

SPE Panel
The next generation of lining material



Bokju



**Clean Water, Healthy Water Eco-friendly Water Tank
Manufacturing Specialist Company**



Bokju co., Ltd

BOKJU's passion will continue to provide sustainable water with eco-friendly water tank development.

Company Introduction

Hello, BOKJU Co.,Ltd, we are always thankful for your interest and support. Since 2009, the year of foundation, we put all of our efforts to provide clean, healthy and sustainable water and kept developing technology to manufacture eco-friendly, modern water containers. As a result, we developed <SPE Panel Lining>, <SPE Combined Panel Reservoir>, <Inner and Outer Reinforced Cylindrical Water Tank>, and <SPE Chemical Tank> and we are sincerely happy that we meet the customers' expectations.

<SPE Panel Lining> and <SPE Combined Panel Reservoir> are already well recognized for their superiorities by being designated as premium products and got the honor of designation as [International Procurement Market Advance Support Corporation]. <Inner and Outer Reinforced Cylindrical Water Tank>, which was also designated as a premium product due to its resolution of the structural problems associated with the STS Cylinder Water Tank and being safe against external environment changes due to long-term exposure, has been developed into a mid and large capacity reservoir. BOKJU promises to do our best to be a leading company related to water.

Award Winning



the Most Advanced Technology in the world

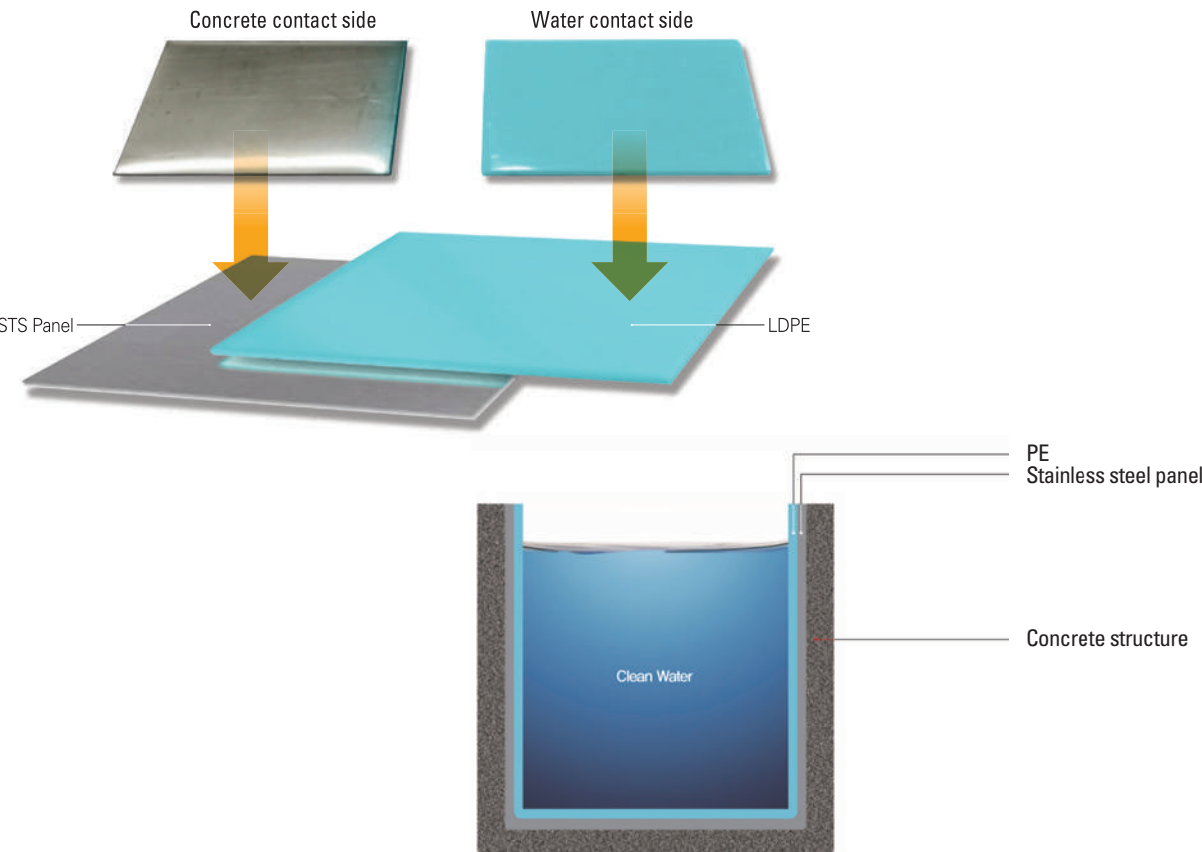
Company History

- 2018 04 | Participated in the ASIA WATER EXHIBITION in Malaysia
- 04 | Obtained FTA certificate (Certificate of product-specific approved exporter)
- 03 | Participated in Southeast Asia Trade Mission
- 02 | Obtained WRAS certificate (water regulations advisory scheme)
- 2017 12 | Signed a contract with Thailand company
- 11 | Signed a contract with Singapore company (USD1,000,000)
- 07 | Export to Vietnam (USD60,000)
- 03 | Signed a contract with India company (USD2,000,000)
- 02 | Establish overseas branch in Thailand (Bangkok)
- 01 | Obtained certificate of intellectual property management
- 2016 12 | Awarded grand prize for management innovation of GyeongSangbuk-do small and medium businesses
- 04 | Selected One of leading companies in water industry from GyeongSangbuk-do
- 03 | Malaysia foreign export contract signed (USD 3 million)
- 02 | Awarded Small and Medium Business Administration President Award Certificate
- 01 | Received INNO-BIZ Certification
- 2015 12 | Awarded Daegu Public Procurement Service Venture Business Special Award Certificate
- 11 | Participated in Korea Premium Goods Show in Tianjin, China as Excellent Company
- 11 | Joined Leaders in Industry-University Cooperation (LINC) (Yeungnam University)
- 08 | Certified for use in KC water supply (PDF Panel Water Tank)
- 07 | Signed MOU contracts with 2 Southeast Asian countries
- 02 | Awarded Korea Federation of SMEs Award Certificate
- 2014 06 | Certified premium procurement product (Inner and outer reinforcement and double-floor cylindrical water tank)
- 05 | Plant expansion and facility establishment
- 05 | Selected by the Small & Medium Business Corporation to be a supported company using the foreign private network
- 04 | Selected by the Small and Medium Business Administration to be a supported company in the enhancement of exporting capabilities
- 03 | Awarded 41st Commerce and Industry Day Federation of Korean Industries President Award
- 02 | Patent number 10-1362746 (Inner and outer reinforcement and double-floor cylindrical storage tank)
- 2013 12 | Patent number 10-1346569 (Storage tank and manufacturing method of storage tank)
- 09 | Collective Standard Certification
- 09 | Signed MOU contract for exporting water tanks to China
- 07 | Patent number 10-1289625 (Storage tank production method and the storage tank produced by that method)
- 2013 05 | K-Mark (Cylindrical storage tank with inner and outer reinforcement structure)
- 05 | Q-Mark (Cylindrical storage tank with inner and outer reinforcement structure)
- 05 | Patent number 10-1267022 (Cylindrical storage tank with inner and outer reinforcement structure)
- 04 | Patent number 10-1257325 (Installation structure of the flow control wall in the water storage tank)
- 03 | Selected by the Public Procurement Service as a company expected to enter the foreign procurement market (PQ-100)
- 02 | Certified for use in KC water supply (STS water tank/wall-body panel (SPE lining, PE flow control wall/STS lining))
- 2012 11 | Awarded Korea Environmental Industry & Technology Institute Water Management Green Technology Award
- 10 | Won Knowledge Economy Committee Commissioner's Award in Technology Innovation by Korean Small and Medium Business 's Innovation Awards
- 08 | Certified as a premium procurement product (SPE combined water reservoir, lining)
- 08 | "SPE" Brand acquisition
- 07 | Selected as venture company number 20120400448
- 05 | Passed the Chinese Ministry of Health test
- 03 | Foreign business department entered China
- 01 | Awarded K-Mark certification (SPE Panel Lining Water Reservoir)
- 2011 12 | Geon-Mark certification (SPE Panel Lining Unit Concrete Water Reservoir)
- 07 | Established company R&D center / Busan and Daegu branches
- 04 | Patent number 10-1029748 (Double-floor water reservoir)
- 2010 11 | Selected as CLEAN business
- 08 | Patent number 10-0978244 (Combined Panel Reservoir)
- 08 | Obtained ISO9001: 2008 & KSQ ISO9001: 2009 certifications
- 03 | Patent number 10-0949071 (Panel unit for lining and reservoir that uses that panel unit)
- 2009 09 | Confirmed proof of direct production
- 08 | Plant registration (Andong Namseon Industrial and Agricultural Complex)
- 07 | Incorporation

SPEP Panel lining

What is **SPEP Panel**?

SPEP panel is layered with LDPE sheet and stainless steel sheet.



Features

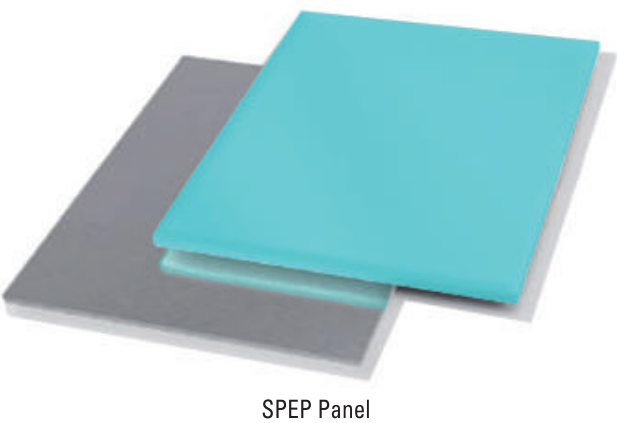
1. Semi-Permanent product life expectancy due to powerful compression strength on both sides and impact strength and exceptional wear-resistance.
2. Double-paneled so even if the water-contacting PE sheet is damaged, the wall-contacting STS steel plate maintains waterproofing function.
3. Excellent hygiene with non-harmful material and strong corrosion resistance against chlorine and fluorine gas (Water-contacting PE).
4. Maintenance and repair are very easy and inexpensive (Even when the PE sheet is damaged, repair is easy).
5. There are no quality issues due to external factors such as piping and temperature change (No spreading of corrosion).
6. Apply for various products such as concrete water reservoir waterproof lining, chemical tank, and wastewater storage.

The Most Advanced Technology in the world

SPEP Panel Characteristics

Technical

- Production of an integrated panel product by fusing LDPE onto a Stainless Steel plate



**SPEP
PANEL**

Hygiene

Harmless, non-toxic, odorless clean water tank with no environmental hormone or heavy metal elution

Economic Feasibility

Economical ripple effect enhanced product due to minimized defect and maintenance costs

Durability

Innovative product with fewer occurrences of defects that can be used semi-permanently and is corrosion free

Water reservoir **lining using SPEP panel**

Technical Details

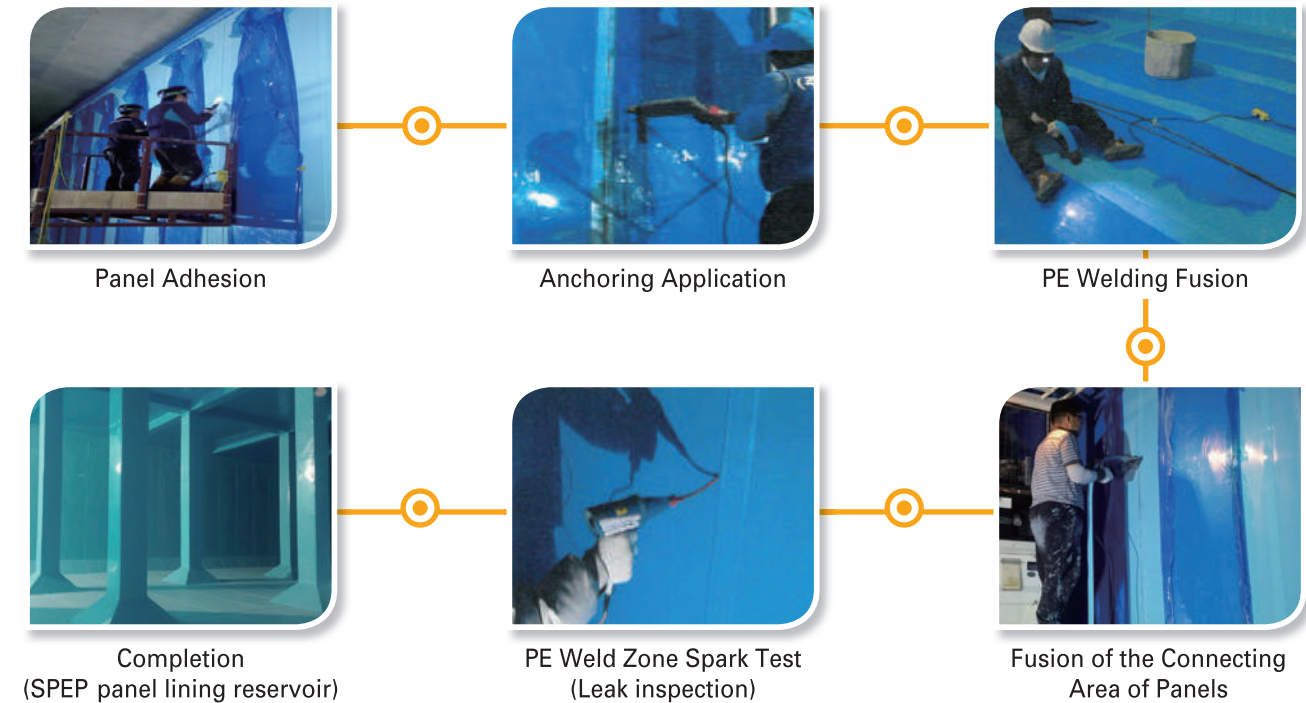
- Water reservoir lining using SPEP panel



Features

1. Excellence : Optimum internal waterproof product for use in construction of reservoir for potable water
 - STS : Good durability due to excellent material properties but vulnerable to chlorine
 - PE : Soft and weak adhesiveness to the structural body but excellent resistance to corrosion against chlorine
 - SPEP Panel: Combination of STS material properties + PE Chlorine corrosion-resistance qualities
2. Durability : Semi-permanent durability due to double adhesion during construction (primary adhesion to the structural body + anchor bolts attached at 70 cm intervals)
3. Economic Feasibility: 2/3 of the installation cost of STS lining, lowest LCC cost
4. Construction: Perfectly waterproof - Checking for defects with scientific method (Spark Test Instrument), perfect waterproof construction
5. Maintenance: Accomplishes both structure body durability enhancement and perfect water quality maintenance due to dual waterproof function of PE and STS's layered panel (SPEP panel) and the structural waterproof function of epoxy adhesive product (EMB) (no spreading of corrosion)

Construction Procedure



SPEP Panel Lining Projects

• Jeongseon Dumun Reservoir	: 9,000 ton, Combined
• Andong Angi Reservoir	: 400 ton, Combined
• Andong Anmak Reservoir	: 5,000 ton
• Andong Anmak Reservoir	: 500 ton
• Cheongju Yongjeong Reservoir	: 10,000 ton
• Gyeongbuk Sindochong Transferred Reservoir	: 20,000 ton
• Andong Okdong Reservoir	: 15,000 ton
• Jeju International Airport Reservoir	: 3,000 ton
• Cheongju Yullyang Reservoir	: 5,500 ton
• Daegu Technopolis Reservoir	: 5,800 ton
• Ulleungdo Dodong Filtration Plant	: 600 ton
• Daegu Manchon Reservoir	: 5,000 ton
• Constitutional Court Premises Reservoir	: 400 ton
• Andong Pyeonghwa Reservoir	: 500 ton
• Ulleungdo Dodong Reservoir	: 200 ton
• Cheongju Oksan Reservoir	: 2,500 ton and many more
• Cheongju Yongjeong Reservoir	: 2,150 ton
• Andong Okdong Booster Station Reservoir	: 810 ton
• Andong Iljik Gwimi Reservoir	: 640 ton
• Andong Songhyeon Reservoir	: 3600 ton
• Cheongju Jibuk Reservoir	: 22,175 ton
• Cheongju Osong Reservoir	: 15,000 ton

Comparison of waterproofing products

	SPE Panel Lining	Other materials
Construction	100% waterproof construction <ul style="list-style-type: none">Anchor construction on concrete structure	Fragment type or simple adhesion
	Anchor construction	
Maintenance	Partial repair possible and lowest repair cost <ul style="list-style-type: none">Repair damaged part with PE welding columnLess than 20% compared to previously	Excessive repair cost, partial repair not possible <ul style="list-style-type: none">Epoxy, PE Sheet, Tile type: Difficult leak inspection and repair, concrete curing requiredSTS : Acid cleaning expense required
	No water outage or interruption of operation <ul style="list-style-type: none">Regular cleaning is sufficient for maintenance	Operation interruption required even for simple repairs
	Even if foreign material enters the reservoir's structure through the pipe, there is no effect on reservoir. (No spreading of corrosion)	Fragment, Tile type : Waterproof removal <ul style="list-style-type: none">STS : Reservoir body/corrosion spreading occurs
	Dual waterproof <ul style="list-style-type: none">STS maintains water-proofing when PE is damaged	Single layered waterproof immediately leaks when a problem occurs
Durability	Chlorine resistance, chemical resistance, no chlorine effect	STS: Most vulnerable to chlorine
	Semi-permanent life-span <ul style="list-style-type: none">STS, PE → Material with more than 40-50year durability	<ul style="list-style-type: none">Epoxy : 3 - 5 yearsSTS : 10 - 20 years (Corrosion, rusting)Tile type : 5 - 10 years
Hygiene	Eco-friendly, hygienic material <ul style="list-style-type: none">Fully recyclableFree of corrosion, harmful leachable materials	Epoxy : Environmental hormones such as Bisphenol A <ul style="list-style-type: none">FRP : Designated waste, fiberglass elutionSTS : Heavy metal elution during corrosion
Economic Feasibility	LCC : (Life Cycle - Cost) Lowest Cost <ul style="list-style-type: none">Realization of lowest LCC through construction, durability, maintenance, recyclable, etc. (More than 60% lower compared to epoxy)	Increased LCC due to lack of durability, maintenance, etc. (At least 2 - 3 times compared to SPE panel)

Construction Example

This is an eco-friendly product that prevents leakage of stored water and blocks the inflow of external pollutants. The interior of the water tank is made with PE material to prevent corrosion by the disinfection chlorine and guarantee safe and clean water quality.



Before Installation



After Installation



Before installing collecting well



After installing collecting well



Before installing collecting well



After installing collecting well



Before Installation



After Installation

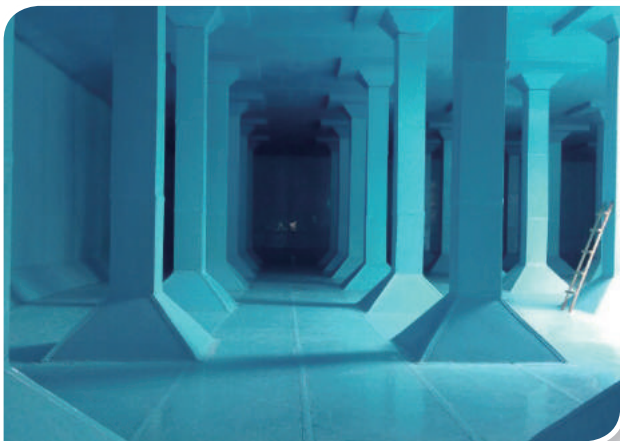
SPEP Panel Completed Pictures



Gyeongbuk Sindoecheong Transferred Reservoir (20,000 ton)



Cheongju Yullyang Reservoir (5,500 ton)



Jeju International Airport Reservoir (3,000 ton)



Andong Anmak Reservoir (5,000 ton)



Daegu Manchon Reservoir (5,000 ton)

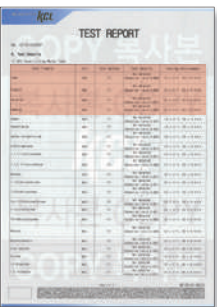


Andong Okdong Reservoir (15,000 ton)

SPEP Panel Test Results

Adhesion strength & Dissolution test

The standard measure suggested on the “KS M ISO 4624 paint and varnish-adhesion peel test” is “0.56MPa or above.”



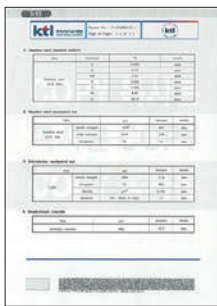
TEST RESULTS				
TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Pull-off Strength	MPa		5.0	Appropriate use criteria for water pump and other materials

Standard measure 0.56 → Results of Test by Bokju 5.0MPa
Adhesion strength improved by 5 times

Test Item	Unit	Test Method	Test Results	Testing Environment
Adhesion	MPa	ASTM D 1002	Not detected	23 ± 2 °C, 50 ± 5 % RH
Dissolution	MPa	ASTM D 1002	Not detected	23 ± 2 °C, 50 ± 5 % RH
Corrosion	MPa	ASTM D 1002	Not detected	23 ± 2 °C, 50 ± 5 % RH

Not detected in all 26 items
Sanitation and safety verified

K Mark Performance Certification



Korea Testing Laboratory
K mark Performance Certification

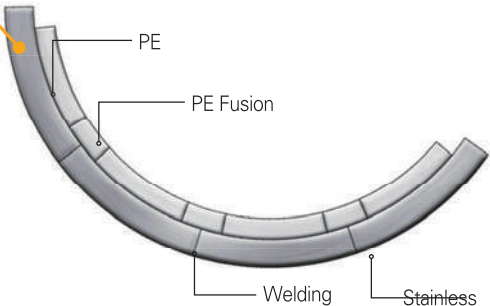
Water Regulations Advisory Scheme



WRAS
Water Regulations Advisory Scheme

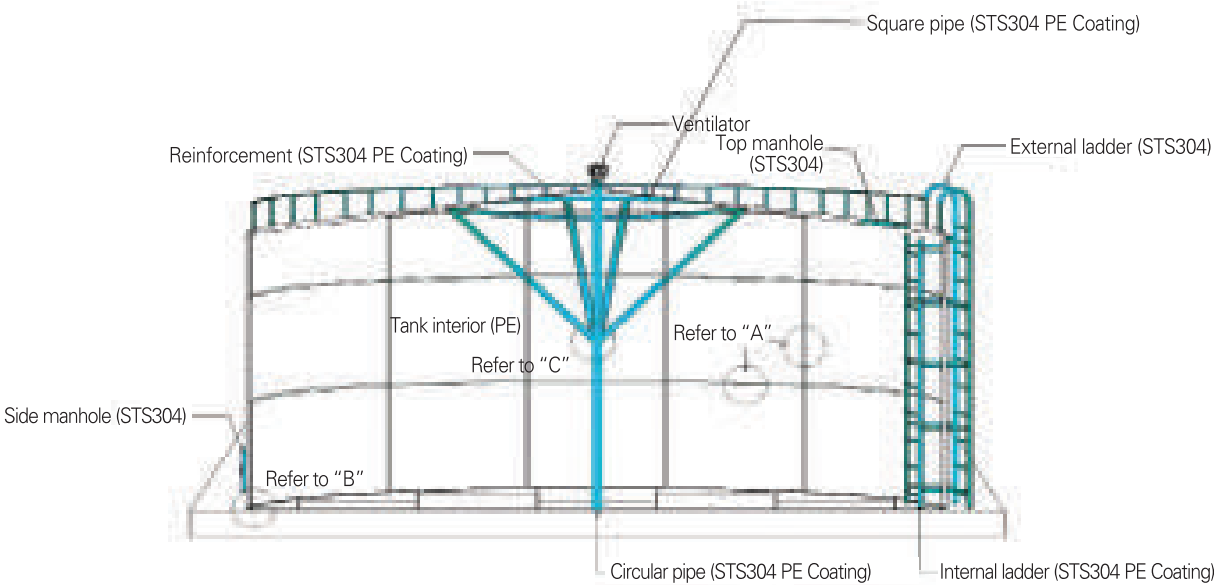
SPEP Panel Tank

First in the World! Combination of the Best of PE and STS!
Dually protected semi-permanent effect SPEP panel tank

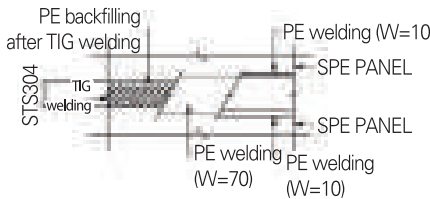


Features

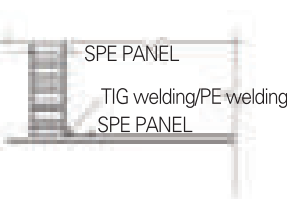
- Economical and exceptionally innovative product that remedies the shortcomings of existing products
- Hygienic and harmless to humans, eco-friendly product (STS: Universal Use, PE: Drinking Use)
- Combination of the strong chemical resistance of the inner PE part and the structural stability of the outer STS
- Semi-permanent life-span (STS gives semi-permanent protection to PE which is weak against UV rays)
- Dual waterproof (Double protection against chemical leak, separate total welding of both STS and PE)
- Large capacity tanks possible through STS welding enhanced structural body
- Structural Stability: Secured structural stability through combined STS part welding
- Maintenance is easy and inexpensive (Defective area PE fusion, simple repair)
- Perfect waterproof construction (Spark tester equipment)
- Excellent economic feasibility (Almost the same as existing PE, FRP tank construction cost)
- Excellent thermal effect by installing external thermal material
- Extensive Use: Usable from filtration plant, tap water, and chemical storage tanks to waste storage



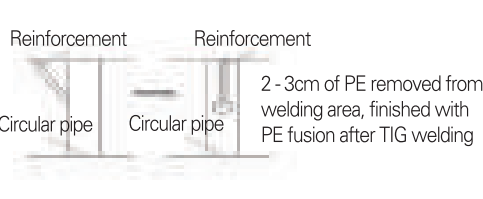
"A" Panel (Interior) connection welding elevation detail



DETAIL "B"



DETAIL "C"



STS Cylinder Type Water Tank

The internal and external of enhanced double-floor STS cylinder water tank with excellent structural stability with earthquake resistant design, economic, durability and corrosion resistance!



Features

- Perfect internal and external enhanced construction
 - Prevents or delays water tank explosion, rupture or overturning
 - Enhanced durability and structural stability against fatigue accumulation, snow load, etc.
 - Increased resistance coefficient of external impact or expanded water pressure (stress)
- Introversion bend welding
 - No basic material damage or body part corrosion
 - Increased stress resistance coefficient
- Double floor construction
 - Enhanced earthquake resistant design and stability due to integration of basic pad and water tank floor plate
 - Corrosion prevention of body part of floor plate material
 - Enhanced structural stability due to decreased fatigue accumulation against movement such as typhoon and overturn prevention

Fission Painting Apply Effect

- Light reflection prevention, no decolorization/discoloration and balance with surrounding environment
- Keeps elegant figure of tank and protects external finishing material
- Enhanced sealing intensity by creasing longitudinal line (improved durability against external impacts)

STS Panel Type Water Tank

Bolt assembly type water tank



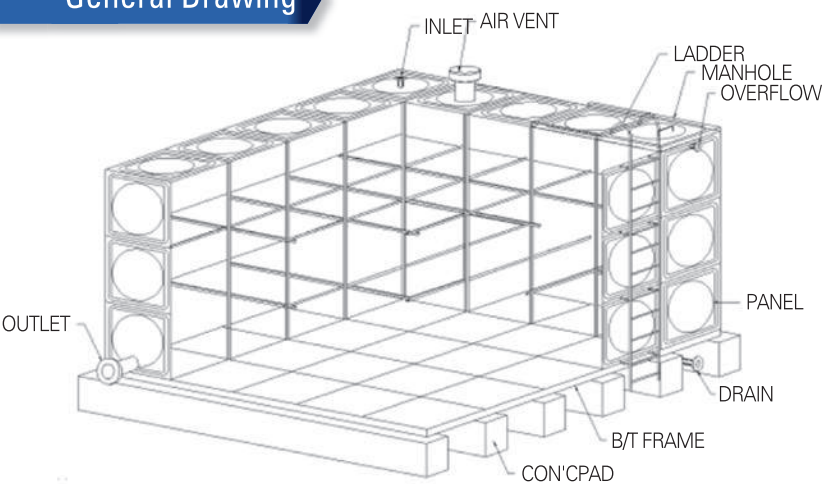
This is a developed product of STS panel for water tank. Each of 500 × 500, 500 × 1000 and 1000 × 1000 mm standardized panels is assembled and constructed to comply with the field's circumstances and order capacity.

General welding water tank

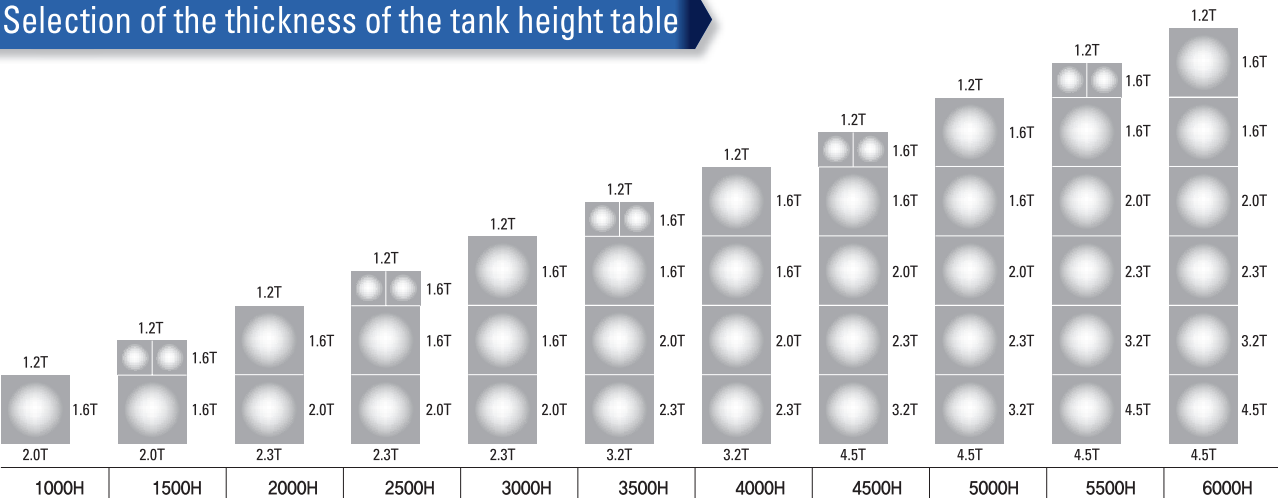


500 × 500, 500 × 1000 and 1000 × 1000 mm formed panels of STS panel are used and installed with welding

General Drawing



Selection of the thickness of the tank height table



STS Lining

Lining material : STS formed panel is welded on STS flat bar sequenced as check tiles such as STS304, STS329J3L or STS329LD. Lining 1000 x 2000 mm is the standard specification and it can be arranged and installed flexibly according to the field circumstances.



Specifications

- Thickness : 1.5T~2.5T
- STS flat bar : 2~3T
- STS Set anchor : M6~M10

Construction Example



Before Installation



After installing desalination



Before Installation



After Installation

Construction Procedure



Flat bar arrangement and fix



STS panel tack welding
& STS panel regular welding



Welded part post-processing (Coating)
& Completion

Flow Control Wall

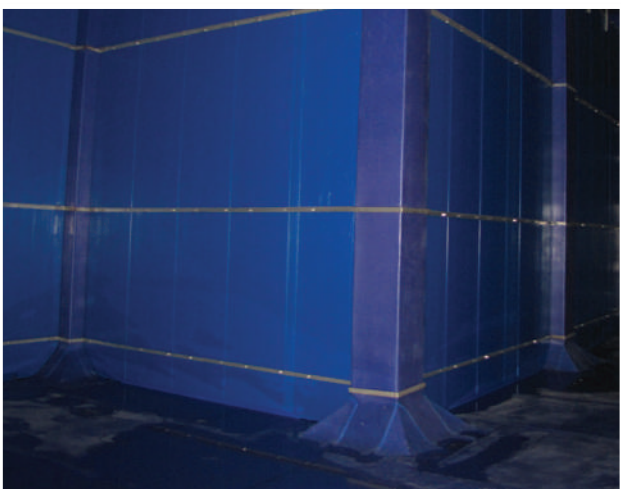
Installed in middle and large sized concrete structure water reservoir. Prevents water stagnation by making water flow smoothly.



STS Flow Control Wall



SPEP Lining Flow Control Wall



PDF Flow Control Wall



PDF Flow Control Wall

Features

- Existing flow control wall
 - Existing construction method of flow control wall involves fixing it to the wall and floor of water reservoir body using anchor bolts and it is known to cause water leak or other defects.
- BOKJU's flow control wall
 - BOKJU's patented construction method is an improvement on the existing method and it solved the problem of water leaks or defects by constructing water control wall with non-anchor bolt.
 - BOKJU is a specialized company that supplies and constructs various material flow control walls such as STS, PDF and SPE flow control walls with its own technology when constructing flow control walls.

Only! Clean Water! Healthy Water!

BOKJU's passion will continue
to provide sustainable water with
eco-friendly water tank development.



Selected as '10th Water Industry Leading Company'
in Gyeongsangbuk-do



Won Technology Innovation Award



Newspaper article in Vietnam



Signed MOU with China



Signed an export contract with Malaysia



Signed MOU with China



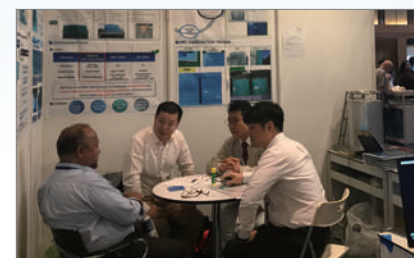
Signed MOU with India



Signed MOU with Singapore



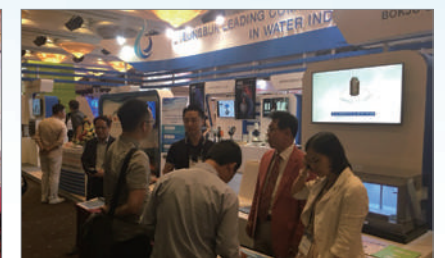
Signed MOU with Vietnam



Asia Water Exhibition in Malaysia



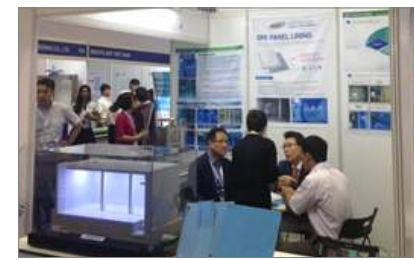
BOKJU product presentation in Vietnam



Korea Best Product Exhibition in Vietnam



Thai Water Exhibition



Water Exhibition in Vietnam





THE MOST ADVANCED TECHNOLOGY IN THE WORLD



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