

# NISSIN TANK

## PANEL-TYPE GRP Water Tank

**ニッシンタンク パネル型**  
GRP製 高架水槽 受水槽



 Nissin Chemical Industry Co., Ltd. <Japan>

 日進化成工業株式会社 (日本)

# PREFACE


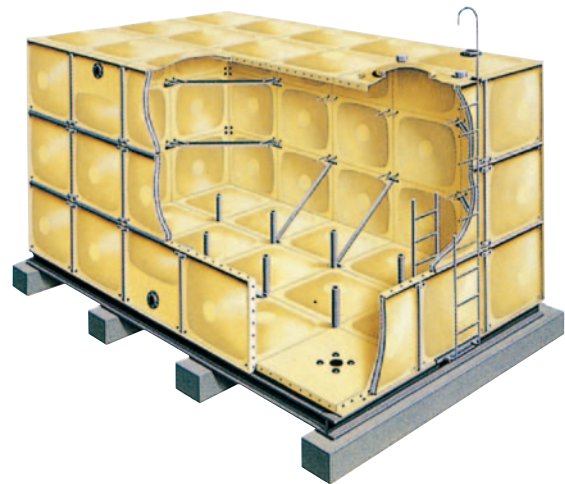
Until the introduction of GRP as a valuable water storage medium, concrete and steel sectional tanks had been widely used on such applications as housing complexes, industrial development areas, buildings, hospitals, rural water supply and other facilities. The use of concrete and steel, however, have their own particular disadvantages. Steel, for example, corrodes very easily—particularly in coastal environments and therefore the tanks must be repainted periodically. Concrete tanks have a tendency to crack. Small cracks can lead to seepage and the possible tainting of the water. In severe cases, fracture may occur which could cause the possible loss of use of the tank. These problems can be avoided by using HOT PRESSED GRP PANELS which provide very uniform, strong and stable construction.

NISSIN WATER TANKS ARE DESIGNED TO  
SATISFY THESE BASIC REQUIREMENTS:

1. "CLEAN" WATER
2. DURABILITY, LONG LIFE
3. STABLE CONSTRUCTION
4. NON LEAKAGE
5. EASY ASSEMBLY

Respond to versatile requirements from the market

# Nissin Tank Products Line

Panel Type			
External Reinforcement		Internal Reinforcement	
Configuration			
Insulation Type Structure	Elemental Type Structure	Insulation Type Structure	Elemental Type Structure
Type			
<b>PD Type</b>	<b>PC Type</b>	<b>PU Type</b>	<b>PJ Type</b>
Construction			
			
PD type		PU type	
Features			
<p>Assembly-type tank By assembling large size panels to wall side, tank exterior is reinforced with steel material. Simple design and rich functionality.</p>		<p>Assembly-type tank By assembling various type pf panels, tank interior is reinforced with steel material.</p>	
Height			
Up to 2m	Up to 2m	Up to 3m	Up to 5m
Color			
Ivory	Ivory	Ivory	Ivory

In case of placing order, please indicate L×W×H(500mm pitch)

Safety design, and fit to extensive applications

# Application and design condition

## Applications

Principally, this tank is designed to store the water which temperature is under 40°C, but not designed for pressure tank purpose.

## Design condition

Keep enough strength and durability against still-water pressure, earthquake, strong-wind and snow fall.

### 1. Earthquake-proof

Designed to endure against horizontal velocity 1.5G.

### 2. Still-pressure proof

Designed to endure against still-water pressure.  
Warp level at the time of full water load varies by model, though its standard is below 1%.

### 3. Wind-pressure proof

Designed to endure against max. wind veloc 60m/sec. for both tank itself and footing, even case of no water in tank.

### 4. Snow-cover pressure proof

Designed to endure even 200Kg/m<sup>2</sup> snow cover f PD, PC, PU and PJ type.

### 5. Warp-proof at outlet mouth

Enough durability against extra forces from outsid



# CLEANLINESS

It is our mission to provide hygienic water.

## 〈Hygienic Aspect〉

Water is the necessary item for our life, and it should be well controlled its cleanliness from hygienic point of view.

Nissin engineers have pursued to implement this object thoroughly to maintain the cleanliness of the water in the tank.

## 〈Alga proof structure〉

By using tankmaterial as GRP(polyester resin and glass fiber) and blocking off sun light from outside, Nissin tank prevents alga from blooming and contamination from proliferation in the tank.



# TOUGHNESS

## Toughness--Durability against Earthquake

For water tank, it is imperative not only to accommodate hygienic aspect as to keep clean water and provide hygienic water, but also to preserve such precious water even under severe earthquake.

In order to meet such social requirement, Nissin makes full use of knowledge obtained from yearly experiences as the tank manufacturer and pursues to implement this concept into the product.



## Tank-structure Strength Test

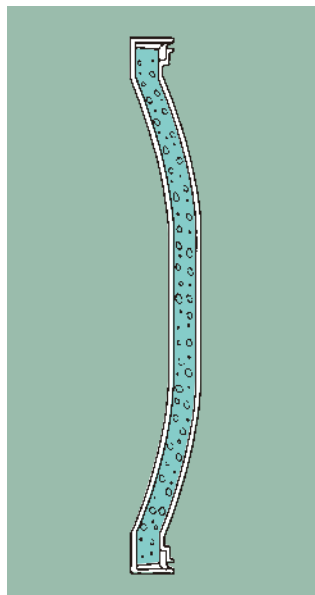
Nissin has kept pursuing to develop the tank implemented the strength against water pressure, earthquake, strong wind, heavy snow fall and heavy load by pipes through repeated experiments and originally developed technologies.

# CHARGING

Nissin tank Panel type shows great force for insulation, by having synthetic resin foam on singular-structured panel and further more three-layer construction covered with GRP.

Exterior appearance looks neat owing to employing Nissin original Insulation Setting Method.

Cross section



# Water tank composed by Panels w integrated technology in every det

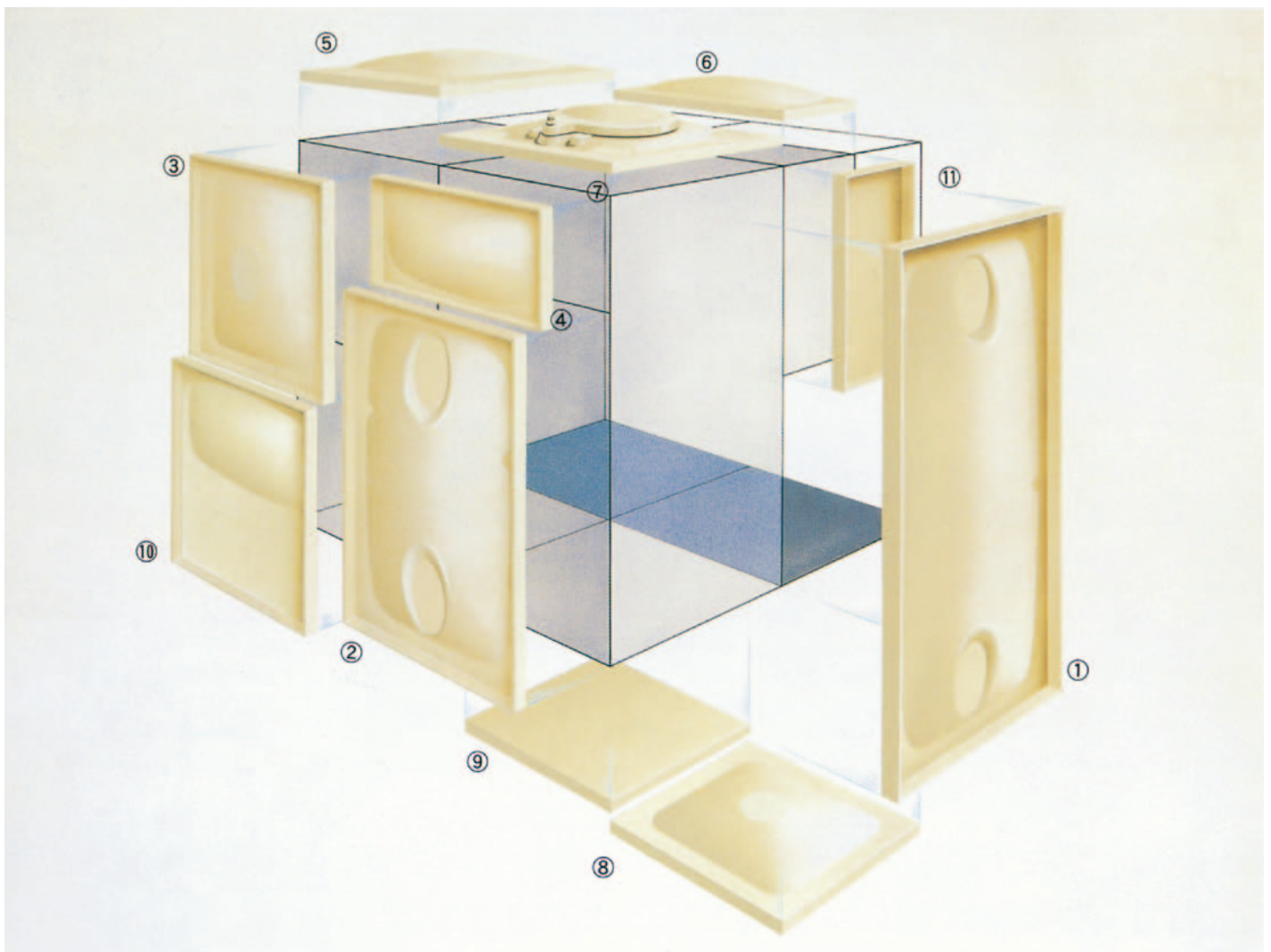
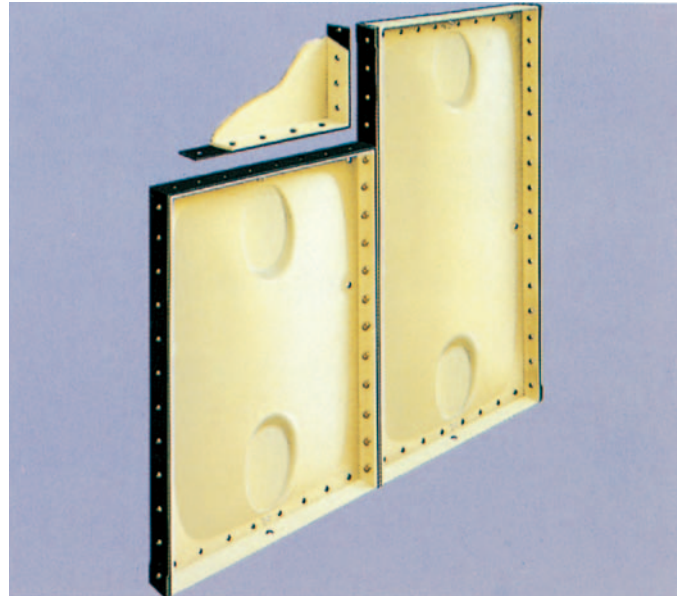
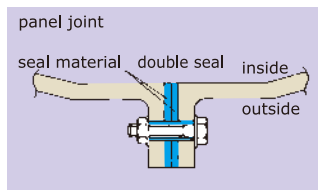
Tank is strongly required to implement the perfectness against leakage.

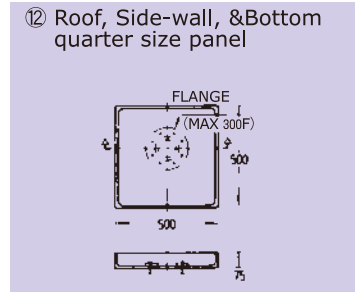
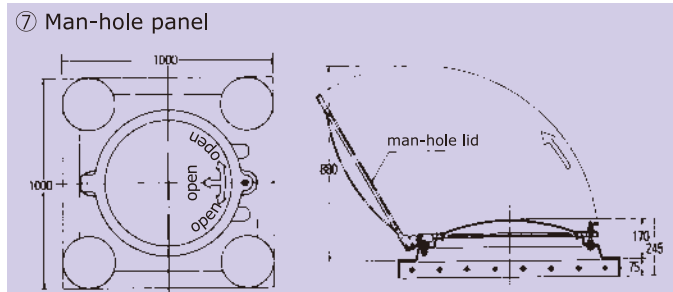
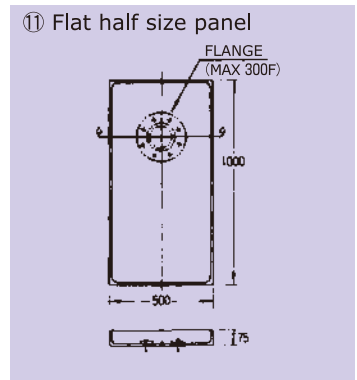
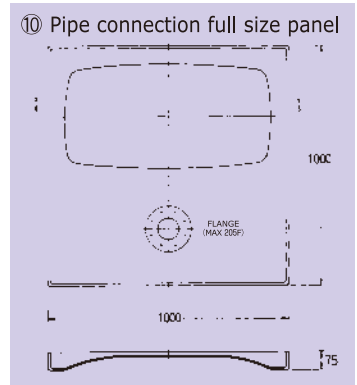
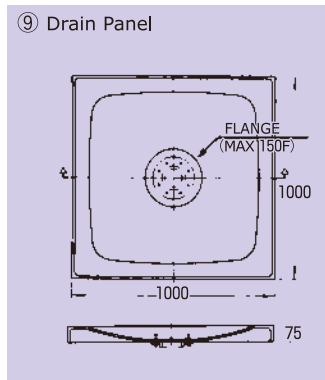
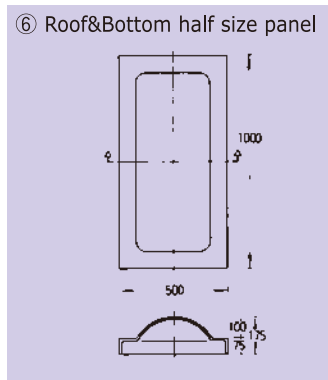
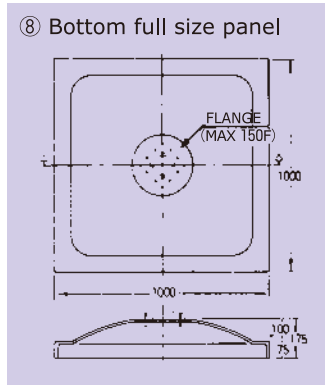
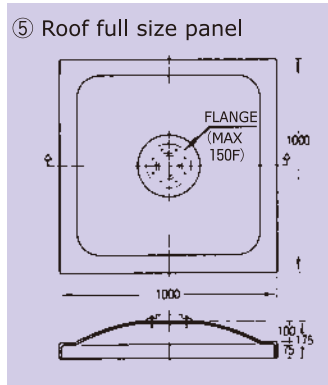
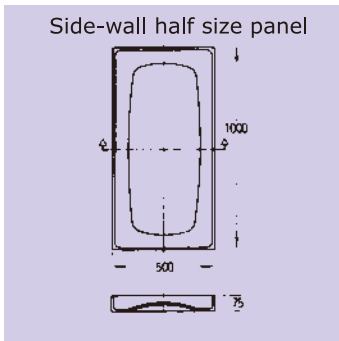
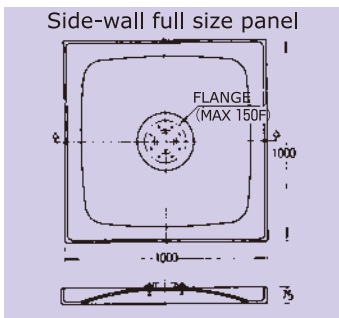
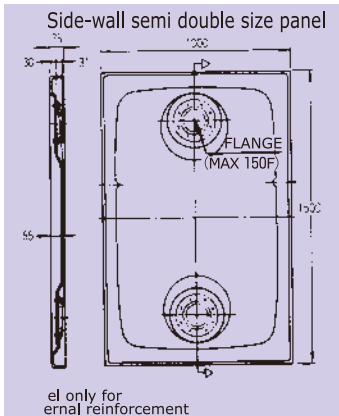
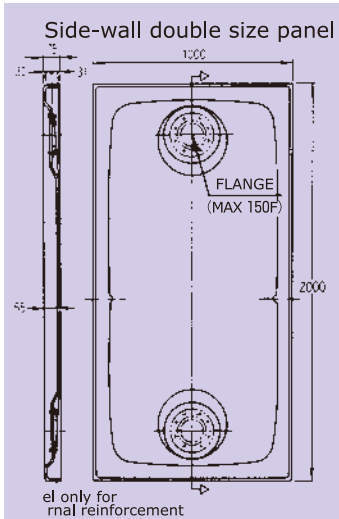
Nissin has originally developed Seal Material , and by employing Double Sealing Method, our tank fulfills this leakage proof task.

## 〈Seal Material and Double Sealing Method〉

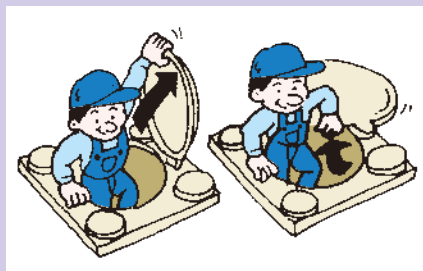
Seal Material at jointed area becomes duplicated sealing which performs much stronger sealing efficiency against leakage.

This seal material complies with the requirements from Food Laws and Municipal Water Supply Laws.





- Features of Maintenance Hatch (Man-hole panel)**
- slide type man-hole panel for both vertical and horizontal opening/closing.
  - Can be fixed firmly by using bolt and nut.
  - Easy access owing to flat space at opening of man-hole.
  - Surface is flat and smooth owing to high-quality press-mould material.



# Panel tank, reinforced by Steel its side walls, assembled

GRP Panel type tank(external reinforcement) offers easy and safety maintenance service accessibility and it satisfies newly issued government ordinance in Japan.

By employing curving surface structure, it offers not only good appearance, but also strong structure which also satisfies another government ordinance in Japan.

Nissin can promote this Panel type Tank(PC type and PD type), which embodies those benefit into products, as most suitable Water Tank in the market.


#### PC type (Elemental structured)

Press casted and curve surface offers the strength, durability and good appearance.

#### PD type (Insulation structured)

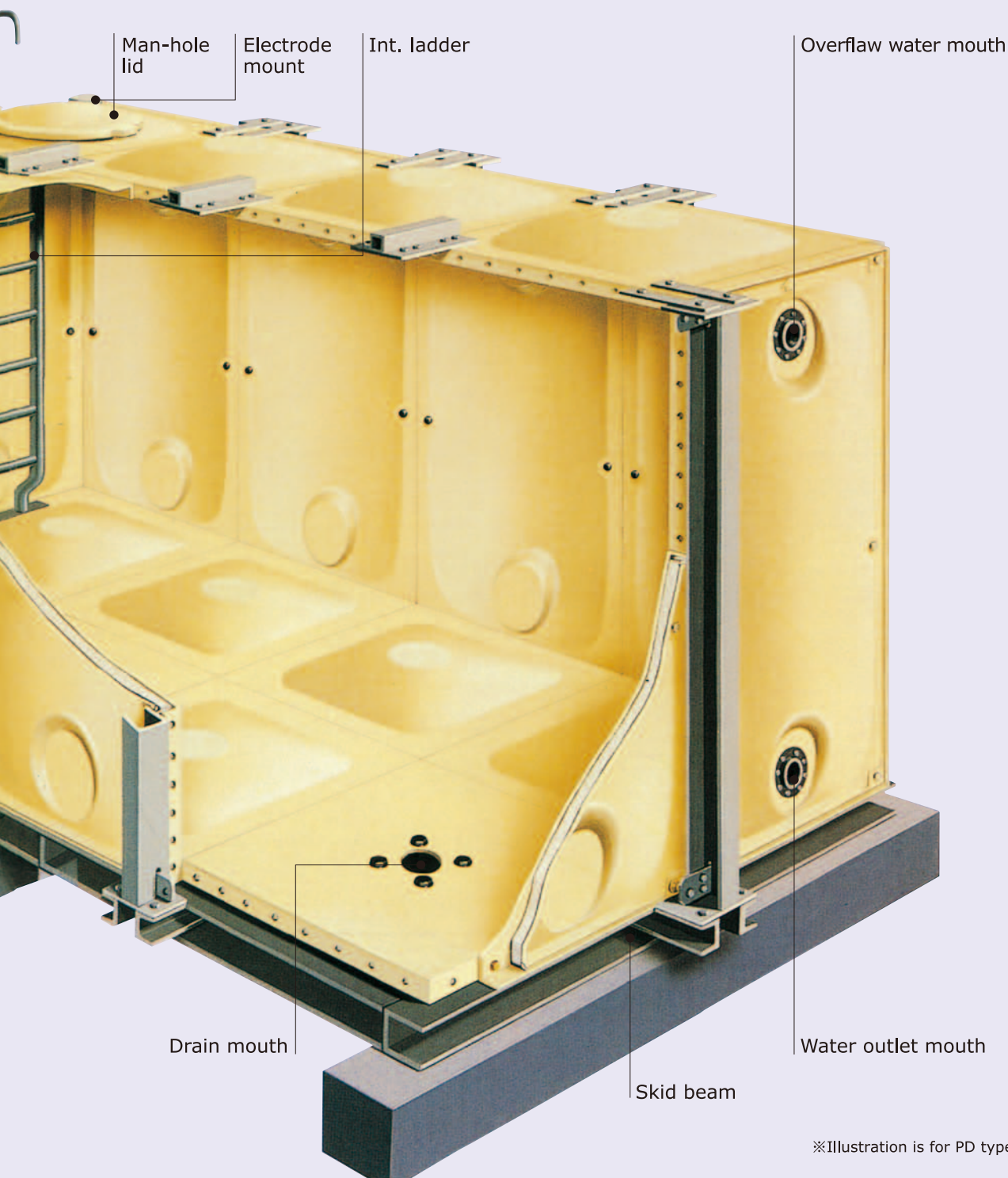
Adding synthetic resin foam on PC type panel and covered by GRP, i.e. three layer structured panel offers superb insulation effect and anti-frost effect.



Standard specification (PC type, PD type)	
Height of the tank	1.0m · 1.5m · 2.0m
Structure	Elemental Type Structure Insulation Type Structure
Usage	Water tank
Color	Ivory  Munsell Color Symbol 2.5Y ½ This color tone and actual product color may slightly vary.

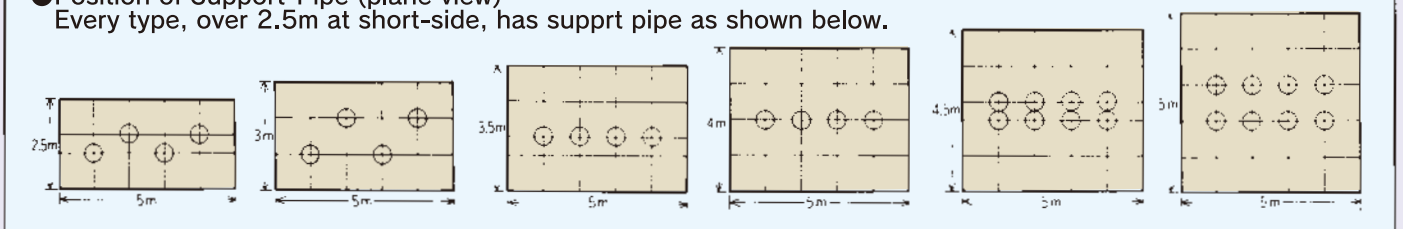


# at the outside of the tank, and by Large size Panel.



※Illustration is for PD type (L)2m×(W)4m×(H)2m.

●Position of Support-Pipe (plane view)  
Every type, over 2.5m at short-side, has support pipe as shown below.



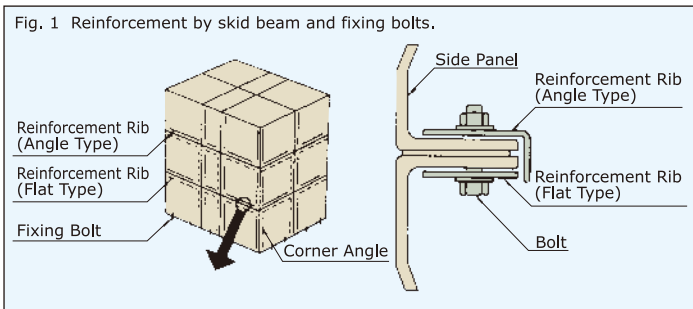
# Tank is assembled by using by combining

Exterior side has reinforced steels either in angle type or belt type to increase the steely portion as Fig. 1.  
 Interior side has slanting stay, parallel stay, and support pipe to increase earthquake-proof.

At the time of earthquake, four corners of the tank, where being loaded heavily, have 90° reinforcement corner angle to add the strength as Fig. 1.

Increase the number of fixing bolts at joints of the skid beam to add the strength as Fig. 1.

Those countermeasures against earthquake help not to have leakage or breakage problem.




### PJ type (Elemental structured)

Press casted and curve surface offers the strength, durability and good appearance.

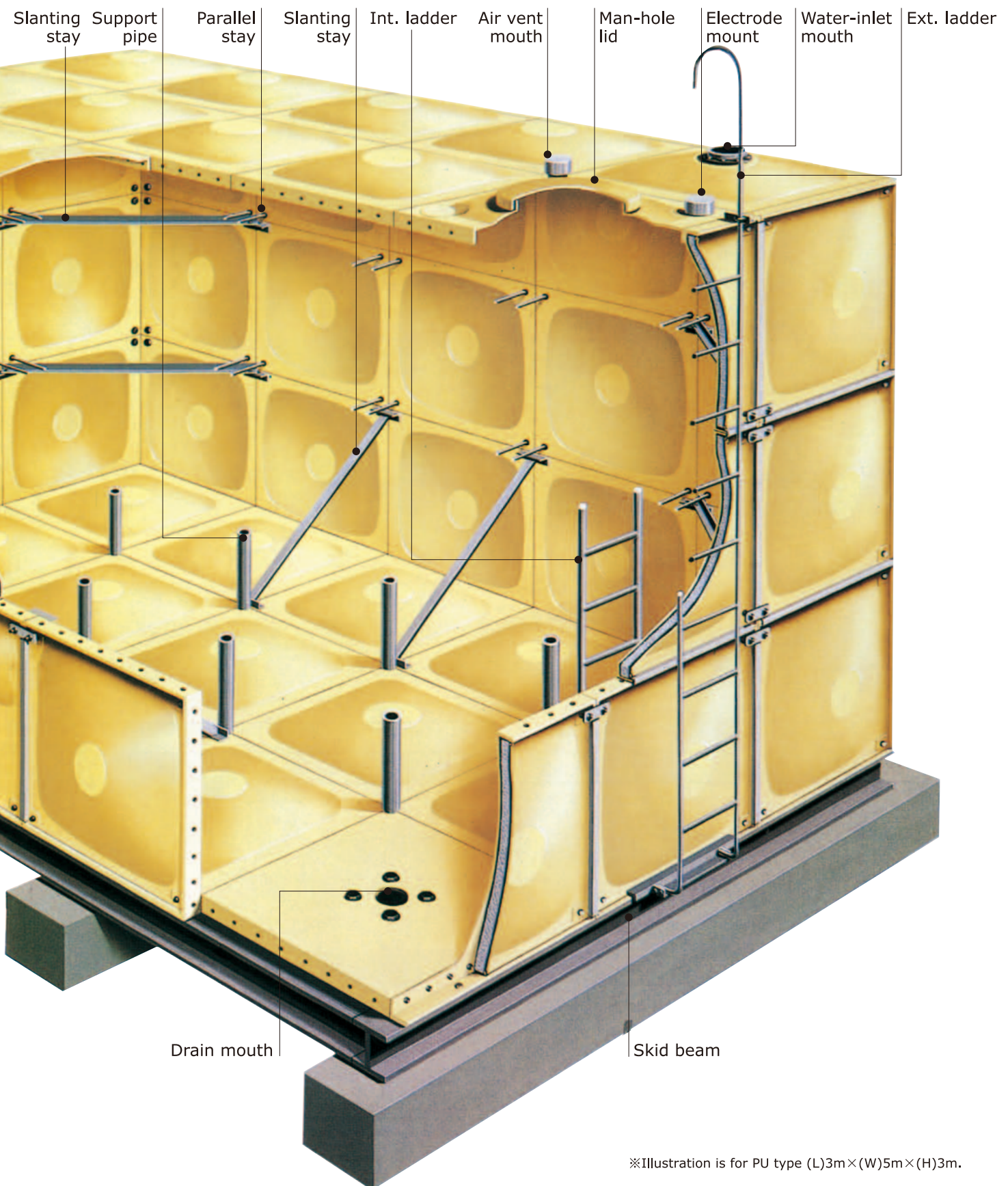
### PU type (Insulation structured)

Adding synthetic resin foam on PC type panel and covered by GRP, i.e. three layer structured panel offers superb insulation effect and anti-frost effect.

Standard specification (PJ type, PU type)	
Height of the tank	2.5m~5.0m
Structure	Elemental Type Structure Insulation Type Structure
Usage	Water tank
Color	Ivory  Munsell Color Symbol 2.5Y 7/2 This color tone and actual product color may slightly vary.



# reinforced steel inside the tank, various type of panels.

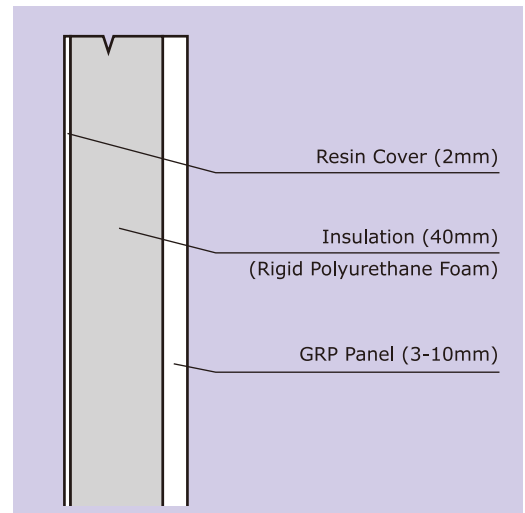


# INSULATION

Glass fibre reinforced plastic has a very low thermal conductivity. However, Nissin has developed specially insulated panels to meet the temperature extremes of tropical or arctic regions and has conducted a wide range of tests at both the high and low temperature levels.

## THERMAL CONDUCTIVITY

	Thermal Conductivity (Kcal/m.hr°C)
STEEL	37.0
GRP (Standard)	0.15
GRP (Insulated)	0.02



# STRONG WATER TANK

## Earthquake Resistant Structure

Nissin tanks are designed to satisfy the following seismic load.  
Horizontal Seismic Coefficient: 2/3G, 1G, 1.5G

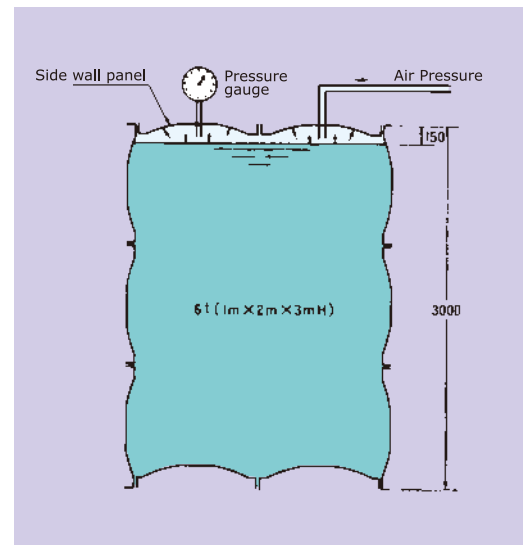
## Testing on Strength of Tank Structure

### Testing method

First the roof was sealed and the tank filled to maximum with water. The air pressure in the tank was then raised in order to rupture the tank, and the sealing, deformation, strain and pressure resistant strength measured.

### Results

Tank	Panel type 6TON (1X~2X3m)
Deformation when full	7mm or less (side wall)
0.1 kg/m <sup>2</sup> pressure	No water leak
Resistance to pressure	Over 16,000kg per meter of side wall
Working water pressure	Under 4,000kg per meter of side wall



Excellent performance shown in sealing capacity, deformation with full water and structural strength (pressure resistance).

## Testing on Strength of Pipework Connections

### JIS specifications

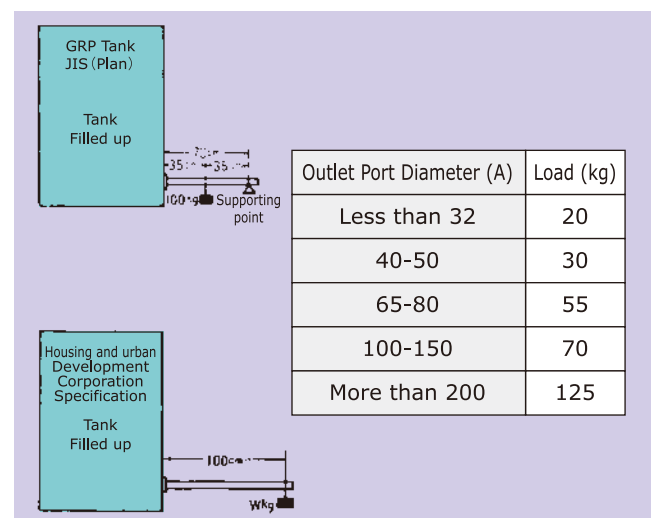
#### Testing method and specifications

Attach a steel pipe to the outlet port. Supporting the tip end at a span of 70cm, apply a load of 100kg to the center, then allow the tank to stand for 60 minutes in filled condition. There should be no water leak.

### Housing and Urban Development Corporation Specifications

#### Testing method and specifications

Attach a steel pipe to the outlet port, fill up the tank, then apply a load 100cm from the tip end of the steel pipe, and allow to stand for 20 minutes or more.



# FEATURES

## CONTENTS OF NISSIN GRP TANKS

	Components	Materials
Panel	GRP Panel Roof Support	GRP moulded from MMD UPV pipe
Reinforcement	Internal tie rods/stays External Reinforcements	Stainless Steel SS 304, ss 316 Galvanized Steel, Stainless Steel
Joints	Nuts, Bolts, Washers Sealant	Galvanized Steel, Stainless Steel SS 304, ss 316 Synthetic rubber, PVC foam
Ladders	Internal External	Aluminum, Stainless Steel Galvanized Steel, Aluminum, Stainless Steel
Indicator		Mechanical of cat and mouse type Direct reading acrylic glass tube (upon request)

# FEATURES

## PHYSICAL PROPERTIES OF NISSIN TANKS PANEL

1	Specific Gravity	1.8	11	Cavity	Less than 1%
2	Tensile Strength	1200 Kg/cm sq.	12	Light Transmission	Nil
3	Impact Strength	79.18 Kj/M <sup>2</sup>	13	Coefficient of thermal Expansion	0.00002/°C
4	Shear Strength	1.1 × 10 <sup>3</sup> Kg/cm sq	14	Glass Content	More than 30%
5	Thermal Conductivity	0.15 Kcal/m hr°C	15	Barcol Hardness	65
6	Thermal expansion Per °c	2.1 × 10 <sup>-5</sup>	16	Flexural Strength	1850 Kg/cm
7	Bending Strength	2100 Kg/cm sq.	17	Preserve Strength	1300 Kg/cm
8	Compressive Strength	3.0 × 10 <sup>3</sup> Kg/cm sq	18	Resistance of Heat	Max.300 deg f
9	Young's Modulus	1.4 × 10 <sup>5</sup> Kg/cm sq	19	Toxicity	Nil
10	Water Absorption	0.04%	20	Bacteriological Analysis	Nil

# QUALITY CONTROL

**STATE OF KUWAIT**  
**MINISTRY OF ENERGY - ELECTRICITY & WATER**  
**WATER RESOURCES DEVELOPMENT CENTER**  
**RESEARCH & DEVELOPMENT SECTION**

**TOXICITY TEST OF NON-METALLIC MATERIALS**  
(Trace Elements & Organic Compounds)

Material: Nissin G.R.P water tank.  
Manufactured by: Nissin Company, Japan.  
Tested for: Elafko General Trad. And com. Co.  
Lab.ref no: 11055-11057 & 11063-11068 & 11081-11083 & 11088  
MTL.No : 287 Date received: 12/6/2007 Date out: 20/01/08

**APPLICATION DETAILS:**  
applied by \_\_\_\_\_ on \_\_\_\_\_  
used for \_\_\_\_\_ to be used in contact with potable water.

**TEST DETAILS:**  
Physical and chemical results of the soaking test carried out on it for ten days for toxic metals and six days for organics in chlorinated water at 50°C are as follows:

1. Taste, odor or color	Nil
2. PH value	WITHIN THE ALLOWABLE RANGE.
3. Release of T.O.C	WITHIN THE ALLOWABLE RANGE.
4. Release of toxic metals	WITHIN THE ALLOWABLE RANGE.
5. Release of T.H.M	WITHIN THE ALLOWABLE RANGE.
6. Release of phenols	WITHIN THE ALLOWABLE RANGE.
7. Release of other organics	WITHIN THE ALLOWABLE RANGE.

Based on the above results, the material submitted passes the test elements and organic compounds.

Note: -  
The results quoted in this report relate only to the sample submitted for evaluation.  
The Ministry of Energy - Electricity & Water is not responsible towards any other specifications of the material.

OPERATOR: \_\_\_\_\_  
HEAD OF SECTION: \_\_\_\_\_  
DIRECTOR: \_\_\_\_\_

**Water Resources Development Center**  
**Ministry of Energy**

**Total analysis of non-metallic materials used in contact with potable water**  
**حوصات الشاملة للمواد غير معدنية المستخدمة في استعمالات مياه الشرب**

Requested by: Elafko General Trad. and Com. Co.  
Name of product: Nissin G.R.P water tank  
Type of product: Nissin G.R.P water tank  
Producing Country: Japan

**Permitted Tests:**  
According to the requirements of The National Water Council (NWC) and National Sanitation Foundation (NSF) with modifications suiting Kuwait conditions. And according to the limitations of The World Health Organization (WHO).

1. Bacteriological analysis	Passed	Approved	ناجح	معتدل	مستحسن
2. Toxicity analysis	Passed	Approved	ناجح	معتدل	مستحسن

Conditions of the validity of this certificate:  
• This certificate is specified for the examined samples only.  
• The ministry of Energy is not responsible towards any changes in the specifications of the material after the analysis.

رئيس قسم البحث وتطوير  
Head of Research & Development Section  
مدير مركز تنمية مصادر المياه  
Director of W.R.D.C.  
مدير مركز تنمية مصادر المياه  
Director of W.R.D.C.  
مدير مركز تنمية مصادر المياه  
Director of W.R.D.C.

**Water Resources Development Center**  
**Ministry of Energy**

**Bacteriological analysis of non-metallic materials used in contact with potable water**  
**الفحص البكتيريولوجي للمواد غير معدنية المستخدمة في استعمالات مياه الشرب**

Requested by: Elafko General Trad and com. Co.  
Name of product: Nissin G.R.P water tank  
Material tested: Nissin G.R.P water tank  
Tests are performed:  
According to the requirements of The National Water Council (NWC) and National Sanitation Foundation (NSF) with modifications suiting Kuwait conditions. To measure the ability of the tested material to support the growth of microorganisms on its surface.  
Duration of test: From 17/11/2006 - 20/1/2007

**Results:**  
The tested material did not increase the bacterial growth.  
The bacterial growth did not decrease sharply.

**Conclusion:**  
Based on the above results, the Panels are bacteriologically suitable for use in contact with drinking water of Kuwait.

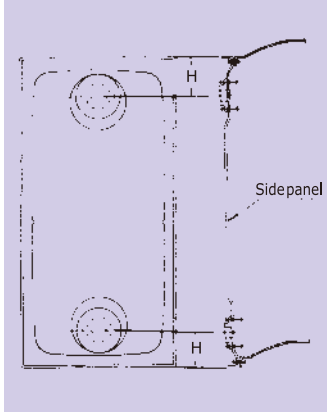
Note:  
• The approval and the results described ensures the material represented by the submitted sample, that there is no change in the nature and source of ingredients or in the process of manufacturing.  
• The Ministry of Electricity & Water is not responsible towards any changes in the specifications of the material.

رئيس قسم البحث وتطوير  
Head of Research & Development Section  
مدير مركز تنمية مصادر المياه  
Director of W.R.D.C.  
مدير مركز تنمية مصادر المياه  
Director of W.R.D.C.  
مدير مركز تنمية مصادر المياه  
Director of W.R.D.C.

# Parts—supervised under strictly managed quality control

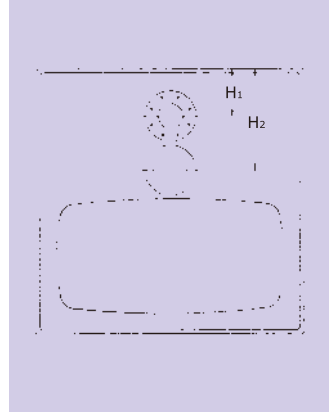
## Fitting under standard radius and minimum radius

- Double size panel  
Semi-double size panel



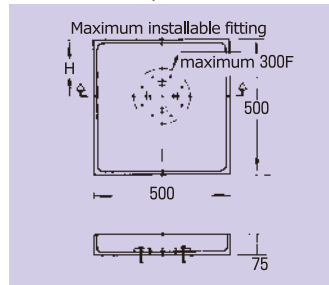
diameter(A)	height(mm)
20	160
25	175
32	180
40	180
50	190
65	200
80	205
100	215
125	235
150	250

- Pipe-connection panel



diameter(A)	height(mm)	
15	135	425
20	135	425
25	150	410
32	155	405
40	155	405
50	165	395
65	175	385
80	180	380
100	190	370
125	210	350
150	225	335
200	250	310
250	280	280
300		

- Quarter-size panel  
Flat half-size panel



diameter(A)	height(mm)
20	135
25	150
32	155
40	155
50	165
65	175
80	180
100	190
125	210
150	225
200	250
250	280

## Standard parts

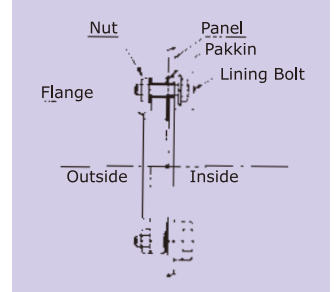
- Int. Ladder (PVC)



- Ext. Ladder



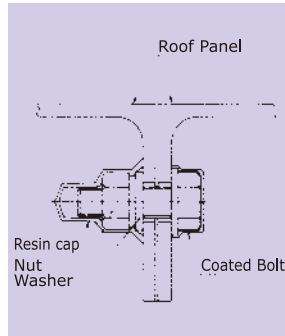
- FC Flange



- Ts Flange



- Resin cap  
Corrosion resistive material is used for bolt, however for ceiling Panel bolts which sit inside the tank, coated bolts and resin caps are prepared to perform better corrosion resistive.



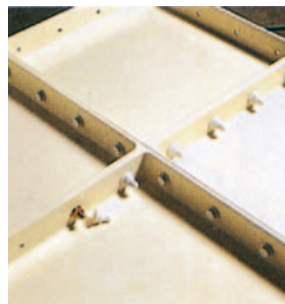
- Socket Flange



- Air Vent



- Electrode



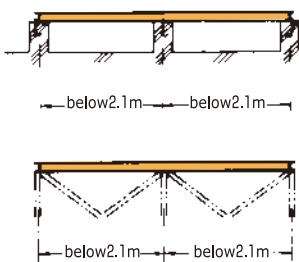
# Useful hints for designing and producing the skid beam

The technical drawing shows a rectangular steel pitch with dimensions: 1061.5 mm (left), 1003 mm (middle), 1003 mm (middle), and 1061.5 mm (right) for the width; and 1061.5 mm (top), 503 mm (middle), and 1061.5 mm (bottom) for the height. To the right, two 3D diagrams illustrate the assembly: the top one shows a correct crosswise assembly of concrete base and steel, marked with a circle (O), and the bottom one shows an incorrect parallel assembly, marked with an X.

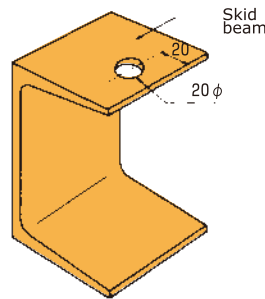
Standard steel pitch  
1003mm for 1m width panel,  
503mm for 0.5m width panel

Concrete base and outside steel must be assembled in crossway as shown, and steels must be crossbeamed.

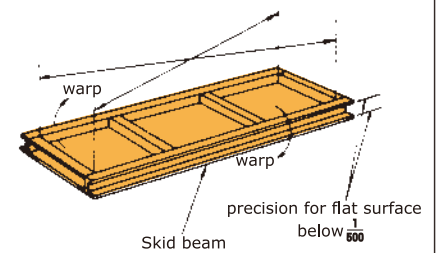
Base pitch for concrete-base stand and supporting pitch of steel piping stand should be less than 2.1m.



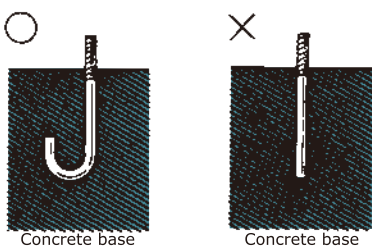
Produce the accuracy of less than 2mm for hole of tank-fixing bolts.



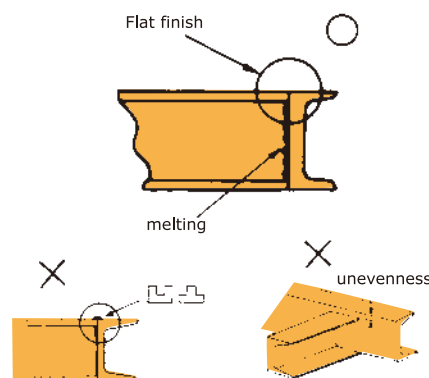
Accuracy for the flatness of stand should be within 2mm (max.10mm) per 1m length.



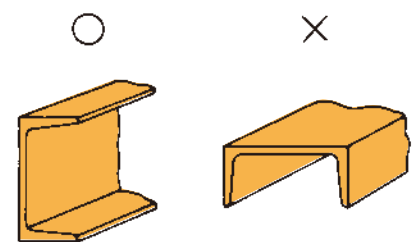
Installation of anchor bolts to the concrete base should be as shown below, and also use suitable anchor bolts which have enough strength.



Not to have unevenness or bump at steel portion as shown below.



Steel with groove should be used as shown below.





**NISSIN TANK**



**Nissin Chemical Industry Co., Ltd.**

6-6-27 Hakozaki Futo, Higashi-ku Fukuoka, 812-0051 Japan

Tel 81-92-641-5551

Fax 81-92-641-5607



**Soles Agent**  
**Elafko General. Trading & Cont.Co.**

Shuwaikh- Bin Fulajj Complex-Kuwait

Tel 965-4822521-4923132

Fax 965-4822531