JC CORPORATION

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01. Status of Company

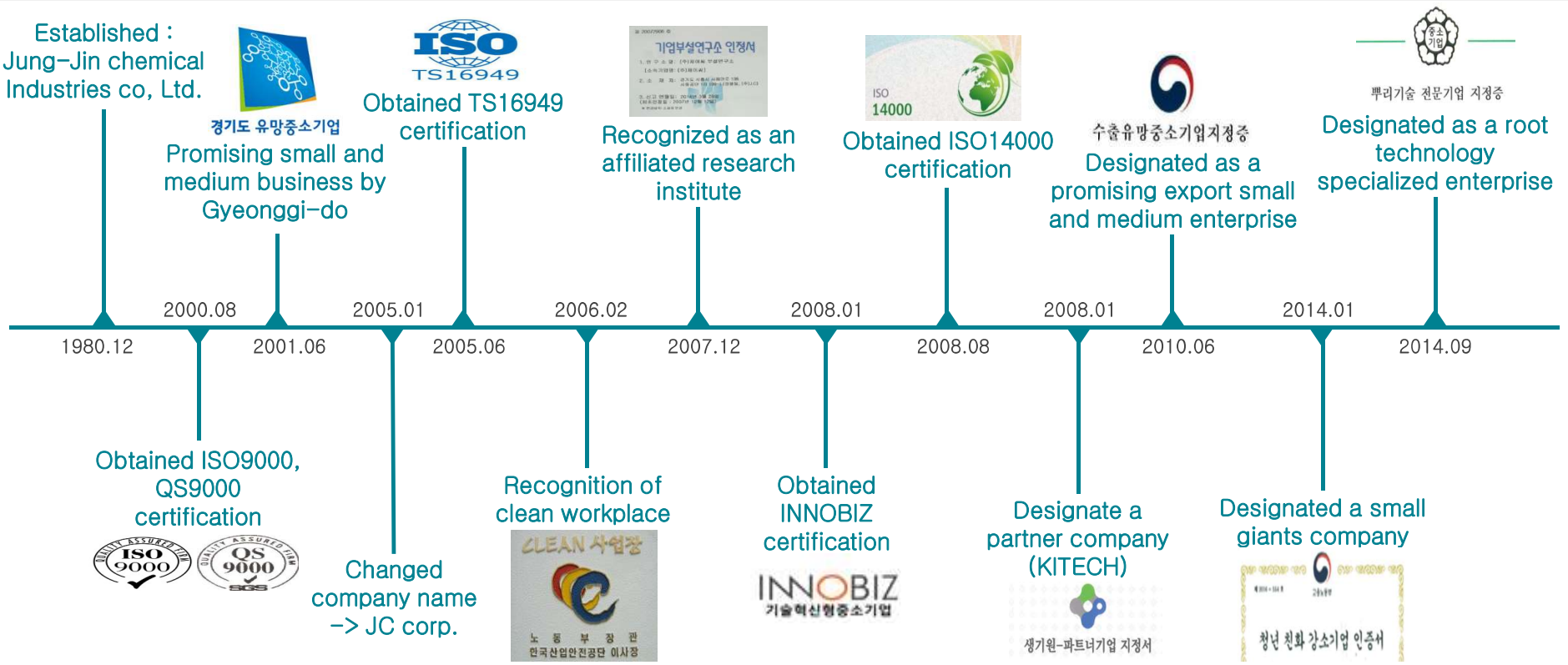
Status of Company
Product Introduction
Technic Data
Manu-facture Process
Product Intro-duction

1. Overview

Established	Dec. 10, 1980
Head office / Factory	136, Seohaean-ro, Siheung City, Gyeonggi-do, Republic of Korea
Major products	Aluminum Flux, Aluminum Paste, Poly Ferric Sulfate (Wastewater treatment)
Customer	Hanon System, Erae Automotive co, Ltd, Doowon co, Ltd, KB Auto Tech
Intellectual Property	Patent (Registration 21), Trademark registration 2, Service registration 1
Status of Company	Employee : 20

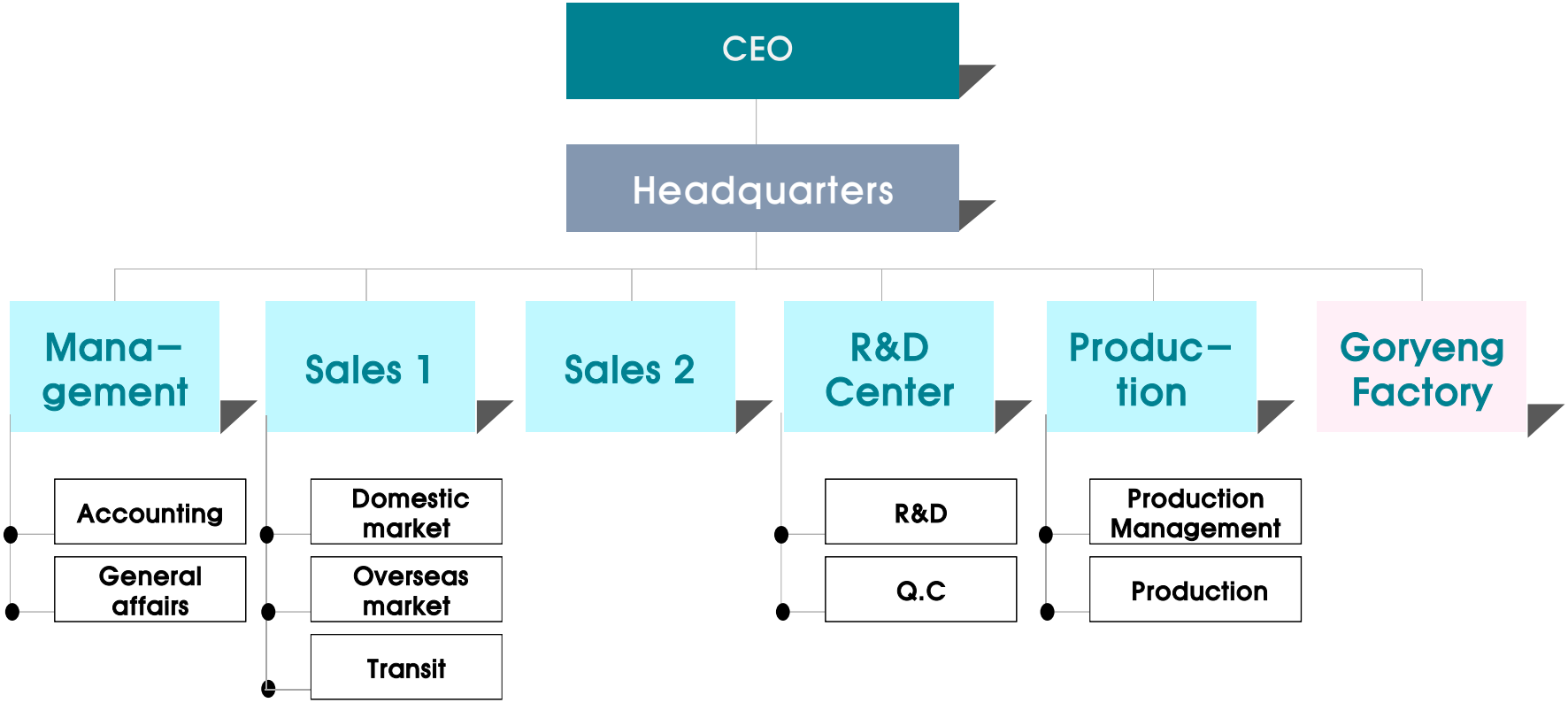
01. Status of Company

2. History



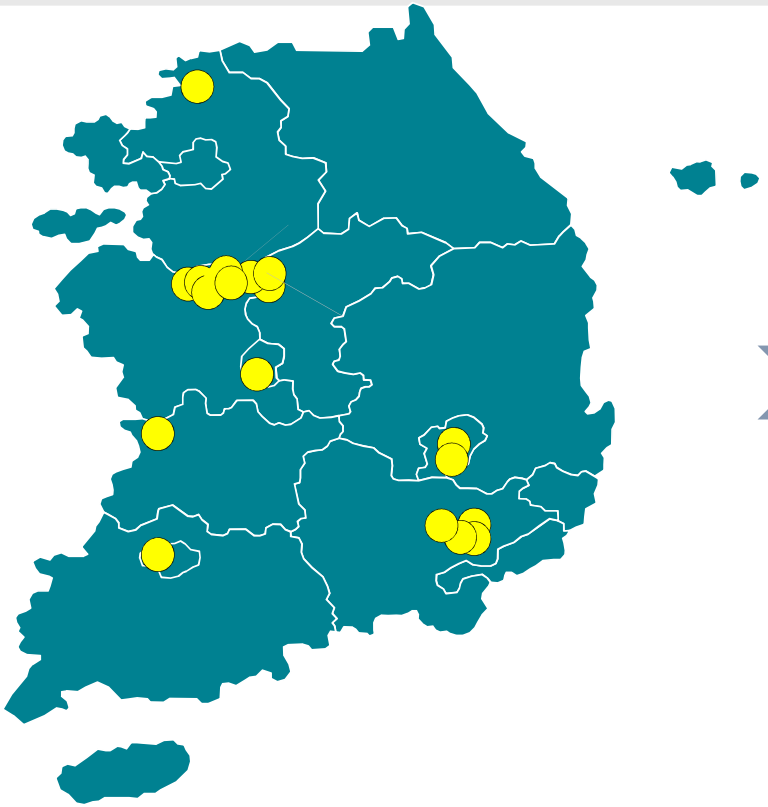
01. Status of Company

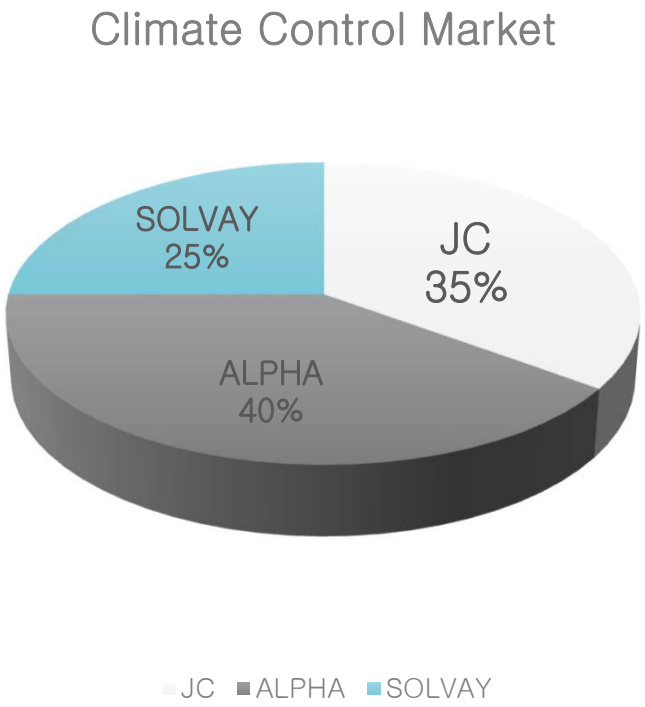
3. Organization chart



01. Status of Company

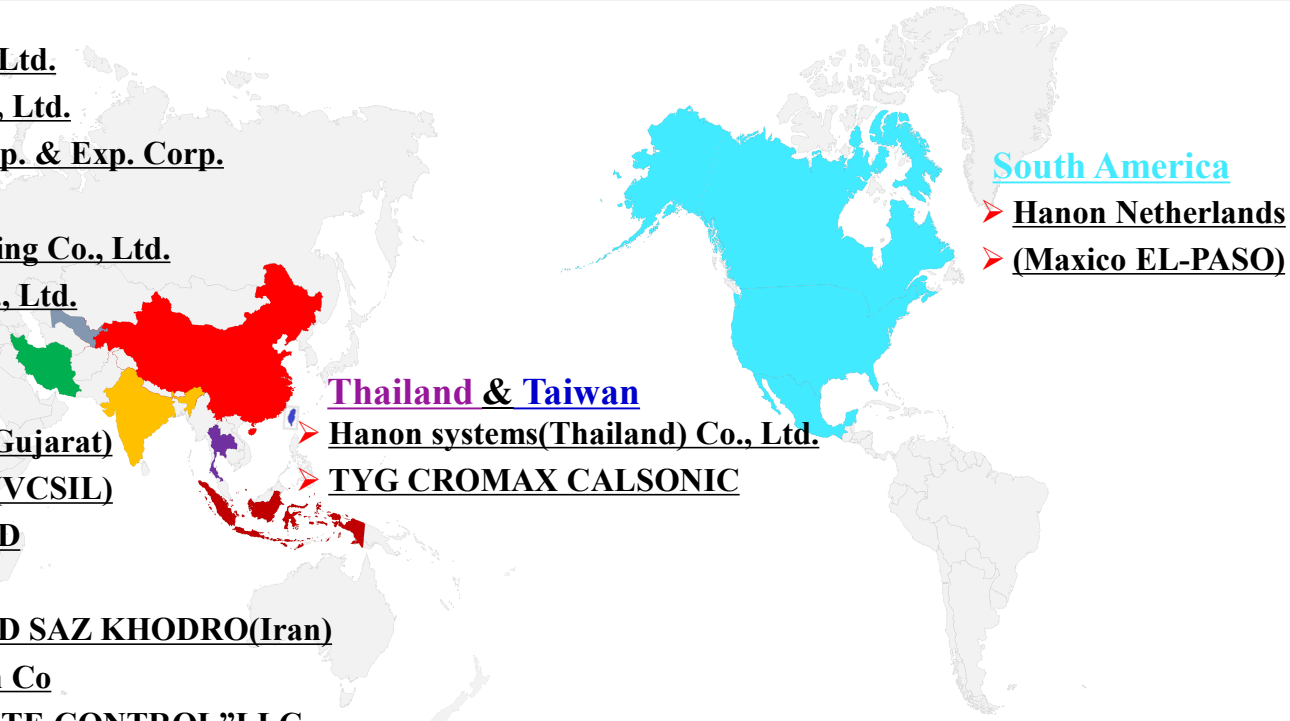
4. Domestic market





01. Status of Company

5. Overseas market



China

- Air International Chongqing Co., Ltd.
- Qing Dao Toyo Auto Radiator Co., Ltd.
- China First Automobile Group Imp. & Exp. Corp.
- Faw-Zexcel Co., Ltd.
- Tianjin Sanden Auto Airconditioning Co., Ltd.
- Tianjin Denso Airconditioning Co., Ltd.

India & Indonesia

- Koyo Jaya Indonesia
- Hanon Automotive India(VASI), (Gujarat)
- Hanon Climate System India Ltd.(VCSIL)
- Modine Thermal Systems PVT.LTD

Iran & Uzbekistan

- Kooshesh Radiator Iran Co / SARD SAZ KHODRO(Iran)
- Valeo Armco(Iran) / Radiator Iran Co
- O'ZERAE JV"O'ZERAE CLIMATE CONTROL"LLC (Uzbekistan)

Thailand & Taiwan

- Hanon systems(Thailand) Co., Ltd.
- TYG CROMAX CALSONIC

South America

- Hanon Netherlands
- (Maxico EL-PASO)

02. Product Introduction

1. Al- Flux

1) characteristic

Flux Type	Non-corrosive and non-hygroscopic fluoride Al-Flux
Appearance	Fine White Powder
Component	Mixture of Potassium Aluminum Fluoride ($KAlF_4$ + $K_2AlF_5 \cdot H_2O$)
State of aqueous phase	Slurry state
Reactivity with moisture and aluminum	Not responding
Residual corrosion after Brazing	None
Post-treatment process after Brazing	Not needed
Fine coating after Brazing	① Hydrophilic and lipophilic ② Excellent corrosion resistance and durability ③ Not hydrolyzed

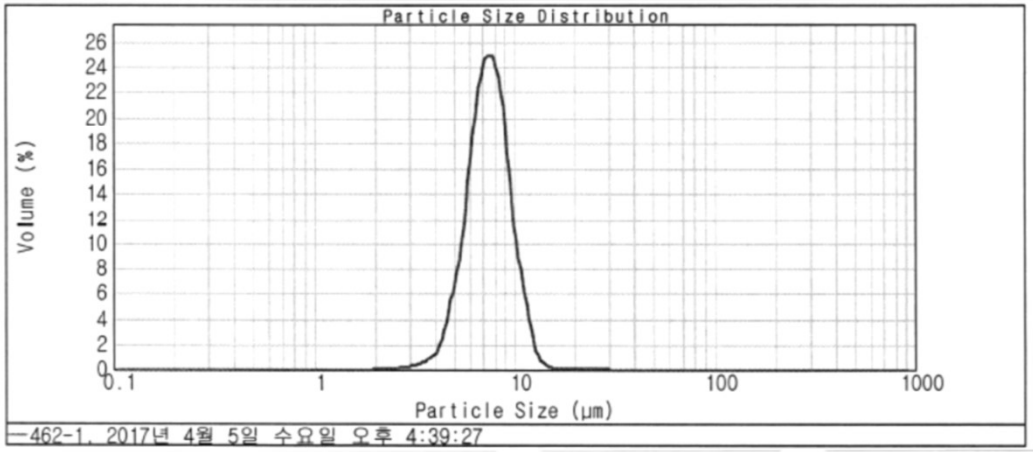
02. Product Introduction

1. Al- Flux

2) Particle size distribution

Size (μm)	Volume In %
0.010	0.00
0.011	0.00
0.013	0.00
0.015	0.00
0.017	0.00
0.020	0.00
0.023	0.00
0.026	0.00
0.030	0.00
0.035	0.00
0.040	0.00
0.046	0.00
0.052	0.00
0.060	0.00
0.069	0.00
0.079	0.00
0.091	0.00
0.105	0.00

구 분	< 10 [%]	< 50 [%]	< 90 [%]
Size [㎛]	5.40	7.46	10.0

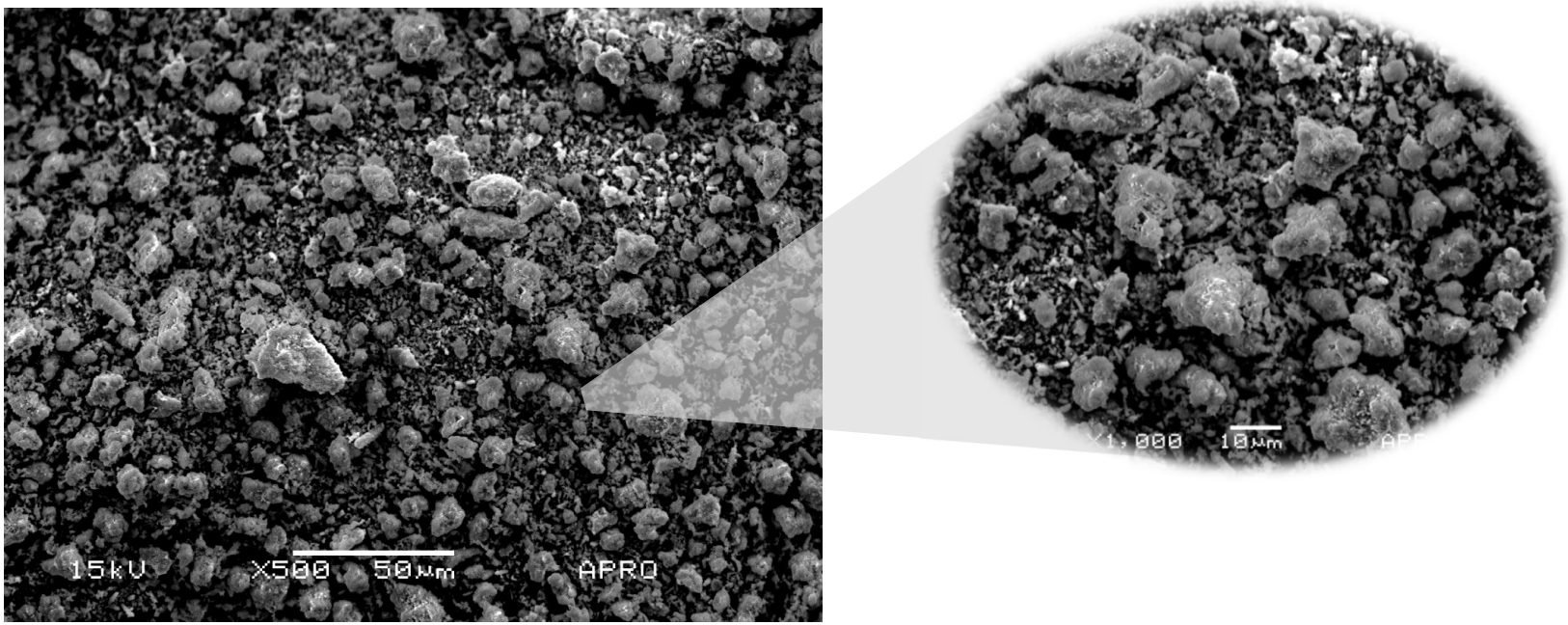


Size (μm)	Volume In %
1258.925	0.00
1445.440	0.00
1659.587	0.00
1905.461	0.00
2187.762	0.00
2511.886	0.00
2884.032	0.00
3311.311	0.00
3801.894	0.00
4365.158	0.00
5011.872	0.00
5754.399	0.00
6606.934	0.00
7585.776	0.00
8709.636	0.00
10000.000	

02. Product Introduction

1. Al- Flux

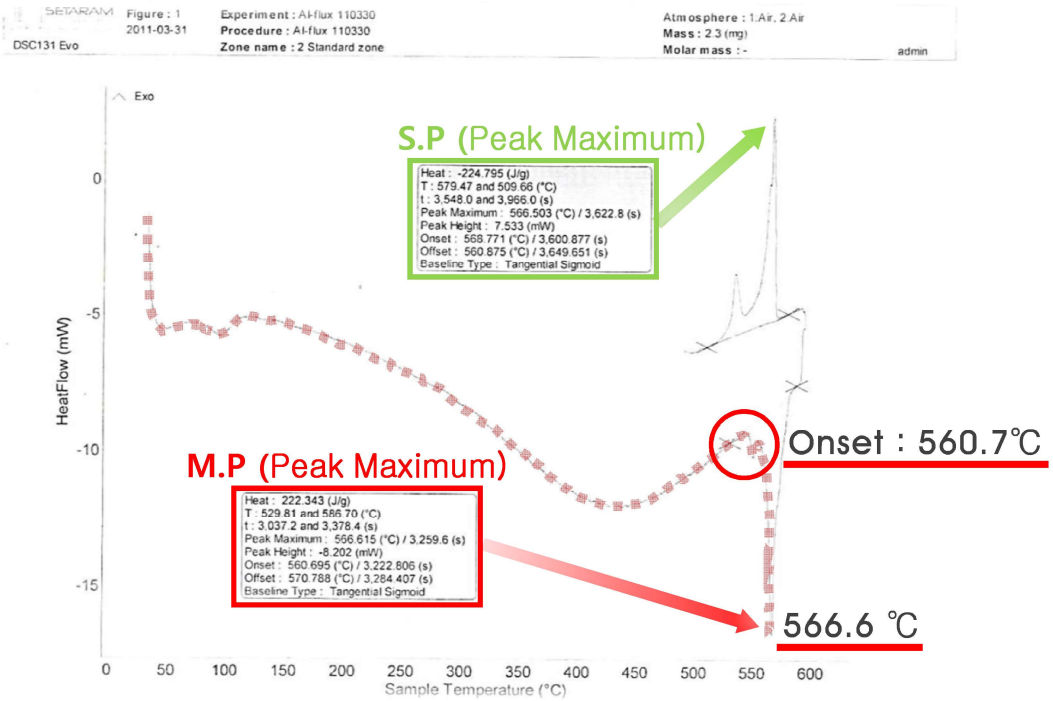
3) SEM Analysis result



02. Product Introduction

1. Al- Flux

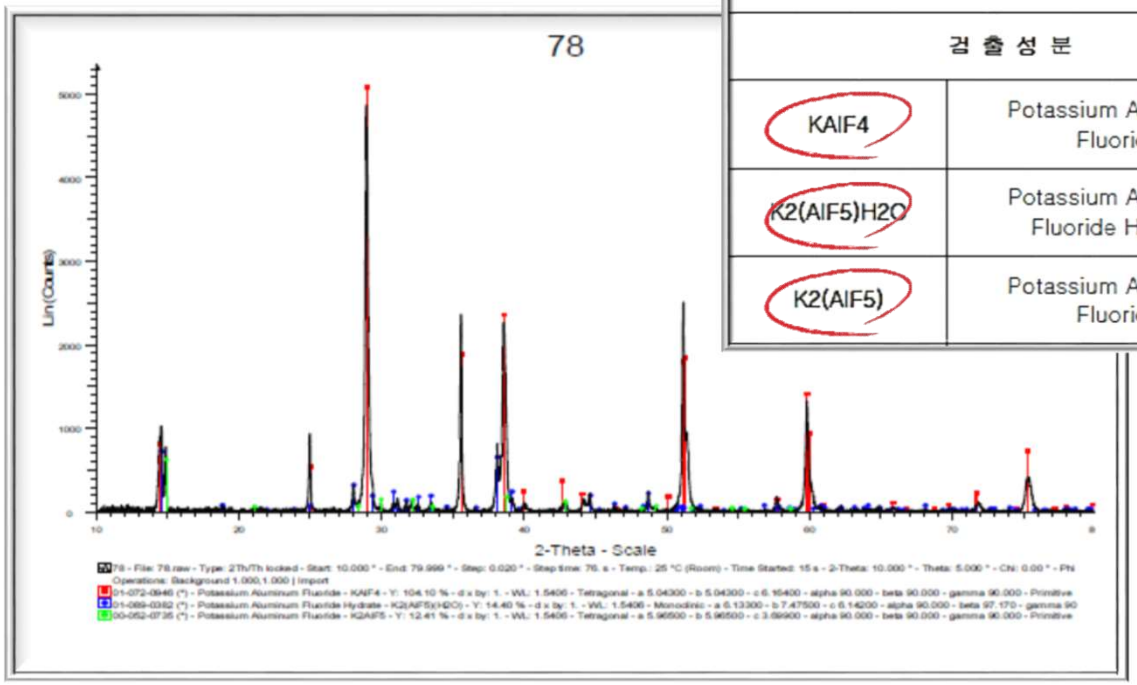
4) DTA(differential thermal analysis) Analysis result



02. Product Introduction

1. Al- Flux

5) XRD Analysis result



Quantitative Analysis – Rietveld			
검 출 성 분		CAS No.	%
KAlF4	Potassium Aluminum Fluoride	01-072-0946(*)	77.77
K2(AlF5)H2O	Potassium Aluminum Fluoride Hydrate	01-089-0382(*)	16.79
K2(AlF5)	Potassium Aluminum Fluoride	00-052-0735(*)	5.44

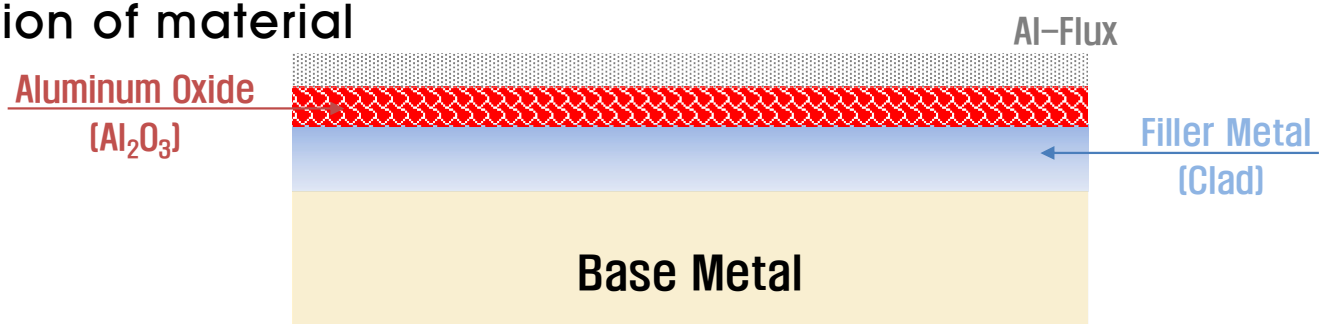
02. Product Introduction

1. Al- Flux

6) Function

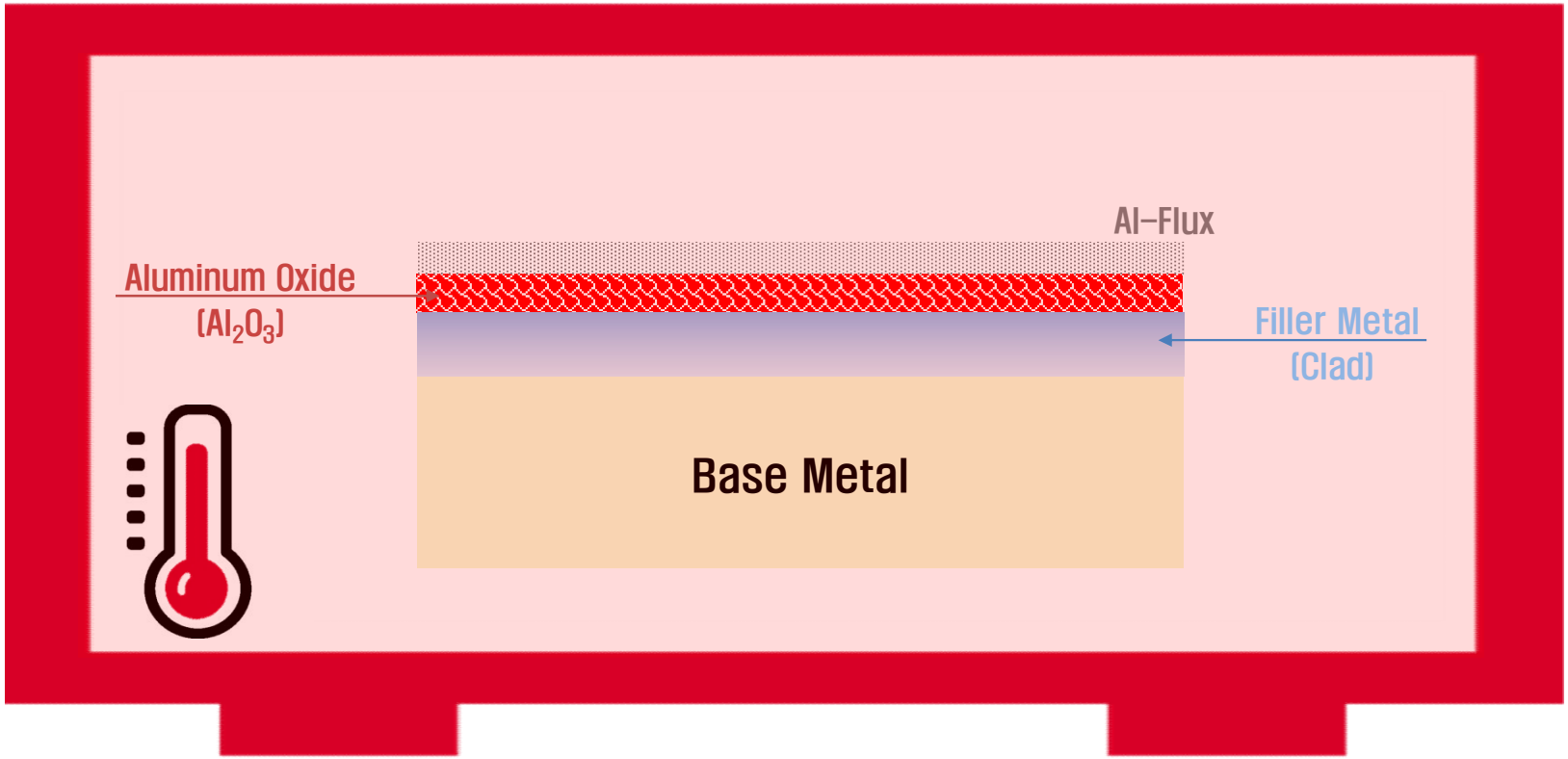
Aluminum oxide removal	Removal of aluminum Oxide03 Aluminum surface * Melting point : Aluminum 660℃, Aluminum Oxide 2,005℃
improve wetting action and increase fluidity	Improving wetting action of base metal and filler metal Increase fluidity of filler metal
prevent re-oxidating	Prevention of re-oxidating of Aluminum surface

7) Composition of material



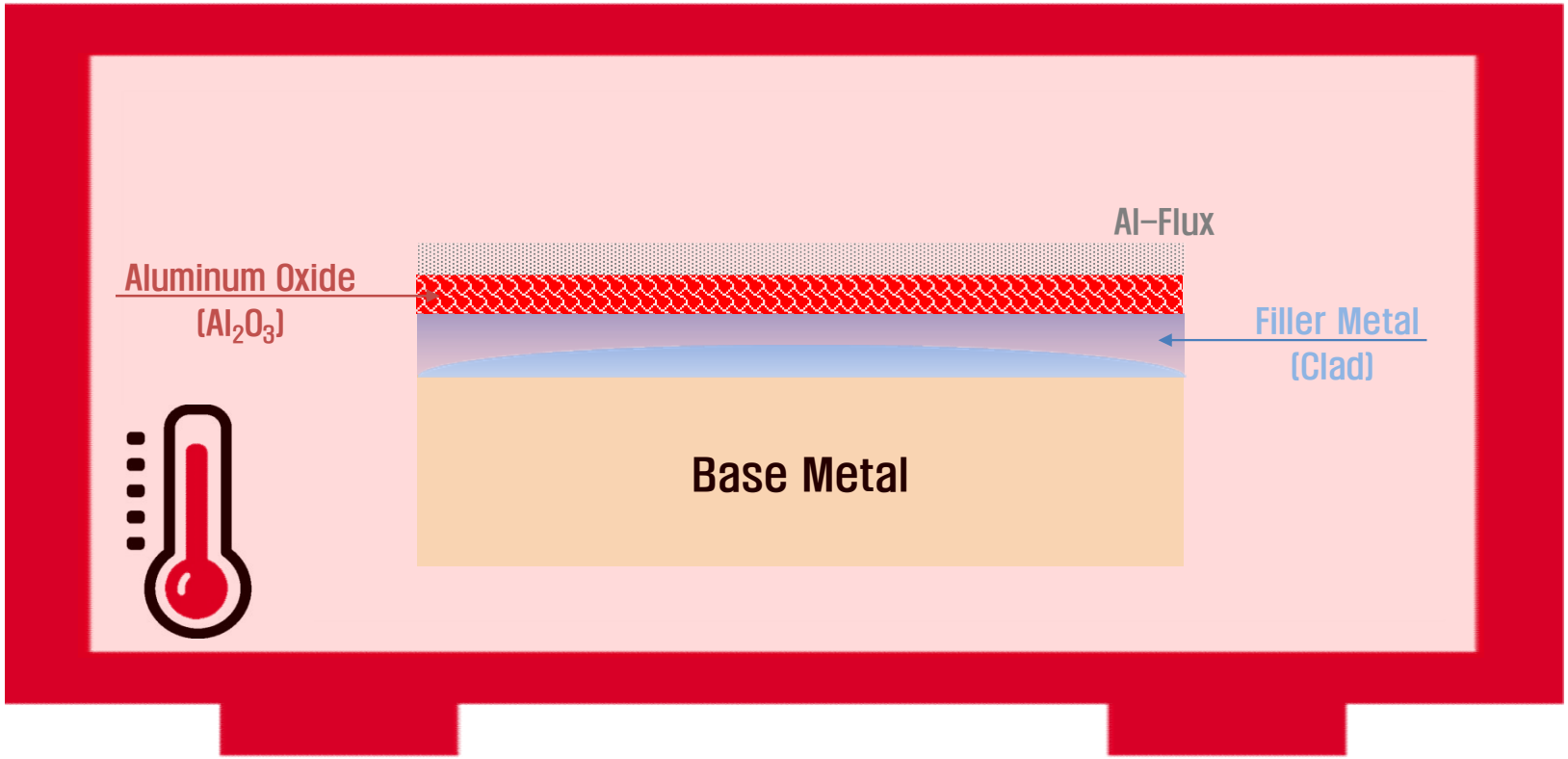
02. Product Introduction

Composition and role of Aluminum material



02. Product Introduction

Composition and role of Aluminum material



2. Other products (Related products of Aluminum Brazing)

1) Characteristics of Flux (Al-Flux, Wet Flux, E-Flux, HB Flux, Cs-Flux)

Product / Division	Al-Flux	Wet Flux	E-Flux	HB Flux	Cs-Flux
Flux Type	Dry Type	Wet Type	Dry Type	Dry Type	Dry Type
Average particle size [㎛]	5~10		13~20	5~10	
Melting point [℃]	560↑				450↓
Application method	Liquid mixture		Powder electrostatic method	Liquid mixture	
Activity (Fluidity)	Good			Very Good	
Brazability	Good			Very Good	
Characteristic	Universality	No dust	No wastewater generated	Easy to braze Mg alloy	Low melting point

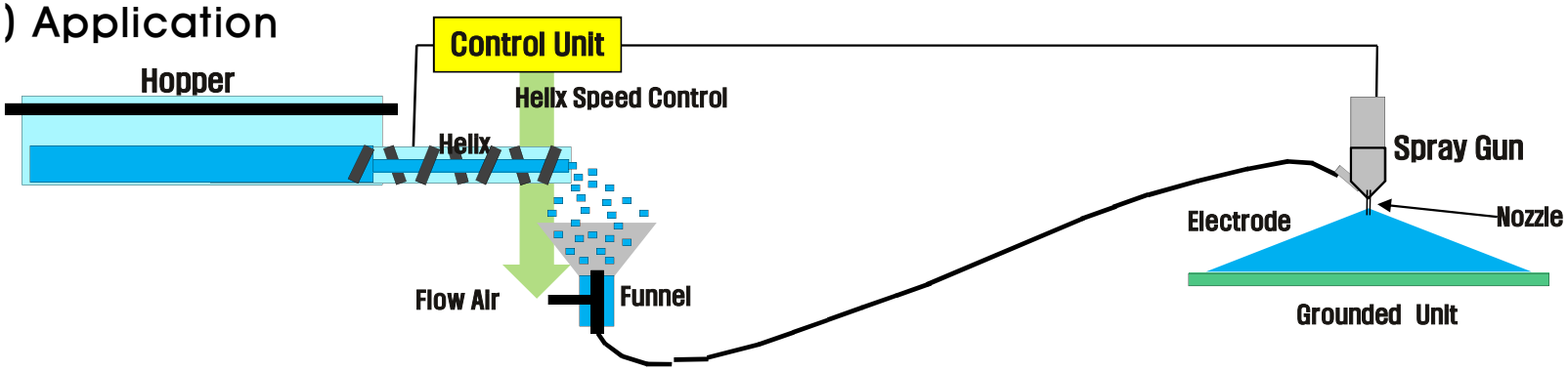
2. Other products (Related products of Aluminum Brazing)

2) E-Flux(Electrostatic Flux)

(1) Characteristic

Appearance	White Powder
Application method	Electrostatic application by mechanic device No waste water due to no water use

(2) Application



02. Product Introduction

2. Other products(Related products of Aluminum Brazing)

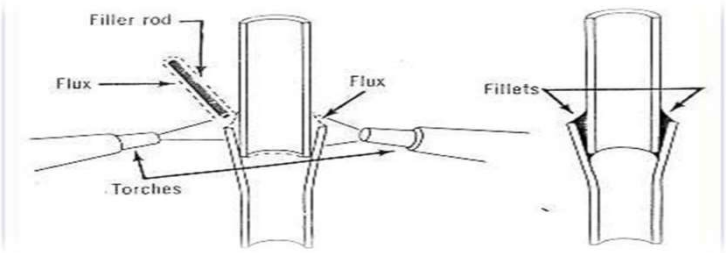
3) Cs-Flux (Powder Type / Paste Type)

(1) Characteristic

Appearance	① White Powder ② White Paste
Activity	Improved wetting action of base metal and filler metal due to high activity
Brazability	① It has great Brazing ability than general Al-Flux ② It is possible to braze heat exchanger which has Mg

(2) Application

① Al-Brazing(Mg Content) ② Al-Torch Brazing ③ Al Brazing Ring



2. Other products(Related products of Aluminum Brazing)

4) Paste Flux (Insoluble Type)

(1) Characteristic

Appearance	White Paste type
Type	Insoluble
Viscosity and condition	① Easy to work with constant viscosity ② Precipitation or liquid seperation does not occur

(2) Application

① Production of B-Tube using tube mill ② Al-Brazing

B-Tube

Figuration and coating device of B-tube

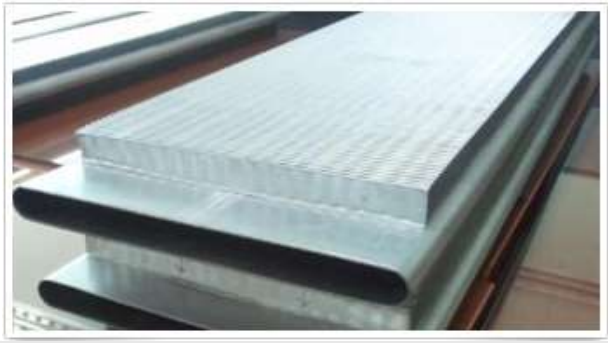
2. Other products(Related products of Aluminum Brazing)

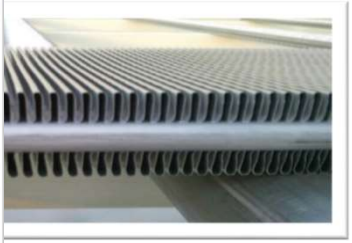
5) Paste Flux (Soluble Type)

(1) Characteristic

Appearance	White Paste type
Type	Soluble
Viscosity and condition	Easy to work with constant viscosity

(2) Application





02. Product Introduction

2. Other products (Related products of Aluminum Brazing)

6) Coating Flux

(1) Characteristic

Appearance	Liquid state adhesive Al-Flux
Appliction method	Dipping Spray (Al-Plate or Al-Tube)
Dry After Application	① Heating dry ② Applied Al-Flux is not released
Work place environment	Ambient environment and air not polluted

(2) Application

① Al-Brazing ② When assembling and transporting ③ Al-Flux Adhesive agent(Al-Plate and Al-Tube etc)

2. Other products (Related product of Aluminum Brazing)

7) Al-Paste

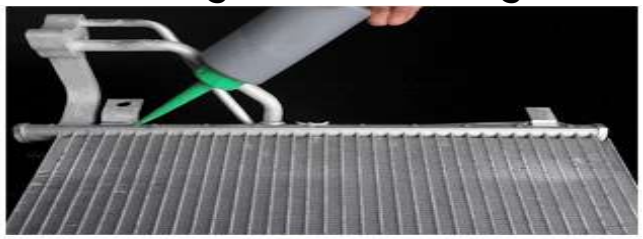
(1) Characteristic

Appearance	Paste Type
Heat exchanger Brazing	① Brazing to area which have a large gab or without Filler metal ② Rebrazing bad parts
Viscosity and condition	Easy work ability due to constant viscosity
Brazability	Excellent brazing due to contain clad powder

(2) Application

① Al-Brazing for non-clad

② Al-Brazing and Rebrazing



2. Other products(Related products of Aluminum Brazing)

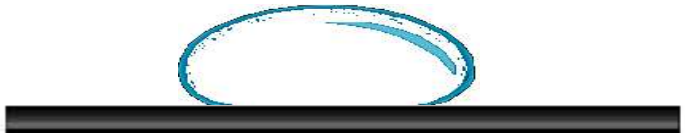
8) Dispersant

(1) Characteristic

Appearance	Colorless and transparent liquid
Remove oil	Disperses oils to remove it
Al-Flux application state	① Reduce the surface tension ② Al-Flux uniformly applied
Brazability	Improve Brazing ability and clear appearance

(2) Application

① Al-Brazing Additive ② Remove oil ③ Al-Flux uniform application ④ Brazability improvement



When dispersant is not used

When dispersant is used

03. Technic Data

1. Aluminum Brazing

1) Aluminum

(1) Characteristic

Apperance	Silver-white soft metal
Ductility and malleability, Thermal conductiviry	It is rich in ductility and malleability and has high Thermal conductivity
Specific gravity	2.7 (Light compared to 7.87 Fe and 8.9 Cu)
Melting point	About 660℃
State in the atmoshphere	Form a thin film of Aluminum Oxide(Al_2O_3) [Al_2O_3 melting point : about 2,005℃]
Alloy statue	Physical and chemical properties change depending on the component (alloy) added

03. Technic Data

1. Aluminum Brazing

(2) Alloy

Type	Main component
1000 type	Al (99%↑)
2000 type	Al-Cu Alloy
3000 type	Al-Mn Alloy
4000 type	Al-Si Alloy
5000 type	Al-Mg Alloy
6000 type	Al-Mg-Si Alloy
7000 type	Al-Zn Alloy

03. Technic Data

1. Aluminum Brazing

(3) Types of alloys used in brazing

3000 type	Base Metal used as base metal
4000 type	Filler Metal used as filler metal

(4) Base Metal component and list oy base metal

① Main component : Al-Mn alloy

② Kinds	Mn content (wt%)	Chatacteristic
3003	1.0~1.5	① Melting Range : 643℃(solidus line) ~ 654℃(liquidus line) ② About 10% stranger than Aluminum 1100 ③ Excellent brazability, workability and corrosion resistance

03. Technic Data

1. Aluminum Brazing

(5) The main component and type of Filler Metal

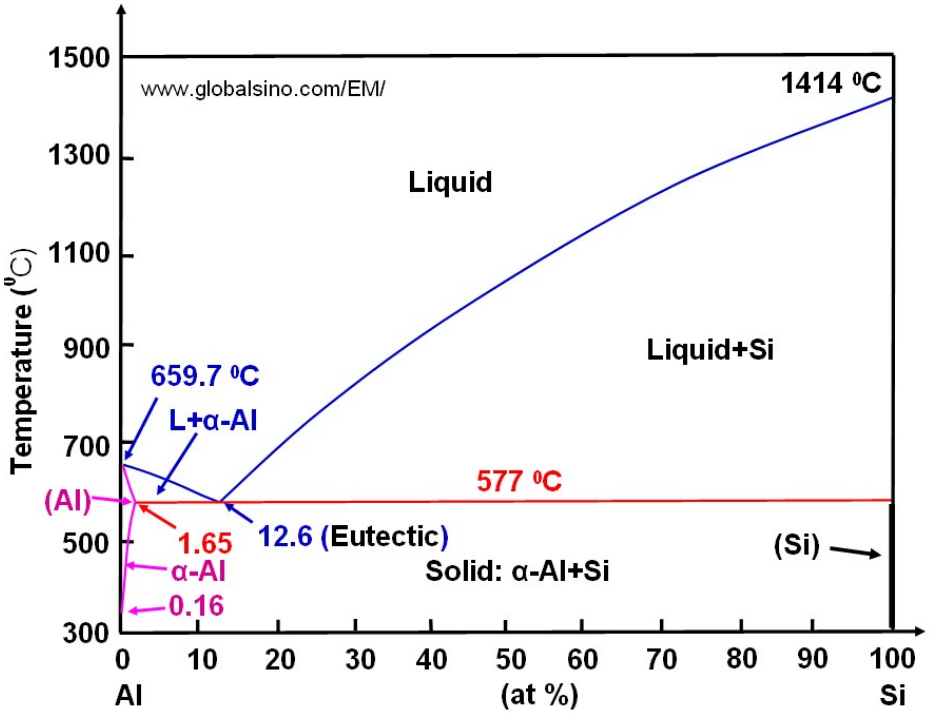
① Main component : Al-Si alloy

② Type	Si content (wt%)	Characteristic
4343	6.8~8.3	① Meltype Range : 577℃(Solidus line) ~ 615℃(Liquidus line) ② Wide melting range, used as filler metal
4045	9~11	① Meltype Range : 577℃(Solidus line) ~ 595℃(Liquidus line) ② Wide melting range, used as filler metal
4047	11~13	① Meltype Range : 577℃(Solidus line) ~ 582℃(Liquidus line) ② Difficult to use as filler metal due to narrow meting range ③ used as welding rod

03. Technic Data

1. Aluminum Brazing

6) Type of alloy and main component



03. Technic Data

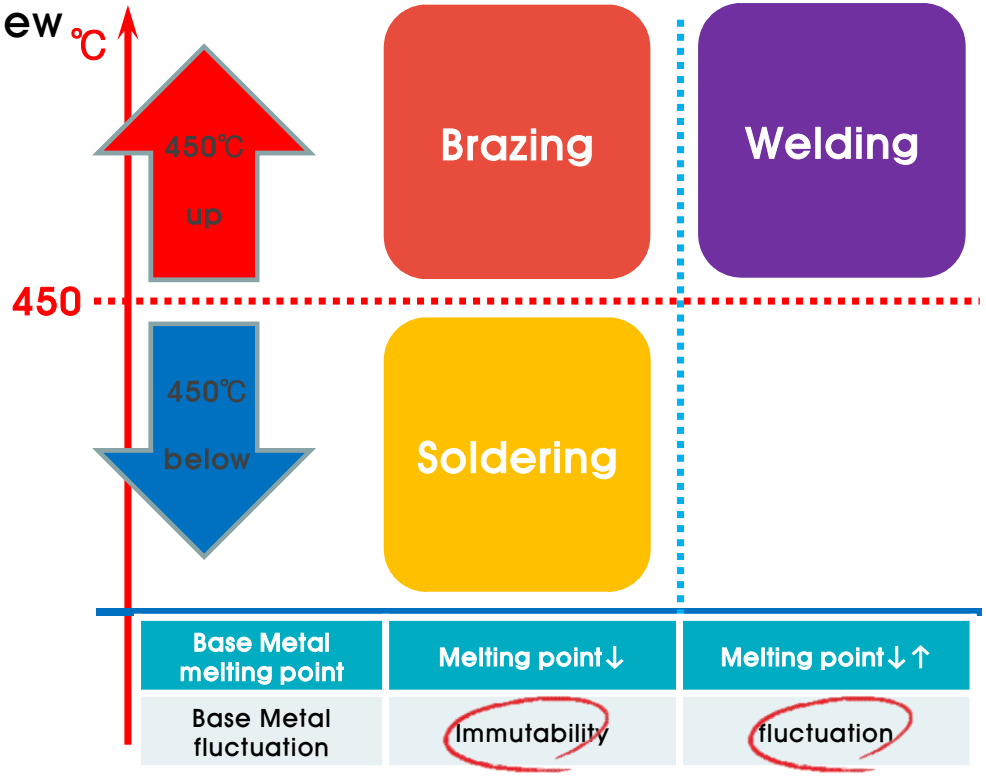
1. Aluminum Brazing

2) Brazing and Soldering, Welding overview

Al Brazing

① Aluminum meting point 660℃
② Oxide film(Al_2O_3) meting point : 2,005℃
③ using Al-Flux – oxide film removal
④ Base metal remains unchanged and assembled
⑤ Precise surface treatment method
⑥ Prevention of re-oxidation and improvement of corrosion resistance

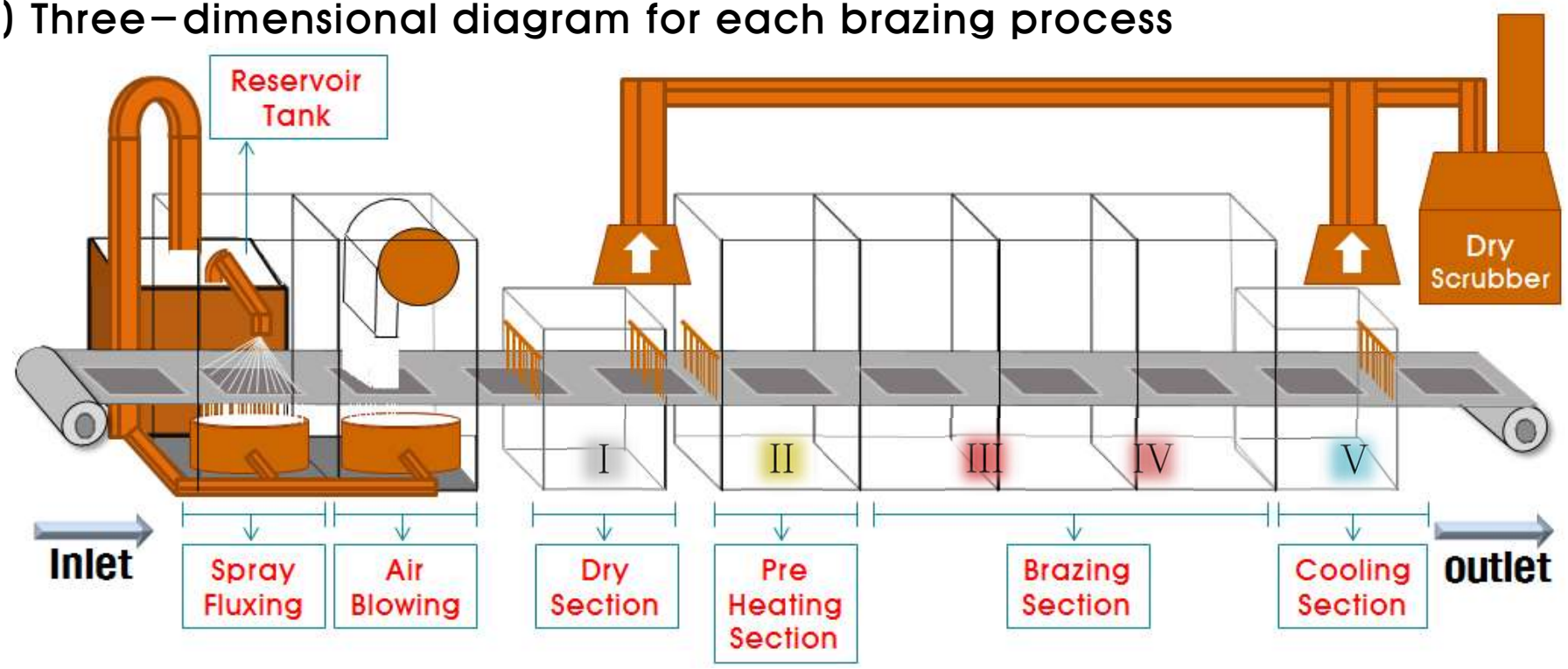
Flux function required



03. Technic Data

1. Aluminum Brazing

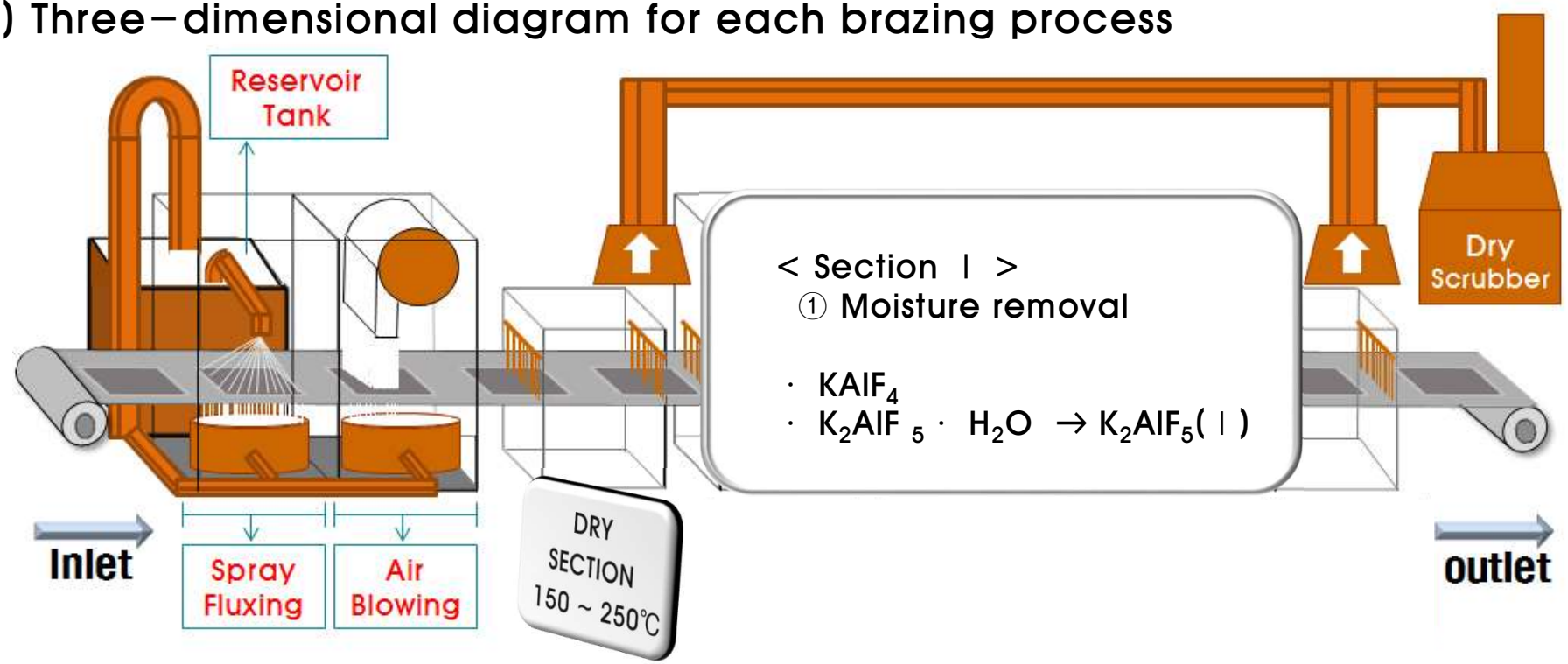
3) Three-dimensional diagram for each brazing process



03. Technic Data

1. Aluminum Brazing

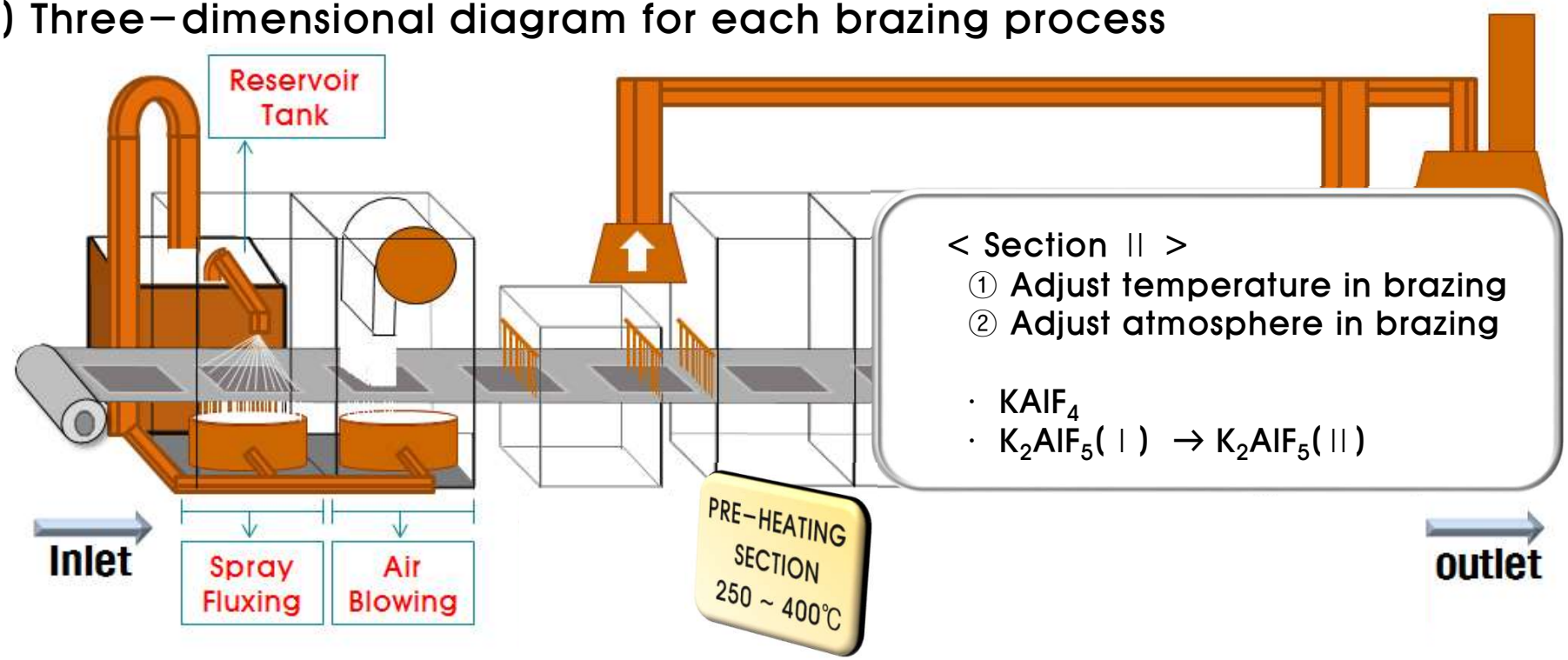
3) Three-dimensional diagram for each brazing process



03. Technic Data

1. Aluminum Brazing

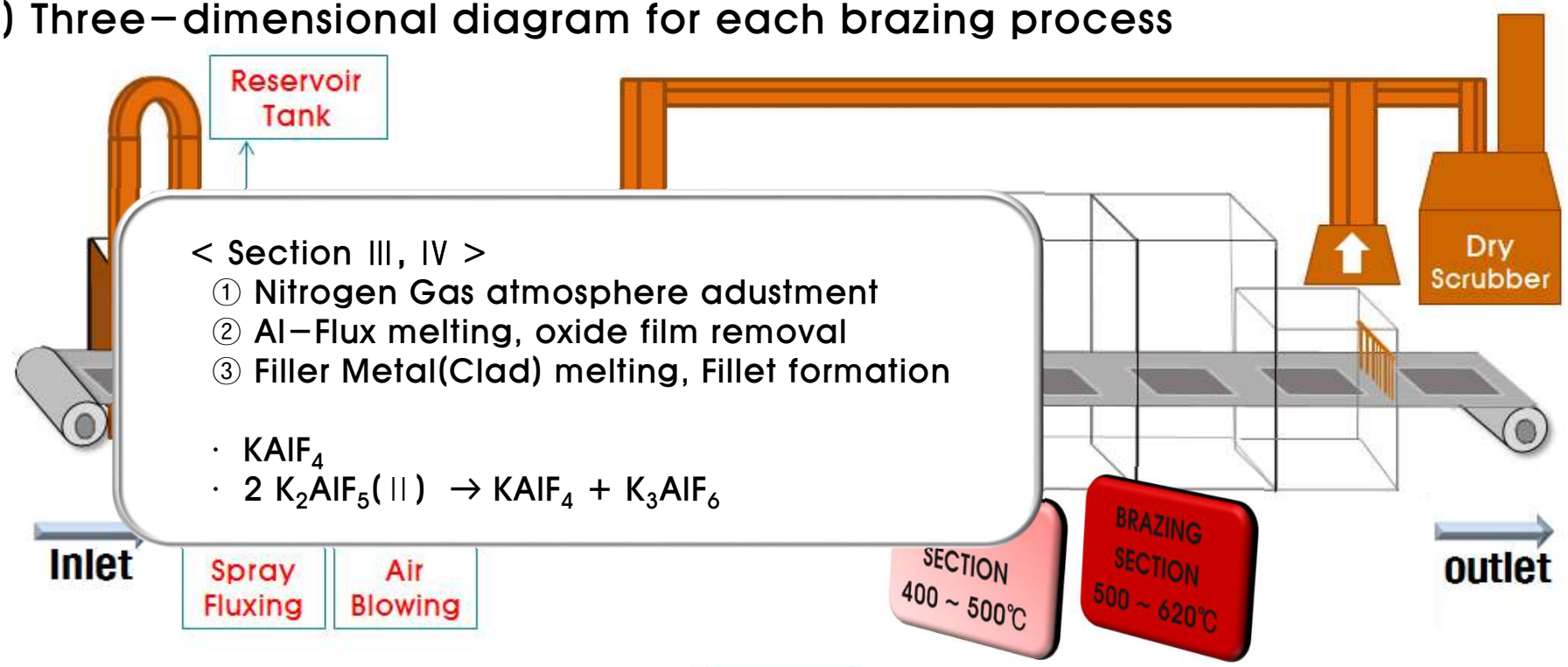
3) Three-dimensional diagram for each brazing process



03. Technic Data

1. Aluminum Brazing

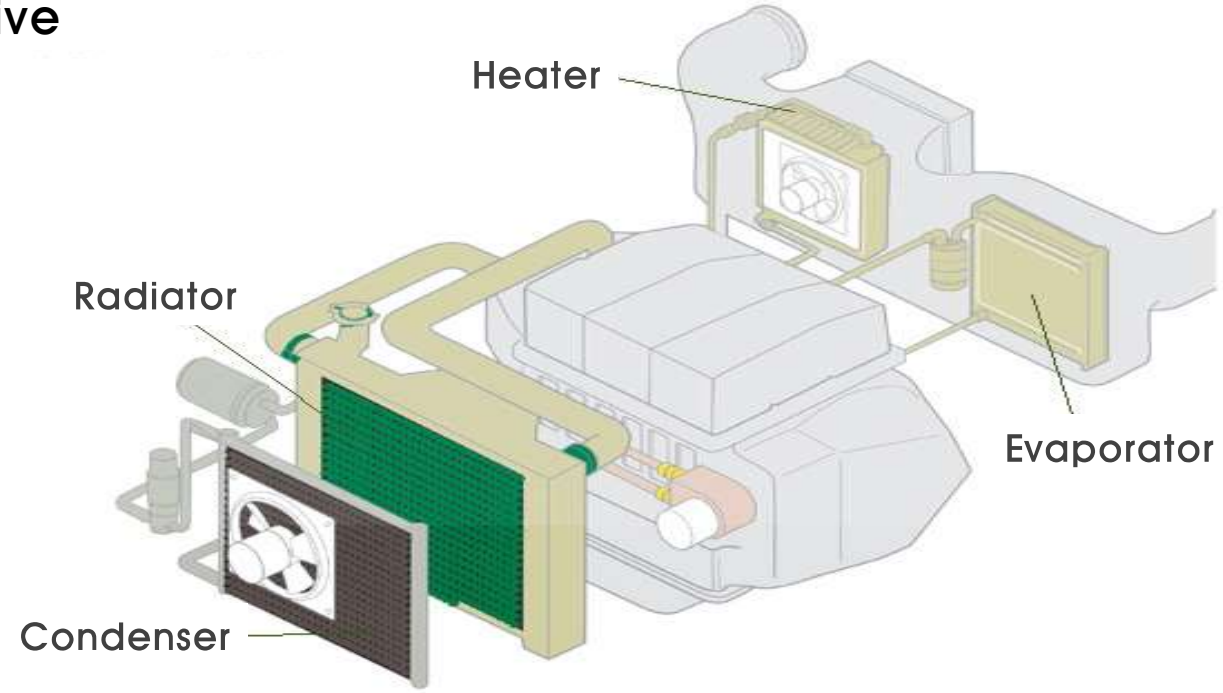
3) Three-dimensional diagram for each brazing process



03. Technic Data

2. Aluminum Heat exchanger

1) Automative



< Fig4. Automative aluminum heat exchanger products >

03. Technic Data

2. Aluminum Heat exchanger

2) Brazing methods

Assembly → Degreasing → Fluxing → Drying → Brazing

(1) Assembly

① Aluminum Assembly of aluminum heat exchanger parts, heats, tubes and fins

(2) Degreasing(Oil removal)

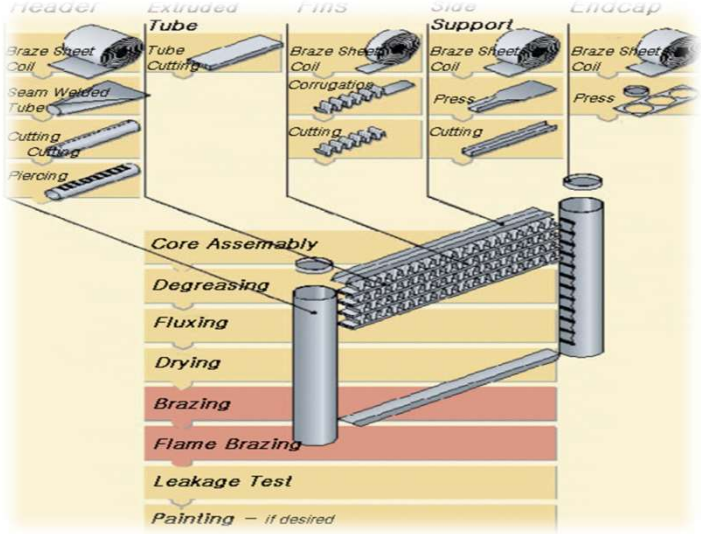
① Removal of residual oil in aluminum heat exchanger

㉠ Alkali cleaner application

㉡ Application of solvents (TCE etx.)

㉢ Heat drying application

(when using quick-drying oil)



< Fig5. Automotive heat exchanger (condenser) >

03. Technic Data

2. Aluminum Heat exchanger

2) Brazing methods

Assembly → Degreasing → Fluxing → Drying → Brazing

(3) Fluxing

① Application of Al-Flux to aluminum heat exchanger
② Apply by spray method
③ The Al-Flux concentration can be adjusted according to the type and location of the heat exchanger

(4) Drying

① Removal of moisture in Al-Flux applied to heat exchanger
② Do not allow moisture to enter the brazing Furnace

03. Technic Data

2. Aluminum Heat exchanger

2) Brazing methods

Assembly → Degreasing → Fluxing → Drying → Brazing

(5) Brazing

① As brazing furnace, it is commonly used as continuous brazing

② Using Nitrogen gas, brazing in an inert atmosphere

< Fig6. Continuous Brazing Furnace >

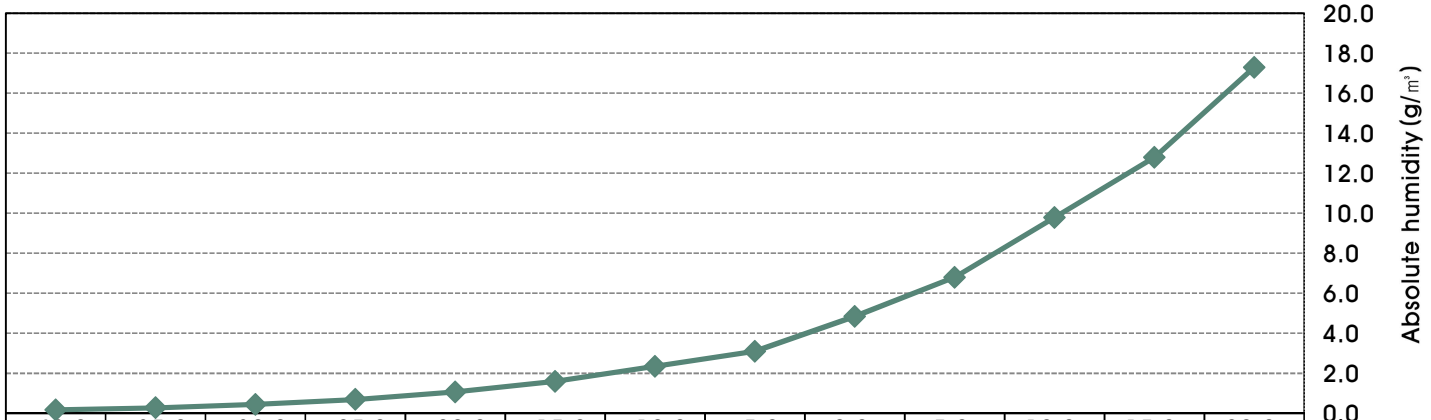
03. Technic Data

2. Aluminum Heat exchanger

③ Management Elements in furnace with brazing

㉠ Dew Point : −40℃ below

㉡ Oxygen Concentration : 100ppm below



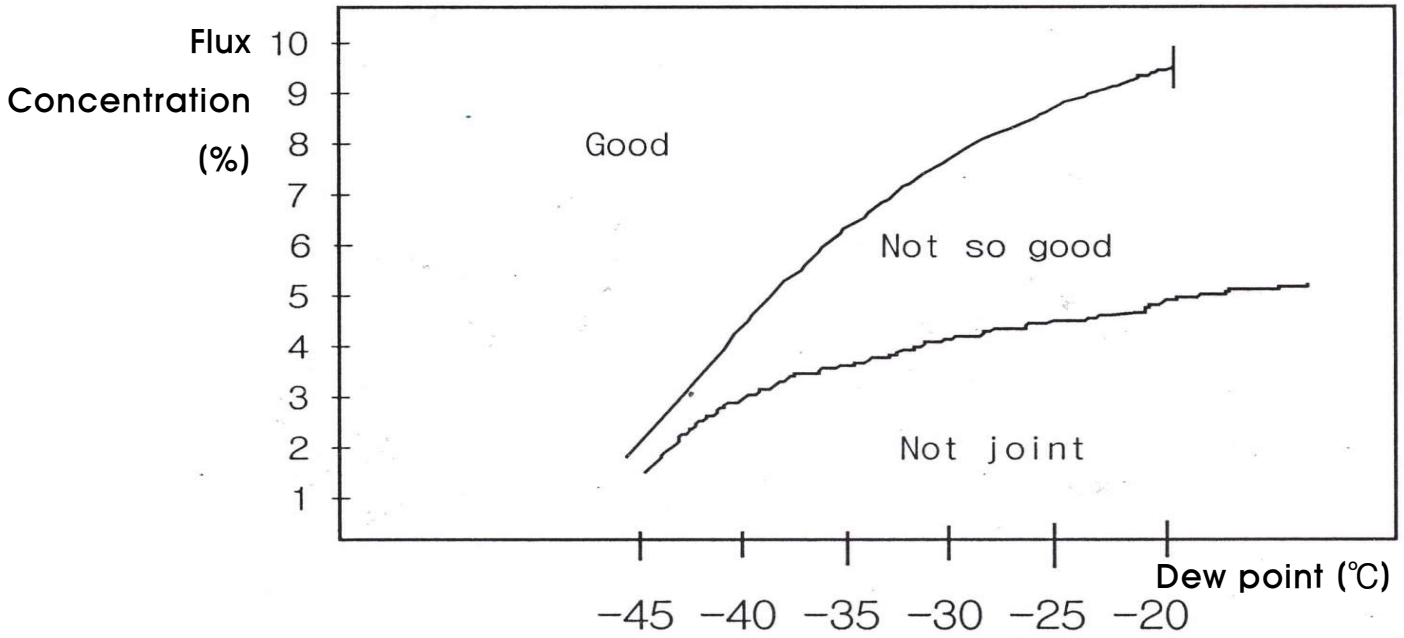
Dew point(℃)	−40.0	−35.0	−30.0	−25.0	−20.0	−15.0	−10.0	−5.0	0.0	5.0	10.0	15.0	20.0
Absolute humidity (g/㎥)	0.172	0.281	0.448	0.698	1.067	1.6	2.35	3.1	4.85	6.8	9.8	12.8	17.3

< Table1. Absolute humidity according to dew point (g/㎥) >

03. Technic Data

2. Aluminum Heat exchanger

④ The Al-Flux concentration and dew point



<Fig7. Al-Flux Concentration and Dew Point >

2. Aluminum Heat exchanger

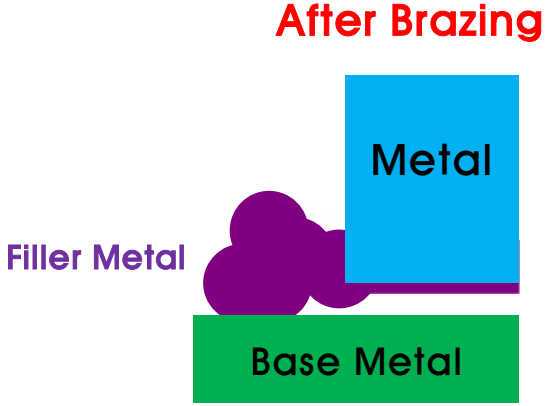
⑤ The maxium temperature for brazing is arround 620℃

㉠ The thermal expansion of aluminum is about three times larger than that of aluminum oxide

㉡ Crack in Aluminum Oxide

㉢ Al-Flux penetration into the rack occurred

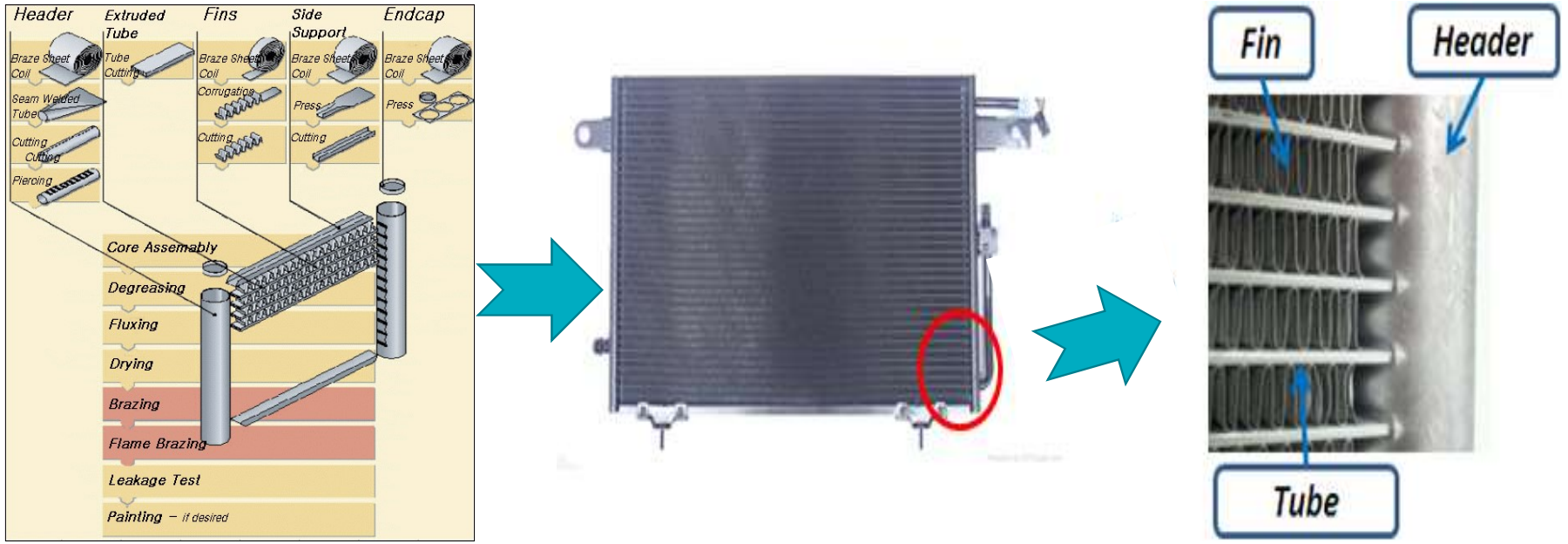
㉣ By capillary action, the filler metal flows between both base metals.



< Fig 8. Capillary Action>

03. Technic Data

2. Aluminum Heat exchanger

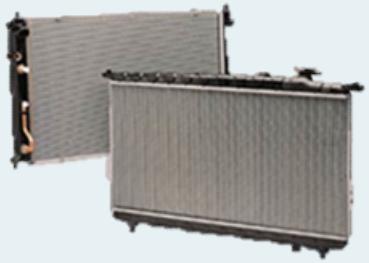
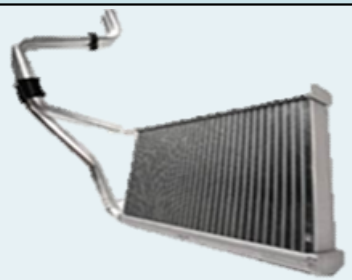
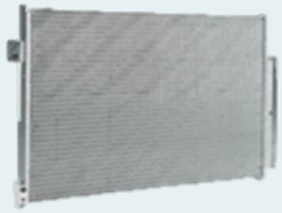
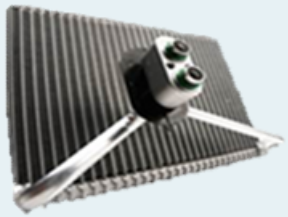


< Fig9. Before and after brazing heat exchanger and three parts >

03. Technic Data

2. Aluminum Heat exchanger

3) Brazing Aluminum heat exchanger

Radiator	Heater	Condenser
		
Evaporater	**Intercooler**	**Oil Cooler**
		

03. Technic Data

3. Related data Al-Flux

1. Patent certificate

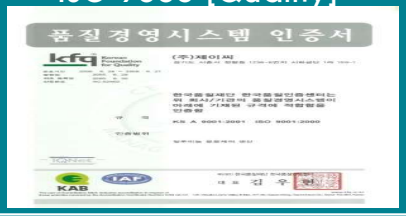
Al-Flux	12
CT-Flux	2
Al-Paste	1
Wet-Flux	1
HB-Flux	1
Torch Flux	1
Paste Flux	1
E-Flux	1
CNT	7
Corrosion-resistance points for aluminum	1

03. Technic Data

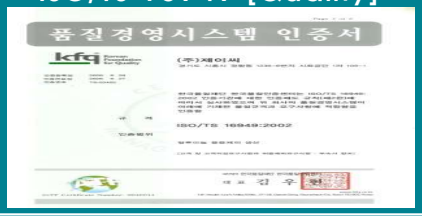
3. Related data Al-Flux

2. Certification

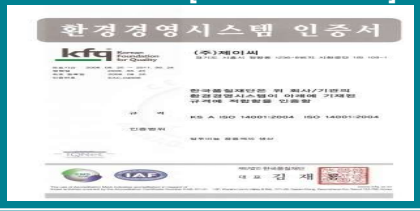
ISO 9000 [Quality]



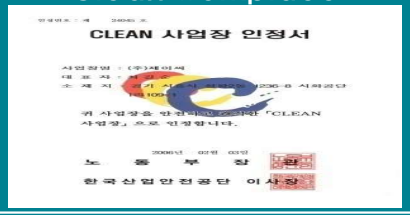
ISO/TS 16949 [Quality]



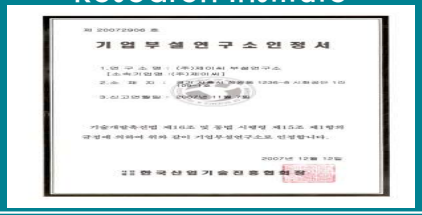
ISO 14000 [Environment]



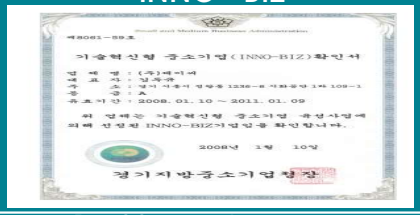
Clean workplace



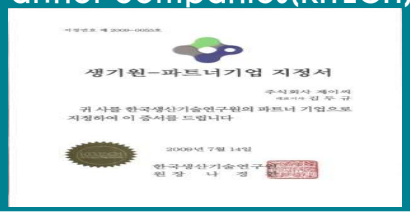
Research Institute



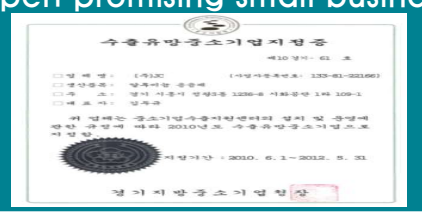
INNO-BIZ



Partner companies(KITECH)



Expert promising small business

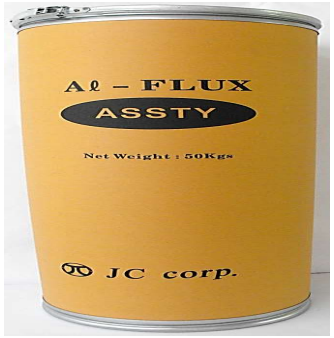


Root technology specializing company

04. Manufacture Process

1. Packing

15kg Paper Bag



50kg Paper Drum

25kg Paper Drum

20kg Paper Box

04. Manufacture Process

2. Packing Size

- 15kg/Paper Bag
- 1,005kg /pallet
  (1,100mm * 1,100mm * 1,500mm)
- 495kg /pallet
  (1,100mm * 1,100mm * 800mm)
- 1,005kg * 10pallets
- 495kg * 10pallets
- 15,000kg/20" container

- 50kg/Paper Drum
- 450kg /pallet
  (1,100mm * 1,100mm * 920mm)
- 450kg * 20pallets
- 9,000kg/20" container

- 25kg/Paper Box
- 450kg /pallet
  (1,100mm * 1,100mm * 775mm)
- 450kg * 20pallets
- 9,000kg/20" container

05. Product Introduction

1. Ferric Sulfate Solution

Iron salt inorganic coagulant with polymer
(Chemical formula – $[Fe_2(OH)_n \cdot (SO_4)_3 - {}^n/_2]_m$)

1. Characteristic
 – Use pure ferrous sulfate raw material
 – Wide agglutination pH range
 – Great effect of removal of heavy metals and organic matter
 – No corrosivity (SUS)

2. Usage
 – Wastewater treatment (Dyeing, Food, Leather, Paper, Waterworks and Sewerage, Livestock, Metal, Mining, Other)

Thank you !!!

JC CORPORATION

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