DYWIDAG

DYWIDAG Cryogenic Post-tensioning System - Engineered for LNG Tanks

We make infrastructure
Safer, Stronger, Smarter.

dywidag.com

Safe LNG Storage Solutions

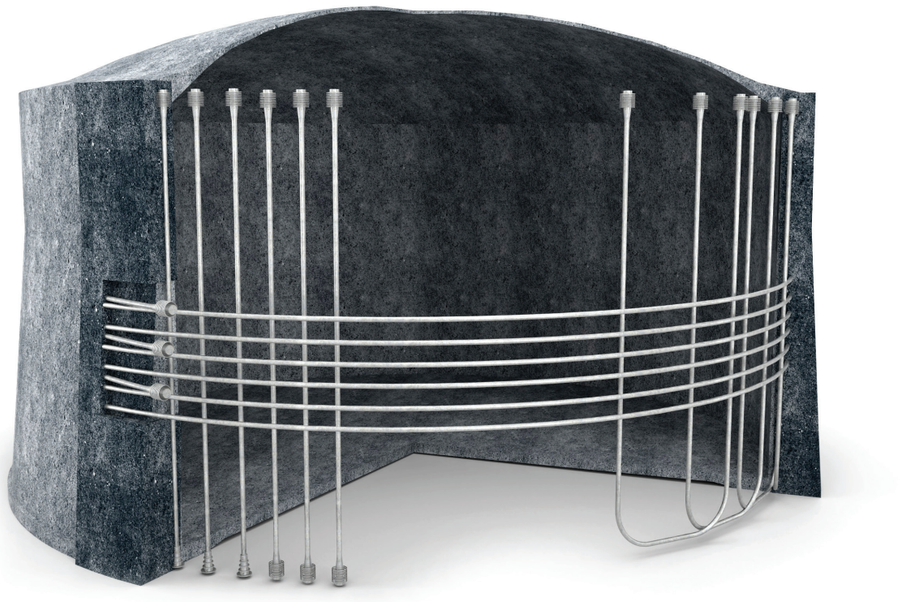
Fueling the Future

For over fifty years, DYWIDAG has been at the forefront of post-tensioning systems in liquified natural gas (LNG) tanks, addressing the critical needs of this dynamic energy sector. As global demand for LNG surges, so does the necessity for larger, more complex storage solutions. These tanks, nowadays often surpassing 100 meters in diameter, are not just storage units but marvels of engineering, meticulously designed to maintain LNG at -165°C.

LNG is a key player in the energy transition, offering environmental and economic benefits. It's a cleaner alternative to traditional fuels, reducing carbon emissions and providing cost-effective energy. Importantly, its liquid form extends its reach beyond pipeline limitations. Our post-tensioning systems are essential in ensuring the structural integrity of these large tanks, thereby playing a pivotal role in the safe and efficient storage of LNG.

DYWIDAG's solutions are bespoke, reflecting our attention to detail and understanding of the complexities involved in each project. Our technical team's expertise ensures that every system is tailored to meet the specific demands of your project, offering flexibility that sets us apart from our competitors.
Since 1970, DYWIDAG has been at the forefront of designing and implementing superior post-tensioning systems. Our innovations cater to increasing tank sizes, guaranteeing safety and longevity.

Where necessary, our experienced geotechnical teams can also provide ground engineering services for additional foundation stability.



Schematic representation of concrete shell post-tensioning options, including straight vertical tendons, U-shaped vertical tendons, horizontal tendons with standard anchors, dead-end MA anchors, and loop anchors.

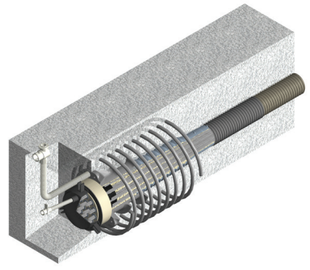
DYWIDAG's Post Tensioning Solutions: Engineering Excellence for Unrivalled Safety

Comprehensive, Customized Service, From Concept to Completion

At DYWIDAG, we pride ourselves on delivering end-to-end services that exceed just product delivery. Our comprehensive approach includes system design, testing, installation, and training, ensuring that your LNG storage project progresses smoothly from inception to completion. Our team's collaborative and adaptive approach allows us to create solutions that precisely fit your project's needs. We partner with top cryogenic testing laboratories to ensure our systems meet the highest safety and performance standards.

Our training programmes are designed to empower your team with the knowledge to maximise the efficiency of our systems. Choose DYWIDAG for our unparalleled commitment to quality, reliability, and innovation. The core post-tensioning products and solutions we can provide to our customers are highlighted below:

Bonded Strand Tendons
Our bonded strand tendons set the standard in post-tensioning technology, offering unmatched corrosion protection and durability, essential for withstanding extreme environmental conditions, including cryogenic temperatures.

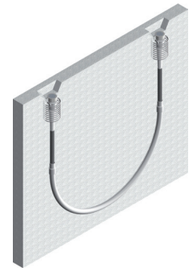


MA ANCHORAGE FOR CRYOGENIC APPLICATION

Multiplane Anchorage System
As a leader in innovative post-tensioning technologies, DYWIDAG offers comprehensive multiple anchorage systems. These solutions ensure superior stability and robustness, vital for the world's largest and most complex LNG tanks.

DEAD-END ANCHORAGE FOR CRYOGENIC APPLICATION

Dead-end Anchorage
DYWIDAG's dead-end anchorage systems provide robust end-point anchorage, offering at same time flexibility in construction method for vertical tendons' bottom ends.



LOOP ANCHORAGE FOR CRYOGENIC APPLICATION

Loop Anchorage
DYWIDAG's loop anchorage systems are designed for efficiency and durability, offering exceptional load distribution flexibility, ensuring structural integrity regardless of size or complexity.

DYWIDAG: A Legacy of Global Recognition for Unmatched Quality

Setting the Benchmark in LNG Post-Tensioning Solutions

DYWIDAG's commitment to excellence is reflected in our global certifications and recognitions. Our systems adhere to international regulations, providing assurance of their quality and reliability.

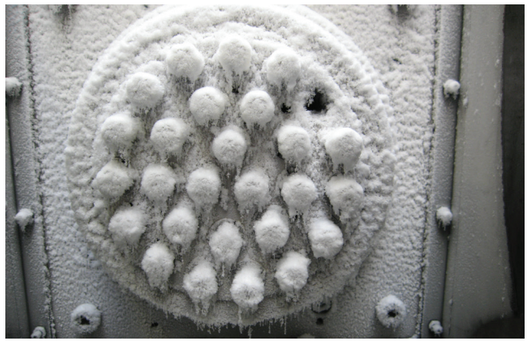
Our compliance with the Fédération Internationale du Béton (fib) guidelines demonstrates our deep understanding of concrete structures and the unique challenges they present. DYWIDAG's active contribution to fib working groups, including those for cryogenic PT-systems, highlights our expertise.

The European Technical Assessment (ETA) is a testimony to our commitment to rigorous testing and documentation, assuring our customers of the reliability and safety of our products in both European and international markets.

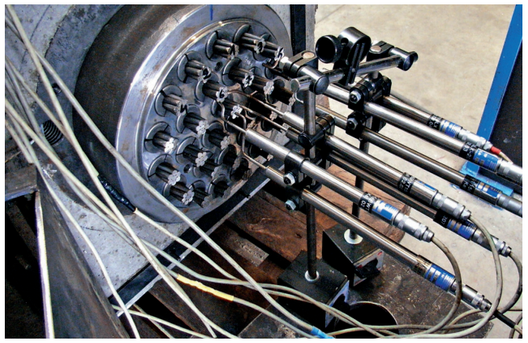
DYWIDAG's recognition by the Post-Tensioning Institute (PTI) underscores our continuous innovation and excellence in post-tensioning technology.

Your Next Step with DYWIDAG

Ready to secure the future of your LNG storage infrastructure with unparalleled safety and efficiency? Please refer to the contact information options on the back page, to discover how DYWIDAG's post-tensioning solutions can benefit your project.



CRYOGENIC TESTING



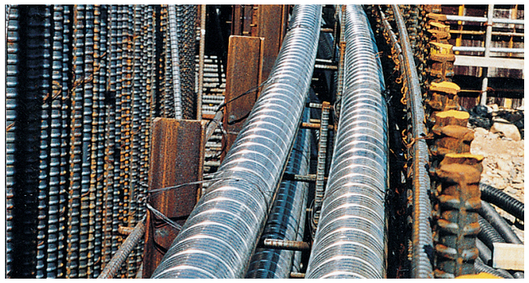
TENDON TESTING

PT TENDON INSTALLATION

References

Tong Young LNG Tanks (Tanks 1-12 in 5 phases)

Location:	Tong Young, South Korea
Client:	Korea Gas Corporation
General Contractor:	Daelim Industrial Co. Ltd.
Period of Execution:	4/2000 - 2/2008
Technical Data:	12no full containment LNG tanks (nickel steel inner tank with prestressed concrete outer tank) of 140,000m³ capacity each. Supplied circumferential and vertical tendons with 19 strands



Tong Young LNG Tanks (Tanks 13 & 14)

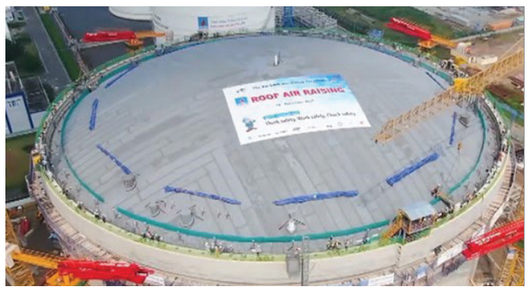
Location:	Tong Young, South Korea
Client:	Korea Gas Corporation
General Contractor:	Daewoo E&C Co. and Hyundai E&C Co. Ltd.
Period of Execution:	3/2007 - 11/2009
Technical Data:	2no full containment LNG tanks (nickel steel inner tank with prestressed concrete outer tank) of 200,000m³ capacity each. Supplied circumferential and vertical tendons with 27 strands

Yangshan LNG Terminal No. 1

Location:	Shanghai, China
Client:	Shanghai Yangshan Port Authority
General Contractor:	Shanghai Power Construction Engineering
Period of Execution:	2007 - 2008
Technical Data:	3no LNG tanks of 165,000m³ capacity each. Supplied circumferential tendons with 19 strands and vertical tendons with 9 strands

Thi Vai LNG Receiving Terminal Project

Location:	Tan Thanh District, Vung Tau Province, Vietnam
Client:	Vietnam Gas Corporation (PV GAS)
General Contractor:	Samsung C&T
Period of Execution:	02/2021 - 08/2021
Technical Data:	1no LNG tanks of 180,000m³ capacity each. Supplied circumferential tendons with 27 strands and vertical tendons with 19 strands



LNG Tanks Sagunto No. 1 and 2

Location:	Sagunto, Spain
Client:	SAGGAS (Union Fenosa Gas, Iberdrola, Endesa, ENI)
Period of Execution:	03/2003 - 03/2006
Technical Data:	2 LNG Storage Tanks, capacity 150,000m³ each prestressed outer concrete tank circumferential tendons with 19 strands vertical tendons with 9 strands

Pyeong Taek LNG Tanks

Location:	Pyeong Taek, South Korea
Client:	Korea Gas Corporation
General Contractor:	Samsung Corp. and Daelim Ind. Co. Ltd.
Period of Execution:	09/2004 – 08/2008
Technical Data:	4no LNG tanks of 160,000m³ capacity each. Supplied circumferential and vertical tendons with 19 strands

Nong Fab LNG Receiving Terminal Project

Location:	Rayong Province, Thailand
Client:	PPTT LNG
General Contractor:	Saipem / CTCI
Period of Execution:	02/2021 - 08/2021
Technical Data:	2no LNG tanks of 160,000m³ capacity each. Supplied circumferential tendons with 19 strands and vertical tendons with 19 strands

Hui Zhou LNG Receiving Terminal Project

Location:	Hui Zhou, Guandong, China
Client:	Guandong Hui Zhou LNG Corporation
General Contractor:	TGE Gas Engineering GmbH
Period of Execution:	08/2021 - 12/2022
Technical Data:	3no LNG tanks of 200,000m³ capacity each. Supplied circumferential tendons with 22 strands and vertical tendons with 12 strands

Case Study

Building the Foundation for Sustainable Energy at Tong Young, South Korea

PRODUCTS
Anchor Bodies MA 6819, Post-tensioning Tendons, Pre-stressing

LOCATION
Tong Young Republic of South Korea

TIMELINE
2000-2009

OWNER
Korea Gas Corporation

CONSULTING ENGINEERS
KoGas Engineering Corp.

GENERAL CONTRACTOR
Tanks 1–12: Daelim Industrial Co., Ltd. Tanks 13–14: Daewoo E&C Co. and Hyundai E&C Co. Ltd.

Summary

As part of a long-term strategy to leverage Liquefied Natural Gas (LNG), the safe and economic energy alternative, the government of the Republic of South Korea undertook the construction of multiple LNG Receiving Terminals across the country. DYWIDAG's high-quality solutions work played a pivotal role in the massive Tong Young LNG Receiving Terminal project, ensuring the structural integrity of 14 LNG storage tanks.

Context

South Korea's reliance on imported resources for its energy needs highlighted the necessity for a dependable, safe, and economic domestic solution. The government's response was to leverage LNG, initiating a long-term plan to construct a series of LNG Receiving Terminals throughout the country. One such project was the Tong Young LNG Receiving Terminal, which consisted of a total of 14 LNG storage tanks across six phases.

Solution

DYWIDAG-Systems Korea, part of the DYWIDAG Group, supplied Multiplane Anchorages (MA) 6819 with circumferential and vertical post-tensioning tendons with 19 strands for Tanks 1–12 and 27 strands for the larger Tanks 13 and 14. Their prestressing work provided essential structural stability, catering to the increasing tank capacities – 140,000m3 for Tanks 1¬–12 and 200,000m3 for Tanks 13–14. This project – which took place over 9 years – also set the stage for Dywidag's involvement in future energy infrastructure endeavors in South Korea.

Get in touch.

For local contact details, please visit our website.

dywidag.com/contact

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