Pipe Specification

- **In Combination with the Proposal Provided by Western Pipeline Company Limited of PipeChina:**

1. According to the “Research on Hydrogen Blending/Pure Hydrogen Transportation in Natural Gas Pipelines” project of the key scientific and technological plan of the14th Five-Year Plan, the transportation pressure of pure hydrogen pipelines has increased to 6.4MPa. Currently, the DN250x6.4MPa pipe has been developed, and its samples have been sent for testing and trials.

2. LESSO, together with a number of other entities, conducted the first pure hydrogen deflagration test (with a burst value of 11.3MPa) on its developed RTP flexible hydrogen composite pipe (DN170x3.5MPa) at the PipeChina Pipeline Fracture Control Test Site in Hami, Xinjiang.
The success of the burst shows that the composite pipe has met the industry design requirements in all indicators, which fills the current gaps in the Chinese market and represents a major breakthrough in the process of the localization of this type of pipe.

Hydrogen Pipe Test Site of Western Pipeline Company Limited of PipeChina





PipeChina Pipeline Fracture Control Test Site in Hami, Xinjiang







LESSO

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Stock Code: 2128.HK

High-barrier Flexible Hydrogen Composite Pipe

With the development of hydrogen energy storage and transportation technology in China, large-scale centralized hydrogen production and long-distance transportation of hydrogen have become an unstoppable trend. Pipeline transportation has also received increasing attention as a economical and efficient mode of transportation.

Due to the risk of hydrogen brittleness and hydrogen corrosion associated with metal steel pipes for hydrogen transportation, a plastic composite pipe with high barrier performance and high strength was designed and developed. It is primarily compounded by an inner pipe layer, an aluminum strip barrier layer, an intermediate plastic layer, a reinforced fiberglass layer, and an outer pipe layer.



LESSO

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Company Introduction

Established in 1986, LESSO (Stock Code: 02128.HK) is a global leader in home furnishings and building materials. Its business portfolio spans plastic piping, building materials and home furnishings, environmental protection, new energy, supply-chain service platforms and others. It offers a wide range of products such as pipes, photovoltaics, plumbing and sanitary ware, integral kitchen materials, integral doors and windows, aluminum formwork and smart scaffolds, water purifiers, water-proofing materials and sealants, fire-fighting equipment, valves, cables, lighting, hygiene materials, items for environmental protection, agricultural facilities, and oceanic aquaculture cages. In 2023, LESSO's sales revenue reached over USD 4.38 billion.

Since implementing a strategy of globalization and expanding its global presence, LESSO has evolved into a sophisticated multinational. It boasts more than 30 advanced production bases worldwide, broadening its industrial and sales networks to cover Asia, North America, South America, Europe, Africa, and Oceania. This enables LESSO to provide quality products and services for global customers in accordance with its continuously improved strategic layout in a timely and efficient way.

LESSO has founded its R&D center with more than 1,000 scientific researchers, one nationally accredited enterprise technology center, and two post-doctoral workstations to support its innovation and technical development. It has taken a leading role in the revision of over 120 international and Chinese industry standards. LESSO owns over 2,900 patents (some of them are pending), and provides over 10,000 varieties of products, making it one of the most comprehensive manufacturers in the piping industry. Its products are utilized globally in different areas, including home decoration, civil construction, municipal water supply, drainage, energy management, power supply and telecommunications, gas supply, fire-fighting, environmental protection, agriculture, oceanic aquaculture, etc.

True to its idea of "Envisioning the Better, Building the Future", LESSO remains committed to creating a better living environment, and advocating ideal cities featuring greenness, livability, and efficiency. With concerted efforts from various sectors, LESSO will fully play its role in sustaining healthy and beautiful space so that global residents could enjoy a comfortable life.





LESSO Research Institute, and Testing Center



LESSO College



Training Apartment Building

Product Features

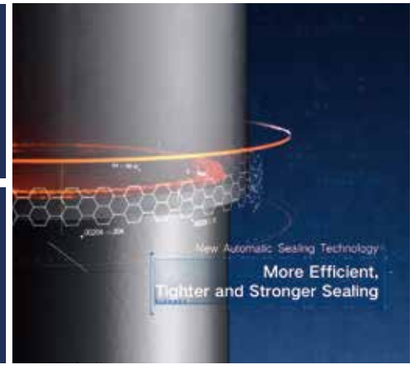


01 Multi-layer Composite Technology

The composite pipe features a five-layer structure. The interior and exterior surfaces of the barrier layer are coated with glue; the reinforced layer utilizes a pre-impregnated glass fiber strip, the surface of which is covered with resin; the automatic unique tension controller is used, and the pipe is bonded and formed with the intermediate layer and the outer pipe layer through the follow-up heating device. The composite pipe retains a stable structure and good structural unity.

02 New Sealing Technology

No sealing ring is used, and automatic sealing is achieved after milling the reinforced layer. The reinforced layer is not exposed, delivering high sealing efficiency and good sealing quality.



03 Corrosion Resistance

The inner and outer layers of the composite pipe are made of polyethylene material that is resistant to acid and alkali. Hence, there is no need to conduct any additional anti-corrosion treatment.



04 High Barrier Performance

The barrier layer consists of four layers of aluminum strip (each layer with a thickness ranging from 0.05mm to 0.1mm). When the thickness of the aluminum is greater than 0.015mm, it provides good impermeability to gas.



05 Convenient Construction and Good Safety

Pipes with a specification below DN200 can be coiled for transportation. Construction and laying are convenient. The number of joints is effectively reduced, guaranteeing high safety.

Applications

- Suitable for hydrogen storage systems, hydrogen transportation systems, hydrogen compression systems, hydrogen filling systems and hydrogen combination systems where the working pressure is no greater than 10MPa and the working ambient temperature is between -20℃ and 65℃.



Performance Standard

- GB/T 34542.1-2017 Storage and Transportation Systems for Gaseous Hydrogen — Part I: General Requirements
- ASME B31.12-2023 Hydrogen Piping and Pipelines.
- NORSOK M-710-2014 (Norway) Qualification of Non-metallic Materials and Manufacturers
- ISO 11114-2:2013(E) Gas Cylinders - Compatibility of Cylinder and Valve Materials with Gas Contents - Part 2: Non-metallic Materials

Performance Indicators

No.	Project	Indicators
1	The stability of no splitting for pressed composite pipes	No cracks on the surface
2	Longitudinal reversion	<3%
3	Short-term hydrostatic strength	Under room temperature: The nominal pressure rating multiplied by 2 for 1h, with no rupture or leakage observed. At 65℃ or design temperature (>65℃): The nominal pressure rating multiplied by 1.5 for 165h, with no rupture or leakage observed.
4	Short-term burst pressure	Under room temperature: ⩾3.0x nominal rating. At 65° C or design temperature (>65° C): ⩾3.0x nominal rating × f_i
5	Minimum bending radius (MBR) test	Meet short-term burst pressure requirements at room temperature
6	Short-term cyclic pressure	No rupture or leakage after ⩾7000 cycles
7	1000h survival test	No rupture or leakage at 65℃ or design temperature (>65℃)
8	Gas sealing performance (for gas pipes)	Under room temperature: The nominal pressure rating multiplied by 1.25 with pressure held for 3h and pressure drop no more than 5%. No rupture or leakage is observed.
9	Tensile performance (for repair pipes)	Maximum tensile failure load ⩾ 3.0 times tensile load rating (TLR)
10	Gas permeability coefficient	⩽1017（CH4,30℃）（cm3*cm/cm2*s*Pa）