

Technical



가

1

(區)

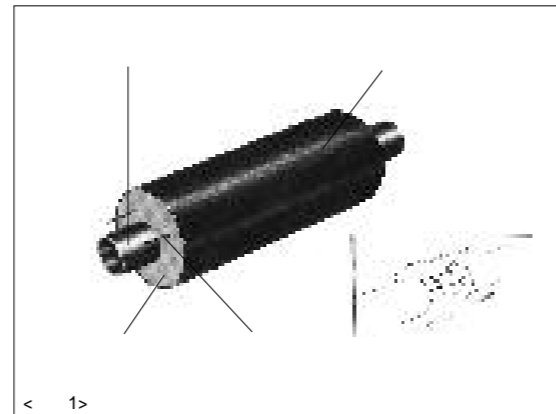
1980

8%

가

< 1> 가	
12 %	50 %
85 %	33 %
31 %	42 %
가 18 %	70 %

1.



< 1>

7L

(Service Pipe) : 41%, 2
 (Insulating Material) : 2% ()
 (Leak Detecting Wire) : Sensor Wire(Ni-Cr)
 Feed Back Wire(Cu) 가
 ()
 Line ,

(Jacket Pipe) :

2.

120 , 65 , 16Bar, Metal Sheet(Sr
 Wrapping Metal Casing M
 Sheet
 PE Sleeve 가 Sleeve
 Casing Metal Casing C
 Casing 4
 1)

가
 Metal Casing : Metal Sheet

가

가 가

가
 Tie-In Joint ,
 460mm

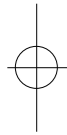
가
 PE Sleeve : 가
 Metal Sleeve

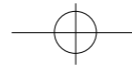
가 Open-Pore Porosity 가
 가

Casing : Sheet

Casing 가

37%





Technical

가0.15 ~ 0.65

2) 가가 가

6) Radial Force : Yield Stress

7) Bending Moment : Yield Stress

Stress Level Yield Stress 15%

Casing : Metal Casing

Metal PUR Sleeve 1

Casing 가 Sand Box 30

Soil Stress Test 24

30Kpa 24

PUR Form Foam

3. Casing

1) Casing EN253

30

EN489

1) : 1m

Joint

가

2) (Earth Load) : 1m

1,800Kg/m³

3) (Axial Movements) : 120

,

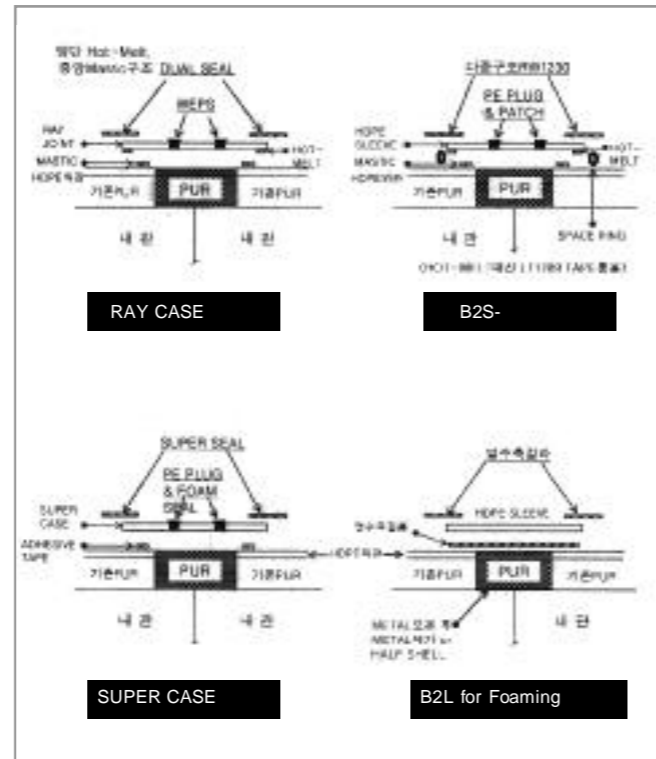
4) :

- Open Trench 2 -30 ~ 80 2

- 65 30

5) 8mm

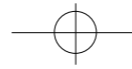
2)



< 2> Casing				
	RAY JOINT	SUPER CASE	B2S-II	B2L for Foaming
	RAY CHEM 社 ()	CANUSA 社 ()	LYMATEX 社 ()	LYMATEX 社 ()
Casing Sleeve	Ray Case Dual Seal	Super Case Super Seal	PE RW1230 (Nitto)	PE Dual Seal
Patch	WEPS	PE Plug Butt. /Foam Seal	PE Plug Butt. /RW-X	
Casing	Dual Seal 가	HDPE PE 가	HDPE	HDPE
Sleeve	Hot melt Mastic	Hot melt Mastic	Hot melt Mastic	Hot melt Mastic
	(WEPS)	PE Plug Foam Seal	PE Plug Mastic	Metal
1	Casing Mastic Tape	Adhesive Tape	Casing Mastic Tape	
2	Dual Seal & Patch	Super Seal & Patch	RW1230 Sheet & Patch	

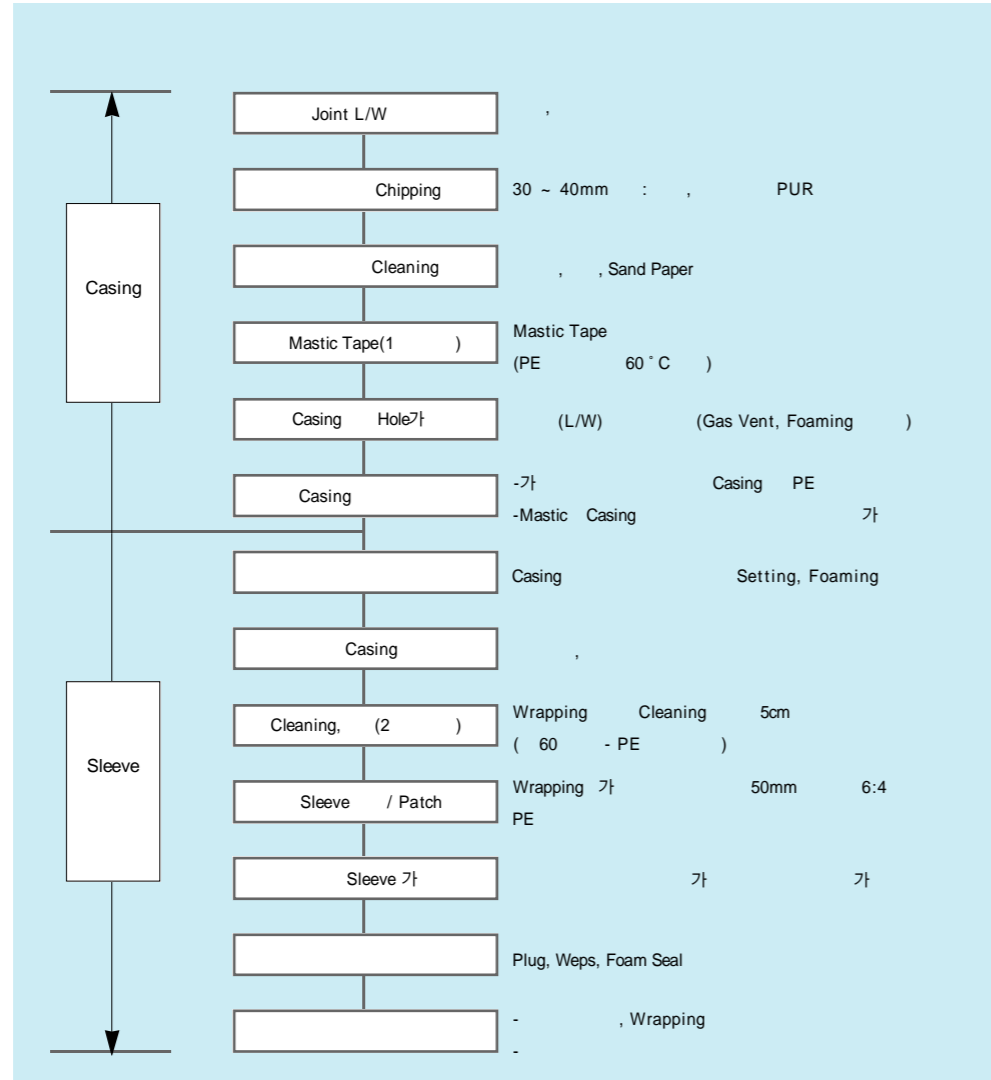
3)

< 3>				
1. Ray Case	- 가 - 가 Torch		- PE 가 (WEPS)	
2. Super Case	- Casing Stress -가 가 -가	1/3 가 Soil	- () (Plug+ Foam Seal)	
3. B2S-II	-Casing 가 Mastic Space Ring 가 가 PE	PE Plug 가	- 가 가	
4. B2L for Foaming	-Metal 가가 - 가 가		-Metal 가	



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4) Flow Chart



PUR FOAM

가 Casing Polyisocyanate Polyol(:Resin)

가 PUR (Rigid)

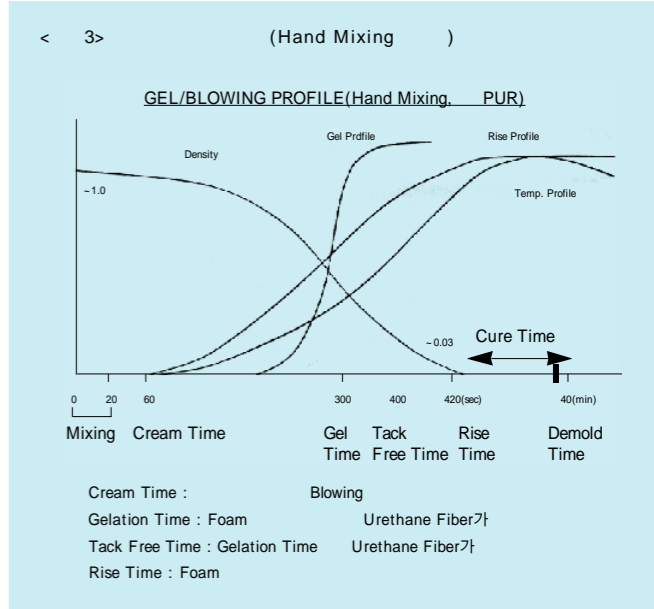
가 가

4. (POLYURETHANE FOAM) 가

Closed Cell

1)

- Isocyanate Polyol Foam
 가
 가 Cream Time
 PUR Cream Time (30~40)
 Foam Cell
 PUR Foam
 가
 18~28 가가



< 4 >

			A : POLYOL + + +
1.	A , B		B : Isocyanate (MDI)
	A , B		* -
2.		가	: Blowing, , Cell
3.	가	가	* - System
	가	가	Foam (
4.			: , , , Cell

2)

가

3) PUR FOAM

- PUR Form Foam

Hand Mixing()

Cream Time 가

Foaming

Technical

< 5 >		
(가)	- () - 가 -Mold 가 -	- Sample - -Mold 가 -Pump 가
	- () - 가 -Mold 가	- -
/Foam	- - -	-MDI , Pump -
/	- -	- 가
	- (Metal) -	- (Metal) 가 -
Foam	-MDI	-Polyol Filter -MDI, Polyol
	- -	-5% 가 - -MDI Filter,
	-Mold 가 - -	-Mold 가 - (Metal) 가 - () 가 -

3

ESCO

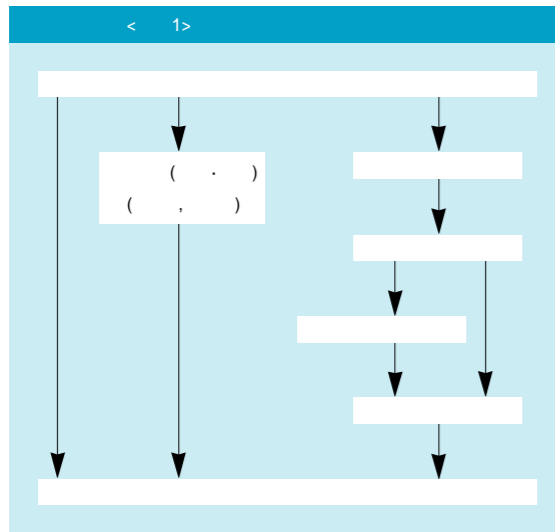
가

가

가



< 1>



< 3>

()	1	2	3	4	5	6	7	8	9	10	11	12
-----	---	---	---	---	---	---	---	---	---	----	----	----

가

< 2>

가

가

가

< 2>

		(kg/cm ³)			(%)	(%)
		500 800	600 1500	300 1,370		
	1.11 1.23	500 800	600 1500	300 1,370		0.04 0.2
	1.01 1.20	320 600			40 310	0.2 0.6
	1.40 2.00	35 755			100 500	0.1 0.3
	1.18 1.20	40 680	840 1,260	620 870	19 37	0.24 0.28
()	1.35 1.45	350 640	570 900	700 1,150	20 40	0.07 0.4
()	1.16 1.35	100 250	65 120	35 200	200 450	0.2 0.7
	1.00 1.30	350			650	
	1.25 1.30	490 560	700 2,100	840 1,050	15 53	0.1 0.3

가

가

가

가

가

1.5

< 4>

(8000)

		(cm ² / g)	(k g / cm ²)
	3.15	3180	368
6000	3.01	6230	516
8000	2.95	8250	548

< 5>

		Coarse Medium Fine				
		2	0.5	0.25		
(mm)		2	0.5	0.25	0.074	0.005

(SEM)

1 4>



< 1>

(200)



< 2>

(200)



< 3>

(1,000)



< 4>

(1,000)

가

100μm(0.1mm)

가

J. K. Michel

$$N = \frac{D_{fissure}}{G_{max}} > 3$$

, N : (groutability)

Dfissure :



가
0.3mm
가
1/3

< 6 >				
(mm)	0.4	0.4	0.6	0.2
	0.4	0.6	0.8	0.2
	0.6	0.8	1.0	0.2
	0.1	0.2	0.2	0.05
	0.1	0.2	0.3	0.05
	0.2	0.3	0.3	0.05

8000cm²/g

0.01mm

0.03mm

Michel

가



가 1/2 2가

(0.4g)



1



< 8 >

7 10

가

1. APT



1m 5

1

가

2. APT



3. BOX



BOX

가

가

4.

가

가



0.1 0.3mm

가

가

가

가

가

가

가

가

가