

Troubleshooting

SMR
 (3) , < 4> .
 $SMR = RMR_{Basic} + (F_1 \cdot F_2 \cdot F_3) + F_4$ (3)

[1] SMR
 가
 3가 (Protection, Reinforcement, Concrete)

2-3. SMR F_4

Swindells
 가 5 () 16

TV,) . Swindells
 가 가 , 가

. Swindells가
 SMR F_4 < 5> .
 SMR F_4

Kendroski RMR
 A_B 가 . < 6>
 SMR F_4

가 , RMR
 가 .
 가

(,) 가
 (1 ~ 2)
 가 SMR

< 5>		F_4		
N			SMR F_4	
	4	0		0
3	0 - 0.6	0.5	+10	
2	2 - 4	3	+8	
1	3 - 6	4	+0	

< 6> Kendroski		F_4	
A_B	(%)	SMR F_4	
0.97 - 0.94	108 - 104	+8	
0.94 - 0.90	104 - 100	0	
0.90 - 0.80	100 - 89	-8	

3. _____
 가 SMR
 가

가
 가
 가

가

Troubleshooting

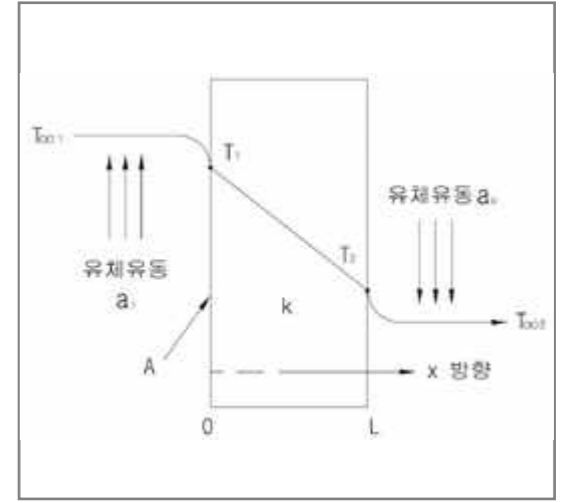
1. _____

1) (conduction)

(Joseph Fourier)
 $Q_x = -k \cdot A \cdot (dT/dL)$ (kcal/h W)
 , k : (kcal/mh)
 A : (m^2)
 dT/dL :

2. _____

(1)

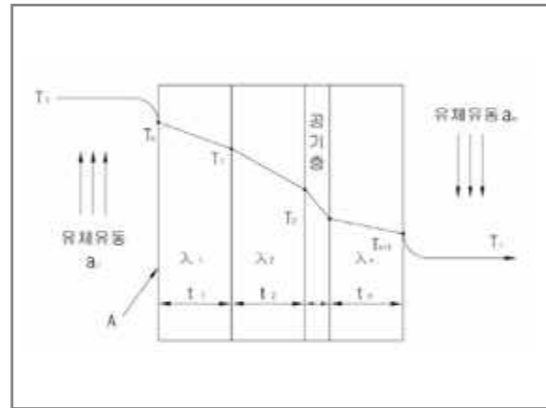


Troubleshooting

2) (convection)

가

a



Q : kcal/mh R : mh /kcal
 k : kcal/mh 1 · 2 ... n :
 ai : ao :
 1/C : 가
 Ti : T :
 Tn+1 : Tr :
 t1, t2...tn :

		(1/C,) (kcal/mh)	
		()	()
()	(ao)	19.5 (1)	28.8 (2)
	(ai)	7.2	7.2
(.)	(ao)	19.5 (1)	28.8 (2)
	(ai)	5.3	8.0

		() (mh /kcal)	
		= 1cm	2cm
		0.15	0.17
		0.16	0.19
		0.18	0.23

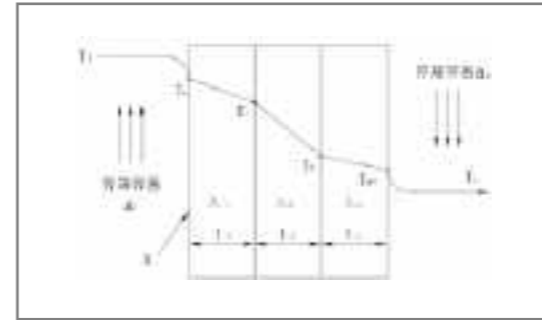
2)

Q = (Ti - Tr) / R = k (Ti - Tr) (kcal/mh)
 R = 1/ai + 1/ao + t/ + 1/C tn / n
 = 1 / k (mh /kcal)

$$Q = ai(T_i - T) = ao(T_{n+1} - T_r) \text{ (kcal/mh)}$$

$$R = 1/ai, t/ \circ 0$$

ao 10kcal/mh , 7kcal/mh



(PIPE)

$$Q = (T_i - T_r) / R = k (T_i - T_r) \text{ (kcal/mh)}$$

$$R = \frac{1}{ai} \left(\frac{1}{d_1} + \frac{1}{a_o d_{n+1}} + \frac{1}{2 \circ l_n} \frac{d_1}{d_o} + \frac{1}{2_1 l_n} \frac{d_2}{d_1} \right) + \dots + \frac{1}{2_n l_n} \frac{d_{n+1}}{d_n}$$

$$Q = d_{n+1}(T_{n+1} - T_r) a_o = d_o(T_i - T_o) a_i$$

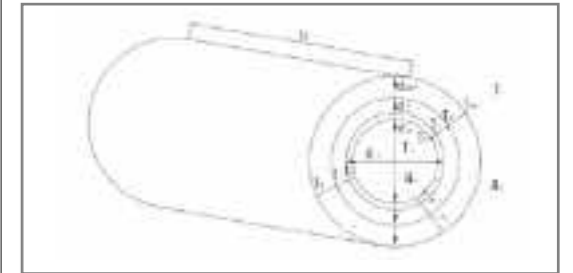
3.

1) 가

		가		
NO	가			
1		1. () 147 가 . (1998 3 9)		
		2. AIR TIGHT 가 ,	x	
2		1. 가 ,		
		2. 가 ,	x	
3		1. 가 (, ,)		
		2. 가 (, ,)	x	
4	(1)	1. U () .		
		2. PIT 1	x	
5		1. PD PD		
		가 .		
6		1. 가 .		

$$R = 1/ai, t/ \circ 0$$

ao 10kcal/mh , 7kcal/mh



Q : kcal/mh () , kcal/mh ()
 R : mh /kcal K : kcal/mh
 ai :
 ao :
 1 · 2 ... n :
 o : Ti :
 To : T1 :
 Tn+1 : Tr :
 do : d1 : dn+1 :
 to : t1, t2...tn :

((Newton))
 Q = a · A · (Th - TL) (kcal/h W)
 a : (kcal/mh) A : (m²)
 Th : () TL : ()

3) (radiation)

가 가

$$Q = \cdot A \cdot (T - T) \text{ (kcal/h W)}$$

T :

$$= 4.8806 \times 10^{-8} \text{ (kcal/m}^2\text{h K}^4) = 5.6697 \times 10^{-8} \text{ (W/m}^2\text{K}^4)$$

(2)

1)

$$Q = (T_i - T_r) / R = k (T_i - T_r) \text{ (kcal/mh)}$$

$$R = 1/ai + 1/ao + t/ + 1/C \dots \dots \dots tn / n$$

$$= 1 / k \text{ (mh /kcal)}$$

$$Q = ai(T_i - T_o) = ao(T_{n+1} - T_r) \text{ (kcal/mh)}$$

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(a ₀) (kcal/mh)					
(T _{n+1} -Tr)	a ₀	(T _{n+1} -Tr)	a ₀	(T _{n+1} -Tr)	a ₀
20	10.0	125	14.6	250	33.1
40	10.5	150	16.6	275	25.0
60	11.5	175	17.5	300	27.0
80	12.3	200	19.3	325	29.0
120	13.3	225	21.1	350	31.3

(a ₀)				
		(T _{n+1} -Tr)		
ft/min	m/sec	100 (38)	200 (93)	300 (149)
200	1.1	1.46	1.43	1.40
400	2.2	1.74	1.69	1.64
880	4.5	2.16	2.10	2.02
1320	6.7	2.50	2.42	2.33
1760	8.9	2.76	2.69	2.58

2)

		(mm)	(mm)	()	()	()	(kcal/mh)	(kcal/mh)		
PD	()	12.47	20	5	-5	-2.2	1.2886	10.3811	8.1	
					-10	-6.7	2.0939	10.3811	5.0	
					-11.9	-8.4	2.3981	10.3811	4.3	
					-15	-11.1	2.8813	10.3811	3.6	
					-18	-13.8	3.3646	10.3811	3.1	
	()	12.47	10	5	-5	-3.6	2.3923	10.3811	4.3	
					-10	-8.35	3.7137	10.3811	2.8	
					-11.9	-10.15	4.2144	10.3811	2.5	
					-15	-13.05	5.0211	10.3811	2.1	
					-18	-15.9	5.8139	10.3811	1.8	
	()	12.47	10	5	-5	-5	2.7818	10.3811	3.7	
					-10	-10	4.1727	10.3811	2.5	
-11.9					-11.9	4.7012	10.3811	2.2		
-15					-15	5.5636	10.3811	1.9		
-18					-18	6.3981	10.3811	1.6		
CD	()	12.47	20	5	-5	-2.2	0.9682	10.3811	10.7	
					-10	-6.7	1.5733	10.3811	6.6	
					-11.9	-8.4	1.8019	10.3811	5.8	
					-15	-11.1	2.1649	10.3811	4.8	
					-18	-13.8	2.5280	10.3811	4.1	
	()	12.47	10	5	-5	7.3	-0.3406	10.3811	가	
					-10	4.75	0.0370	10.3811		
					-11.9	3.8	0.1777	10.3811		
					-15	2.25	0.4072	10.3811		
					-18	0.7	0.6367	10.3811		
	CD	()	12.47	10	5	-5	-3.6	1.7581	10.3811	5.9
						-10	-8.35	2.7292	10.3811	3.8
-11.9						-10.15	3.0972	10.3811	3.4	
-15						-13.05	3.6900	10.3811	2.8	
-18						-15.9	4.2727	10.3811	2.4	
()		12.47	10	5	-5	-5	2.0443	10.3811	5.1	
					-10	-10	3.0665	10.3811	3.4	
					-11.9	-11.9	3.4549	10.3811	3.0	
					-15	-15	4.0887	10.3811	2.5	
					-18	-18	4.7020	10.3811	2.2	

3)

NO			
1		1. 가 가	
2		1. PD	
3		1. PD	

4)

NO			
1		1. 10T 2. PD 3. 20T 가 20T	()
2		1. (10T) 2. (10T) 20T	

4.

3 가

가

1. P1078 ~ 1086
2. P81 ~ 83
3. P229 ~ 234
4. P25 ~ 33
5. P75 ~ 98
6. P380 ~ 390