

TKK

TOYO KANETSU K.K.

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***Small Scale LNG Tanks***

## *We deliver LNG Tanks to the World*

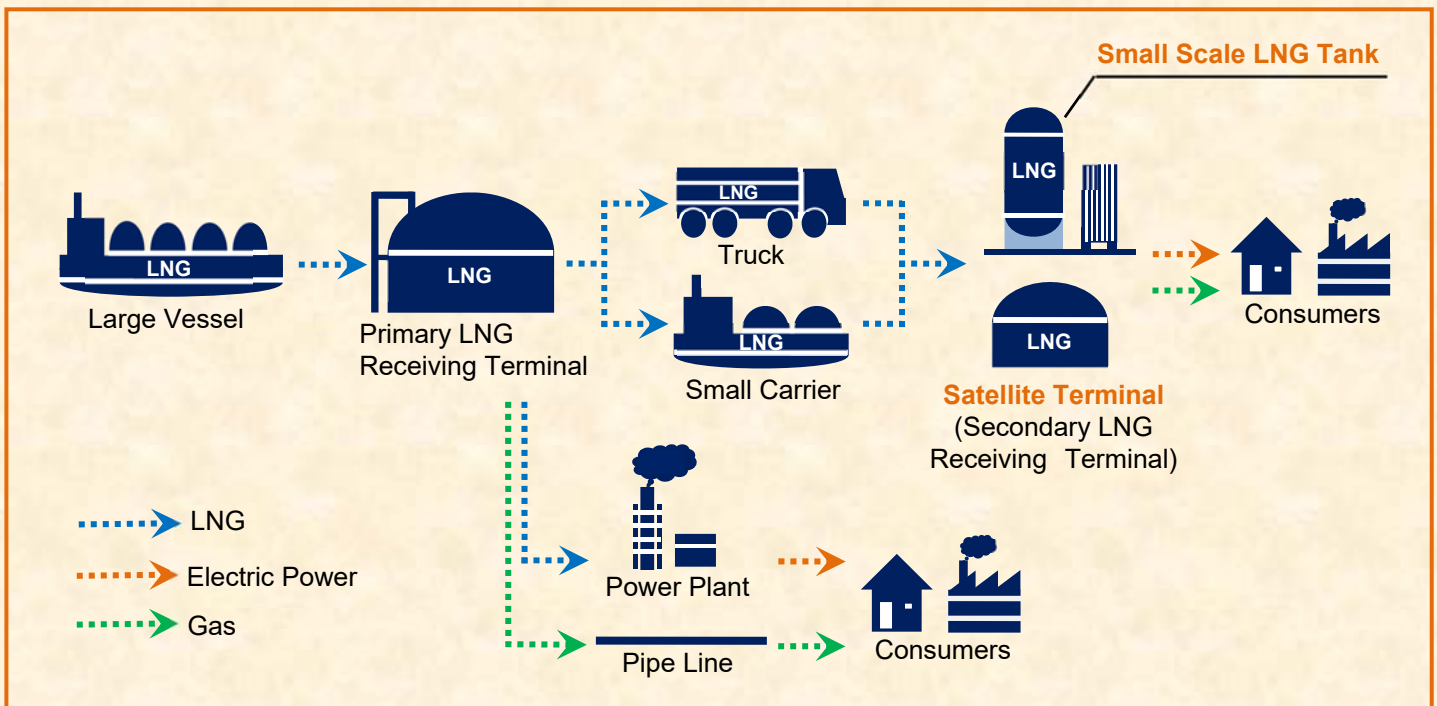
Starting in 1950, we began applying welding technologies developed over the years to the manufacturing of welded petroleum tanks. Since then, we have expanded operations to build more than 5,700 safe, economical, high-quality tanks - including crude oil storage tanks, LNG and LPG cryogenic storage tanks and high-pressure spherical tanks - to countries around the globe which export petroleum and natural gas as well as their consumer-nation counterparts. We keep on pursuing further technological advances as a leader in the field.





## Small Scale LNG Tank for Satellite Terminals

Satellite Terminal is equipped with smaller scale LNG storage tank and auxiliary facilities. TTK supports ever-growing LNG distribution business by supplying small-scale LNG tank based on our unparalleled experience and expertise as an international leading company in the industry.

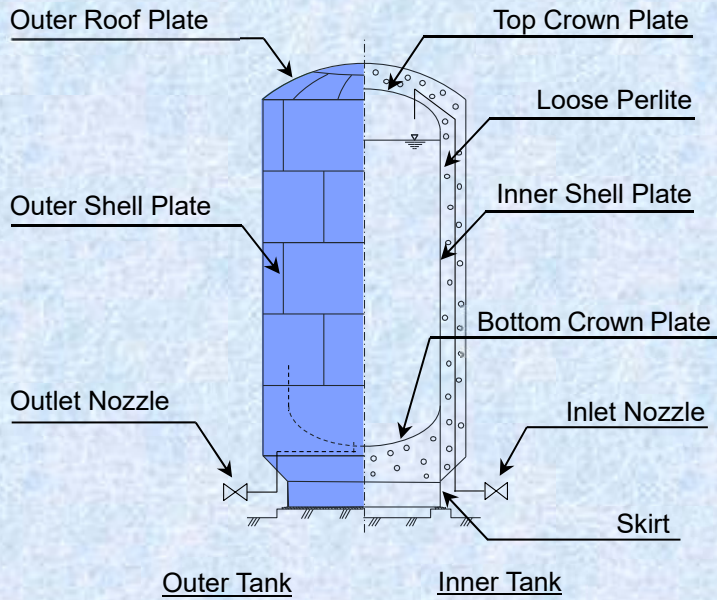


***Perlite Insulated***

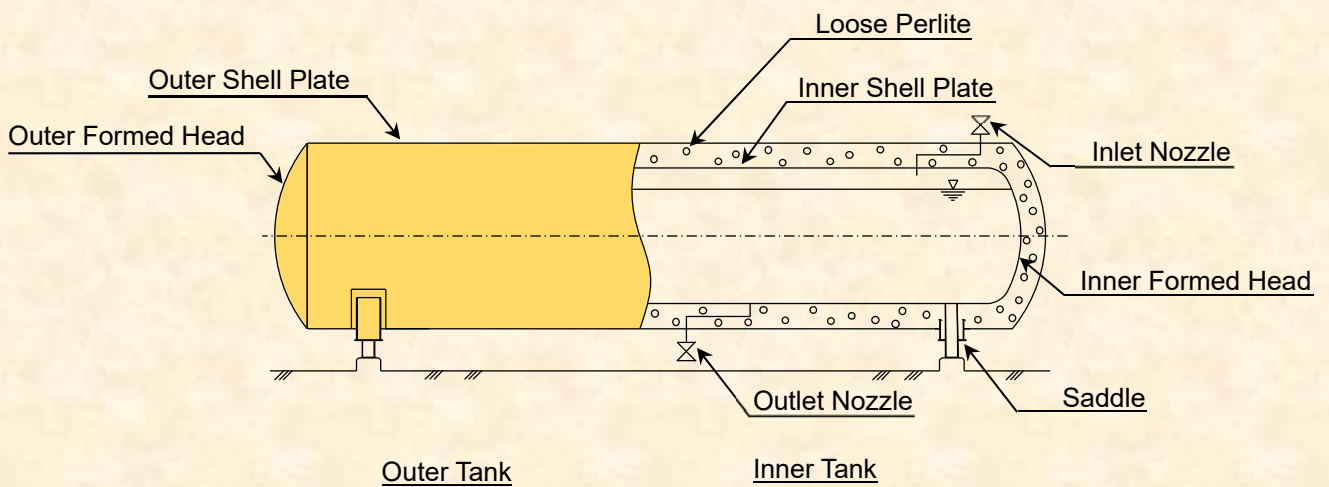
***Double Shell Vertical Tank & Horizontal Tank***



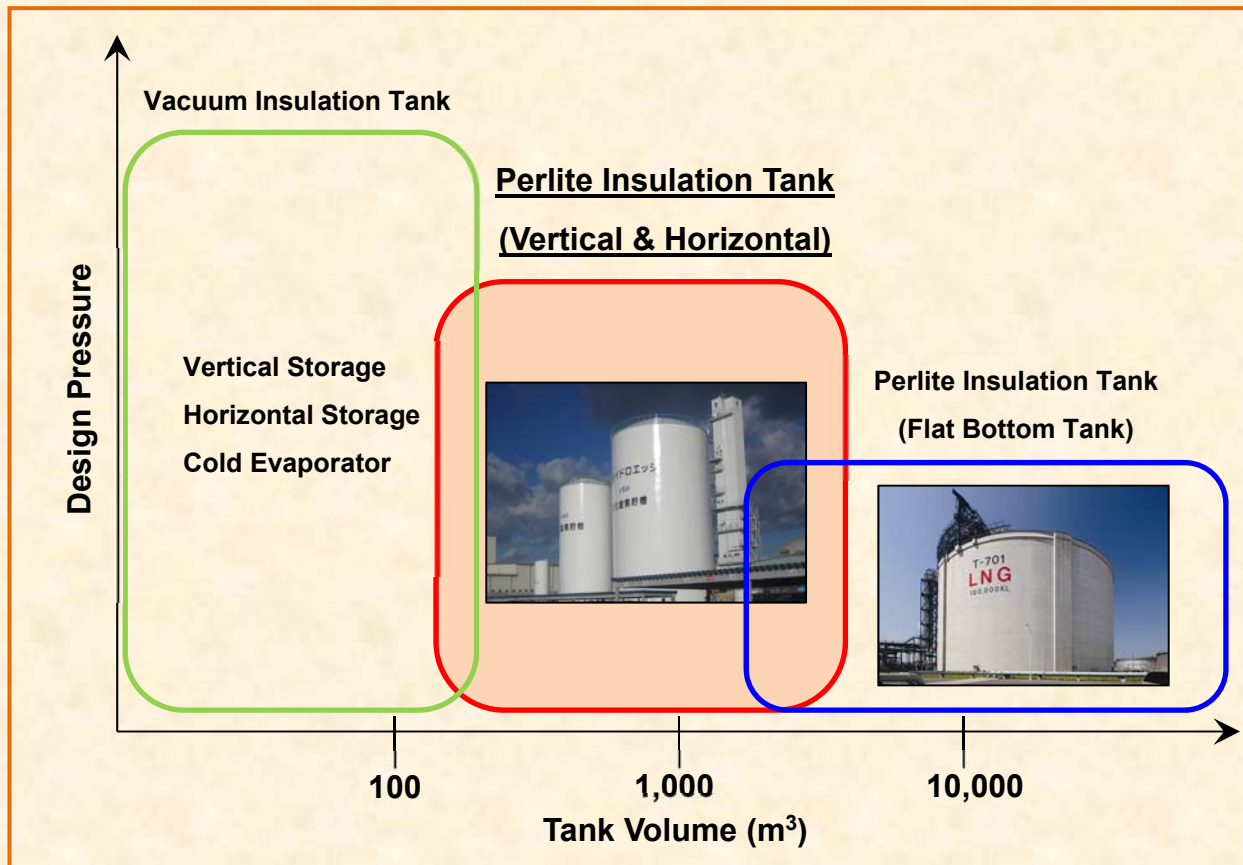
## Double Shell Vertical Tank (Perlite Insulated)



## Double Shell Horizontal Tank (Perlite Insulated)



## Above-ground LNG Tank Application



## Structure

- This storage unit consists of an inner tank made of cryogenic steel and an outer tank of normal steel.
- The space between the two tanks is insulated with loose perlite.

## Service

This storage unit is designed to store content at cryogenic temperature:

LNG (-162 degree C) and liquefied industrial gases, LO<sub>2</sub> (-183 degree C), LN<sub>2</sub> (-196 degree C), etc.

## Advantages

Double Shell Vertical Tank & Horizontal Tank have the following advantages over Flat Bottomed Cylindrical Double Shell Storage Tank.

- Capable of higher design pressure. Thus, the tank can be operated up to 1.0 MPa without discharging BOG\* or requiring a compressor.
- Tank can be delivered in a shorter time period and at a lower cost.
- Upright design of vertical tank enables land-saving layout.

\* BOG: Boil Off Gas

## Perlite Insulation Tank vs Vacuum Insulation Tank

	Perlite Insulation Tank	Vacuum Insulation Tank
Insulation Type	N <sub>2</sub> Gas + Perlite	Perlite + Vacuum (Small Tank) or Multilayer Super Insulation + Vacuum (Large Tank)
Insulation Space (Distance between the outer tank and Inner tank)	1,000 ~ 1,200 mm	200 ~ 400 mm
Tank Capacity	“Excellent” Vertical Type : Approx. 5,000 m <sup>3</sup>  “Good” Horizontal Type : Approx. 1,000 m <sup>3</sup>	“Good” Approx. 1,000 m <sup>3</sup>
Design Pressure (Inner Tank)	“Excellent” 0.2 ~ 1.0MPa	“Excellent” 0.2 ~ 1.0 MPa + Vacuum Pressure (-0.1MPa)
Outer Tank Structure	“Excellent” Not Heavy Low Internal Pressure Design	“Poor” Heavy Vacuum Pressure Design
BOG	“Good” 0.2~0.3 wt%/day	“Excellent” Under 0.1 wt%/day
Construction & Maintenance	“Excellent” Worker can enter insulation space and do direct work.	“Poor” Worker cannot enter insulation space.
Delivery Date	“Fair” Equivalent	“Fair” Equivalent
Cost	“Excellent” Weight : Light	“Good” Weight : Heavy (“Poor” Super insulation case : more heavy)

Note) \* The Difference of inner tank weight by changing design pressure

a) For 1.0 MPa design pressure case

Inner tank of perlite insulation tank is lighter 10% than vacuum insulation tank.

b) For 0.3 MPa design pressure case

Inner tank of perlite insulation tank is lighter 30% than vacuum insulation tank.

# TKK's Approach to Double Shell Vertical Tank & Horizontal Tank

## Site Fabrication Method & Offsite Fabrication Method

TKK offers 2 types of construction methods: Site fabrication and Offsite fabrication.

### Site Fabrication Method

- Site fabrication method is TKK's specialty as we have extensive experience as a tank builder to fabricate large capacity tanks on site.



### Offsite Fabrication Method

- Offsite fabrication method is recommended in case of a shorter time window for site construction. Offsite fabrication can be carried out without waiting for the completion of other site activities, such as site preparation, piling and foundation work. The small-scale LNG tank can be fully fabricated at our fabrication shop and transported to the site on customer's demand.





## Design Standardization

TKK provides the standardized small-scale LNG tank line-up. Our standardized tank design satisfies the prevailing international Codes and Standards. Standardized design helps to reduce both delivery period and the product cost.

### Line-up of Standardized Vertical Tanks

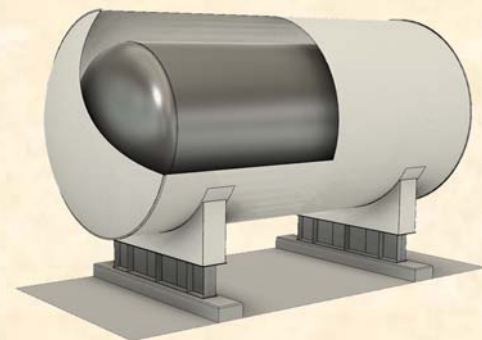
Specifications \ Model Code	TK-500	TK-1000	TK-2000	TK-4000
Gross Capacity (m <sup>3</sup> )	556	1,112	2,223	4,445
Net Capacity (m <sup>3</sup> )	500	1,000	2,000	4,000
Design Temperature (°C)	-164	-164	-164	-164
Max. Design Pressure (MPa)	1.0	0.4	0.4	0.2
Outer Tank Diameter (mm)	8,900	10,400	13,400	16,900
Outer Tank Height (mm)	21,700	27,300	29,050	33,130
Max. Design Boil Off Rate (wt% / day)	0.30	0.30	0.30	0.30
Tank Material	Inner Tank : SA240 Type304, Outer Tank : A36			
Insulation Type	Loose Perlite			
Design Code	ASME Sec. VIII Div. 1, API620, ASCE7			



We can also respond to made-to-order demands with a capacity range from 300 to 5,000 m<sup>3</sup>.

### Line-up of Standardized Horizontal Tanks

Specifications \ Model Code	TKH-500	TKH-1000
Gross Capacity (m <sup>3</sup> )	556	1,112
Net Capacity (m <sup>3</sup> )	500	1,000
Design Temperature (°C)	-164	-164
Max. Design Pressure (MPa)	1.0	0.4
Outer Tank Diameter (mm)	8,900	8,900
Outer Tank Height (mm)	11,440	11,440
Outer Tank Length (mm)	20,180	36,930
Max. Design Boil Off Rate (wt% / day)	0.30	0.30
Tank Material	Inner Tank : SA240 Type304, Outer Tank : A36	
Insulation Type	Loose Perlite	
Design Code	ASME Sec. VIII Div. 1	



We can also respond to made-to-order demands with a capacity range from 300 to 1,000 m<sup>3</sup>.

## Modularization of larger LNG Tank

Modularization of large LNG TANK offers a number of advantages conventional construction. The bulk of the fabrication and assembly are performed at Batam plants, which contributes to shorter production lead time and cost reductions.

### Capabilities

- Fully fabricated flat bottom cylindrical LNG tank and transport to the site
- Tank system : Single containment tank system
- Tank capacity : 5,000m<sup>3</sup> ~ 10,000m<sup>3</sup>.
- The lead time ranging from storage tank design to mechanical completion :18 month  
The transportation lead time ranging from Batam plant to construction site\* :45 days  
\*(From Batam plant within 1,000 km)



## Contact us

### TOYO KANETSU K.K.

Address:	11-1, Minamisuna 2-chome, Koto-ku, Tokyo 136-8666, Japan
Phone:	+81-3-5857-3109
Fax:	+81-3-5857-3173
website:	<a href="http://www.toyokanetsu.co.jp/global/">http://www.toyokanetsu.co.jp/global/</a>

## Group Companies

### PT. TOYO KANETSU INDONESIA

**Address:** Midplaza Building 1, 8th Floor, JL. Jend. Sudirman Kav. 10-11, Jakarta 10220, Indonesia

### TOYO KANETSU SINGAPORE PTE. LTD.

**Address:** 16 Ayer Rajah Crescent #03-04 Tempco Technominium, 3rd Floor, 139965 Singapore

### TOYO KANETSU (MALAYSIA) SDN. BHD

**Address:** Sublot 51, 1st Floor Medan Jaya Commercial Centre 97000 Bintulu, Malaysia