

## Heat losses

### Calculation prerequisites for pre-insulated single and double pipe systems

#### Conditions of installation

Height of back-filling above highest point of pipe (H)	0,6m	
Distance between pipes	0,20 m	$\text{Ø } 110 \leq D_y \leq \text{Ø } 180$
	0,25 m	$\text{Ø } 200 \leq D_y \leq \text{Ø } 500$
	0,30 m	$\text{Ø } 630 \leq D_y \leq \text{Ø } 900$

#### Ground conditions:

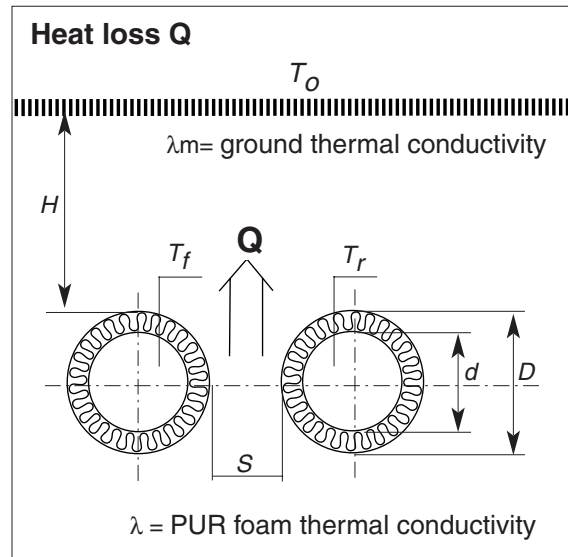
Thermal conductivity  $\lambda_m = 1,5 \text{ W/m}^\circ \text{K}$

#### PUR foam insulation:

Thermal conductivity  $\lambda_i = 0,027 \text{ W/m}^\circ \text{K}$

#### Temperatures, yearly average (primary system):

Flow pipelines	$T_f = 85^\circ \text{C}$
Return pipelines	$T_r = 55^\circ \text{C}$
Ambient temperature	$T_o = 5^\circ \text{C}$
	$\Delta T = 65^\circ \text{C}$



If  $\Delta T$  is changed  $10^\circ$ , the heat losses are influenced by  $\frac{10}{65} = 15\%$

Calculation of heat losses can be made with the computer program "Ecodim" issued by the Swedish District Heating Organisation.

## Single pipe systems

### Heat losses at $\Delta T = 65^{\circ}\text{C}$

DN	Series 1		Series 2		Series 3	
	W/ m	kWh/ m year	W/ m	kWh/ m year	W/ m	kWh/ m year
20	18,0	158	15,3	134	14,1	123
25	21,6	189	18,2	160	16,3	143
32	22,5	197	19,6	172	17,9	157
40	25,9	227	22,2	195	20,1	175
50	28,7	251	25,1	220	21,7	191
65	34,2	300	28,2	248	24,5	214
80	35,3	309	29,6	259	26,0	228
100	37,0	324	31,0	271	27,1	237
125	43,1	378	35,9	314	30,4	266
150	51,5	451	40,9	358	33,7	295
200	56,4	494	43,4	380	35,3	309
250	54,4	477	42,3	275	35,3	309
300	63,0	552	48,7	426	38,4	337
350	61,3	537	45,9	402	37,6	330
400	63,6	557	48,7	427	37,9	332
450	96,1	841	65,8	576	48,7	427
500	96,1	841	63,6	557	47,5	416
600	134,0	1178	78,3	686	53,8	471
700	157,0	1376	89,6	784	62,5	547
800	195,0	1710	97,2	851	70,1	614

## Double pipe systems

### Heat losses at $\Delta T = 65^{\circ}\text{C}$

DN	STANDARD		DOUBLE+	
	W/m	kWh/m year	W/m	kWh/m year
2 x 20	12,1	106	10,6	81
2 x 25	13,9	121	11,7	102
2 x 32	15,1	132	12,8	112
2 x 40	18,4	161	14,9	131
2 x 50	17,6	154	14,5	127
2 x 65	21,2	186	17,1	150
2 x 80	24,6	215	18,8	164
2 x 100	24,4	214		
2 x 125	22,0	193		
2 x 150	27,4	240		
2 x 200	30,0	260		

Calculation of heat losses can be made with the computer program "Ecodim" issued by the Swedish District Heating Organisation.