**m**	**m**	**kg/h**	**m/s**	**kPa**	**kPa**	**kPa**	
Double apartment manifold: M1; Storey: 2; Bld. unit: NONE; $\theta_{s,C}$: 17,0 °C;																				
Room: 0,8; $\theta_{i,C}$: 26,0 °C; Φreq,C: 9079 W; Φ surplus,C: -3307 W;																				
0,8-1-1	17,7	OZ	23,4	0,000	796	506	7	28,6	200	-5,9	0,0	0	5,7	94,2	73,1	0,18	5,2	6,4 3,4	15,0	*3,00*
0,8-1-2	17,7	OZ	23,4	0,000	796	506	7	28,6	200	-5,9	0,0	0	11,8	100,2	73,1	0,18	5,6	6,4 3,0	15,0	*3,00*
0,8-1-3	17,7	OZ	23,4	0,000	796	506	7	28,6	200	-5,9	0,0	0	18,1	106,6	73,1	0,18	5,9	6,4 2,7	15,0	*3,00*
0,8-1-4	17,7	OZ	23,4	0,000	796	506	7	28,6	200	-5,9	0,0	0	24,2	112,6	73,1	0,18	6,3	6,4 2,3	15,0	*3,00*
0,8-1-5	17,7	OZ	23,4	0,000	796	506	7	28,6	200	-5,9	0,0	0	30,5	118,9	73,1	0,18	**6,6**	**6,4 2,0**	**15,0**	*3,00*
0,8-2-1	12,6	OZ	23,4	0,000	566	360	5	28,6	200	-5,9	0,0	0	14,7	77,6	52,4	0,13	1,6	11,0 2,4	15,0	*1,50*

HCZ	A	Type	$\vartheta_{surface,C}$	$R_{\lambda,B}$	$\Phi_{req,C}$	Φ_C	$\Phi_{OS,C}$	q_C	VA	$\Delta\theta_C$	A_{feed}	$\Phi_{feeds,C}$	L_{feeds}	L_{tot}	m	v	Δp	$\Delta p_{reg,z}$ $\Delta p_{reg,p}$	Δp_{tot}	n
	m²		°C	(m²·K)/W	W	W	W	W/m²	mm	K	m²	W	m	m	kg/h	m/s	kPa	kPa	kPa	
Double apartment manifold: M2; Storey: 2; Bld. unit: NONE; $\theta_{s,C}$: 17,0 °C;																				
Room: 0,8; $\theta_{i,C}$: 26,0 °C; Φreq,C: 9079 W; Φ surplus,C: -3307 W;																				
0,8-3-1	12,5	OZ	23,4	0,000	561	357	5	28,6	200	-5,9	0,0	0	13,2	75,6	51,9	0,13	1,6	10,8 0,8	13,1	*1,50*
0,8-4-1	22,1	OZ	23,4	0,000	993	631	9	28,6	200	-5,9	0,0	0	7,1	117,5	91,8	0,23	9,7	2,7 0,7	13,1	*5,00*
0,8-4-2	22,1	OZ	23,4	0,000	993	631	9	28,6	200	-5,9	0,0	0	14,9	125,2	91,8	0,23	10,4	2,2 0,6	13,1	*5,50*
0,8-4-3	22,1	OZ	23,4	0,000	993	631	9	28,6	200	-5,9	0,0	0	22,7	133,1	91,8	0,23	11,0	1,4 0,7	13,1	*6,50*
0,8-4-4	22,1	OZ	23,4	0,000	993	631	9	28,6	200	-5,9	0,0	0	30,5	140,8	91,8	0,23	**11,7**	**0,9** **0,6**	**13,1**	*8,00*
Double apartment manifold: M3; Storey: 2; Bld. unit: NONE; $\theta_{s,C}$: 17,0 °C;																				
Room: 0,1; $\theta_{i,C}$: 26,0 °C; Φreq,C: 4421 W; Φ surplus,C: -1619 W;																				
0,1-1-1	18,3	OZ	23,2	0,000	881	559	6	30,5	200	-5,4	0,0	0	8,7	100,5	89,0	0,22	**7,8**	**2,0** **0,6**	**10,4**	*5,50*
0,1-1-2	18,3	OZ	23,2	0,000	881	559	6	30,5	200	-5,4	0,0	0	2,8	94,5	89,0	0,22	7,4	2,0 1,0	10,4	*5,50*
0,1-2-1	12,6	OZ	23,2	0,000	605	384	4	30,5	200	-5,4	0,0	0	8,4	71,4	61,9	0,15	3,0	6,9 0,5	10,4	*2,50*

HCZ	A	Type	$\vartheta_{surface,C}$	$R_{\lambda,B}$	$\Phi_{req,C}$	Φ_C	$\Phi_{OS,C}$	q_C	VA	$\Delta\theta_C$	A_{feed}	$\Phi_{feeds,C}$	L_{feeds}	L_{tot}	m	v	Δp	$\Delta p_{reg,z}$ $\Delta p_{reg,p}$	Δp_{tot}	n
	m²		°C	(m²·K)/W	W	W	W	W/m²	mm	K	m²	W	m	m	kg/h	m/s	kPa	kPa	kPa	
Double apartment manifold: M4; Storey: 2; Bld. unit: NONE; $\theta_{s,C}$: 17,0 °C;																				
Room: 0,1; $\theta_{i,C}$: 26,0 °C; Φreq,C: 4421 W; Φ surplus,C: -1619 W;																				
0,1-3-1	6,2	OZ	23,2	0,000	299	189	2	30,4	200	-4,2	0,0	0	13,5	44,6	39,7	0,10	0,7	6,3 2,1	9,1	*1,50*
0,1-4-1	18,3	OZ	23,2	0,000	877	556	6	30,5	200	-5,4	0,0	0	8,4	99,7	88,5	0,22	**7,7**	**0,8** **0,5**	**9,1**	*8,00*
0,1-4-2	18,3	OZ	23,2	0,000	877	556	6	30,5	200	-5,4	0,0	0	2,8	94,1	88,5	0,22	7,3	1,0 0,8	9,1	*7,00*

List of rooms - heating

Room Symbol	Room surface area	Thermal resistance of covering	Room temperature during heating period	Heat loss in room	Required output of heating function	Required specific output of heating function	Required radiant heating output	Required convection heating output	Obtained radiant heating output	Obtained convection heating output	Output recovered from pipe-runs	Coverage of heat loss in room
Room	**A**	**$R_{\lambda,B}$**	**$\theta_{i,H}$**	**$\Phi_{std,H}$**	**$\Phi_{req,H}$**	**$q_{req,H}$**	**$\Phi_{req,rad,H}$**	**$\Phi_{req,conv,H}$**	**$\Phi_{rh,H}$**	**$\Phi_{conv,H}$**	**$\Phi_{pipe,H}$**	**%$\Phi_{req,H}$**
	m²	**(m²·K)/W**	**°C**	**W**	**W**	**W/m²**	**W**	**W**	**W**	**W**	**W**	**%**
Storey: 1, Elevation 0 m												
Bld. unit: 01												
0,1	98,3	0,000	20,0	0	5404	55,00	5404	0	5404	0	0,00	100
0,10	2,9		20,0	0	159	55,00	0	159	0	0	0,00	0
0,11	3,3		20,0	0	183	55,00	0	183	0	0	0,00	0
0,12	9,2		20,0	0	504	55,00	0	504	0	0	0,00	0
0,2	5,7		20,0	0	315	55,00	0	315	0	0	0,00	0
0,3	2,9		20,0	0	159	55,00	0	159	0	0	0,00	0
0,4	3,3		20,0	0	183	55,00	0	183	0	0	0,00	0
0,5	4,3		20,0	0	238	55,00	0	238	0	0	0,00	0
0,6	29,2		20,0	0	1606	55,00	0	1606	0	0	0,00	0
0,7	9,5		20,0	0	524	55,00	0	524	0	0	0,00	0
0,8	201,8	0,000	20,0	0	11096	55,00	11096	0	11096	0	0,00	100
0,9	5,7		20,0	0	315	55,00	0	315	0	0	0,00	0

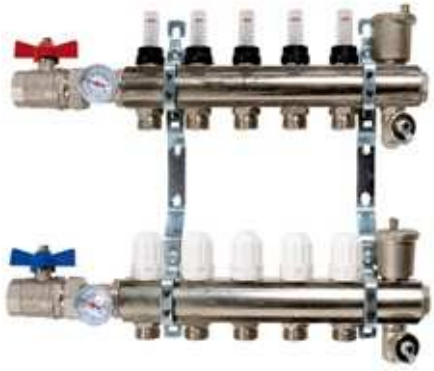
List of rooms - cooling

Room Symbol	Room surface area	Thermal resistance of covering	Room temperature during cooling period	Required output of cooling function	Required specific output of cooling function	Required radiant cooling output	Required convection cooling output	Obtained radiant cooling output	Obtained convection cooling output	Coverage of required cooling output	
Room	**A**	**$R_{\lambda,B}$**	**$\theta_{i,C}$**	**$\Phi_{req,C}$**	**$q_{req,C}$**	**$\Phi_{req,rad,C}$**	**$\Phi_{req,conv,C}$**	**$\Phi_{rh,C}$**	**$\Phi_{conv,C}$**	**%$\Phi_{req,C}$**	
	m²	**(m²·K)/W**	**°C**	**W**	**W/m²**	**W**	**W**	**W**	**W**	**%**	
Storey: 1, Elevation 0 m											
Bld. unit: 01											
0,1	98,3	0,000	26,0	4421	45	4421	0	2802	0	63	
0,8	201,8	0,000	26,0	9079	45	9079	0	5771	0	64	

Manifold board: M1

Storey: 2
Building unit: NONE
Type: Manifold with balancing screws
Number of outlet pairs: 6
Manifold set: With ball valve straight
Manifold cabinet: Concealed manifold cabinet

No.	Type	To terminal unit	To room	Room label	Pipe type	Diameter mm	Valve set.
1	Heating/cooling ceiling	0,8-2-1	0,8	Living room	PEX pipe	16x2.0	1,50
2	Heating/cooling ceiling	0,8-1-5	0,8	Living room	PEX pipe	16x2.0	3,00
3	Heating/cooling ceiling	0,8-1-4	0,8	Living room	PEX pipe	16x2.0	3,00
4	Heating/cooling ceiling	0,8-1-3	0,8	Living room	PEX pipe	16x2.0	3,00
5	Heating/cooling ceiling	0,8-1-2	0,8	Living room	PEX pipe	16x2.0	3,00
6	Heating/cooling ceiling	0,8-1-1	0,8	Living room	PEX pipe	16x2.0	3,00



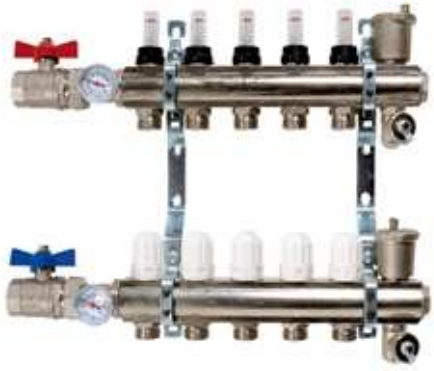
List of radiant heating components

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	6 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	500x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Manifold board: M2

Storey: 2
Building unit: NONE
Type: Manifold with balancing screws
Number of outlet pairs: 5
Manifold set: With ball valve straight
Manifold cabinet: Concealed manifold cabinet

No.	Type	To terminal unit	To room	Room label	Pipe type	Diameter mm	Valve set.
1	Heating/cooling ceiling	0,8-3-1	0,8	Living room	PEX pipe	16x2.0	1,50
2	Heating/cooling ceiling	0,8-4-4	0,8	Living room	PEX pipe	16x2.0	8,00
3	Heating/cooling ceiling	0,8-4-3	0,8	Living room	PEX pipe	16x2.0	6,50
4	Heating/cooling ceiling	0,8-4-2	0,8	Living room	PEX pipe	16x2.0	5,50
5	Heating/cooling ceiling	0,8-4-1	0,8	Living room	PEX pipe	16x2.0	5,00



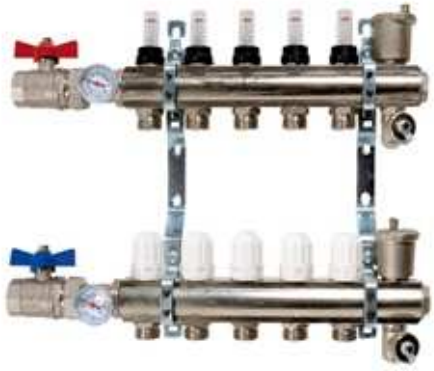
List of radiant heating components

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	5 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	400x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Manifold board: M3

Storey: 2
Building unit: NONE
Type: Manifold with balancing screws
Number of outlet pairs: 3
Manifold set: With ball valve straight
Manifold cabinet: Concealed manifold cabinet

No.	Type	To terminal unit	To room	Room label	Pipe type	Diameter mm	Valve set.
1	Heating/cooling ceiling	0,1-1-2	0,1	Living room	PEX pipe	16x2.0	5,50
2	Heating/cooling ceiling	0,1-2-1	0,1	Living room	PEX pipe	16x2.0	2,50
3	Heating/cooling ceiling	0,1-1-1	0,1	Living room	PEX pipe	16x2.0	5,50



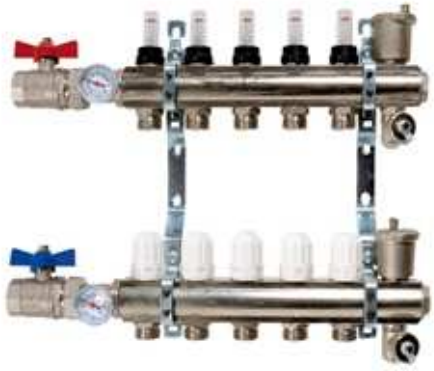
List of radiant heating components

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	3 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	400x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Manifold board: M4

Storey: 2
Building unit: NONE
Type: Manifold with balancing screws
Number of outlet pairs: 3
Manifold set: With ball valve straight
Manifold cabinet: Concealed manifold cabinet

No.	Type	To terminal unit	To room	Room label	Pipe type	Diameter mm	Valve set.
1	Heating/cooling ceiling	0,1-4-1	0,1	Living room	PEX pipe	16x2.0	8,00
2	Heating/cooling ceiling	0,1-3-1	0,1	Living room	PEX pipe	16x2.0	1,50
3	Heating/cooling ceiling	0,1-4-2	0,1	Living room	PEX pipe	16x2.0	7,00



List of radiant heating components

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	3 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	400x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Radiant system installation parameters

Heating/cooling zone symbol and thermal resistance of covering	Occupied / peripheral zone	Area	Pipe spacing	Pipe type Coil Manner of arrangement Number of circuits	Overall circuit length (feeds + loop)	Valve setting	Heating/cooling surface structure
Symbol Covering $R_{\lambda,B}$ (m²·K)/W	**Type**	**A m²**	**VA mm**	**Pipe**	**L_{tot} m**	**Valve set.**	**Structure**
Double apartment manifold: M1, Storey: 2, Bld. unit: NONE No. of outlets: 6, Manifold with balancing screws Manifold cabinet type: Concealed manifold cabinet Supply valve: Lockshield, Return valve: Thermostatic valve,							
Room: 0,8, No. of HZs: 11 / 11, Pipe laying system: Ceiling clip rail system							
0,8-1-1 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 6 Single pipe meander pattern	94,2 5,7 + 88,4	3,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-1-2 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 5 Single pipe meander pattern	100,2 11,8 + 88,4	3,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-1-3 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 3 Single pipe meander pattern	106,6 18,1 + 88,4	3,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-1-4 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 4 Single pipe meander pattern	112,6 24,2 + 88,4	3,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-1-5 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 2 Single pipe meander pattern	118,9 30,5 + 88,4	3,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-2-1 None - 0,000	OZ	12,6	200	PEX pipe 16x2.0 Coil 4 Single pipe meander pattern	77,6 14,7 + 62,9	1,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
Double apartment manifold: M2, Storey: 2, Bld. unit: NONE							

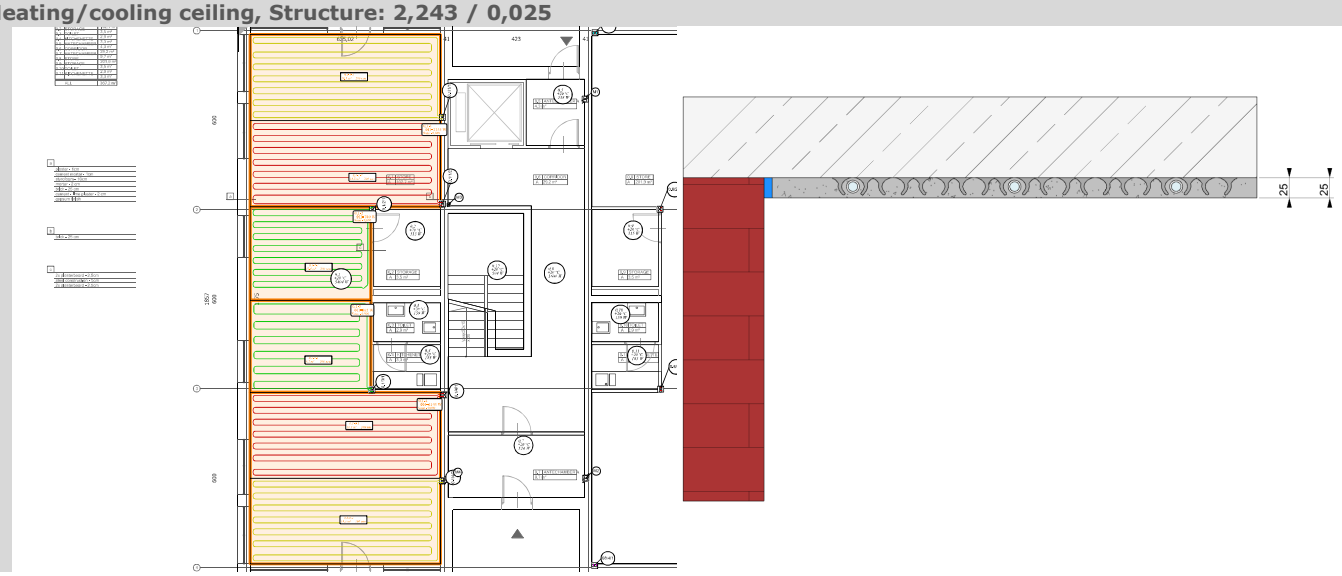
Symbol Covering $R_{\lambda,B}$ (m²·K)/W	Type	A m²	VA mm	Pipe	L_{tot} m	Valve set.	Structure
No. of outlets: 5, Manifold with balancing screws Manifold cabinet type: Concealed manifold cabinet **Supply valve: Lockshield, Return valve: Thermostatic valve,**							
Room: 0,8, No. of HZs: 11 / 11, Pipe laying system: Ceiling clip rail system							
0,8-3-1 None - 0,000	OZ	12,5	200	PEX pipe 16x2.0 Coil 3 Single pipe meander pattern	75,6 13,2 + 62,4	1,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-4-1 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 3 Single pipe meander pattern	117,5 7,1 + 110,3	5,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-4-2 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 2 Single pipe meander pattern	125,2 14,9 + 110,3	5,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-4-3 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 1 Single pipe meander pattern	133,1 22,7 + 110,3	6,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,8-4-4 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 1 Single pipe meander pattern	140,8 30,5 + 110,3	8,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
Double apartment manifold: M3, Storey: 2, Bld. unit: NONE **No. of outlets: 3, Manifold with balancing screws Manifold cabinet type: Concealed manifold cabinet** **Supply valve: Lockshield, Return valve: Thermostatic valve,**							
Room: 0,1, No. of HZs: 6 / 6, Pipe laying system: Ceiling clip rail system							
0,1-1-1 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 4 Single pipe meander pattern	100,5 8,7 + 91,7	5,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,1-1-2 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 5 Single pipe meander pattern	94,5 2,8 + 91,7	5,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,1-2-1 None - 0,000	OZ	12,6	200	PEX pipe 16x2.0 Coil 8 Single pipe meander pattern	71,4 8,4 + 63,0	2,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
Double apartment manifold: M4, Storey: 2, Bld. unit: NONE **No. of outlets: 3, Manifold with balancing screws Manifold cabinet type: Concealed manifold cabinet**							

Symbol Covering $R_{\lambda,B}$ (m²·K)/W	Type	A m²	VA mm	Pipe	L_{tot} m	Valve set.	Structure
Supply valve: Lockshield, Return valve: Thermostatic valve,							
Room: 0,1, No. of HZs: 6 / 6, Pipe laying system: Ceiling clip rail system							
0,1-3-1 None - 0,000	OZ	6,2	200	PEX pipe 16x2.0 Coil 2 Single pipe meander pattern	44,6 13,5 + 31,1	1,50	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,1-4-1 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 5 Single pipe meander pattern	99,7 8,4 + 91,3	8,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W
0,1-4-2 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 7 Single pipe meander pattern	94,1 2,8 + 91,3	7,00	Plaster 0.870 W/(m x K) 2,5 cm (Su 0,6 cm) Rλ,floor = 2,143 (m²·K)/W

Room chart: 0,1

Storey: 1
Building unit: 01
Manifolds in room: -
Automatic control components: -

Heating/cooling ceiling, Structure: 2,243 / 0,025



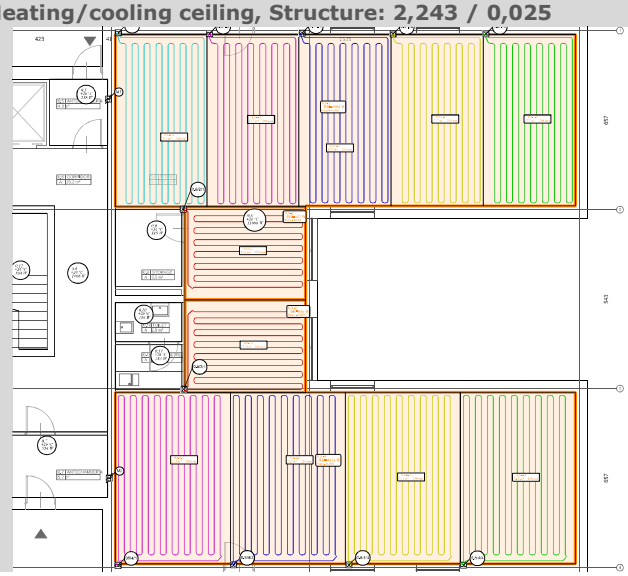
Heating/cooling zone symbol	Occupied / peripheral zone	Area	Pipe spacing	Pipe type	Type of heating-cooling surface	Pipe arrangement	Overall circuit length (feeds + loop)	Manifold outlet number
Symbol Covering $R_{\lambda,B}$ (m²·K)/W	**Type**	**A m²**	**VA mm**	**Pipe**	**Type**	**Pipe laying pattern**	**L_{tot} m**	**Outlet no.**
Double apartment manifold: M3, Storey: 2, Bld. unit: NONE								
0,1-1-1 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 4	Heating/cooling ceiling	Single pipe meander pattern	100,5 8,7 + 91,7	3
0,1-1-2 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 5	Heating/cooling ceiling	Single pipe meander pattern	94,5 2,8 + 91,7	1
0,1-2-1 None - 0,000	OZ	12,6	200	PEX pipe 16x2.0 Coil 8	Heating/cooling ceiling	Single pipe meander pattern	71,4 8,4 + 63,0	2

Heating/cooling zone symbol	Occupied / peripheral zone	Area	Pipe spacing	Pipe type	Type of heating-cooling surface	Pipe arrangement	Overall circuit length (feeds + loop)	Manifold outlet number
Symbol Covering $R_{\lambda,B}$ (m²·K)/W	**Type**	**A m²**	**VA mm**	**Pipe**	**Type**	**Pipe laying pattern**	**L_{tot} m**	**Outlet no.**
Double apartment manifold: M4, Storey: 2, Bld. unit: NONE								
0,1-3-1 None - 0,000	OZ	6,2	200	PEX pipe 16x2.0 Coil 2	Heating/cooling ceiling	Single pipe meander pattern	44,6 13,5 + 31,1	2
0,1-4-1 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 5	Heating/cooling ceiling	Single pipe meander pattern	99,7 8,4 + 91,3	1
0,1-4-2 None - 0,000	OZ	18,3	200	PEX pipe 16x2.0 Coil 7	Heating/cooling ceiling	Single pipe meander pattern	94,1 2,8 + 91,3	3

Room chart: 0,8

Storey: 1
Building unit: 01
Manifolds in room: -
Automatic control components: -

Heating/cooling ceiling, Structure: 2,243 / 0,025



Heating/cooling zone symbol	Occupied / peripheral zone	Area	Pipe spacing	Pipe type	Type of heating-cooling surface	Pipe arrangement	Overall circuit length (feeds + loop)	Manifold outlet number
Symbol Covering $R_{\lambda,B}$ (m²·K)/W	**Type**	**A m²**	**VA mm**	**Pipe**	**Type**	**Pipe laying pattern**	**L_{tot} m**	**Outlet no.**
Double apartment manifold: M1, Storey: 2, Bld. unit: NONE								
0,8-1-1 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 6	Heating/cooling ceiling	Single pipe meander pattern	94,2 5,7 + 88,4	6
0,8-1-2 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 5	Heating/cooling ceiling	Single pipe meander pattern	100,2 11,8 + 88,4	5
0,8-1-3 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 3	Heating/cooling ceiling	Single pipe meander pattern	106,6 18,1 + 88,4	4
0,8-1-4 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 4	Heating/cooling ceiling	Single pipe meander pattern	112,6 24,2 + 88,4	3
0,8-1-5 None - 0,000	OZ	17,7	200	PEX pipe 16x2.0 Coil 2	Heating/cooling ceiling	Single pipe meander pattern	118,9 30,5 + 88,4	2
0,8-2-1 None - 0,000	OZ	12,6	200	PEX pipe 16x2.0 Coil 4	Heating/cooling ceiling	Single pipe meander pattern	77,6 14,7 + 62,9	1

Heating/cooling zone symbol	Occupied / peripheral zone	Area	Pipe spacing	Pipe type	Type of heating-cooling surface	Pipe arrangement	Overall circuit length (feeds + loop)	Manifold outlet number
Symbol Covering $R_{\lambda,B}$ (m²·K)/W	**Type**	**A m²**	**VA mm**	**Pipe**	**Type**	**Pipe laying pattern**	**L_{tot} m**	**Outlet no.**
Double apartment manifold: M2, Storey: 2, Bld. unit: NONE								
0,8-3-1 None - 0,000	OZ	12,5	200	PEX pipe 16x2.0 Coil 3	Heating/cooling ceiling	Single pipe meander pattern	75,6 13,2 + 62,4	1
0,8-4-1 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 3	Heating/cooling ceiling	Single pipe meander pattern	117,5 7,1 + 110,3	5
0,8-4-2 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 2	Heating/cooling ceiling	Single pipe meander pattern	125,2 14,9 + 110,3	4
0,8-4-3 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 1	Heating/cooling ceiling	Single pipe meander pattern	133,1 22,7 + 110,3	3
0,8-4-4 None - 0,000	OZ	22,1	200	PEX pipe 16x2.0 Coil 1	Heating/cooling ceiling	Single pipe meander pattern	140,8 30,5 + 110,3	2

List of pipes, pipe fittings and couplings

Product	Size	Catalogue code	Quantity	Unit
Copper pipes and fittings EN 1057				
Pipes				
Hard copper pipe, Type X bars	28 x 1,5		10	m
Hard copper pipe, Type X bars	35 x 1,5		10	m
Soft copper pipe, Type X coils	18 x 1		36	m
Soft copper pipe, Type X coils	22 x 1		45	m
Pipe fittings				
Bend 90°	18 - 18		10	pcs.
Bend 90°	22 - 22		12	pcs.
Coupling	28 - 18		2	pcs.
Coupling FT	18 - ¾"FT		2	pcs.
Coupling FT	22 - ¾"FT		2	pcs.
Coupling MT	22 - ½"MT		2	pcs.
Coupling MT	22 - ¾"MT		6	pcs.
Coupling MT	22 - 1"MT		8	pcs.
Coupling MT	28 - ¾"MT		2	pcs.
Coupling MT	28 - 1"MT		6	pcs.
Elbow 90°	18 - 18		8	pcs.
Elbow 90°	22 - 22		8	pcs.
Elbow 90°	35 - 35		2	pcs.
Fitting reducer	22 - 18		4	pcs.
Tee	28 - 35 - 22		2	pcs.
Tee	22 - 18 - 18		2	pcs.
Tee	22 - 28 - 22		2	pcs.

List of insulation

Product	Size	Catalogue code	Quantity	Unit
Standard insulation catalogue				
Lagging				
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=18 mm, Th=25 mm		36	m
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=22 mm, Th=25 mm		45	m
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=28 mm, Th=40 mm		10	m
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=35 mm, Th=40 mm		10	m

List of valves and fittings

Product	Size	Catalogue code	Quantity	Unit
Miscellaneous fittings of any make				
Other				
Water meter heat counter	¾"MT, Qnom: 0,6 m³/h	Water meter heat counter	1	pcs.
Water meter heat counter	¾"MT, Qnom: 1 m³/h	Water meter heat counter	1	pcs.
Neutral valves cataloge - typical construction				
Valves				
Ball valve. FT	20, kvs=40.0	DN20	3	pcs.
Ball valve. FT	25, kvs=60.0	DN25	3	pcs.
Regulatory automatic balancing valve, FT	15	DN15	1	pcs.
Regulatory automatic balancing valve, FT	20	DN20	1	pcs.

List of radiant heating components

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Coils				
PEX pipe	16x2.0, Coil 100 m	any producer	300	m
PEX pipe	16x2.0, Coil 300 m	any producer	1500	m
Pipe fittings				
Pipe-Manifold fitting 16x3/4		any producer	34	pcs.
Manifolds				
Manifold with balancing screws	3 ways	any producer	2	pcs.
Manifold with balancing screws	5 ways	any producer	1	pcs.

Product	Size	Catalogue code	Quantity	Unit
Manifold with balancing screws fot. Uponor	6 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet fot.Uponor	400x750x160	any producer	3	pcs.
Concealed manifold cabinet fot.Uponor	500x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	4	pcs.
Accessories				
Pipe fastening element 2pcs./m fot.Instalco-tech		any producer	3415	pcs.

Pipes summary

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	6 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	500x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Product	Size	Catalogue code	Quantity	Unit
Standard insulation catalogue				
Lagging				
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=18 mm, Th=25 mm		36	m
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=22 mm, Th=25 mm		45	m
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=28 mm, Th=40 mm		10	m
PE foam lagging, λ(20°C)=0,038W/mK	In.diam.=35 mm, Th=40 mm		10	m

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Coils				

Product	Size	Catalogue code	Quantity	Unit
PEX pipe	16x2.0, Coil 100 m	any producer	300	m
PEX pipe	16x2.0, Coil 300 m	any producer	1500	m
Pipe fittings				
Pipe-Manifold fitting 16x3/4		any producer	34	pcs.
Manifolds				
Manifold with balancing screws	3 ways	any producer	2	pcs.
Manifold with balancing screws	5 ways	any producer	1	pcs.
Manifold with balancing screws	6 ways	any producer	1	pcs.

Product	Size	Catalogue code	Quantity	Unit
Manifold cabinets				
Concealed manifold cabinet fot.Uponor	400x750x160	any producer	3	pcs.
Concealed manifold cabinet fot.Uponor	500x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	4	pcs.
Accessories				
Pipe fastening element 2pcs./m fot.Instalco-tech		any producer	3415	pcs.

Product	Size	Catalogue code	Quantity	Unit
Copper pipes and fittings EN 1057				
Pipes				
Hard copper pipe, Type X bars	28 x 1,5		10	m
Hard copper pipe, Type X bars	35 x 1,5		10	m
Soft copper pipe, Type X coils	18 x 1		36	m
Soft copper pipe, Type X coils	22 x 1		45	m
Pipe fittings				
Bend 90°	18 - 18		10	pcs.
Bend 90°	22 - 22		12	pcs.
Coupling	28 - 18		2	pcs.
Coupling FT	18 - ¾"FT		2	pcs.
Coupling FT	22 - ¾"FT		2	pcs.

Product	Size	Catalogue code	Quantity	Unit
Coupling MT	22 - ½"MT		2	pcs.
Coupling MT	22 - ¾"MT		6	pcs.
Coupling MT	22 - 1"MT		8	pcs.
Coupling MT	28 - ¾"MT		2	pcs.
Coupling MT	28 - 1"MT		6	pcs.
Elbow 90°	18 - 18		8	pcs.
Elbow 90°	22 - 22		8	pcs.
Elbow 90°	35 - 35		2	pcs.
Fitting reducer	22 - 18		4	pcs.
Tee	28 - 35 - 22		2	pcs.
Tee	22 - 18 - 18		2	pcs.
Tee	22 - 28 - 22		2	pcs.

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	3 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	400x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Product	Size	Catalogue code	Quantity	Unit
(Planned components)				
Copper pipes and fittings EN 1057				
Pipes				
Hard copper pipe, Type X bars	28 x 1,5		9,77	m
Hard copper pipe, Type X bars	35 x 1,5		9,85	m

Product	Size	Catalogue code	Quantity	Unit
Soft copper pipe, Type X coils	18 x 1		35,22	m
Soft copper pipe, Type X coils	22 x 1		44,54	m

(Insulated)

Copper pipes and fittings EN 1057				
Pipes				
Hard copper pipe, Type X bars	28 x 1,5		9,77	m
Hard copper pipe, Type X bars	35 x 1,5		9,85	m
Soft copper pipe, Type X coils	18 x 1		35,22	m
Soft copper pipe, Type X coils	22 x 1		44,54	m

(Sized)

Copper pipes and fittings EN 1057				
Pipes				
Hard copper pipe, Type X bars	28 x 1,5		9,77	m
Hard copper pipe, Type X bars	35 x 1,5		9,85	m
Soft copper pipe, Type X coils	18 x 1		35,22	m
Soft copper pipe, Type X coils	22 x 1		44,54	m

(From radiant systems)

Basic radiant systems				
Pipes				
PEX pipe	16x2.0	any producer	1707,03	m

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws fot. Uponor	5 ways	any producer	1	pcs.
Manifold cabinets				

Product	Size	Catalogue code	Quantity	Unit
Concealed manifold cabinet	400x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Product	Size	Catalogue code	Quantity	Unit
Basic radiant systems				
Manifolds				
Manifold with balancing screws	3 ways	any producer	1	pcs.
Manifold cabinets				
Concealed manifold cabinet	400x750x160	any producer	1	pcs.
Valves				
Straight ball valve 1''	25	any producer	1	pcs.

Product	Size	Catalogue code	Quantity	Unit

Product	Size	Catalogue code	Quantity	Unit
Miscellaneous fittings of any make				
Other				
Water meter heat counter	¾"MT, Qnom: 0,6 m³/h	Water meter heat counter	1	pcs.
Water meter heat counter	¾"MT, Qnom: 1 m³/h	Water meter heat counter	1	pcs.
Neutral valves cataloge - typical construction				
Valves				
Ball valve. FT	20, kvs=40.0	DN20	3	pcs.
Ball valve. FT	25, kvs=60.0	DN25	3	pcs.
Regulatory automatic balancing valve, FT	15	DN15	1	pcs.
Regulatory automatic balancing valve, FT	20	DN20	1	pcs.