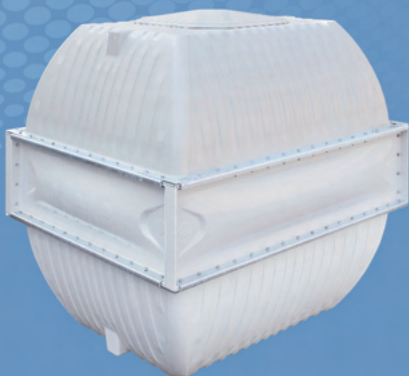




ONE TANK

GRP TWO-PIECES WATER TANK



SANGWON ENG CO., LTD.

SANGWON GRP Water Tank, ONE TANK

Company Profile

Excellent in Clean & Hygienic and, Non-leakage.
Sectional GRP Water Tank for Easy to Design and Installation.

Our company specializes in the development and production of GRP Water Tanks. Located in Gimhae, our large-scale plant and research center are dedicated to on going development and production to lead the industry. Our advanced technology has received ISO, WRAS(UK), BSEN(UK), PSB(SINGAPORE) certification and is garnering world acclaim.

In addition, with a corporate ideology rooted in placing our customers first, we base our management and product development upon this foundation of trust, contributing to technological innovation, quality improvement, and added value enhancement.

In order to carry out such customer-oriented management, we constantly keep in mind the priorities of stringent quality management and environmental protection. In following, we adopted ISO product quality and environmental management standards from the very beginning and our efforts to grow as an environmental friendly company along with our customers are never ending.

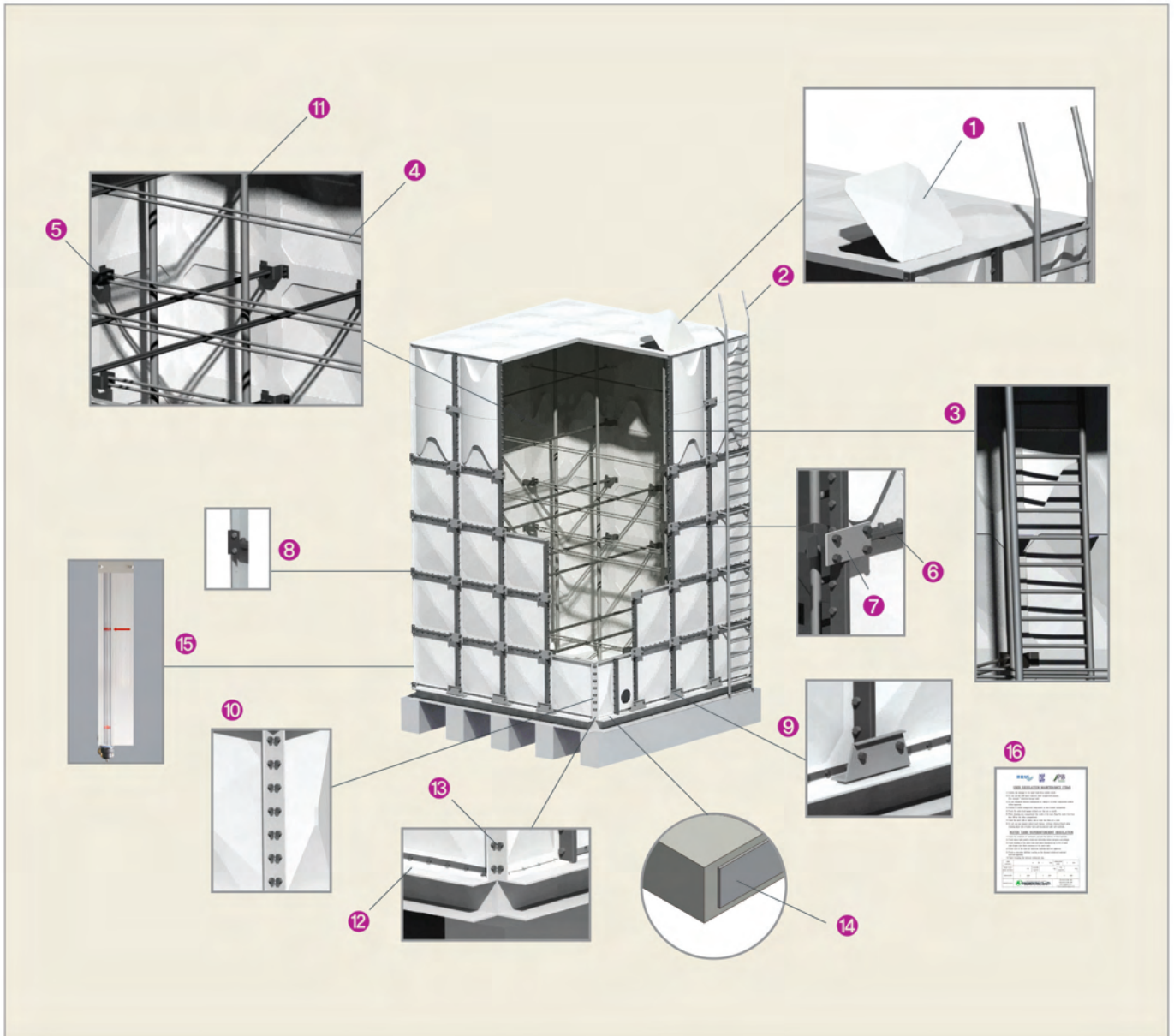
We ask for your continuing interest and support. Thank you.



Water tank panel factory

Internally Reinforced System

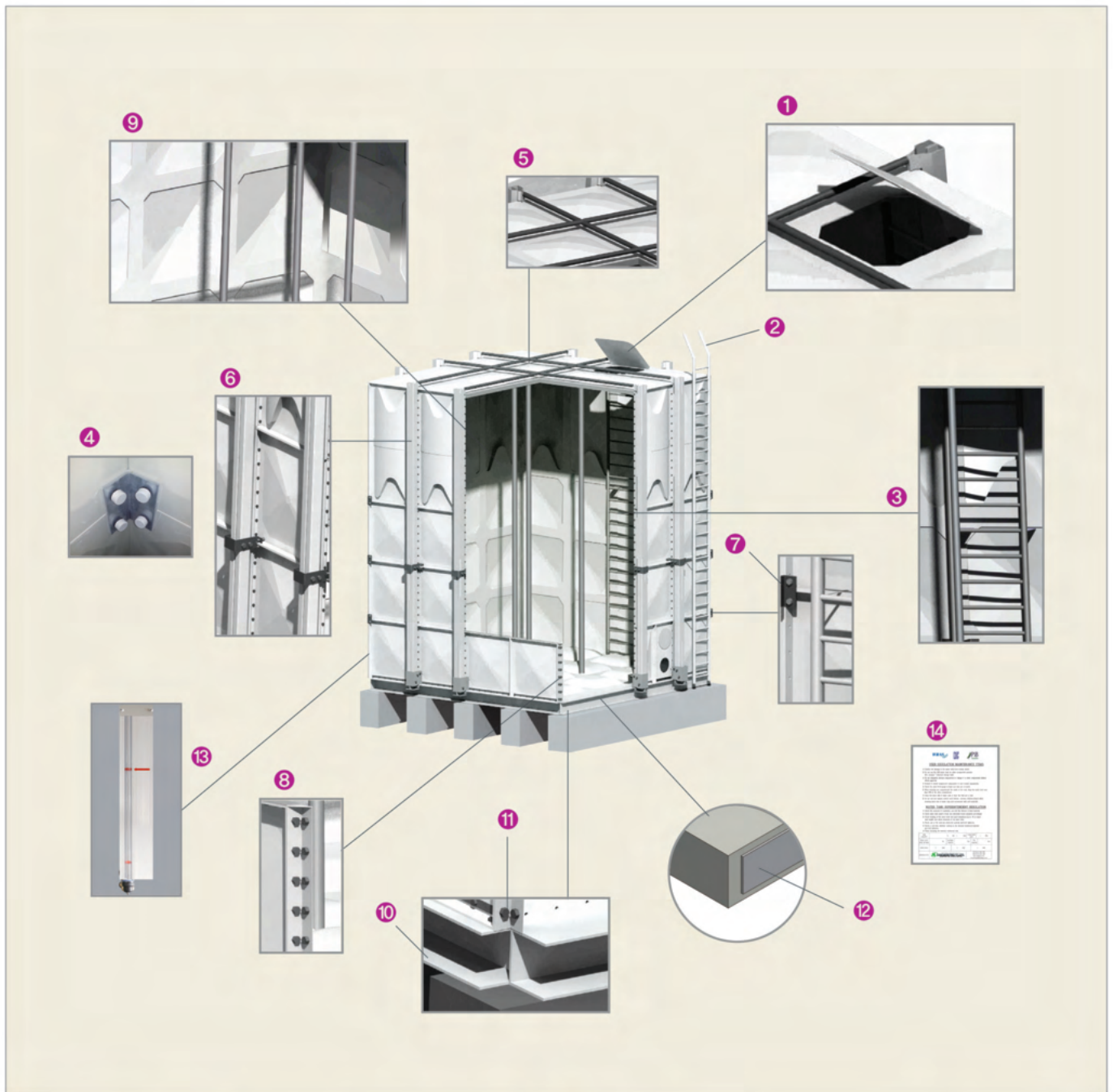
- It is possible that various capacity's design and flexible space should be used by GRP panels standardized
- Excellent watertightness, hygienic conditions and non-leakage applied internally reinforced stay(Stainless)



No.	Name	Material
1	Manhole panel	GRP
2	External ladder	SS400 (HDG)
3	Internal ladder	GRP (Pultrusion)
4	Internal tie rod	GRP Tie rod GRP, STS304(PET coating), STS316L (PET coating)
5	Internal bracket	High strength GRP GRP, STS304(Powder painting), STS316L (Powder painting)
6	Flange bar, Flat bar	SS400 (HDG)
7	External bracket	
8	Corner bracket	
9	Bottom bracket	

No.	Name	Material
10	Corner frame	SS400 (HDG)
11	Roof support pipe	GRP (Pultrusion)
12	Base frame	SS400 (HDG)
13	Bolts and nuts	Inside STS : Bolt/Nut(304, 316L), Washer(316L) Roof panel : acetyl cap bolt(M10) Outside : HDG Bolt + PVC Bolt cap Connection : HDG + Acetyl cap (M14) Size : M10, M14
14	Sealing tape	PVC Sealant + Butyl or EVA Sealant+ PVC Sealant
15	Water level gauge	Aluminum case + PE Clear tube + Socket
16	Name plate	Aluminum (water tank safety management instructions)

Externally Reinforced System



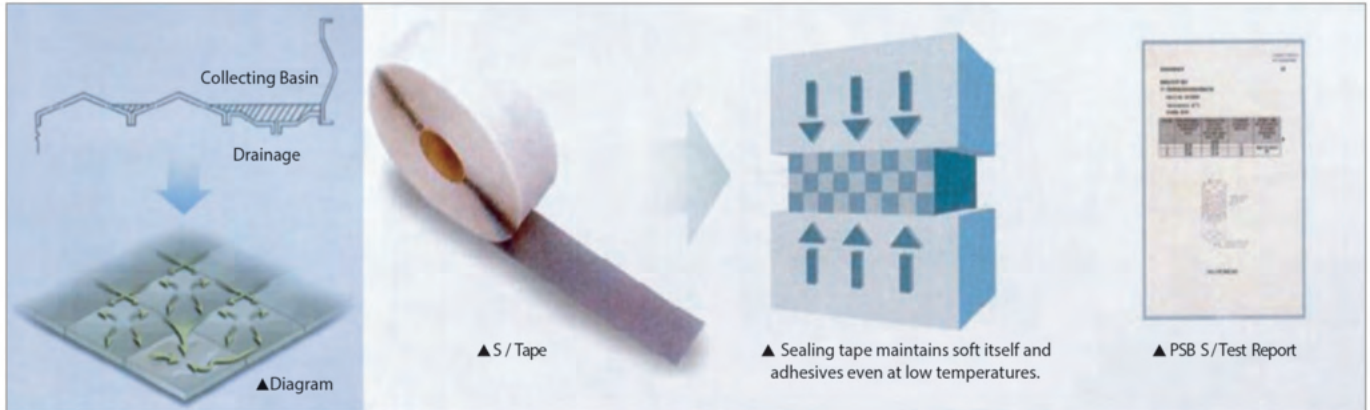
No.	Name	Material
1	Manhole panel	GRP
2	External ladder	SS400(HDG)
3	Internal ladder	GRP (Pultrusion)
4	Internal bracket	GRP, STS304(PET coating), STS316L(PET coating)
5	External support tie-rod	HDG PIPE
6	External pair frame	1.5~2.5mH : Bent type, 3~5mH : I-Beam type
7	Corner bracket	SS400(HDG)
8	Corner frame	
9	Roof support pipe	GRP(Pultrusion)

No.	Name	Material
10	Base frame	SS400(HDG)
11	Bolts and nuts	Inside STS : Bolt/Nut(304, 316L), Washer(316L)
		Roof Panel: Acetyl cap bolt(M10)
		Outside : HDG Bolt + PVC Bolt cap
		Connection: HDG + Acetyl Cap (M14)
		Size: M10, M14
12	Sealing tape	① PVC Sealant + Butyl ② EVA Sealant + PVC Sealant
13	Water level gauge	Aluminum case+PE Clear tube+Socket
14	Name plate	Aluminum (water tank safety management instructions)

Perfect Watertight & Drain System

- As using foaming type sealant tape which is excellent water proof & force of restitution, maintains perfect non-leakage of the water tank. The concave drain panel facilitates complete and quick drainage.

Type of Sealing Tape		Characteristic
Optional Items	EVA+PVC	Applicable to 50°C
	Butyl+PVC	Preventing to Stick PVC tape out from GRP Panel



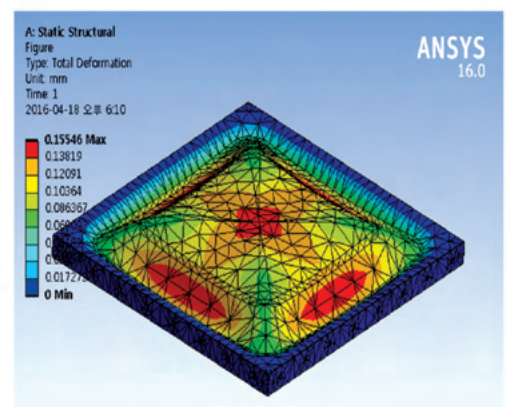
Strength & Durability of GRP Water Tank

Section	Design Standard
Hydrostatic pressure	More than 4 times the hydrostatic pressure strength Strain at full water : Less than 1% of tank height
Wind force	Less than 60m/sec
Seismic resistance	Design of Seismic intensity 5.0 structure (additional reinforcement is required when seismic intensity is 5.0 or higher)
Snow load	60Kg/m ² , Snow fall less than 30cm
Illumination rate	Less than 0.1%
Out-fit force	No leakage under condition of vertical 100Kg load with 100A fitting and 70mm span supporter
Water temperature	Usable temperature : Less than 30°C / Limited temperature : Max 70°C
Water quality	Tap water, well water : chlorine below 50mg/ℓ Seawater : application externally reinforced water tank (max 4m height)

Stress Analysis of GRP Panel

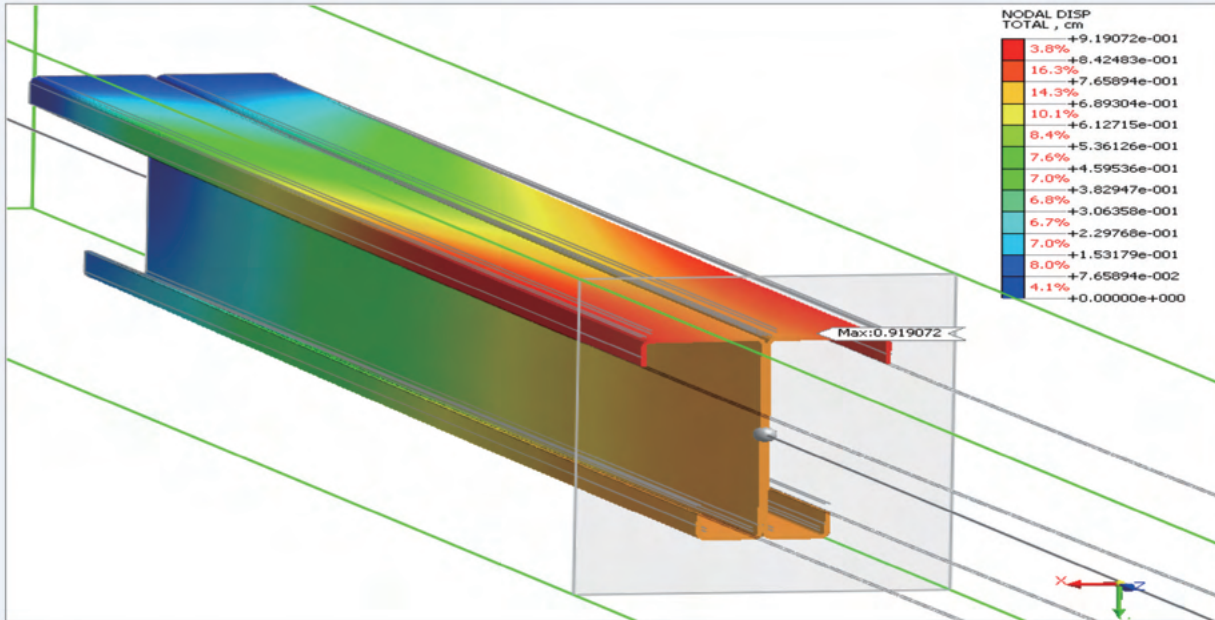
- GRP Water tank panel is designed with special shape for maximizing safety against stress and deformation, so it has better structural strength than normal circle designed panel.

- As GRP Water panel is manufactured by oil-hydraulic press under high temperature and high pressure, it maintains top water pressure strength and there is no dimensional deviation by temperature change.

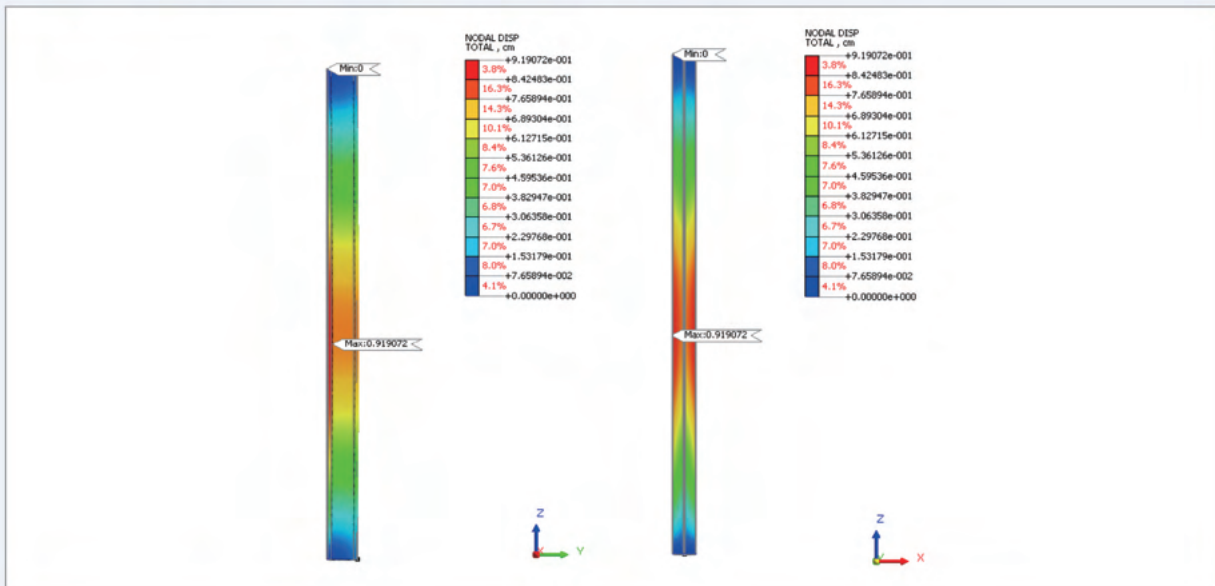


Externally Reinforced System Structural Analysis

FEM - Water Tank Height (3MH-75m³)



FEM - External Pair Frame (3MH-75m³)



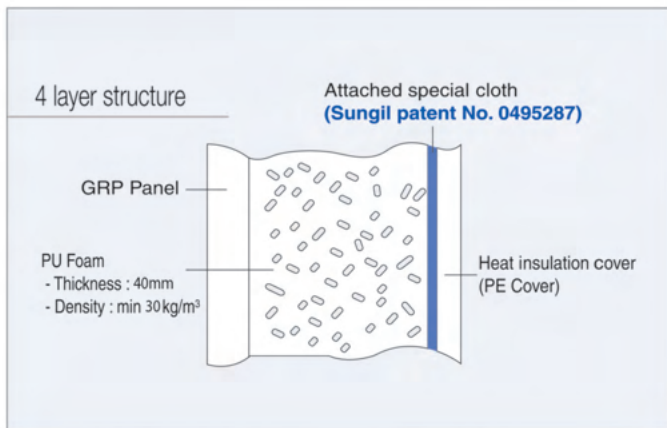
- Result of Skid base strength review (Safety Factor 2.0)

Height	Contents		Bending Stress(kg/cm ²)	Result	Remark
3.0mH	Main Skid Base	Long term	1520 < 1600 (Allowable value)	OK	
		Short term	2130 < 2400 (Allowable value)	OK	

Excellent Heat Insulation

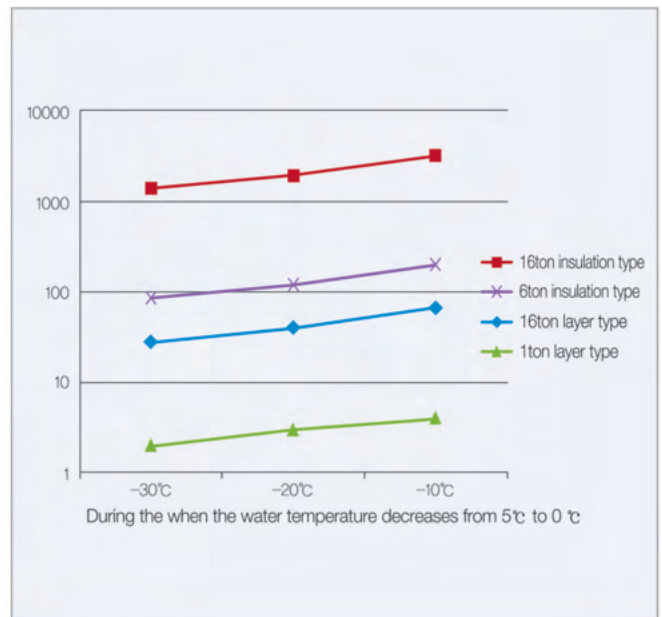
Composition of Insulation panel

- Excellent insulation of GRP material itself with Eco-friendly Polyurethane heat insulating material prevents freeze & water condensation.
- There is non-woven fabric with excellent adhesion inside GRP insulated panel, ensuring shape stability of panel throughout longer time periods.
- GRP insulated panel with 4 layers structure ensures excellent insulating effect.
- Thickness of insulated panel : 40mm.



During the time when the water temperature decreases from 5° to 0°

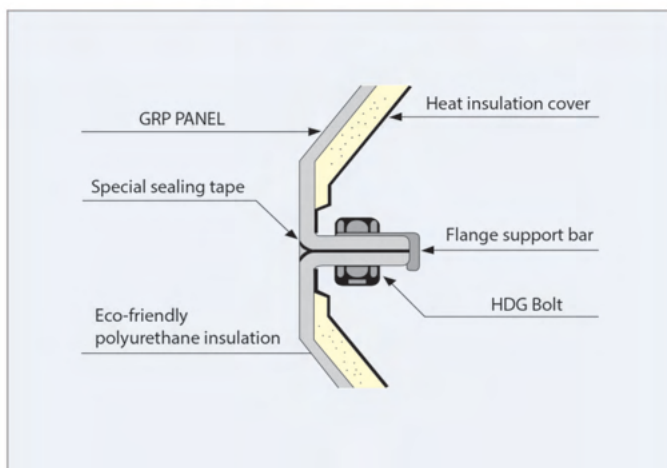
Capacity	Classification	Temperature of Atmosphere		
		-10°C	-20°C	-30°C
16 m ³	Single Layer Type	67 hr	40 hr	28 hr
	Insulation Type	3215 hr	1929 hr	1377 hr
1 m ³	Single Layer Type	4 hr	3 hr	2 hr
	Insulation Type	200 hr	120 hr	86 hr



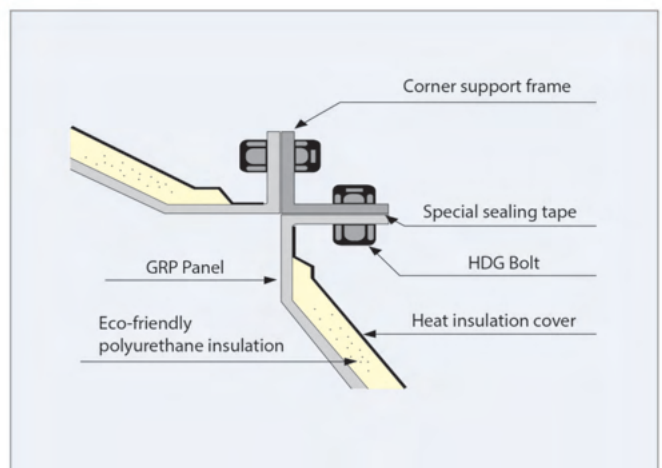
※ Test condition

- Tank is filled with water
- No further water supply, or drainage during the test

Drawing of Panel Joint Part / Corner Part



- Heat insulation foam core thickness : 40mm



●● Partition Type Water Tank

- It is possible to eliminate unusable space, and utilize the maximum space, by installing a partition type tank. Economical and effective for maintenance.

● Special feature

- Utilizing maximum capacity

In the basement or other confined areas, it is possible to eliminate unusable space, and utilize the maximum space, by installing a partition type tank.

- Various uses

If partition type tanks are installed, one section can be used for drinking water, and the other section for service water (Ex. fire fighting).

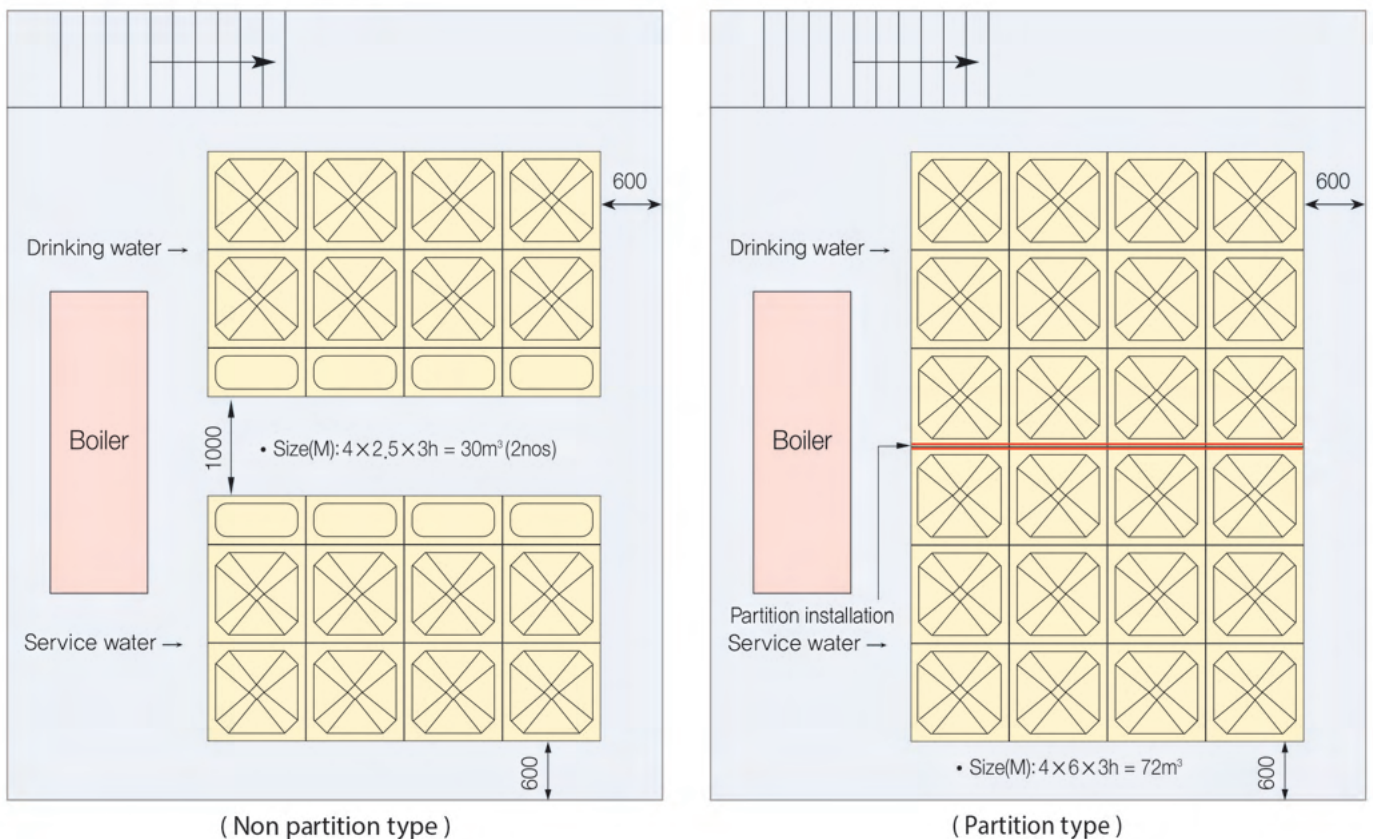
- Easy maintenance

It is convenient for maintenance, because two tanks can be installed as one unit.

- Cost effectiveness

The cost and installation of 1 partition tank is cheaper than 2 separate tanks.

● Partition Installation



● Effect for Partition Water Tank System

If a tank with different uses is installed in the boiler room which has limited space as a partition-type tank, capacity of 72m³ can be divided to use 36m³ of drinking water and service water each.

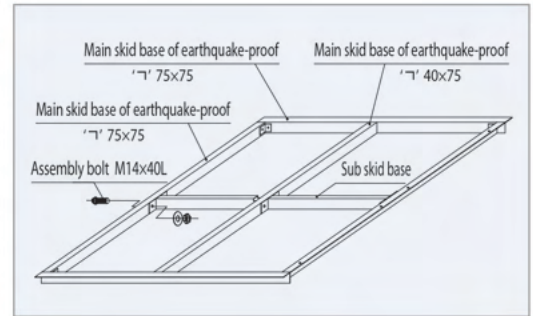
However, if separated two tanks are installed, the maximum capacity of each tank is 30m³ only since there should be 1 meter distance between each tank for maintenance and operating space.

Earthquake-Proof Skid Base System

-Height of water tank 2.5mH, height of water tank 4m, GRP sectional panel, putting water to 85% of water tank height, earthquake-proof strength 5.0

•Result of skid base strength review (Safety Factor 2.0)

Height	Contents		Bending Stress(kg/cm ²)	Drooping(cm)
2.5mH	Main skid base	Long term	1170 < 1600(Allowable value) ■ O.K	0.15 < 0.25(Allowable value) ■ O.K
		Short term	1340 < 2400(Allowable value) ■ O.K	0.17 < 0.33(Allowable value) ■ O.K
	Sub skid base	Long term	1590 < 1600(Allowable value) ■ O.K	0.21 < 0.25(Allowable value) ■ O.K
		Short term	1830 < 2400(Allowable value) ■ O.K	0.25 < 0.33(Allowable value) ■ O.K
4mH	Main skid base	Long term	790 < 1600(Allowable value) ■ O.K	0.06 < 0.25(Allowable value) ■ O.K
		Short term	900 < 2400(Allowable value) ■ O.K	0.27 < 0.33(Allowable value) ■ O.K
	Sub skid base	Long term	1540 < 1600(Allowable value) ■ O.K	0.15 < 0.25(Allowable value) ■ O.K
		Short term	1750 < 2400(Allowable value) ■ O.K	0.17 < 0.33(Allowable value) ■ O.K



Wave Proof Panel for Earthquake-Proof

Sample Size
4.0(W) × 4.0(L) × 4.0(H) = 64.0Ton

Floor plan of Wave Proof Panel

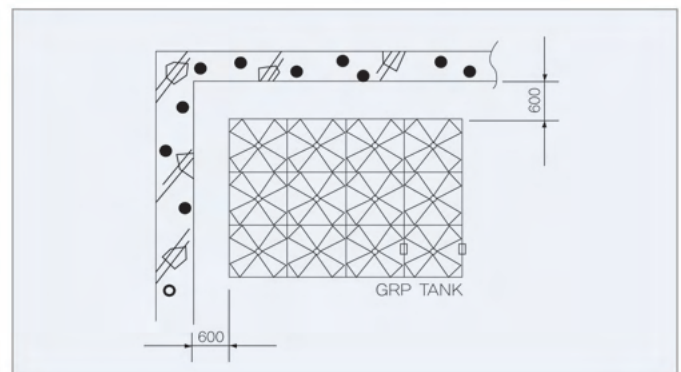
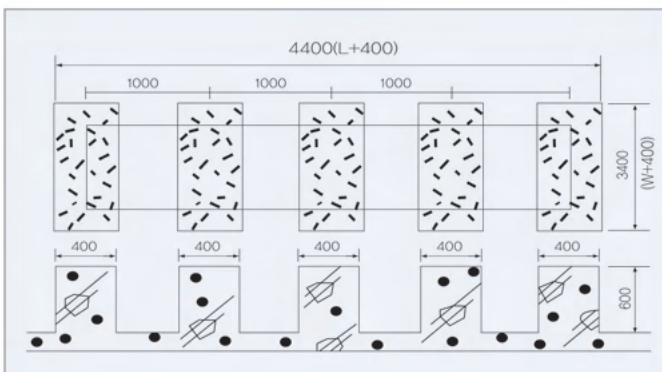
“Earthquake-resistant design and Fire safety standards of Fire fighting facility” The third clause of Article 4

-Wave proof panel shall be installed from the center of water tank to 4 directions, the length must be over one half of water tank length, the height must be over one half of water tank height.

Installation Standard(Pad and Space)

Standard of Base Concrete PAD Installation and Space

- For maintenance of GRP tank, it needs extra space at least 600mm from wall and 1,000mm from ceiling.



GRP Water Tank Installation Processing



Base concrete
PAD & Bottom panel assembly



Wall panel assembly



Roof panel assembly



Internal tie-rod & Roof support assembly



Completed

Installation and Caution

- 1) Customers are requested to make foundation pad construction according to the designed specifications and the strength of the site.
- 2) Check the evenness of foundation(Within 5mm) and the flatness of base material.(Within 0.5mm)
- 3) Check rust of the external reinforced material and any bolts and nuts, their tightness.
- 4) Check installed state of the external ladders and water level gauge.
- 5) Check bending of the water tank wall panel(maximum up to 1% of water tank height) and check skewness of the water tank.
- 6) Check a corrosion inhibitor coating on the internal reinforced material and bolts tightness.
- 7) Check drooping the internal reinforced stay and check assembled state the internal bracket.
- 8) Check assembled state of the internal ladder and roof supports.
- 9) Check the size of socket for plumbing will be installed.
- 10) Check assembled state of a socket for plumbing.

GRP TWO-PIECES WATER TANK

■Excellent Insulation

- Insulated panel with 4 layers structured & using Eco-friendly Polyurethane heat insulating material ensure excellent insulating effect

■Easy to clean & Excellent hygienic

- Because of wide manhole, it is easy to clean inside of water tank & it has excellent hygienic & watertightness

■Excellent durability

- It secures excellent surface strength & durability as Using high-temperature & high pressure press machine (2,500 Ton)

■Competitive Price

- Excellent price competitiveness & High quality Water tank with no tie-rod type

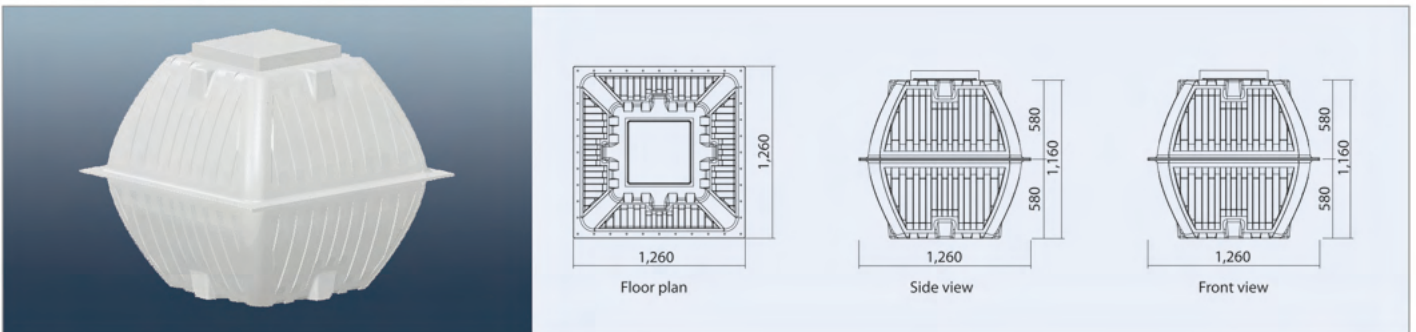
■Easy & quick to install

- It is easy and quick to install with easy assembly of upper & lower panels

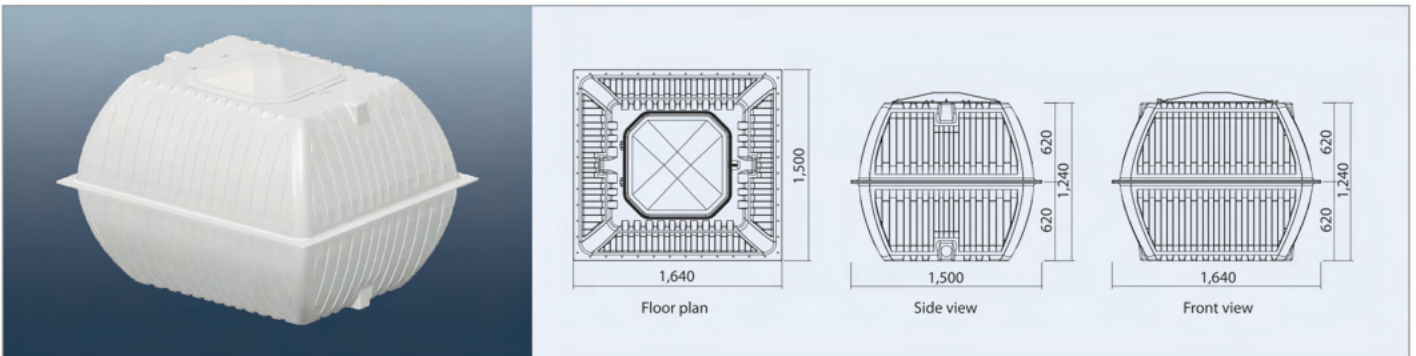
■Structure of Non Skid base

- Excellent Earthquake-resistant without concrete frame & skid base.

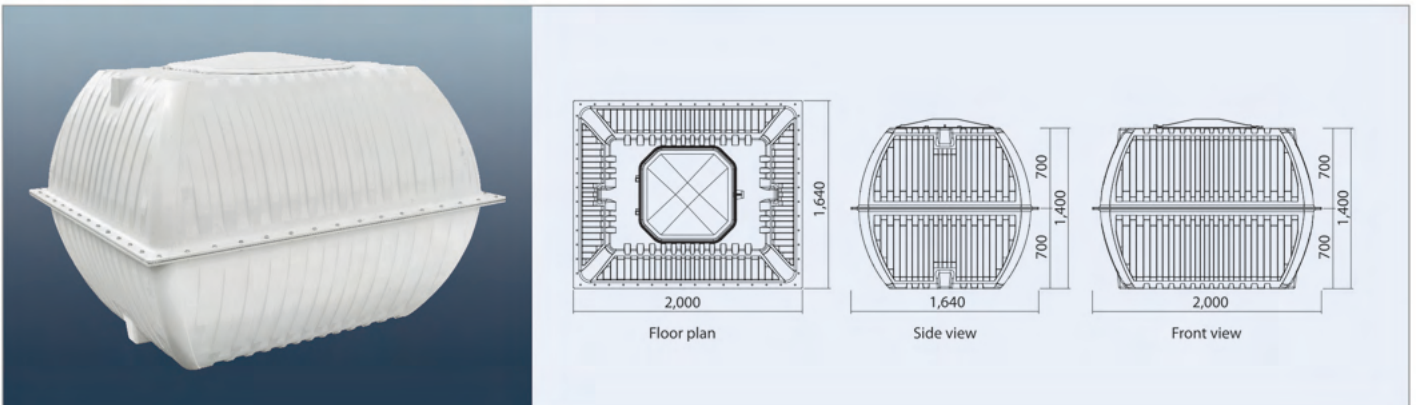
● GRP TWO-PIECES 1m³ TYPE (5m²)



● GRP TWO-PIECES 2m³ TYPE (8m²)

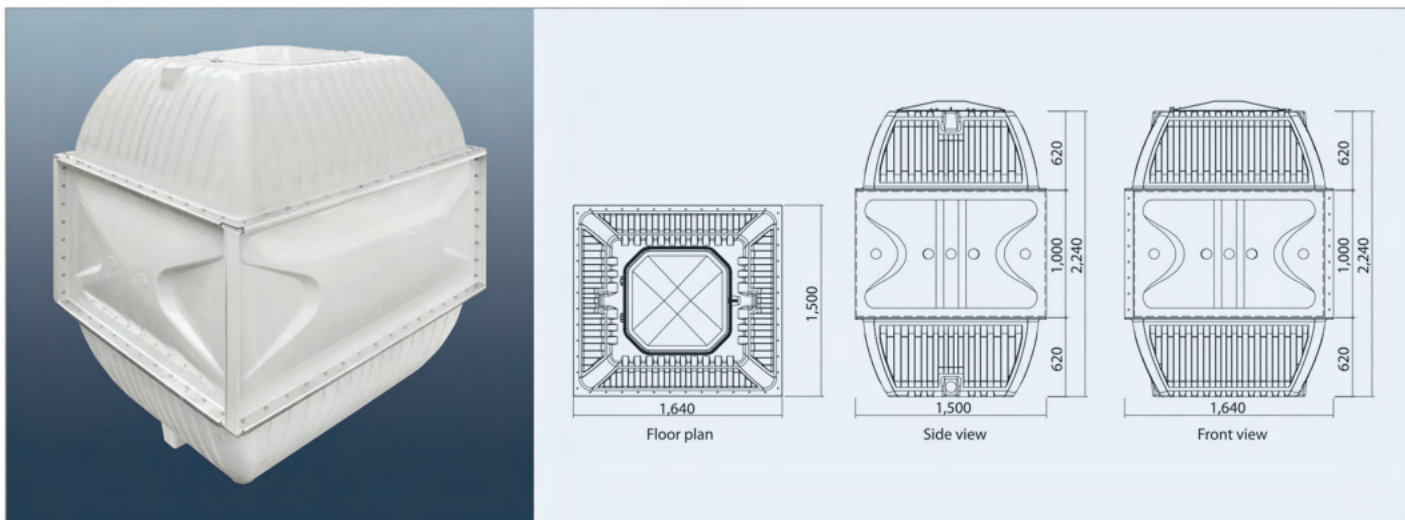


● GRP TWO-PIECES 3m³ TYPE (10m²)

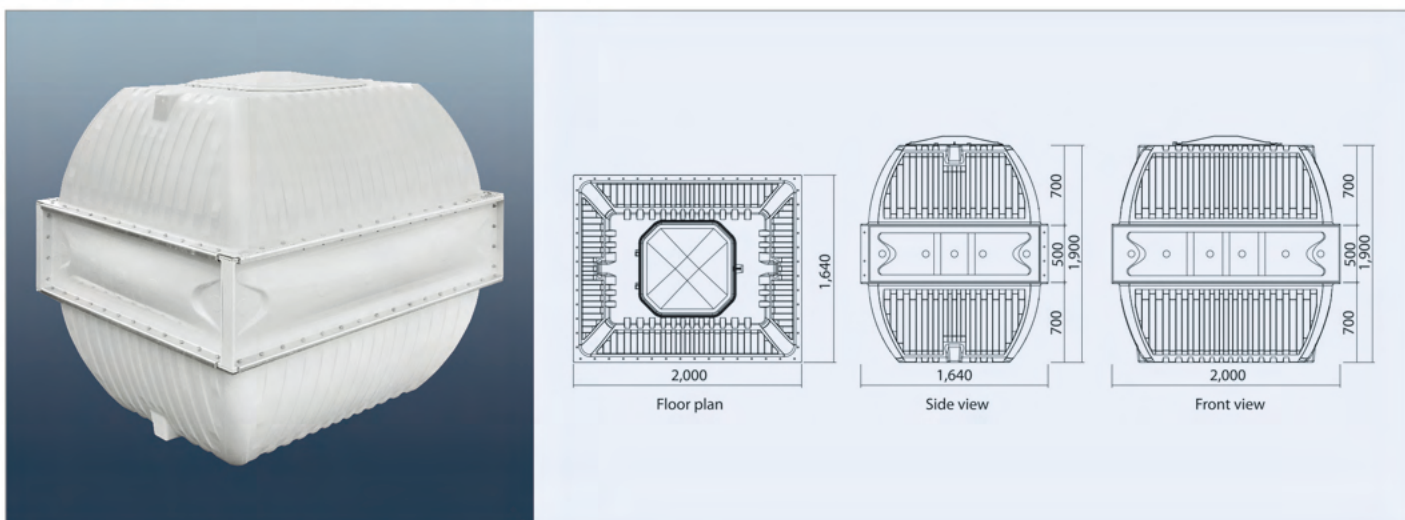


GRP TWO-PIECES WATER TANK : Earthquake resistant reinforced type

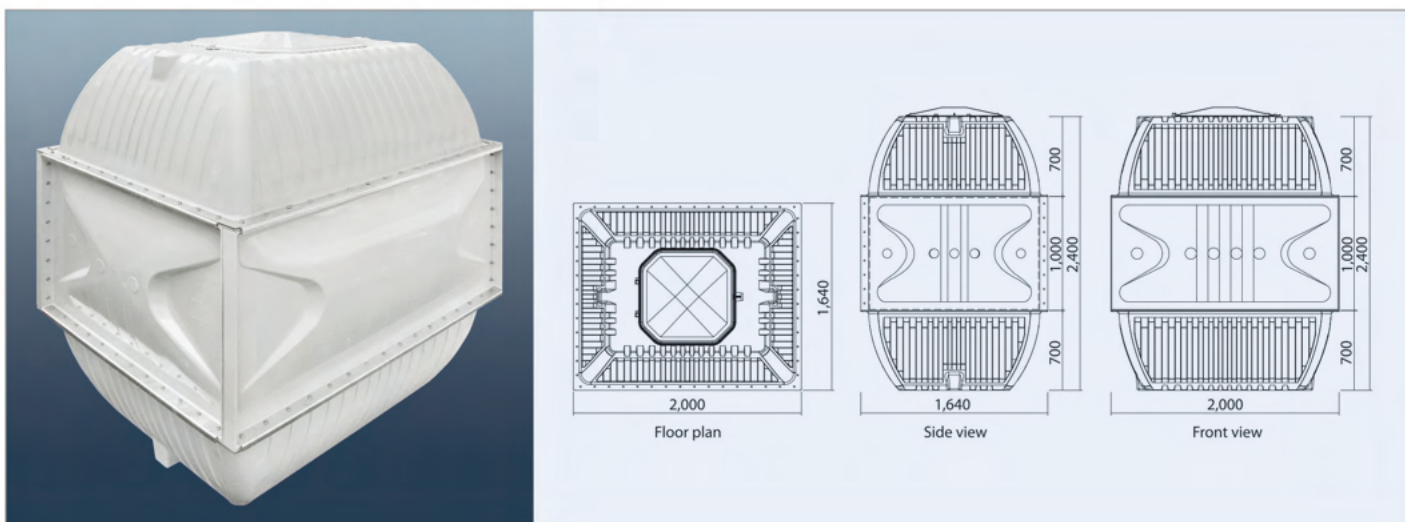
GRP TWO-PIECES 4m³ TYPE (13.5m²)



GRP TWO-PIECES 5m³ TYPE (14m²)



GRP TWO-PIECES 6m³ TYPE (17m²)



⦿ Maintenance Control

- To keep the tank clean and ensure its safe use, please perform the following inspection and maintenance work.
- SANGWON ONE TANK Panel tanks are designed and manufactured for long-term service. Maintenance and inspection must be conducted to secure hygienic and long life. To facilitate easy and safe maintenance and inspection, a proper space must be secured around water tanks.

⦿ Maintenance Control

- 1) Caution the damage to the water tank from outside shock.
- 2) Do not use the GRP water tank for other unapproved purpose.
(For example chemical storage tank)
- 3) Do not dismantle internal components or change it to other components without official approval.
- 4) Prohibit to install unapproved components or non-consent equipment.
- 5) Maintain standard water level at all times
(Keep the 85% water level of water tank height)
- 6) Clean the inner side of water tank at least 2 times per a year.
- 7) In case of partition water tank, keep under 50% water level of the water tank height in opposite side when clean water tank.
- 8) Do not use any organic solvent such thinner, acetone, chlorine bleach when cleaning inner side of water tank and recommend with soft material.
- 9) Ventilating Water tank frequently.

- Location : Head office water tank
- Size(M) : 4 X 3 X 6mh



⦿ Maintenance Item

Maintenance item	Interval	Remarks
1. Clean the inner side of water tank	2 times / year	- When cleaning inner side of water tank, need to use soft materials like soft cloth or sponge, do not use rough materials like steel brush or wire.
2. Looseness of the bolts and nuts	2 times / year	- Retighten any loose bolts and nuts. (do not use impact wrench)
3. Check standard water level	1 time / month	- Checking operation of water level control valve.
4. Check cloginess of airvent, overflow	1 time / month	- Removing foreign body and cleaning.
5. Manhole cover	1 time / month	- Making sure that the manhole cover is completely shut, always keep it locked.
6. Turbid water	1 time / month	- Checking the inner parts of the tank, the outlet and the other places for turbid water.
7. Water leakage and deformation of the tank	1 time / month	- If the water tank leaks or deformed, immediately contact the local sales representatives.
8. Internal & external pressure other than hydrostatic pressure	1 time / month	- If any pressure other than hydrostatic pressure applied to the tank, immediately return the tank to its normal state.
9. Looseness of the bolts and nuts for Ladder	1 time / year	- Fasten loose bolt for ladder. - When bolt rusted, need to remove the rusting and coat for rustproofing on the bolt. - When the bolt is corroded, need to replace the bolt.

●● Certificates For GRP Water Tank

- Getting all international certificates and Test reports for GRP Water tank
- Realization of customer satisfaction through quality management system
- GRP Water tank of best quality with competitive price

● GRP Water Tank Certificates and Test Reports



ISO



WRAS Certificate (U.K)



PSB Test Certificate (Singapore)



BSEN (U.K)



Head Office View



- GRP / STEEL TANK MANUFACTURER -
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