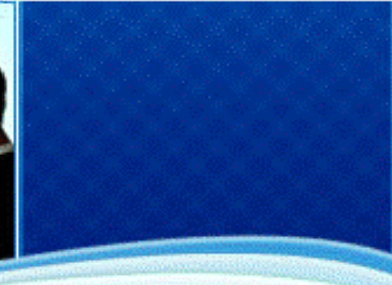


ESLIN[®]

E-Glass Fiber Insulation



Contents

1. Introduction

2. E-Glass Fiber

3. ESLIN[®]

4. Comparison of Material

5. Field Application

6. Workability & Improvement

7. Supply Reference

8. Strength

9. Patent List

1. Introduction

1-1. History

- Company specializing in industrial thermal insulation materials
Foundation corporate HITLIN SP (02. 2010)
- Manufacturer of E-glass fiber insulation & service provider for installation and inspection
Change company name to MOREENS CORPORATION (03. 2011)
- Brand : **ESLIN** as abbreviation of **E**nergy **S**aving **L**ayered **I**nsulation
- Patents : 17 patents registered as of 07. 2016
- Certified venture company (03. 2011)
- Certified quality management system(KIC) : ISO9001:2009 (05. 2011)
- Certified environmental management system(KIC) : ISO14001:2004 (05. 2011)
- Changed company name to ESLIN CORPORATION (08. 2014)

1-2. Capacity

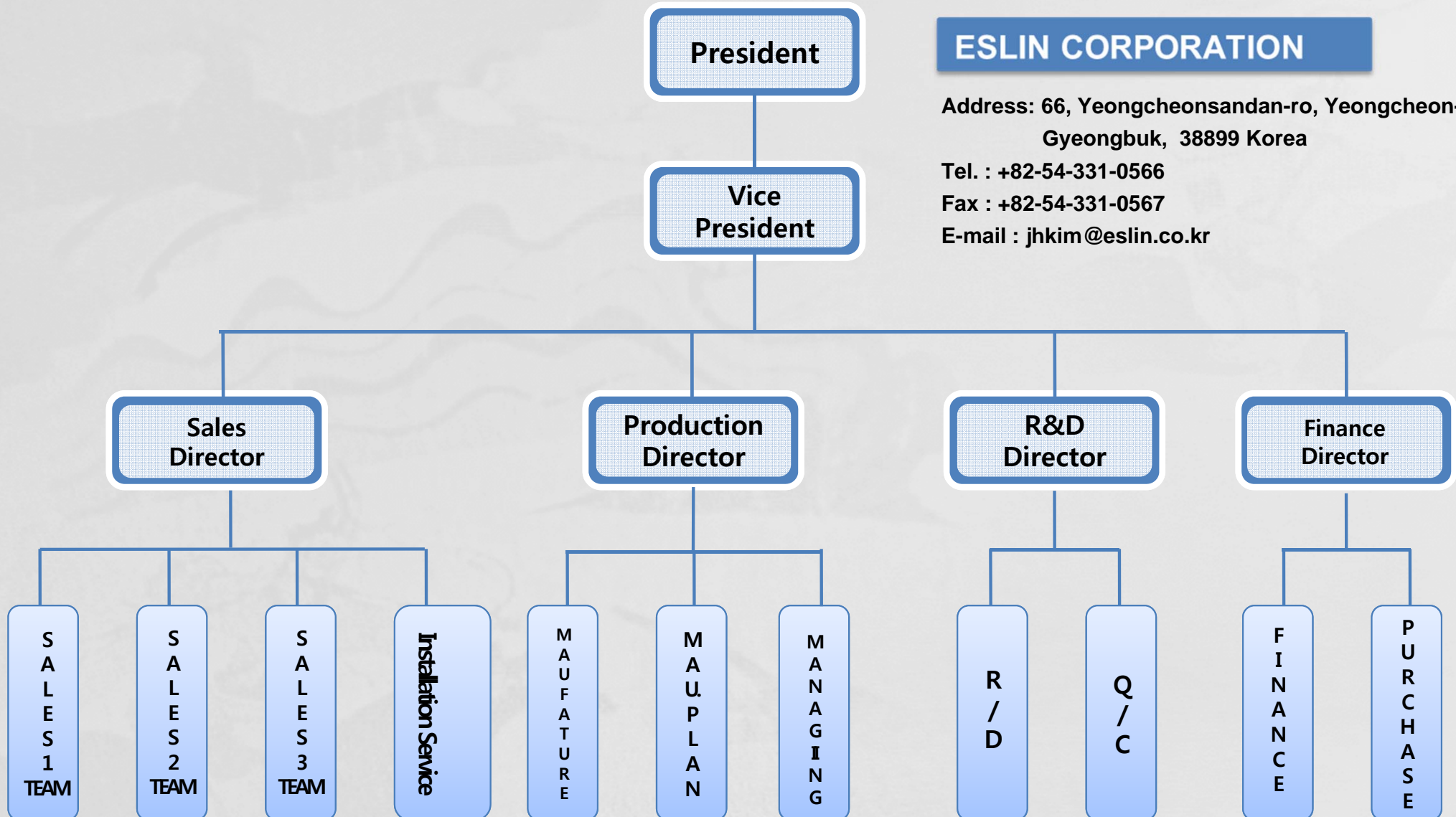
Product	Capacity (m ³ /day)
Pipe Cover	70
Board Cover	30
Total Capacity	100



▶ Head Office & Factory

1. Introduction

1-3. Organization Chart



2. E-GLASS Fiber

2-1. Characteristics of E-Glass Fiber

Properties	A Glass	C Glass	E Glass	S Glass
Melting Temperature(°C)	-	-	1140	-
Softening Point(°C)	720	-	846	970
Tensile Strength of Single Fiber (Kg/mm ²)	310	310	370	430
Tensile Strength of Strand (Kg/mm ²)	160-235	160-235	175-275	210-320
Young's Modulus (Kg/mm ²)	7400	7400	7700	8800
Density (g/cm ³)	2.46	2.46	2.53	2.45
Reflective Index	1.542	-	1.55	-
Coefficient of Linear	9	8	5	5
Thermal Expansion (1 X 10E-6 / °C)			6.11	
Volume Resistivity (Ωcm)	1.00E+11	-	1.00E+16	-

2. E-GLASS Fiber

2-2. Chemical Composition & Safety

Component	Composition (%)	Remarks	Class.	Carcinogen Valuation		Contents	Result
				Human	Animal		
SiO ₂	50~60	Main Component	I	O	O	Radon & derivative (human1, animal1 : asbestos has been appointed its section in advance.)	Sufficient evidence
Al ₂ O ₃	12~16						
CaO	15~25						
B ₂ O ₃	7.3	Secondary Component	II B	-	O	Glass Wool, Rock Wool, Ceramic Fiber	Limited evidence, But sufficient Evidence for animal
MgO	3.3						
Na ₂ O	1.7	Alkaline Component	III	-	-	Continuous filament glass fiber	Inadequate evidence
K ₂ O							
Fe ₂ O ₃							
F ₂							
			IV	-	-	N/A	Inadequate evidence

- ▶ Continuous E-Glass fiber made by melting process
- ▶ Completely non-combustible and unbreakable thermal insulation
- ▶ Resistant to acidic and alkaline, Stable at high temperature

- ▶ IARC (International Agency For Research Of Cancer) (Edition 2008.04)
America insulation industry society reported continuous filament glass fiber have inadequate evidence to cause cancer to human body.

2. E-Glass Fiber

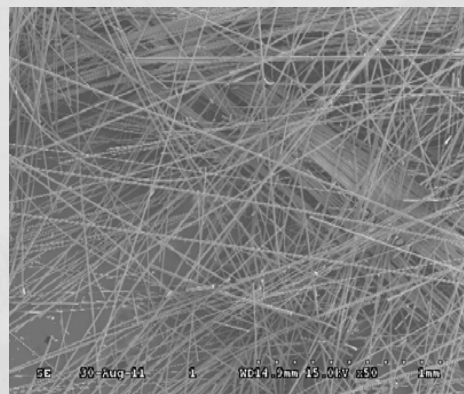
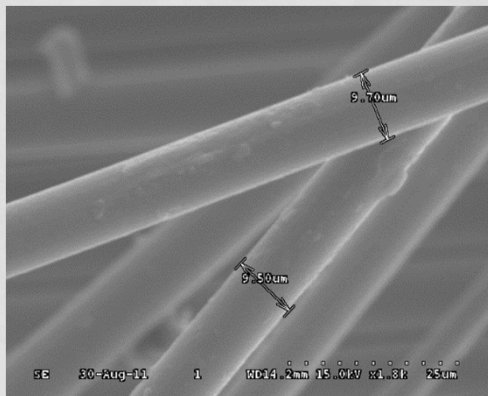
2-3. Type of E-Glass Fiber & E-Glass Needle Mat

► Type of E-Glass Fiber

Type	Diameter (μm)	Purpose of use	Cost
Yarn	9~ 11	Thermal Conductivity	High
Roving	13~ 16	Fiber Reinforcement	Middle, Low

► E-GLASS Needle Mat (Raw Material for ESLIN)

Layered thin card type slabs into glass fiber mat of 3 mm to 25 mm thick by needle punching.

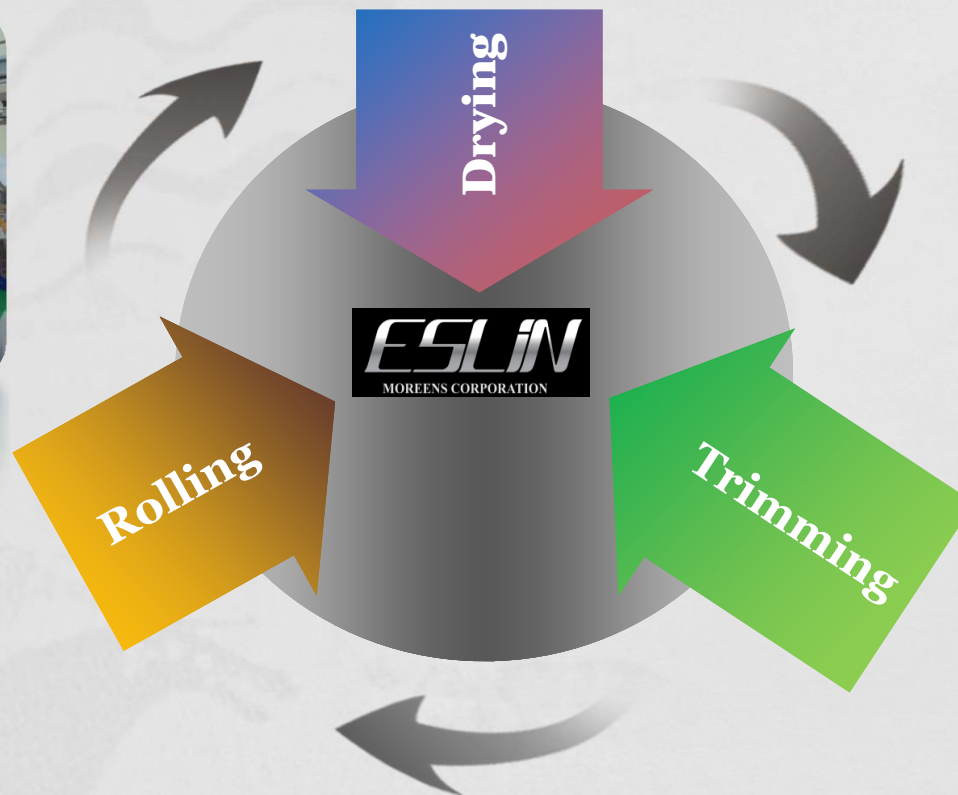


☆☆☆ ESLIN use 100% yarn for high thermal conductivity

3. ESLIN[®]

3-1. What is ESLIN ?

▶ **ESLIN (Energy Saving Layered Insulation)** is our company's brand name, which is made from E-Glass fiber mat by needle punching process. (Pipe Cover, Elbow Cover, Board & Felt)



3. ESLIN[®]

3-2. Physical Properties

No.	Description	Test Code	Spec	ESLIN E-Glass Fiber	
1	Thermal Conductivity	ASTM C518-10	Mean Temp. : 70°C ±5°C	0.03	Kcal/mh °C
2	Density(Pipe)	ASTM C303-10	200kg/m ³ ±10%	194	kg/m ³
	Density(Board)		180kg/m ³ ±10%	186	kg/m ³
	Density(Felt)		160kg/m ³ ±10%	162	kg/m ³
3	Hot shrinkage temperature	KS L 9102 : 2014	750°C or higher	862	°C
4	Linear Shrinkage	ASTM C356-10	2% or lower	0.32	%
5	Water Repellency	KS F 4714 : 2012	98% or higher	98.4	%
6	Material Component Analysis	ASTM C114-13	SiO ₂ : 50 ~ 60% Al ₂ O ₃ : 12 ~ 16%	SiO ₂	59.9 %
				Al ₂ O ₃	12.9 %
				CaO	21.0 %
				MgO	0.94 %
				TiO ₂	0.44 %
				Weight loss by heat	1.30 %

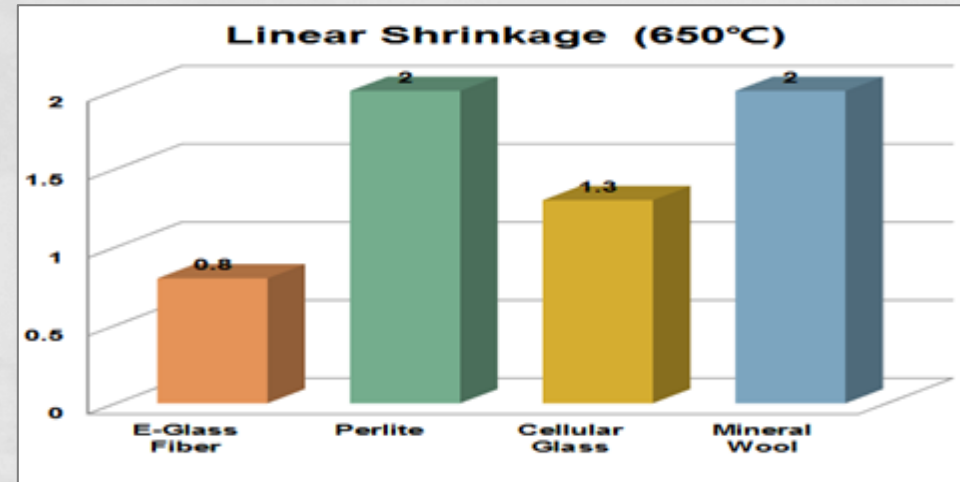
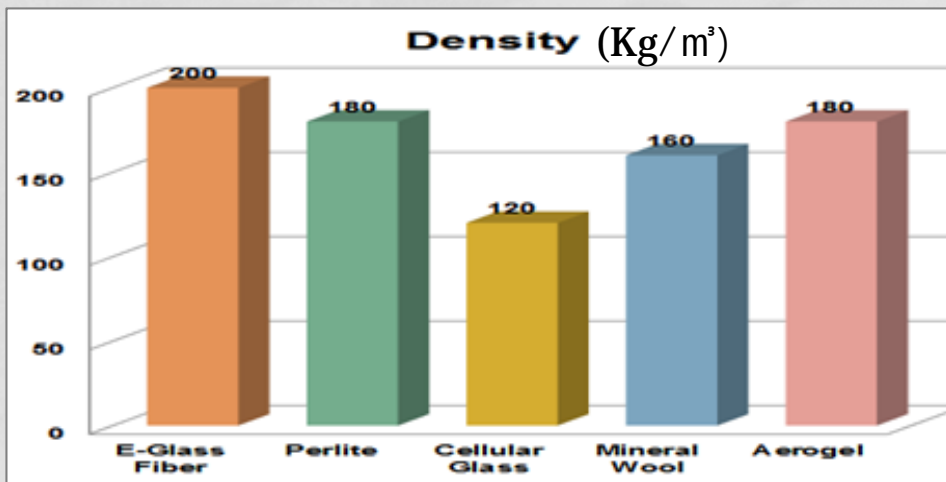
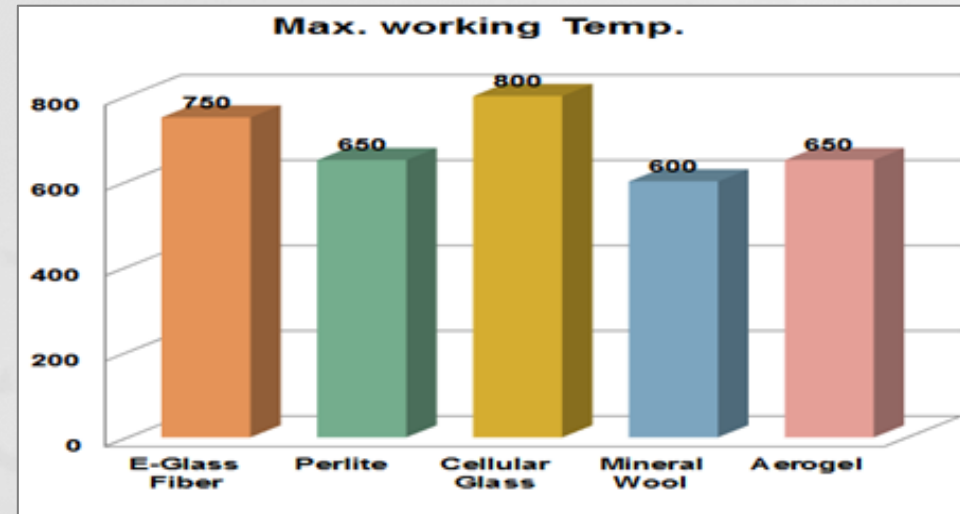
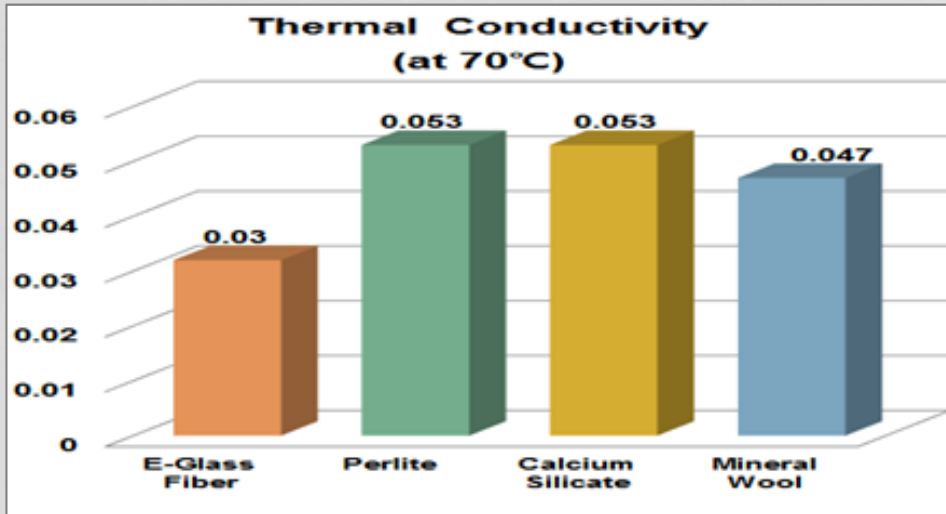
3-3. Products

Classification	Facing	Diameter	Length	Thickness
PIPE	EGA	0.5 ~ 44 inches	1 m	20 mm ~
Elbow		4 ~ 44 inches	N/A	20 mm ~
Board	EG	ROUND : 46 inches or larger	1 m x 1 m	20 mm ~
		FLAT		
Felt	-	-	10m/RL	25 mm

- ▶ EG : without typical facing (Non water-repellent)
- ▶ EGA : with typical facing (Al foil, Glass cloth)

4. Comparison of Material

4-1. Physical Properties



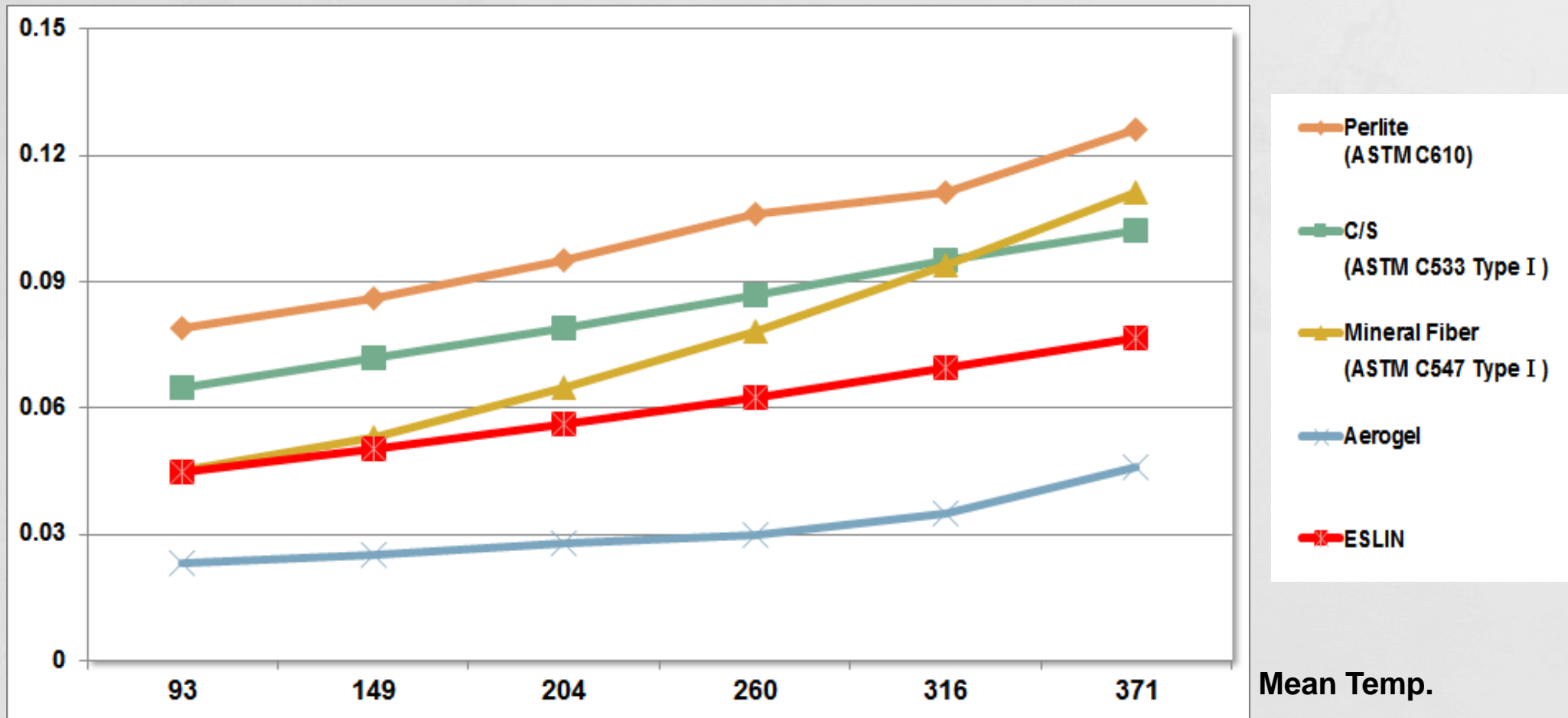
▶ Remark. Properties of other products can be slightly changed by manufacturing company.

4. Comparison of Material

4-2. Thermal Conductivity

W/m.k

Thermal Conductivity



▶ Remark. Properties of other products can be slightly changed by manufacturing company.

4. Comparison of Materials

4-3. Chlorides Content

- ▶ 50ppm or below for CUI(S.C.C , Pitting Corrosion) Prevention [API 571]
- ▶ Major Cause of CUI (Corrosion Under Insulation)
 - High Concentration of **Chlorides** and So2 in special environment(sea water, hot and humid)
 - Pipe Surface temperature of between 100°C and 121°C
 - **Chlorides to be contained in insulation material**

[단위 : ppm]

Component	Perlite	ESLIN	Calcium Silicate	비 고
Cl-	150	34.7	400	Site Record(H - Company)

[API 571 : Damage Mechanisms Affecting Fixed Equipment in the Refinery Industry]

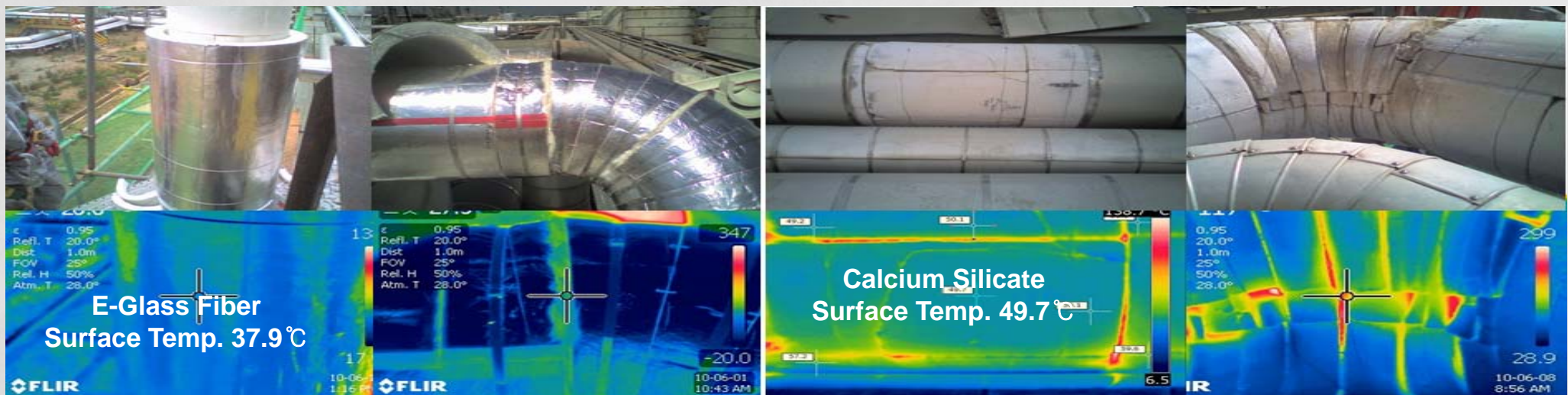
4. Comparison of Material

4-4. Thermal Efficiency (ESLIN vs Calcium Silicate)

- ▶ **Condition**
 - Steam Temp. : HPS 360 °C
 - Pipe Size : 14 Inch, Insulation Thickness : 100mm
- Ambient Temp. : 28°C
- Cost per kw : \$ 0.03432 /kw

	ESLIN a	Calcium Silicate b	Remarks a - b
Surface Temp. (°C)	37.9	49.7	- 11.8
Heat Loss (w/m.h)	178.42	458.46	- 280.0
Energy Cost (\$/m.yr)	55	141	- 86

▶ **Energy Saving : 280.0 Watt/m * 365 day/yr * 24 hrs/day * 0.001 * \$ 0.03432/kW·hr= \$ 95,673/yr-m**



4. Comparison of Material

4-5. Thermal Efficiency (Perlite vs ESLIN vs Aerogel)

▶ Test Procedure

- Term : 08.8.14 ~ 10.02 (49days)
49days after installation of Aerogel /
E-Glass Fiber / Perlite

- Pipe Spec. : 14" #525 HP STM Pipe
- Temp. measurement after 49days

▶ Test Result

- 1) Temp. as soon as installation of insulation.
Temp. of Aerogel is very high.

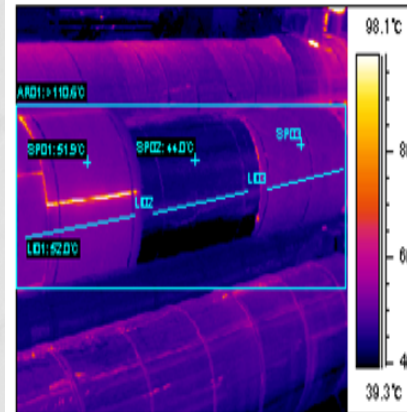
- 2) Temp. after 49days

Perlite(43.7) > Aerogel (39.8) > E-Glass Fiber(34.8)

Pipe Spec.	Material	Surface Temp.(°C)		Remark
		Installation That momentt	After 49days	
14" HS Pipe	Aerogel (40t)	48.5	39.8	All Surface Temp. is down because ambient temp. is down
	E-Glass Fiber (70t)	44.0	34.8	
	Perlite(125t)	43.3	43.7	

▶ Photograph and data

1. INFRARED IMAGE



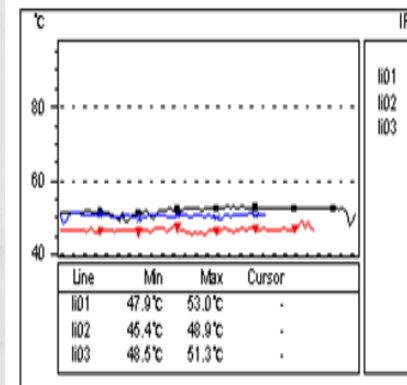
2. Digital camera Photo



3. Result table

Object	Value
Emissivity	0.89
Object distance	74,3 m
Relative	0.52
Label	Value
IR : max	>110,6°C
SP01	51,9°C
SP02	44,0°C
SP03	50,3°C
LI01 : max	53,0°C
LI02 : max	48,9°C
LI03 : max	51,3°C
AR01 : max	>110,6°C
AR01 : avg	48,3°C

4. PROFILE



5. Description

1. 검사일자 : 2008.08.18

2. Line Max Temperature :

SP 01 : Perlite 53.0°C

SP 02 : E-Glass Fiber :48.9°C

SP 03 : Aerogel :51.3°C

4. Comparison of Material

4-6. Installation Cost and Material Cost

Cost		Perlite	E-Glass Fiber (ESLIN)	Aerogel	
Material Cost	HP Steam 8"	(125T) 85~95%	(70T) 100%	(40T) 180 ~ 240 %	
Installation Cost	Installation Cost		<ul style="list-style-type: none"> High cost because of handling of many Pieces High cost of many cutting on site 	<ul style="list-style-type: none"> Low cost by providing pre-formed fittings on site Supply of standard size & shape of pipes & elbows to site 	<ul style="list-style-type: none"> Hard work and high cost of backstitch installation on site High dust in installation of multi-layers.
	Installation ability (0.5" ~ 44")	Piping	<ul style="list-style-type: none"> Large number of pieces by size. 	<ul style="list-style-type: none"> Supply in half pipe sections of 1 m long for all sizes. 	<ul style="list-style-type: none"> Many workers needed for backstitch installation by pipe size(refer to next page) Hard work for tapping screw because of thin thickness (Ex. electric tracing line) Additional fittings neede because of thin thickness(Support Cover, Angle Cover etc.) Additional binder needed because of Non Pre-formed material.(space between 150 and 200mm)
		Fitting	<ul style="list-style-type: none"> Skilled worker needed 	<ul style="list-style-type: none"> Supply pre-formed products, No skilled worker needed 	<ul style="list-style-type: none"> Backstitch installation needed. Very hard work for small pipe line
		Dust	<ul style="list-style-type: none"> High (cleaning work needed) 	<ul style="list-style-type: none"> Low (easy multi-works) 	<ul style="list-style-type: none"> High Dust (multi-works difficult)
		Layer	<ul style="list-style-type: none"> 1 or 2 Layers 	<ul style="list-style-type: none"> 1 or 2 Layers 	<ul style="list-style-type: none"> Low thickness mats(5mm or 10mm) requires hard & long time installation work for multi layering.

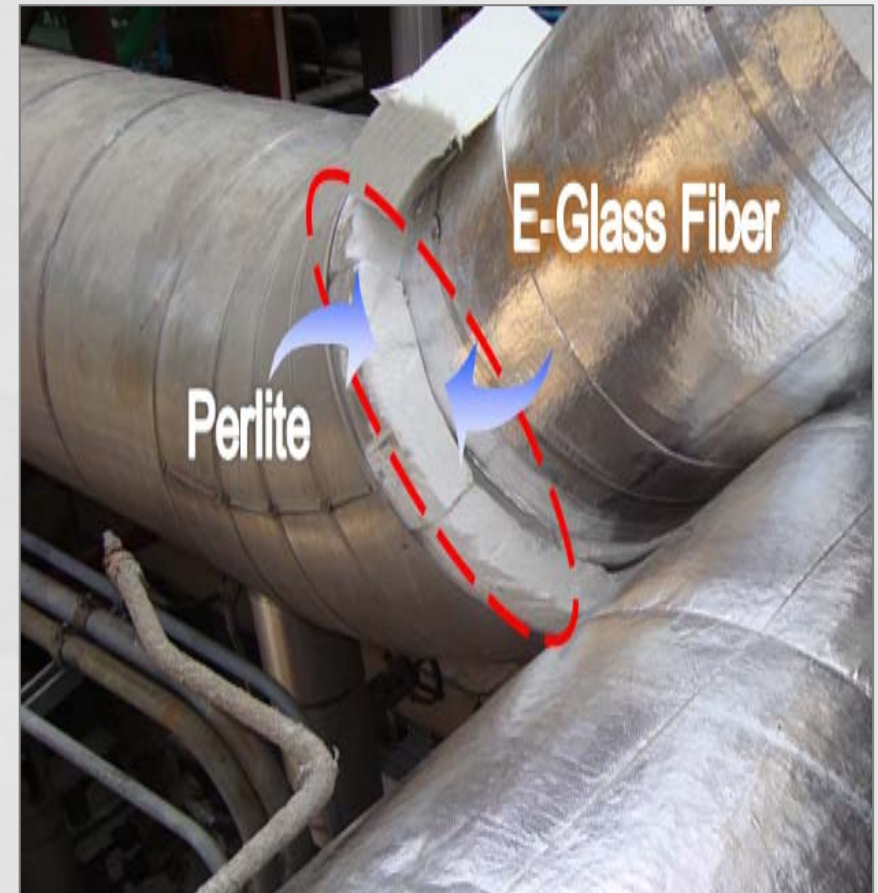
4. Comparison of Material

4-6-1. Example of installation

▶ Thin thickness



- ▶ Installation of many pipe racks
- ▶ Reduction in insulation weight



- ▶ Save working time
- ▶ Make better use of a space
- ▶ Safety without high place work

4. Comparison of Material

4-6-2. Example of installation

Work	Perlite	ESLIN (E-Glass Fiber)	Aerogel
Pipe			
			

Good Point of ESLIN

- ▶ Easy multiple works without working dust
- ▶ No damage to steam tracing line
- ▶ 1 m pipe insulation in 2 half pipes

4. Comparison of Material

4-6-3. Example of installation

Work	Perlite	ESLIN (E-Glass Fiber)	Aerogel
Elbow			

Good Point of ESLIN

- ▶ Elbow Cover (4" ~ 44") : Pre-fabricated insulations in our factory → No skilled worker needed

4-6-4. Waste Management

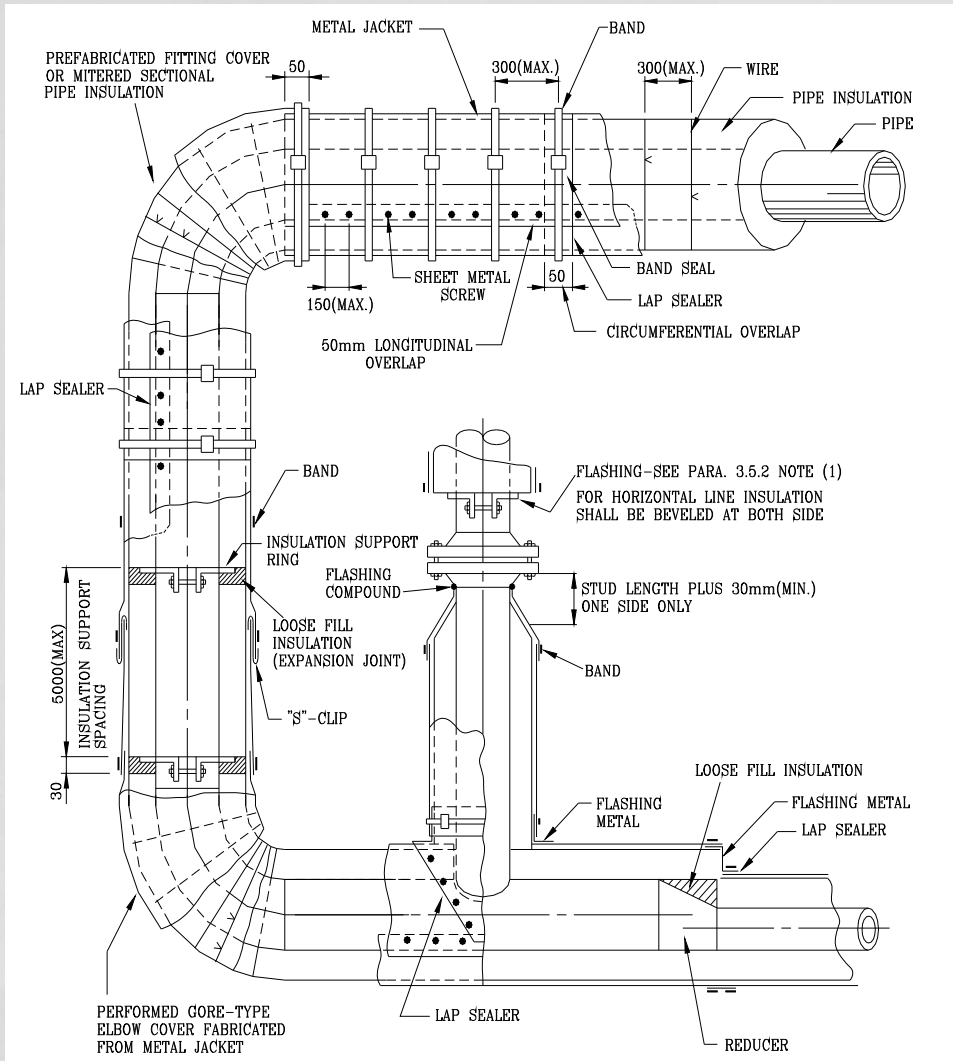


- ▶ Materials recyclable & Low Maintenance Cost
- ▶ A Great of deal of waste (EX. Perlite)

5. Field Application

5-1. Pipe & Elbow

Specifications



▶ Exhaust Gas Pipe, Elbow Cover (72")



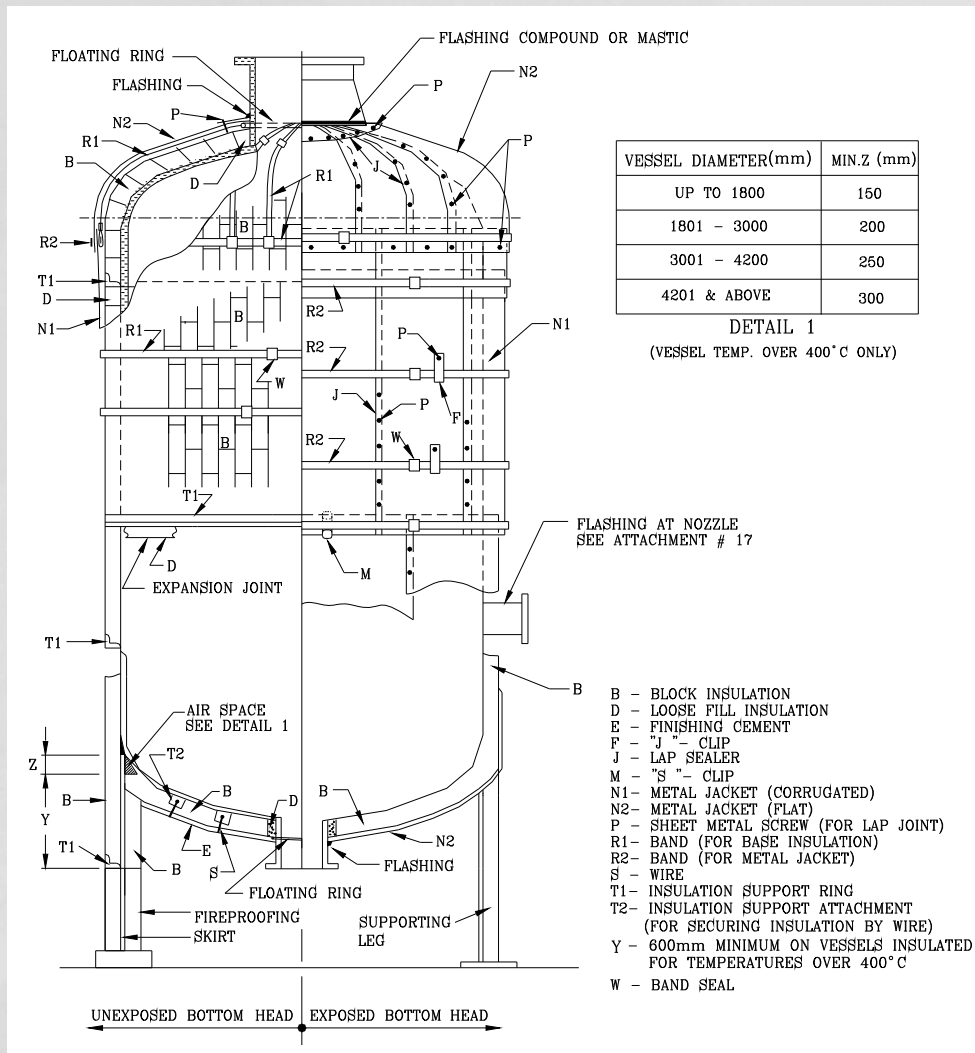
▶ Pipe Cover, Elbow Cover (4" ~ 44", Variable Layers)

▶ Supply pre-fabricated insulation, Accurate Cutting at factory-> Good installation ability and thermal efficiency

5. Field Application

5-2. Equipment Board (46" ~)

Specification

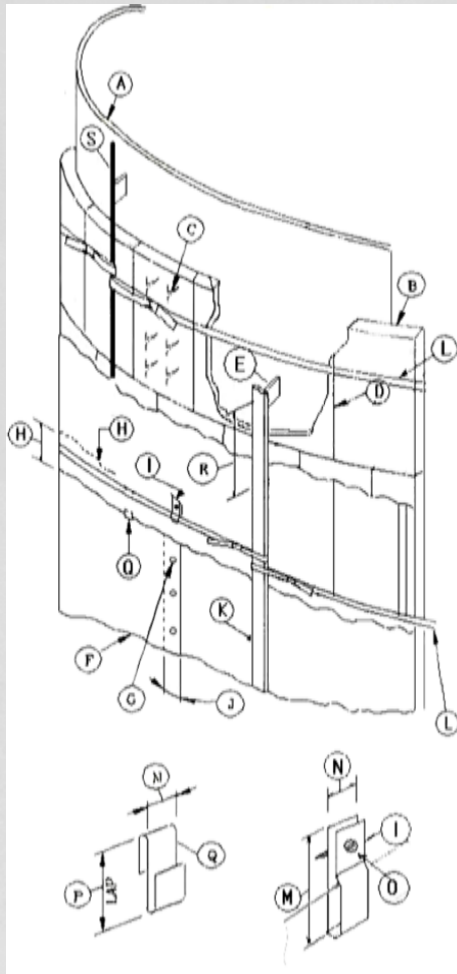


- ▶ Supply R-Board type, Minimizing of safety accident
- ▶ Horizontal Work for work efficiency and quality increase (Reduction of scaffolding cost 30~ 40%)
- ▶ Reduction of installation cost by 30% and lifting equipment using cost.

5. Field Application

5-3. Storage Tank

Specifications



- A: Tank Shell
- B: Insulation
- C: Insulation anchor pins 305mm (12") on center
- D: Stagger vertical insulation joints and butt tightly
- E: Insulation Jacket Support
- F: Corrugated jacket sheet
- G: 4mm x 16mm stainless steel sheet metal screws. 150mm(6") centers (maximum), at every vertical lap.
- H: 75mm(3") circumferential lap
- I: Band loop, space: approximately 2500mm
- J: Vertical lap (100mm)
- K: 6.4 mm (1/4") x 38mm(1-1/2") lay bar 3.6m (12'-0") long(maximum) Type 304 stainless steel. Use only on tanks above 6m (20'-0")

Tank Diameter	Number of Bars	Circumferential Spacing
8 to 12m (20 to 40')	3	120°C
12 to 18m (40' to 60')	4	90°C
18 to 24m (60' to 80')	6	60°C
24 to 30m (80' to 100')	8	45°C
30m (100' and over)	Space Approximately	Every 12m (40')

- L: Stainless steel straps and seals installed at every circumferential seam of metal jacket and insulation and not over 810mm (24") on center. When hard block is used or when temperatures exceed 204 °C, use expander type springs.
- M: Band loop (50mm)
- N: 19mm wide x 0.5mm thickness
- O: stainless steel screw
- P: S Clip (75mm)
- Q: "S" clips (see detail) space approximately 450mm (18") apart-minimum of 2 per sheet Use 19mm x 0.5 mm strapping.
- R: 300mm (12") centers. By equipment vendor
- S: Insulation rod bar 3.6m (12'-0") long(maximum) carbon steel. Use only on tanks above 3.6m diameter. Insulation rod bar shall be installed as followed.

Tank Diameter	Number of Bars	Circumferential Spacing
3.6 to 8m	2	180°C
9 to 18m	3	120°C
17 to 32m	Space Approximately	every 24m



6. Workability & Improvement

6-1. Layout



- ▶ Application of Conveyor Belt System

6-2. Rolling (Pipe Cover)



- ▶ Rolling M.C & Jig, Removal type and all-in-on design
- ▶ Final auto inspection, Thickness deviation down($\pm 2\%$)

6-3. Binder



- ▶ Auto-measuring M/C. for homogenization
- ▶ RO M/C. for removal of chloride ion(Cl-) from water

6-4. Layering (Board)



- ▶ F-Board : Automation
- ▶ R-Board : Uniform size to apply same method of pipe cover production.

6. Workability & Improvement

6-5. Trimming



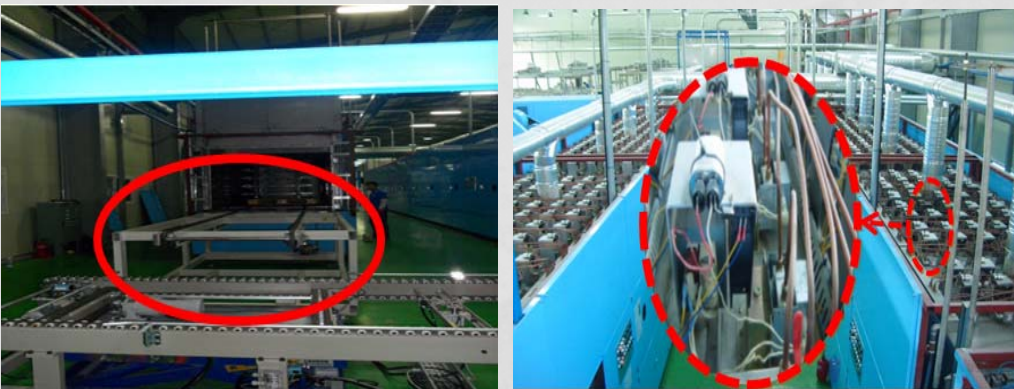
- ▶ ALGC , Center , Side Cutting One System
- ▶ Auto JIG Type and One Center Cutting System for prevention of longitudinal gap

6-6. Packing



- ▶ Auto Packing System for minimizing damage of product

6-7. Drying



Type	Magnetron			Capa. (m ³)	Remark
	Power Con.(kw)	Cooling type	replacement(hr)		
Previous	600	Air	5,000	100	Inc. heated air dryer
Now	900 X 2	Water	17,520	100	

7. Supply References

7-1. Power Plants

No.	Owner	Project Name	Supply Term
1	Korea Water Resource Co.	Gwangju water supply	02. 2012
2	Korea Western Power	Taeon Power Plant Maintenance	03. 2012
3	Gwangyang Iron Co.	Maintenance	03. 2012
4	Doosan Heavy Ind.	Vietnam Power Plant Boiler	05. 2012
5	Inteco	Song-do combined cogeneration Steam Turbine	07. 2012
6	Korea Midland Power	Gas Turbine	08. 2012
7	Korea Western Power	West Incheon Power Main Steam Line	03. 2013
8	GS Power	Bucheon combined cogeneration(GS Neotech)	12. 2012
9	Kor. East-West Power	Ulsan thermal power Steam Boiler	11. 2012
10	Hanjin Heavy Ind.	Byeollae Group Energy Insulation	01.2013
11	Korea Midland Power	Sejong Combined cogeneration HRSG, Gas Turbine	02.2013
12	Korea Western Power	Pyeongta 2nd Power Plant(MHIK_Insultech)	03. 2013
13	Kor. South-East Power	Yeongheung thermal power 5th	04. 2013
14	Kor. South-East Power	Ulsan combined thermal power 4th	05. 2013
15	Korea Western Power	Taeon Power dev. Head office 8 th Turbine	05. 2013
16	Korea Western Power	Taeon Power dev. Head office 5 th ,6 th Turbine	2013. 05

7. Supply References

7-1. Power Plants

No.	Owner	Project Name	Supply Term
17	Kor. South-East Power	Yeosu #2 CFB Boiler	06. 2013
18	Korea Western Power	Pyeongta 2nd Power Plant	06. 2013
19	Daeryun Power	Yangj Group Energy	08.2013
20	Kor. District Heating Co.	Sejong-si District Heating(GS Neotech)	08. 2013
21	Daegu Green Power	Daegu Innovation City District Heating	05. 2014
22	Pocheon Power	Pocheon Combined Thermal Power	04. 2014
23	POSCO Eng&Con.	Ansan Combined Thermal Power	09. 2014
24	Korea Western Power	Taeon IGCC (Doosan Heavy Ind.)	09. 2014
25	Dongducheon Dream Power	Dongducheon Thermal Power	05. 2014
26	POSCO Energy	West Incheon POSCO Energy #7,8,9 (GS Neotech)	11. 2014
27	Kor. East-West Power	Dangjin Thermal Power #9	07. 2014
28	GS EPS	Dangjin BioMess	02. 2015
29	Kor. District Heating Co.	Seoul Sangam Distrct Heating	03. 2015
30	Doosan Eng.&Con.	Hanam CHP HRSG	03. 2015
31	GS Donghe Power	Bugpyeong Thermal Power	07. 2015
32	Korea Midland Power	Wonju RDF Cogeneration Power	02. 2015
33	GS Neotech	Gwangju group Energy	07. 2015
34	Doosan heavy Ind.	Saemangeum Group Energy	10. 2015
35	Sedae Energy Tech	Osan HRSG PJT	06. 2015
36	Kumho Petrochemical Co.	Yeosu Kumho CHP-S1 PJT	06. 2015

7. Supply References

7-2. Petrochemical Plant

No.	Owner	Project Name	Supply Term
1	SK Eng.&Con.	H-Project (UCO) Insulation	12. 2010
2	Tae Kwang Ind.(Ulsan)	Maintenance	01. 2012
3	Hyundai Heavy Ind.	Main Column Insulation	04. 2012
4	Hyundai Oil Bank(Daesan)	#2 BTX PJT	06. 2012
5	LG Chem.(Yeosu)	4A PJT	08. 2012
6	Kumho P&B(Yeosu)	BPA PJT	09. 2012
7	LG Chem.(Daesan)	BPA PJT	10. 2012
8	ISU Chm.(Ulsan)	Maintenance	09. 2012
9	GS Eng.&Con.	Ulsan Steam Highway	09. 2012
10	KP Chem.(Ulsan)	Factory No.1 PTA/PIA	10. 2012
11	Hyosung(Ulsan)	Yongyeon Factory NO. 1,2 STEAM LINE	1. 2013
12	LG Chem.(Yeosu)	NPG / MMA / NCC/ VCM / C/A EDC	1. 2013
13	SK GAS	Ulsan P D H	12. 2015
14	Kumho Petro. Co. (Yeosu)	Kumho Petro. No.2 Energy Steam Line	03. 2013
15	Hanwha Che.(Yeosu)	Hanwha ORANGE PJT	03. 2013
16	Kumho Polychem.(Yeosu)	Kumho YEP IV PJT	03. 2013
17	Daelim Indu.	Yeosu HDPE Factory	04. 2013

7. Supply References

7-2. Petrochemical Plants

No.	Owner	Project Name	Supply Term
18	Kumho Polychem.(Yeosu)	Kumho Polychem. MVR PJT	05. 2013
19	LG Chem.(Yeosu)	SM PJT	06. 2013
20	LG Chem.(Daesan)	EVA, SSBR, PFO, BRU PJT	09. 2013
21	Hyundai Oil Bank(Daesan)	Maintenance	Long term contract
22	Hyundai Oil Bank(Daesan)	Sukwhasa Steam Line	01. 2014
23	Hyundai Engineering(Daesan)	LBO PJT	06. 2014
24	Hyosung	DH-2 PJT	12. 2014
25	GS Caltex	Maintenance	Long term contract

7. Supply References

7-3. Overseas

No.	Owner & Project Name	Contry	Supply Term
1	Silverline Insulation	U.S.A	02. 2012
2	Tesoro Salt Lake City Refinery	U.S.A	02. 2012
3	Huntington Ingalls Industries	U.S.A	03. 2012
4	Nu-West Construction Products	U.S.A	03. 2012
5	Penn State	U.S.A	03. 2012
6	VII	U.S.A	04. 2012
7	NewGen Products,LLC	U.S.A	06. 2012
8	Versitech, Inc.	U.S.A	09. 2012
9	Crescent Dunes Solar	U.S.A	10. 2012
10	Portland General Electric	U.S.A	10. 2012
11	Alstom Power Inc.	U.S.A	12. 2012
12	Insultec	U.S.A	02. 2013

8. Strength

8-1. Our strength

Good Point	Effect
Quality	High efficient insulation and good durability
	Easily control of thickness and low heat loss
	Prevention of heat loss from breaking and deflection of Insulation
On Site	Easy multi-work without working dust
	Easier installation & no skilled worker needed
	Short installation time
Safety	Easy horizontal work & high place work reduced
	Supply of pre-fabricated fittings & 2-piece pipes makes work fast and simple
Economic Feasibility	Thin thickness and low weight
	Supply of full dress-up cover saves installation cost
	Bump factor 3% max.
	Recyclable material.
	Less waste disposal produced

9. Patent List

9-1. Patent List

No.	Date of application	Date of registration	Application No.	Titles
1	2011.10.17	2013.01.02	1020110105650	MANUFACTURING DEVICE OF MAT TYPE GLASS FIBER ADIABATIC MATERIALS
2	2011.07.27	2013.01.22	1020110074366	CUTTING APPARATUS FOR GLASS FIBER ADIABATIC PIPE MANUFACTURING DEVICE
3	2011.03.22	2011.08.24	1020110025184	WATER REPELLENT HEAT INSULATING MATERIALS BY E-GLASS FIBER AND ITS MANUFACTURING METHOD
4	2011.11.23	2013.12.17	1020110122856	MANUFACTURING METHOD OF WATER REPELLENCY BINDER FOR GLASS FIBER HEAT INSULATING MATERIALS FORMING
5	2011.12.23	2013.11.20	1020110141149	MANUFACTURING METHOD OF FLAME RETARDANCY BINDER FOR GLASS FIBER HEAT INSULATING MATERIALS FORMING
6	2011.11.01	2013.08.05	1020110112798	MANUFACTURING METHOD OF BINDER FOR GLASS FIBER HEAT INSULATING MATERIALS FORMING
7	2011.08.09	2013.06.26	1020110079308	GLASS FIBER INSULATING MATERIAL OF CURVED SURFACE TYPE AND ITS MANUFACTURING METHOD
8	2011.09.01	2013.06.03	1020110088409	CUTTING DEVICE OF GLASS FIBER ADIABATIC PIPE
9	2011.08.24	2013.04.29	1020110084290	FORM SEPARATOR OF GLASS FIBER ADIABATIC PIPE MANUFACTURING DEVICE
10	2011.03.22	2011.12.23	1020110025185	MANUFACTURING METHOD OF FIREPROOF BINDER FOR E-GLASS FIBER HEAT INSULATING MATERIALS FORMING
11	2012.04.03	2013.11.05	1020120034303	MANUFACTURING METHOD OF FIREPROOF BINDER WITH LOW CHLORIDE FOR E-GLASS FIBER HEAT INSULATING MATERIALS FORMING
12	2012.03.12	2014.05.21	1020120024840	WATER REPELLENT E-GLASS FIBER HEAT INSULATING MATERIALS AND ITS MANUFACTURING METHOD
13	2012.07.03	2014.06.20	1020120072367	INSULATING REFRACTORY MATERIALS MANUFACTURING METHOD FOR FIRE DOOR
14	2013.12.05	2015.03.18	1020130066464	CONNECTING OF E-GLASS FIBER MAT AND BINDER SPREADING APPARATUS THEREOF
15	2013.06.11	2015.03.18	1020130150363	IMPREGNATION DEVICE OF WATER REPELLENT SOLUTION FOR GLASS FIBER MAT HAVING WATER REPELLENCY
16	2013.11.28	2015.04.23	1020130146272	MANUFACTURING METHOD OF WATER-RAPELLENT SOLUTION FOR FIBROUS HEAT INSULATOR
17	2014.10.11	2015.04.01	201420587292.9	INSULATOR (registered in China)

Petroleum Refinery

- CDU, FCC, SRU, HOU



Petroleum Chemistry

- NCC, BTX, BPA



Power Plant

- Boiler, Turbine, Heat Storage Tank



Shipbuilding Offshore Plant

- Exhaust Gas pipe
- A-60, Sound, Thermal
- COPT