www.thermosetme.ae

Cherish water & Clean nature

KORVAN™

GRP Panel Water Tanks

THERMOSET TECHNOLOGIES (MIDDLE EAST) L.L.C.

GRP Sectional Panel Water Tank

WRAS APPROVED PRODUCT

PSB TEST

KQA Q.Assurance

BAS ISO 9001 REGISTERED

BAS ISO 14001 REGISTERED

BAS OHSAS 18001 REGISTERED

DAC DUBAI ACCREDITATION CENTER CB-022-MS

Cherish water and Clean nature KORVAN

● CEO Message

We are pleased to introduce ourselves as a dedicated manufacturer of GRP products in Korea. We are a front-runner in the creation of a better living environment using high technology, the newest facilities and high-quality manufacturing capabilities. Based on unsaturated polyester, we manufacture GRP sectional panel for water tank and artificial stone such as Sink top, Sink bowl, Bath tube, Ceiling panel by huge hydraulic press

Since the establishment in 1996, we have worked to develop improved living environments through continuous research and investment.
Now we expand business stage to the whole Asia,
the Middle East, Africa and Oceania in order to afford a high qulified products to global customers. And we will keep working to become an enterprise that creates the worldwide value of the living environment, sharing most useful products with global customers.

Always we think over our customers as we do our own family,
working hard to cultivate the health and living environment-oriented business.
We will grow up as a world-renowned superior enterprise,
realizing the best in customer satisfaction by providing excellent products and services for the living environment, and by establishing corporate and organizational cultures suitable for the global environment.

Thank you.

Sincerely yours

Yong-Ki Lee
CEO

Headquarter

KORVAN GRP Panel Water Tanks
THERMOSET TECHNOLOGIES (MIDDLE EAST) L.L.C.

Export-Award Tower
(A hundred million dollars)

THERMOSET Technologies GRP PANEL WATER TANK

Thermoset Technologies (Middle East) was founded in **2004** in DIP, Dubai (United Arab Emirates) with a view to cater the growing demand for quality portable water storage system keeping low cost, low maintenance, and high reliability.

Its products are certified by ISO **9001:2008**, KS Q ISO **9001:2009**, EN ISO **9001:2008**, WRAS UK (Water Regulations Advisory Scheme) and utilized by the water and electricity governing bodies of several countries in G.C.C and MENA region, such as United Arab Emirates, Saudi Arabia, Kuwait, Qatar, Jordon, Iraq and Egypt.

Thermoset Technologies LLC is appointed by Korvan Ind. Co. LTD., Korea as an exclusive sole agent and distributor for the Middle East market for their GRP water tanks.

The company is quality-driven and is continuously engaged in investing latest technology along with innovative design in manufacturing.

The company emphasizes in personalized sales and after-sales service, which have been the driving forces in understanding the customized requirements of our clients. Teams of qualified engineers and experienced marketing personnel have ensured customer satisfaction.

WRAS

WATER REGULATIONS ADVISORY SCHEME LTD. (WRAS)
MATERIAL APPROVAL

GLASS REINFORCED PLASTICS (GRP) - COMPONENTS.

APPROVAL NUMBER: 1501513
APPROVAL HOLDER: KORVAN INDUSTRY CO. LTD.

CERTIFICATE OF CONFORMITY

Product Listing Scheme : Class 2

FOR

Product: GRP/FRP Sectional Water Tank
Brand: KORVAN
Model:
Country of Origin: Korea
Product Details: Size: 1m (l) x 1m (w) x 4m (h)

Standard(s)
SS 245 1995, SS 373:2001 & AS/NZS 4020:2005

Test Report(s)

KQA

Certificate of Approval

KQA approves that the Quality Management System of the following company is conformed with the certification audit criteria

Certificate No: KQA-Q082292
Company: KORVAN CO., LTD.
Address: Head office: 37, Anjingol-ro, Wolgot-myeon, Gimpo-si, Gyeonggi-do, Republic of Korea
Second factory: 434, Dangjotbuk-ro, Daegot-myeon, Gimpo-si, Gyeonggi-do, Republic of Korea

The standards for this certificate of conformity is as follows

Management Systems Standards
ISO 9001:2008, KS Q ISO 9001:2009, EN ISO 9001:2008

Scope of Registration
Manufacture of Ferro molybdenum, Molybdenum briquette, Ferro vanadium and Press molded product(Artificial marble for sink, Water tank)

Original Approval: 4 February 2008
Validity: 4 November 2013 - 3 November 2014
Date of issue: 4 November 2013

Korea Quality Assurance

KORVAN Industry Material R&D Center

is doing its best to maximize the customer's profits through hygienic and safe product development and exhaustive quality control measures under the objective of creating living environments which global customers can enjoy together.

Approved by world best quality certification

Certificate of WRAS (Water Regulations Advisory Scheme - United Kingdom)
NO 0907573 (Sections 5120)

Korvan GRP Sectional Water Tank meet the requirements of WRAS Test of effects on Water Quality/BS6920 : 2000/ Odour and Flavour of water test : and is suitable for use with Hot and Cold water

Certificate of PSB(Productivity and Standards Board - Singapore)
Test specification SS245 as the safety for 6 times water pressure

Approved by PSB(Singapore Productivity & Standards Board) Test specification SS245 as the safety for 6 times water pressure and sanitation for potable water

Test for Water quality

Test for Panel Transformation

Test for Hydraulic Pressure

PSB test for 1 x 1 x 4mH

Physical property

Korvan panel and reinforced parts confirmed by a strict quality standard

ITEM	VALUE
Tensile strength	83~104 Mpa
Flexural Strength	170Mpa
Barcol Hardness	59
Absorption rate	0.04%
Glass fiber content	32.2%
Oder & Taste	Not detected
Turbidity	Below 2 degree
Color	Below 5 degree
Light transmission	Nil
Heavy metals	Not detected
Consumption of KMnO4	1.3mg/L
pH(20'C)	7~8.5
Phenol	Not detected
Evaporation reside	4.0mg/L

Certifications

DUBAI MUNICIPALITY

ENVIRONMENT PROTECTION AND SAFETY SECTION
PERMIT NO. 899/2005

Issued To	:	Thermoset Technologies (Middle East) L.L.C.
Location	:	Dubai Investment Park
For	:	Fiberglass Products
License No.	:	558606
Date	:	08/03/2005

Signed
Director Environment Department

The permit holder is required to comply with all Dubai Municipality Local and Administrative Orders regarding Environment Protection and Safety issued from time to time and specifically each conditions attached.

DISTRIBUTOR CERTIFICATE

KORVAN

KORVAN COMPANY LIMITED

To whom it may concern

Hereby we certify that

"THERMOSET TECHNOLOGIES LLC" is

appointed by "Korvan Company Limited" as an

authorized distributor for the UAE market.

Term : Nov. 1, 2014 ~ Oct. 30, 2015

KORVAN IND. CO., LTD.

Y. K. LEE / PRESIDENT

TEST REPORT

TEST RESULTS

Korea Testing & Research Institute

President

TEST REPORT

TEST RESULTS

Korea Testing & Research Institute

President

Process of erection Korvan GRP sectional water tank

Cutting and measure SMC sheets

Molded by hot hydraulic press

Inspect GRP panel

Drill on the GRP panel

Concrete foundation for the erection of water tank

Assemble bottom panel

Erect wall and partition panel

Assemble roof panel and manhole

Delivered high quality products to global customers

It is the time for you enjoy Korvan water tank with best Quality and leading Technology.

Qatar / Size 3 X 9 X 2m/h : 54 Ton

Labor City / UAE / Size 12 X 12.5 X 2m/h : 300 Ton

Ajman / UAE / Size 7 X 9 X 2m/h : 126 Ton

Saudi Arabia / Size 9 X 12 X 4m/h : 432 Ton

Bahrain / UAE / Size 7 X (5+5) X 2m/h : 140 Ton (78 Set)

Sudan / Size 9 X 25 X 4m/h : 900 Ton

What is GRP Water Tank?

GRP Sectional Panel Tanks are constructed of panels made from SMC(Sheet Molding Compound) by hydraulic hot press under high temperature (150℃) and pressure conditions to maintain the best endurance.

Using stainless steel for the interior structure and plated steel for the exterior, the panel exhibits excellent resistance to erosion.

Easy installation with on-site bolt assembly and Tank shape and volume can be freely designed with no restrictions based on site location,weather or climate.

COMPARISON : Korvan GRP panel type vs Other types

	Water quality	Water tightness	Durability	Transportation	Maintenance	Anti-corrosion	Installation
Korvan GRP Panel tank	◎	◎	○	◎	◎	◎	◎
Concrete Tank	X	△	△	X	X	◎	△
Steel Tank	△	◎	○	△	X	X	X
Stainless Steel Tank	◎	◎	○	△	△	△	X
GRP Hand Lay-up tank	△	◎	○	X	△	◎	○

◎ : Very good ○ : Good △ : Normal X : Poor

※ It is possible that the roof panel of stainless steel tank get rust by high concentration of chlorine contents

Structural Analysis of Korvan GRP Panel

Korvan GRP water tanks are designed to be the safest panels through optimized design.

If the panels are reliable, the cost of reinforcement can be reduced and the best water tanks can be made at the most economic cost.

(SMC Durability)

Design Basis : External force 〈 Maximum feature / Safety Factor

Item	Design Condition
Seismic load	horizontal Seismic Kh = 2/3 Vertical Kv = 1/3 Designed bases on Kh = 1/3G, horizontal seismic load.
Hydrostatic Pressure	Water Level [Height in Meters] x 0.1KGF/㎠ [0.01MPa] Designed to stand against hydrostatic pressure enough The max. change of side wall is less than 1.0% of total height left in Water for 38 hours.
Snow Load	60 kgf/㎡ [at the base of 30㎝ of snow depth] Designed to stand under 200kg/㎡ enough
Wind Load	Wind Load – 255 kgf/㎡ [2.55 x 10-3 Mpa] Designed to stand under max. 60m/sec even in case tank dose not include water.
Illumination	Illumination – Under 0.1%
Water Temperature	Under 30℃ (normal) / Under 50℃ (maximum) (Special making in case of thermal spring)

Structural Design of wall panel (1m X1m)

GRP water tank
Internal reinforcement structure

1 External Ladder (HDG)

2 Internal Ladder (GRP)

3 Corner Frame (HDG)

4 External Flange Bar – Angle (HDG)

5 External Flange Bar – Flat (HDG)

6 Roof Supporter (PVC)

7 Tie Rod

8 Steel Skid Base – Channel (HDG)

9 Internal Bracket for Tie Rod

10 Internal Bracket for Tie Rod

11 Internal / External Bracket

12 Internal / External Bracket

Manhole (Ø750)

Air Vent

Anchor Bracket

Brass Socket

Flat Flange

GRP water tank
External reinforcement structure

External Ladder (HDG)

Internal Ladder (GRP)

Roof Supporter (PVC)

Partition Main Frame

External Flange Bar – Angle (HDG)

Partition Sub Frame

External Main Frame (HDG)

Steel Skid Base – Channel (HDG)

Internal / External Bracket

Manhole (Ø750)

Air Vent

Anchor Bracket

Brass Socket

Flat Flange

Various Shape and Size of Korvan GRP Panel

● Own designed panel

Korvan produces exclusive panels and providing such as partition, manhole, flange and drain by the purpose.

● **Exclusive Panel for connecting Flange**

Development of Exclusive Panel for Flange in Korea.

● **Various design for wall Panel**

● Bottom Panel

● Drain Panel

● Roof Panel

● Manhole Panel

● Partition Panel

Features of Korvan GRP sectional water tank

Super Hygienic

Korvan panel which is certified WRAS is possible to make the GRP panels in a variety of colours.
In most cases, however, this type of tank is installed in the open, exposed to direct sunlight. If the GRP panels are translucent, the growth of algae and other micro-organisms would be accelerated.
After extensive testing and research, Korvan has adopted panel to minimize this problem, completely opaque and does not permit the passage of any light through it.
A typical problem with steel tanks has always been the high thermal conductivity and expansion of coefficient of steel.
These characteristics can cause loosening of the panel connecting bolts in areas of wide temperature change

WRAS APPROVED PRODUCT

Cracked surface for Concrete water tank after 3 years installation

Rusted steel for STS Water tank after 3 years installation

Inside state of Korvan GRP Water tank after 3 years installation

Blocked penetration of light to prevent algae growth

KORVAN panel : Prevent light penetration

Other tank : High light transmissible panel

Various design by water tank capacity

Various sized panels can make the below tanks that utilize the most
horizontal & perpendicular space and also can be erected from small capacity tank to huge tank.

1,000 Liter for home

90,000 Liter for industry

1,080,000 Liter big project

Pillar : construction of □ Type

Safety of water pressure

The convex bottom panel can be the water pressure created by filling the tank seals the joints preventing leakage.
In other type tanks, water pressure can loosen the joints breaking the seal, and allowing the stored water to leak out.

Korvan convex bottom panel

General bottom panel

Excellent Insulation

The heat insulation panel with 3 layers structure improves heat insulation effect,
protects water condensation on the outside of the tank and minimizes temperature variation of the stored water.

Comparison of Thermal transmission

Tank type	Coefficient of Thermal transmission Kcal / m.hr℃ (j/m hr℃)
STEEL	37.0 (1.55 X 100,000)
GRP (Non-insulated)	0.15 (630)
GRP (Insulated)	0.02 (84)

Tank type	Coefficient of overall Thermal transmission Kcal / m.hr℃ (j/m hr℃)	
	Air - Panel - Air	Water -Panel -Air
STEEL	14.3 (59.9)	24 (100)
GRP (Non-insulated)	3.0 (13)	5 (21)
GRP (Insulated)	0.9 (3.8)	1 (4)

Temperature curve for inside water tank

Water Tightness

The joints are sealed with a special sealing tape for GRP sectional panel water tank with long experience and technology.
It maintains soft itself and adhesives even at low temperature.
The combined flange thickness at the panel joints is sufficient to meet any stress imposed.
This self-sealing feature eliminates the possibility of separation and hence prevents water leakage of the tank.

96% thikness restored initial 24 hours after compressing with sealing tapes

PSB test report for sealing tape

Complete Drainage

The convex bottom panels with a concave drain panel system make sure complete and fast drainage.
It's very useful to take a maintenance inside of water tank

Partition Water tank

Suitable for the confined area

The water tank for two different purposes are needed in a confined area or boiler facility. As an example 16 tons water tank, the partition type can be divided by two tanks in one as using half(8 tons) for drinking water and another half(8 tons) for service water. If the separated water tank installed as shown on the below picture, you have to install two different tanks with a maximum each 6 tons, because you need to keep 1 meter distance between each separated tanks for maintenance and operating space.

Individual water tank

2m(W) x 1.5m(L) x 2m(H) = 6 tons
- Total 12 tons by separated 2 water tanks

Partition water tank

2m(W) x 4m(L) (2m + 2m) x 2m(H) = 16 tons
- Total 16 tons by partition water tank

● Various panel size for partition type water tank

Korvan has exclusive partition panel according to the various size of different height and width so it doesn't need to cut the another panel for patition.
It can make perfect installation to prevent water leakage

For 1M height only

For 1.5M height only

For 2M height only

For more than 2.5M height

Base Concrete

- Customers should construct a concrete foundation according to the designated water tank specification and the firmness of the site.
- The strength of the base concrete should be at least 180kg/cm2
- The thickness of mortar on the base concrete should be less than 20mm

Construct of concrete foundation
and steel skid
[Example : 3m(L) x 4m(W) x 3m(H)]

Concrete foundation for 3m x 4m

Front view for installation space

Top view for installation space

Specification of steel skid

1. Durability reinforcement parts by optimized structural designed
2. Providing all accessories to able erect water tank at construction site
3. Safety construct by bolt assembly without weldding and make a short construction period and reduce the cost

Tank Height	Steel skid A (Standard Size)		Steel skid B (Standard Size)	
Height 1m ~ 2m	angle 75 X 75 X 6mm		channel 75 X 40 X 6mm	
Height 2.5m ~ 4m	channel 125 X 65 X 6.5 X 8mm			
Height 4.5m ~ 5m	channel 150 X 75 X 8 X 10mm		channel 100 X 50 X 6mm	

※ The above list is recommendable standard. It can be redesigned by customer's requirement and condition of construction site.

◆ Steel skid assembly by Channel type

	Steel skid A	Steel skid B
1M	1120L	990L
1.5M	1620L	962L / 527L
2M	2120L	962L / 1021L
2.5M	1560L / 1060R	962L / 553L / 962L
3M	1560L / 1560R	962L / 1053L / 962L
3.5M	1560L / 2060R	962L / 994L / 553L / 962L
4M	2060L / 2060R	962L / 994L / 1053L /962L
5M	2060L / 1000L / 2060L	962L / 994L / 1053L / 994L / 962L

◆ Steel skid assembly by Angle type

	Steel skid A	Steel skid B
1M	1140L	990L
1.5M	1640L	957L / 527L
2M	2140L	957L / 1206L
2.5M	1575L / 1070R	957L / 563L / 957L
3M	1570L / 1570R	957L / 1063L / 957L
3.5M	1570L / 2070R	957L / 994L / 563L / 957L
4M	2070L / 2070R	957L / 994L / 1063L / 957L
5M	2070L / 1000L / 2070L	957L / 994L / 1063L / 994L / 957L

Specification of connection

1. Specification of connection

- Able to supply all installation accessories including connection by customer's requirement
- Cusomter should inform the specification of inlet, outle, drain and overflow size.
- The below list is for Korvan standard connection for customer's reference

Standard Connection Size

Water tank capacity(ton)	Inlet	Outlet	Overflow	Drain
1㎥ ~ 10㎥	25A	50A	50A	40A
11㎥ ~ 20㎥	40A	65A	65A	40A
21㎥ ~ 50㎥	50A	80A	80A	40A
51㎥ ~ 100㎥	80A	100A	125A	50A
101㎥ ~ 200㎥	80A	150A	125A	50A
201㎥ ~ 500㎥	100A	150A	150A	80A
501㎥ ~	100A	200A	150A	80A

2. Connection line-up

◆ PVC flange type

mm / inch	D	T1	T2	G	L	C	Hole
65A (2½)	175	20	25	80	140	140	4
80A (3)	185	20	25	90	140	150	8
100A (4)	210	20	25	110	140	175	8
125A (5)	250	20	25	140	140	210	8
150A (6)	280	20	25	170	140	240	8
200A (8)	330	22	25	290	170	290	12
250A (10)	400	24	25	355	170	355	12
300A (12)	445	24	25	400	170	400	16

◆ Brass socket type

mm / inch	D	D1	L	T
15A	43	25	25	1.5
20A	46	25	30	1.5
25A (1)	65	65	30	1.5
32A (1¼)	79	79	30	1.5
65A (1½)	85	85	30	1.5
50A (2)	85	55	40	2

Caution for the connection

Install a prop while installing piping and take care not to put an excessive load
Install pipes on the site where the tank is located and take care not to put on the biased load

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