



BEYOND EXPECTATION & BEYOND LIMITATION



POLYUREA





MESSAGE FROM CEO

Dear valuable customers,

First of all, I would like to express my deepest gratitude to our valuable customers in the world who have constantly supported Kukdo Chemical Co., Ltd. to become the global leader of Epoxy industry. Since Kukdo set foot in the world of epoxy for the first time in Seoul, Korea 42 years ago, we have overcome a lot of challenges successfully, thanks to the full support from our customers.



Kukdo currently operates 3 factories in Korea and 1 in China for produce 543,000mt of epoxy resins and 120,000mt of polyol annually. We also set up a logistics center in the heart of Europe where we are able to provide the most efficient and prompt delivery service. It is a huge benefit to our valuable customers that they are able to avoid the risk of time lag and reduce the burden of inventory. We are working hard to finalize our global supply networks in a few years to provide the same excellent service to our customers who are outside of our current network.

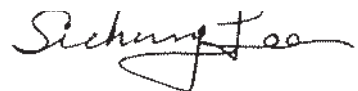
Furthermore, Kukdo continuously focuses on our well-organized quality control and environmental management system based on ISO-9000 and 14001 for our customer's confidence. We also increasingly put our efforts toward developing innovative products for our valuable customers who are engaged in a variety of applications including electric & electronic products, automobiles, wet & powder coatings, composites, adhesives and insulation. We are strongly confident that our continuous efforts on R&D benefit our valuable customers enormously, which eventually increase our customer's value.

As Kukdo's core value is "For customer value", we try to provide our valuable customers with a total solution; supplying trend-leading products, innovative materials, cost-efficient packaged delivery service, technology and market information in cooperation with our valuable customers. Our core value will be firmly alive in our daily life in Kukdo.

All members of Kukdo always appreciate the full support from our valuable customers and promise that we will continuously try our best for our customer's success.

Faithfully yours,

Si Chang Lee, President



KUKDO HISTORY



1970~ 1980's

- Feb. 1972 Establishment of KUKDO CHEMICAL Industry CO., LTD.
- Jan. 1973 Completion of Seoul factory for Epoxy resin & Hardener(1st factory in Korea)
- Oct. 1983 Establishment of R&D Center.

1990's

- Apr. 1994 Completion of Iksan factory for Epoxy resin & Hardener(2nd factory in Korea)
- Mar. 1996 Establishment of KUKDO Fine Chemical in Sihwa(3rd factory in Korea)
- May. 1997 Establishment of PU Business Division
- Apr. 1999 Change Company Name to KUKDO CHEMICAL CO., LTD.

2000's

- Apr. 2002 Establishment of KUKDO CHEMICAL (KunShan) CO., LTD. in China
- Nov. 2003 Completion of KunShan factory for Polyol and Epoxy resin in China
- Jul. 2004 Completion of Busan factory for System Polyol and Epoxy resin in Busan
- Dec. 2004 1st expansion of 16KT of Polyol in China factory(Total 65KT)
- Mar. 2008 Acquisition of HAJIN CHEM TECH
- Nov. 2008 Completion of 40KT of Liquid Epoxy resin in Iksan
- Dec. 2008 Awarded 200 Million Dollar Export Tower Prize (45th Trade Anniversary)
- Nov. 2010 Awarded 2010 Global Excellent Management by JMAC
- Apr. 2011 Obtained Customs approved registered exporter Certificate by Customs
- Sep. 2011 Obtained AEO(Authorized Economic Operator) Certificate by Customs
- Dec. 2011 Awarded 300 Million Dollar Export Tower Prize (48th Trade Anniversary)
- Dec. 2011 Awarded Korean World-class Product Award 2011 by Knowledge Economy
- May. 2012 2nd expansion of 55KT of Polyol in China factory(Total 120KT)
- Feb. 2013 Establishment of SHINDO CHEMICAL CO., LTD.

WE ARE THE WORLD BEST POLYUREA MANUFACTURER

Since being established in 1972, KUKDO Chemical Co., Ltd. has produced a wide range of epoxy resins, curing agents and polyol and remains at the forefront of technical developments to meet the most stringent demands of modern industry.

Our financial strength and recent plant expansions have led to KUKDO becoming one of the largest manufacturer in the world. Our large capacity and technical orientated strategy has allowed us to succeed in gaining a big share of the global market. We have over 40 years of technical experience and know-how of the various markets and coupled with a global sales network, we can service every sector with excellent quality and innovative products.



Kukdo certified to ISO-9001/ISO-14001 and complying with the most stringent requirements for manufacturing, sales and management under new regulations such as REACH, RoHS and GHS. All of the relevant products have been registered under REACH.

Kukdo is also committed to developing new and novel products to follow the ever more stringent environmental requirements.

MANAGEMENT PHILOSOPHY OF KUKDO

1. CUSTOMER CENTERED
2. EMPLOYEE'S HAPPINESS
3. RESPONSIBILITIES TOWARD STOCK HOLDERS
4. MID & LONG TERM PREDICTION and PREPARATION
5. CEASELESS CHALLENGE and INNOVATION
6. LEGITIMACY and JUSTICE
7. SOCIAL RESPONSIBILITIES

What is vision EGK 2015

Achievement of customer's absolute satisfaction!

We provide top quality products and total solutions

The world's best Quality Manufacturer

- The global standard company satisfying customer's needs
- Secure global network, human resources, marketing and products capacity to meet customer's demand all over the world
- Provide customers with comprehensive techniques and services

Excellent and Great KUKDO

Respectable and transparent company as a global standard top-ranking company

Human Resources Management

- Help employees to realize their ambitions
- Respect employee's creativity & competence
- Promote the most talented people

Emphasis on R&D

- Lead the advanced technology in the world wide chemical market

POLYUREA VS. OTHERS

Performance Type	Polyurea	Polyurethane	Epoxy	Polyester	Acryl
Physical strength	A B C	B C	A	A	A B
Elongation	A	A	C	C	A
Impact resistance	A	A B	B	B	B
Abrasion resistance	A	A B	A B	A B	A B
Adhesion to concrete	A B C	A B C	A	B	B C
Cure shrinkage	C	C	C	A	B
Permeability	C	A B	C	C	A B
UV resistance	C	A B C	C	A B	A
Temperature limit	A B C	B	A B	B C	C

Chemical Resistance	Polyurea	Polyurethane	Epoxy	Polyester	Acryl
Mineral acids	B C	B C	A B	A B	B C
Organic acids	B	B C	B	A	B C
Alkalis	A B	B C	A	B	B C
Chlorinated solvents	B C	B C	A B C	A B C	B C
Oxygenated solvents	B C	B C	A B C	A B C	B C
Hydrocarbon solvents	B C	B C	A B	A B	B C
Salts	A	A B	A	A	A B
Water	A	B C	A B	A B	A B

A Excellent B Good C Normal

POLYUREA PRODUCTS LIST

ITEM	KPU-100	KPU-300	KPU-600	KPT-H30
Characteristic	AWWA C222 Satisfied	General pure polyurea	High elongation pure polyurea	Hybrid polyurea
Usage	Pipe coating	Waterproof, anticorrosive coating, lining		
Tack Free Time(at 25°C)	~ 1 min.	~ 1 min.	~ 2 min.	~ 1 min.
Tensile Strength(N/cm ²)	Over 2,200	Over 1,500	Over 1,200	Over 1,000
Elongation(%)	Below 100	300±100	600±100	200±100
Hardness(Shore)	D65±5	A90±5	A80±5	A85±10
Packing Unit(kg/Drum)	A=216, B=200	A=216, B=200	A=216, B=200	A=200, B=200

ITEM	KPU-SL100	KPT-SL100	RP-300
Characteristic	Self leveling pure polyurea	Self leveling hybrid polyurea	Repair material pure polyurea
Usage	Self leveling		Repair
Tack Free Time(at 25°C)	~ 10 min.	~ 10 min.	~ 10 min.
Tensile Strength(N/cm ²)	Over 1,500	Over 1,000	Over 1,500
Elongation(%)	Below 100	Below 100	300±100
Hardness(Shore)	D55±5	D55±5	A90±5
Packing Unit(kg/Drum)	A=216, B=200	A=216, B=200	A=4, B=4

KUKDO POLYUREA

RECOMMENDED THICKNESS

STEEL	CONCRETE	CHEMICALS	PROTECTION
0.4~2.0mm	1.5mm~	2.0mm~	1.5mm~

APPLICATION METHOD / WORKING PROCEDURE



Substrate Surface Treatment

- Grinding or sandblasting of projection and dilapidated parts throughly and remove sand or dust.
- Seal the surface crack after V-cutting.
- Make a curved line about 10mm with a sealing material on the edges.



Substrate Preparation

- Level the area where prominence & depression or pockets are located using scrapper or roller.
- Substrate preparation is used for minimizing the pinholes during polyurea coating to concrete. It can be used such as PCM(Polymer cement mortar, PU sealants, PU spray foam, putty).



Primer coating

- Dry the surface sufficiently and work under water portion of 8%
- Apply an appropriate primer to substrate with a brush, roller or spray gun.



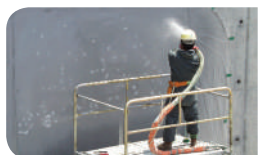
Primary Polyurea spray

- Spray polyurea with the thickness of 1mm.



Repairing of pinholes

- Fill up pinholes after primary spray
- Use repairing urea, urethane putty or mixture of primer and cement for repairing.



Secondary Polyurea spray

- Spray polyurea with thickness required after repairing of pinholes.



Inspection & Confirmation

- Inspect thickness, adhesion strength, and pinholes.
- In case pinholes are still remained, repair using repair material.
- In case thickness or adhesion strength is not adequate, respray.

POLYUREA SPRAY CONDITION

- Spray Machine : High pressure Spray Machine for polyurea coating
- GUN : GUSMER GX-7, GRACO FUSION MP GUN
- Resine Temp. : 60~77°C
- Machine Temp. : over 5°C
- Injection Pressure : over 1,400N/cm² (2,000psi)

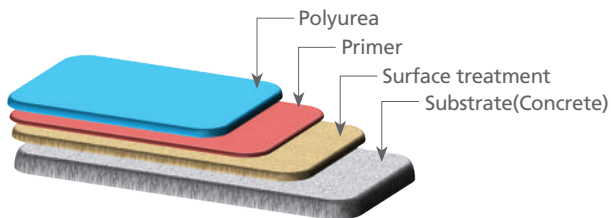
High pressure Spray Machine



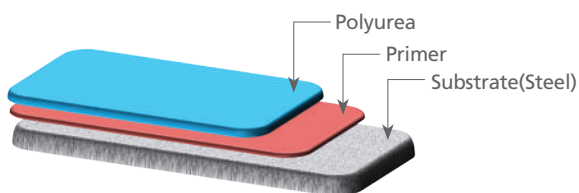
Spray Gun



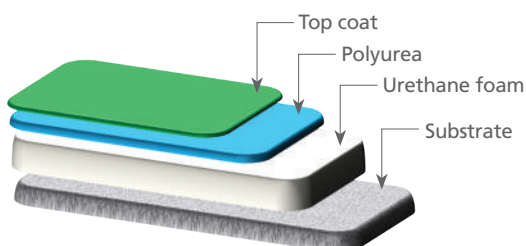
Concrete Structure Waterproofing



Steel Anti-corrosive Coating



Outside Insulation Protection



KUKDO POLYUREA

POLYUREA CASE STUDY



Waterproofing of underground structure in Incheon International Airport



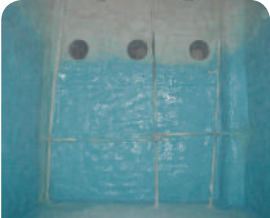
Bridge deck waterproof



Swimming pool waterproof



Roof gardening



Heat Reservoir Foam Protection



Gymnasium Roof Foam Protection



EPS, Artificial Set Protection



Sticker free coating



Tab Water Treatment Facility Waterproof



Fire resistance for LPG/LNG cargo protection



Chemical Wastewater Treatment Facility Waterproof



Wastewater Treatment Facility Roof Waterproof



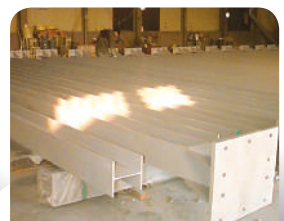
LNG pipe anticorrosive coating



Sheet Pile for Seashore



Steel pipe anticorrosive coating



High-speed railway electric pole anticorrosive coating



Concrete Pipe Anti-corrosive Coating



Parking lot flooring



Truck Bed Lining



Subway-Building passageway waterproofing

POLYURETHANE PRIMER, TOP COAT

Usage

- Primers are specially designed products to better adhesion strength between applying material and raw substrate like concrete/asphalt, galvanized/steel due to their good wetting property, and to strengthen substrates.
- Top coating on the secondary flooring material, where it is required for better weatherability, water resistance, and chemical resistance with a brush, roller or air gun.

Types of Products

PRODUCT NAME	POLYDO 110	POLYDO 820
PROPERTIES		
Characteristic	MDI type one-pack PU primer	Acrylic modified two-pack PU top coat
Appearance	Yellowish Transparent Liquid	Pigmented Liquid
Pot Life (min. / at 25°C)	< 40	< 60
Tack Free Time (min. / at 25°C)	< 100	< 120
Curing Time (hr / at 25°C)	20 ~ 40	24 ~ 48
Usage (kg/1m ²)	0.2 ~ 0.4	0.2 ~ 0.4
Packing Unit(kg/Can)	17	A=5, B=10

*Basic color : gray, green, brown and black(Colors can be modified upon a request from customer)

Application Method

- Must dry the surface thoroughly. If moisture remains on the surface, it will cause bubble in a secondary flooring material and decrease adhesion strength significantly, due to a poor hardening in secondary flooring material.
- Apply the primer after V-cutting on cracks or damaged parts for proper treatment.
- Choose appropriate primer for the substrate and apply it with brush, roller or air gun.
- Apply appropriate quantity of primer. If you apply the primer too much at once, it will cause lots of bubbles or crevice between the secondary flooring material and the primer, and result in poor adhesion effect due to the remained solvent.
- Take next step to the substrate after checking the surface is completely dried. Check it either by hands or nose, because the volatilization speed of solvent is different according to the temperature.
- Next step work shall be done within 24 hours after primer application. If the primer surface contacts water component from rain or dew, it will lose sufficient adhesion strength between primer and applied material, where re-priming is required.
- When a substrate such as concrete is worn-out, apply the primer 2 to 3 times over it in order to strengthen the surface, then proceed to next step.



KUKDO POLYUREA

POLYURETHANE WATERPROOF, FLOORING MATERIALS

Usage

- Waterproof for general constructions(Apartment and Building Roof, verandah, Bathroom, Basement, etc)
- Waterproof for pool, tank, basement constructions and bridge.
- Flooring material for classroom, hospital, corridor.
- Flooring material for factory, fitness center, roller skating rink, basketball place or simple stadium.
- Flooring material for wholesale mart, department store, and parking lot.

Characteristics

- Easy to work on a complex form of structure or on a vertical surface. Possible to form seamless waterproof / flooring layer.
- Excellent adhesion strength to any substrates. Excellent bridging effect performs highly on cracks due to good elongation.
- Easy to adjust a color tone and its beautiful elastic surface can be applied in various purposes such as sports facility and rest place.
- Excellent soundproof & protection against dusts. Very slight load on building structure.
- Pleasant feeling of walking due to noise and shock absorption.
- Excellent performance in durability, chemical resistance, and impact resistance. When it is damaged, partial repair is possible easily.

Types of Products

PRODUCT NAME	261	382	391
PROPERTIES			
Characteristic	Waterproof material of KS approved	Flooring material	High modulus Flooring material
Mixing ratio(weight)	A/B = 1/2.5	A/B=1/2	A/B=1/2
Pot Life (min. / at 25°C)	< 40	< 40	< 40
Curing Time (hr / at 25°C)	24 ~ 48	24 ~ 48	24 ~ 48
Tensile Strength (kgf/cm ²)	< 25	< 70	< 80
Elongation (%)	> 450	> 150	> 50
Hardness(Shore A)	60±5	85±5	95±5
Usage (kg/1mm, m ²)	1.3±0.1	1.3±0.1	1.3±0.1
Packing Unit(kg/Can)	A=9, B=22.5	A=10, B=20	A=10, B=20

*Basic color: green, gray(colors can be modified upon a request from customer)



Water-proof of top-floor



Floor for office



Floor for multipurpose stadium



Floor for basketball stadium



Discount store/warehouse

APPLICATION METHOD / WORKING PROCEDURE



Substrate Surface Treatment

- Grinding or sandblasting of projection and dilapidated parts thoroughly and remove sand or dust.
- Seal the surface crack after V-cutting.
- Make a curved line about 10mm with a sealing material on the edges.



Primer coating

- Dry the surface sufficiently and work under water portion of 8%
- Apply an appropriate primer to substrate with a bursh, roller or spray gun.



Mixing the Waterproof /Flooring material

- Blend the material(Resin and Hardener) in a recommended mixing ratio and agitate it sufficiently.
- For poor workability, Urethane thinner can be used as additives but it can be a cause for foaming during summer season.
- Appropriate quantity, which can be used within the pot life, should be mixed in one time, because the pot life can be varied greatly depending on the temperature change.



Waterproof /Flooring material Application

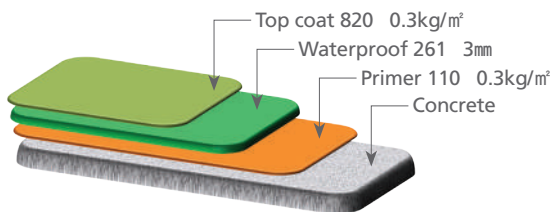
- Apply waterproof/floor material with trowel, brush, roller or squeezer at an uniformed thickness.
- Apply waterproof/floor material from vertical parts first.
- Either you want the thickness over 3mm or a forming problem occurs during summer, you may overlap the appying process on the material more than twice.



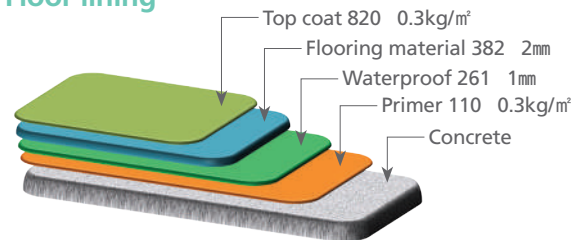
Top coating Application (Exposed type)

- In order to have better performance in durability, abrasion, resistance, and weatherability of top coat, remove dust or alien substances on the secondary waterproof/flooring material before applying top coat to substrate with a brush, roller, and spary gun.

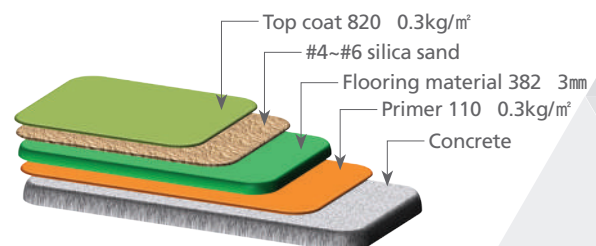
Exposure Waterproofing



Floor-lining



Non-slip type Floor-lining



KUKDO POLYUREA

POLYURETHANE INSULATION SPRAY FOAM

Usage

- Heat insulation material for house, building, factory, hospital, hotel and general construction structure.
- Heat insulation material for refrigerating warehouse, heat exchanger and basement construction.
- Heat insulation material for livestock, poultry farm, temporary building and tank.

Characteristics

- Excellent in heat insulation, chemical resistance and adhesion strength to the substrate.
- Good mechanical strength, durability and light weight.
- Homogeneous and continuous foam cell can be generated.
- Due to easy application, it can be easily applied to complex structure or parts.
- Efficient workability through reactivity control by season.
- Possible to apply polyurea, hybrid or RIM as protective coating for long-time durability under outdoor exposure.

Types of Products

PRODUCT NAME	KSF-ISO	KSF-1201B	KSF-362B
PROPERTIES			
Characteristic	CRUDE MDI	Cold Warehouse	Exterior insulation and waterproof
Rise Time (at 25°C)		< 14sec	< 16sec
Free Rising Density (kg/m ³)		26±1	38±2
Thermal Conductivity (W/m.K, at 20±5°C)		< 0.03	< 0.03
Compressive strength (N/cm ²)		> 15	> 25
Usage (kg/50cm. m ²)		1.5 ~ 2.5	2.5 ~ 3.5
Packing Unit(kg/Drum)	250	200	200

Application method

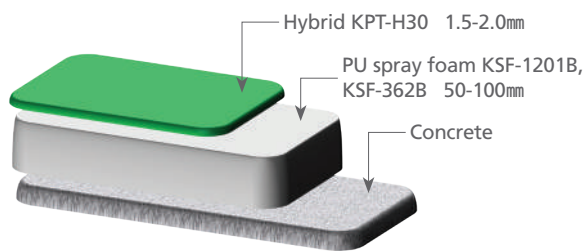
- Our KSF series are two-component system that is composed of MDI(A resin) and Polyol(B resin).
- Spraying after A and B resin mixed by 1:1 ratio(volume) using high pressure spray machine, it can make a thermal insulation layer on a substrate.

NOTES ON USE AND CASE STUDY

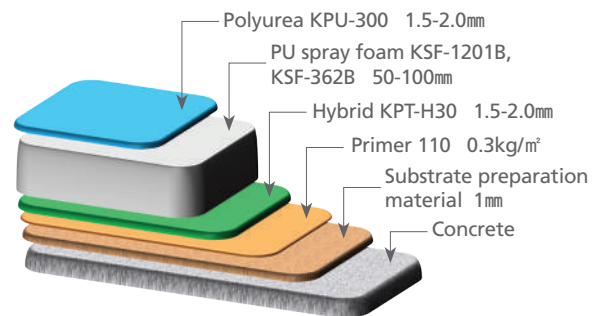
Notes on use

- 1:1(A:B resin) volume ratio is essential when machine operating.
- Cleaning of water, oil, veneer board dregs and paints on substrate before work.
- Do not work when high humidity, raining.
- Do not leave the fire occurred substances in the work place.
- Always wear personal protective equipment such as gloves/clothing/glasses when working with spray guns.
- Products must be stored less than 20 °C in a dry, cool, dark place and away from direct sunlight.
- Resin must be cut off from heat, moisture, (especially A resin reacts with moisture) keep container tightly closed after using.
- Avoid contact each A, B resin and A, B pump must be plugged suited position when handling resin.
- Use the products as fast as possible from manufactured day.
- Cleaning spray machine (gun, screen, hose..) after working.

Roof Insulation



Heat Reservoir Insulation/waterproofing



LNG storage tank Insulation



Roof Insulation of Warehouse



Water pipe Insulation for heating steam



Heat reservoir Insulation



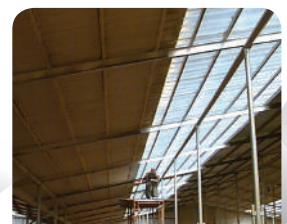
Roof Insulation



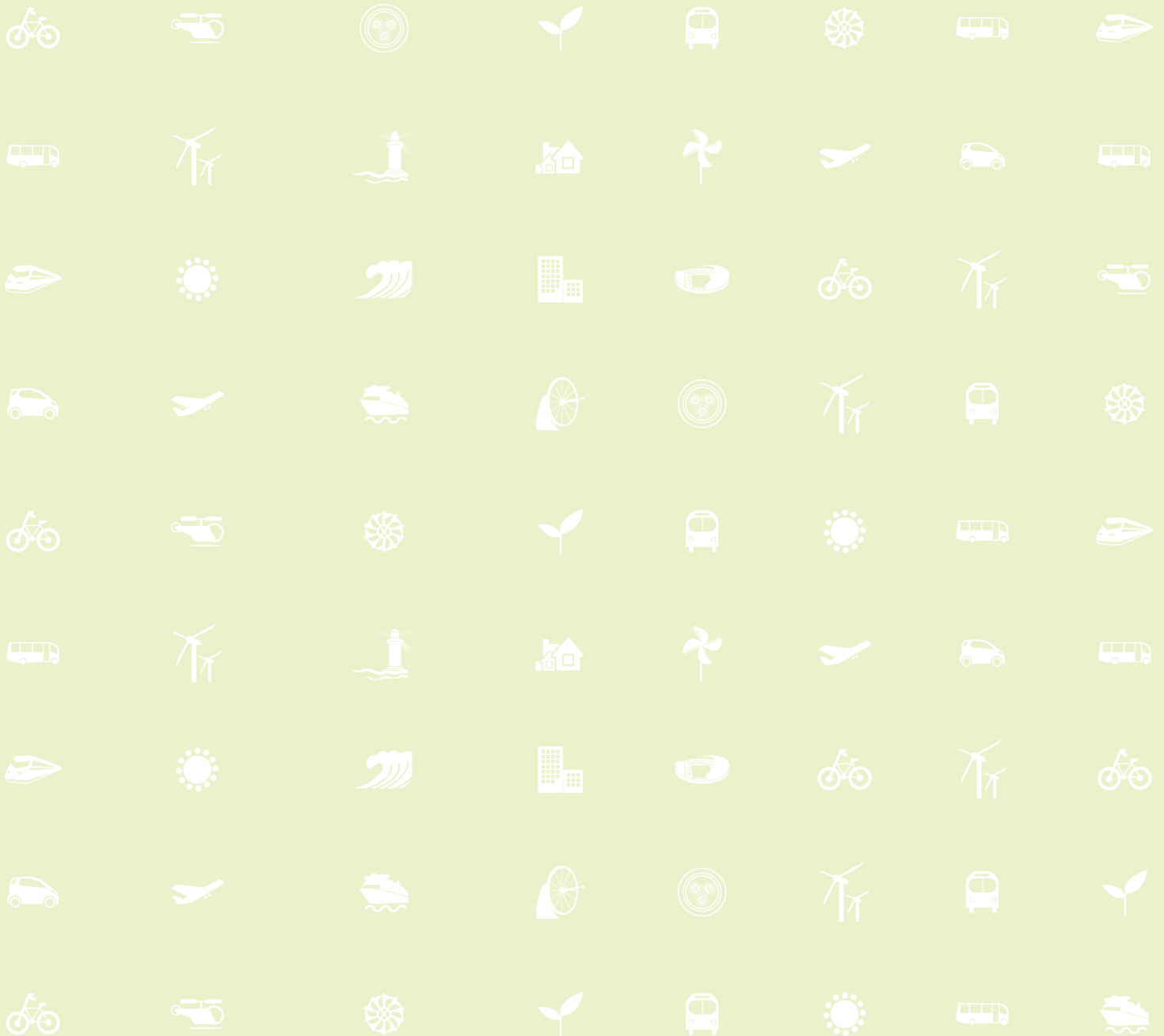
Inside Insulation of Cold storage house



Roof Insulation of Gymnasium



Roof Insulation of Livestock Building



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