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JING CHENG HOLDING



北京天海工业有限公司

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LNG 产品介绍

LNG PRODUCTS INTRODUCTION

随着世界经济发展，能源消费不断增长，温室气体和各种有害物质排放激增，导致人类生存环境加剧恶化。天然气与其他一次能源相比，更加清洁、环保和高效。在此基础上开发的LNG（液化天然气）适时地顺应了这一发展趋势。



随着天然气在能源中的战略位置逐渐提高，北京天海工业有限公司开发了LNG气瓶、LNG汽车罐车、LNG贮罐、LNG加气站、车（船）燃料用LNG供气系统等产品，并提供天然气储运领域全套解决方案，推动了清洁能源汽车燃料系统的发展。

LNG在低温、低压、液态下储存、运输及应用，其密度为气态的620倍左右，压缩天然气的三倍，单次加气可持续行驶500--700公里，能满足城市公交、城际客车、重型卡车的长途行驶的要求，且环保、安全可靠，因此已逐渐成为我国汽车新能源市场需求的的一个主要能源。

The energy consumption is increasing continuously with the development of world economy. The increasing emission of greenhouse gases and a variety of harmful substances leads to the living environment of mankind aggravated. To compare with other primary energies, natural gas is more clean, environmental and efficient. Thus, the development of LNG on this basis (liquefied natural gas) timely meet this trend.

LNG is stored, transported and used under low temperature and pressure as well as liquid state, its density is about 620 times of which under gaseous and about 3 times of CNG. One time filling can sustain 500~700km travel distance, which not only meets the long-distance driving requirement for city bus, intercity bus and heavy-duty truck, but also is environmental, safe as well as reliable. Therefore, it has gradually become one main energy of our automotive new energy market.

With the increasing of strategic position of natural gas, BTIC developed LNG cylinder, LNG tanker, LNG storage tank, LNG filling station, vehicle (vessel) used LNG supply system, and provide complete solution for natural gas storage and transportation field, which pushes the development of clean energy vehicle fuel system.



Beijing Tianhai Industry Co., Ltd. is a joint venture. BTIC is a group enterprise having six professional manufacturing facilities for the production of gas storage and transportation equipment, (Beijing manufacturing facility, Tianjin manufacturing facility, Shanghai manufacturing facility, Langfang manufacturing facility, Daxing manufacturing facility, Mulin manufacturing facility), a specific automotive manufacturing base and an America subsidiary company.

BTIC is experienced in and qualified for designing and manufacturing various kinds of high pressure gas cylinders with pressure level B1,B2,B3,A1,A2, C2, C3,D1,D2. Presently, BTIC can produce high pressure seamless steel cylinder, welded cylinder, composite cylinder, accumulator shells, cryogenic cylinder, and gas storage special container, aluminum liner fully wrapped with carbon fiber composite cylinder and cryogenic tank in more than 800 sizes. BTIC's products serve a wide application in chemical industries, fire fighting, petroleum industries, energy, city construction, food process, metallurgy, mechanics, electronics.

BTIC now has the following quality system certificates: ISO9001:2008、ISO/TS16949:2009 system certification and ISO14001: 2004,OHSAS18001: 1999 Environment and occupational health safety management system ,Besides, BTIC has 34 international approvals, including the US DOT approval, Germany TUV approval certificate and Canada TC approval. JP brand seamless steel cylinder won the national silver medal in 1984 and then were awarded as Beijing Famous Brand Product from 2002 to 2009 . Today BTIC's products have been exported to more than 40 countries.

BTIC is such a company whose economic indicators have been ranking the top in the Chinese steel cylinder manufacturing industry for 15 consecutive years. In 2007 BTIC has been awarded National May 1st Labor Medal again, while in 2008 awarded National product quality qualified enterprises. From 2006 to 2009 BTIC has acquired The Head Enterprise of Chinese Industry consecutively. In 2010 BTIC is one of The Head Enterprise of Chinese Metallic Pressure Container Manufacturer. In 2011 BTIC has got Advanced and High-Tech Enterprise.

BTIC's spirit is Honesty, Working, Learning, Innovation, and Goal of being the first class.



北京天海工业有限公司是中外合资企业，是一个具有六个专业气体储运装备生产基地（北京生产基地、天津生产基地、上海生产基地、廊坊生产基地、大兴生产基地、木林生产基地），及一个专用汽车制造基地（北京攀尼高空作业设备有限公司）和一个美国公司的集团公司。

公司具有B1、B2、B3、A1、A2、C3、D1、D2级压力容器设计、制造资格。现可生产800余个品种规格的高压无缝气瓶、焊接气瓶、缠绕气瓶、蓄能器、低温气瓶、储气式特种集装箱、铝内胆碳纤维全缠绕复合气瓶及低温储运装备等系列产品；公司的产品广泛应用于汽车、化工、消防、医疗、石油、能源、城建、食品、冶金、机械、电子等行业。

北京天海工业有限公司现在已经取得ISO9001:2008、ISO/TS16949:2009国际质量管理体系认证和ISO14001:2004环境管理体系、OHSAS18001:1999职业健康安全管理体系以及包括美国DOT、德国TUV、加拿大TC等三十四国际产品认证。JP牌钢质无缝气瓶在1984年荣获国家质量奖，2002年至2009年被誉为“北京名牌”产品。目前，公司产品已出口世界五大洲四十多个国家和地区。

北京天海工业有限公司各项经济技术指标已经连续十五年保持全国同行业第一。2007年再次被评为“用户满意企业”，2008年被评为全国产品质量稳定合格企业，中国金属压力容器制造行业排头兵企业，2010年被评为国家一级安全生产标准化企业，2011年被评为高新技术企业。

企业精神：“诚信、敬业、学习、创新，志在一流”





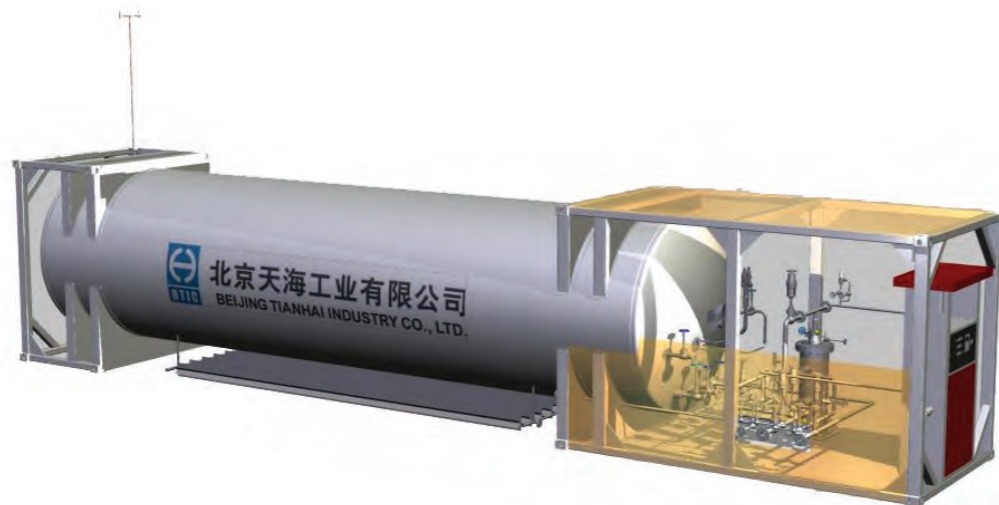
Certificates
资质

LNG撬装式加气站

LNG skid mounted filling stations

将LNG储罐、LNG泵撬、LNG加注机等集中安装在一个撬体上，为LNG汽车加注液化天然气。

Assemble LNG storage tank, LNG pump and LNG filling machine on one frame so as to fill LNG into LNG vehicle.



移动式LNG撬装加气站

LNG Automobile Filling Station

技术参数 technical parameter

参数和配置 parameters and configuration	加气站类型 The type of filling station	小型撬装式LNG加气站 Small skid-mounted LNG filling stations	中型撬装式LNG加气站 Medium-sized skid-mounted LNG filling stations
参数与性能 Parameters and performance	日加气规模 Daily filling amount (Nm ³)	8000—10000	10000—15000
	LNG储存量 LNG storage volume (m ³)	1x30(可根据客户需求选配) depending on customer' demands	1x60(可根据客户需求选配) depending on customer' demands
	储罐设计压力 Tank design pressure (Mpa)	1.26	1.26
	系统设计压力 system design pressure (Mpa)	2	2
	动力需求 power demand (KW)	15	15-30
主要设备参数 The main equipment parameters	车辆加气速度 gas filling speed (辆/小时) (vehicle/hour)	10-12	20-25
	售气计量精度 gas sales measurement accuracy (%)	1	1
	储罐数量 Tank quantity (个)	1	1
	售气机数量 the quantity of gas supplier (个)	1	2
	潜液泵数量 immersed pump quantity (个)	1	1-2
控制系统 control system	PLC可编程控制		
安保系统 security system	可燃气体、火焰报警、ESD连锁保护 flammable gas, flame alarm, ESD chain protection		

工艺流程 Process flow

卸车流程 unloading

LNG槽车—密闭接头—LNG泵—LNG储罐，从LNG液化厂用低温运输槽车将LNG运至汽车加气站，通过加气站卸车接口、真空管道、潜液泵、阀门等将LNG灌注到加气站的低温储罐中。
LNG tanker—sealed joint—LNG pump—LNG tank, LNG will be transported by LNG cryogenic trailer from plant to filling stations, and flowed into cryogenic tank through the unloading joint, vacuum pipeline and valves with the functions of immersed pump

汽车加液流程 filling

LNG储罐—LNG泵—售气机—LNG车载气瓶，给车辆加气时，先将加注管路通过专用的LNG加液枪与汽车上的LNG瓶进液接口相连接，控制储罐内的压力将LNG输送到一种专业的低温潜液泵中，通过加气机来控制泵运转输送的流量，同时用LNG流量计计量出输送的液体，在控制面板上反显示重量（或标方数）和价格。
LNG tank—LNG pump—gas supplier—LNG automobile cylinder, connect the filling pipeline to the cylinder inlet through the LNG filling coupling, control the pressure in tank and convey the LNG into cryogenic immersed pump with the flow controlled by gas-filling machine. Meanwhile, the weight (or volume) and price of conveyed fluid measured by LNG flow meter will display on control panel.

泄压流程 pressure relieving

LNG储罐—安全阀（泄气），LNG储罐内气相压力高于安全阀设定压力，安全阀自动泄压。
LNG tank—relief valve, if the pressure in gas phase of LNG tank is higher than the setting pressure, the safety valve will discharge the pressure automatically.

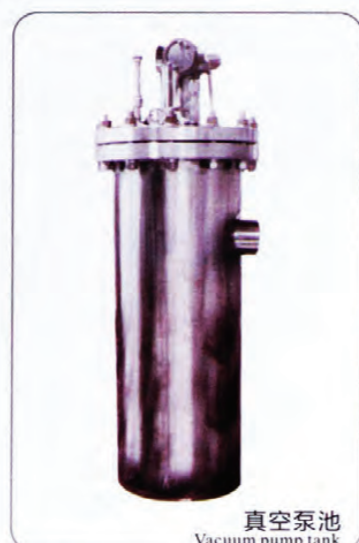
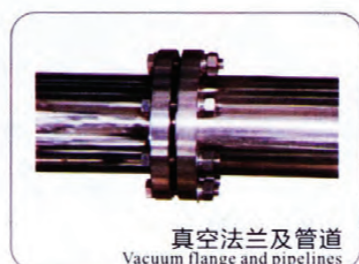
LNG泵撬

LNG pump skid



LNG泵撬是将LNG低温潜液泵、真空泵池、气化器、真空管路及阀门等集成在一个撬体上，具有卸车、调压、加气等功能。

LNG pump skid is an integrated frame of LNG cryogenic immersed pump, vacuum pump tank, vaporizer, vacuum pipeline and valve with the function of loading, pressure adjustment and filling.



空温式汽化器 (卸车/储罐增压器及EAG加热器)
Air-heated vaporizer(Unload/pressurize vaporizer /EAG heater)

LNG / L-CNG加气站成套设备

LNG/L-CNG filling station set equipment

概述 general

LNG / L-CNG加气站是LNG与CNG两种加气方式的有机组合，是一种正在兴起、具有良好推广应用前景的加气站类型。

LNG/L-CNG filling station is the combination of LNG and CNG two filling methods, which is the arisen type of filling station with prosperous application.

LNG / L-CNG加气站特点

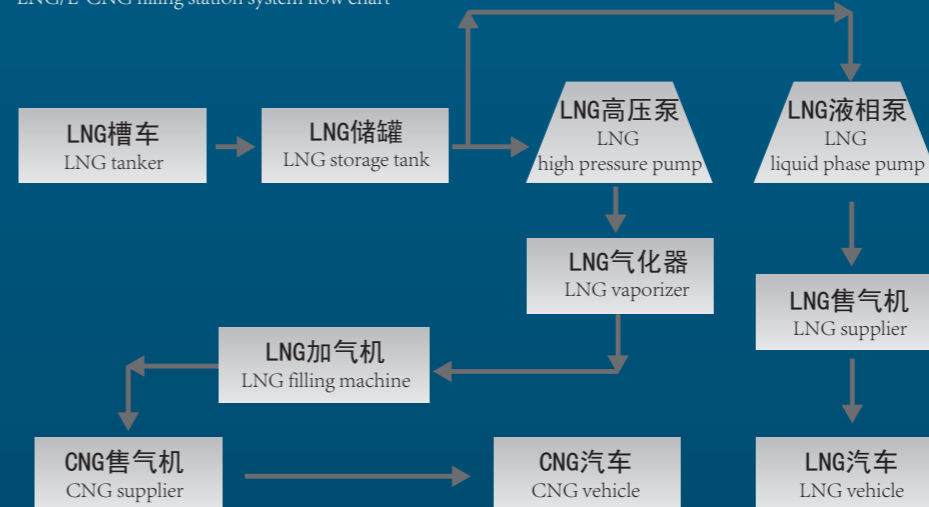
characteristics

它以液相、低温的天然气进站，通过液相泵加压、气化后实现对汽车加气，无需高耗电量和噪音大的气体压缩机，站内用能较少，因而加压效率高、运行费用低。

The cryogenic liquefied natural gas at filling station will be converted into gas pressurized through liquid phase pump and filled into vehicle. The high power consuming and noisy gas compressor is not needed, which may save station space and energy as well as cost.

LNG / L-CNG加气站系统流程示意图

LNG/L-CNG filling station system flow chart



珠海
Zhuhai



贵阳
Guiyang



山东滨州
Binzhou
(Shandong)



案例 cases

目前，北京天海工业有限公司为客户提供LNG / L-CNG成套解决方案，并在珠海、贵阳和山东滨州投建了LNG / L-CNG加气站，设备安全平稳运行。

At present, BTIC provide the LNG/L-CNG whole set solution for customers, and built several LNG/L-CNG filling stations in Zhuhai, Guiyang and Shandong. The equipment at these facilities run smoothly and safely.

火花塞点火SI储罐

SI storage Tank

SI储罐是利用火花塞进行点火的低压储罐。通过对LNG加气站、发动机、整车SI储罐多方位技术整合，北京天海工业有限公司能很好的提供低成本的车用LNG解决方案。目前我们已为北汽福田、贵阳公交、海口公交、东风汽车、陕西重汽等公司提供SI储罐。

SI storage tank is sparkle ignition low pressure storage tank. BTIC can provide low cost vehicle used LNG solution by integration of LNG filling station, engine, SI tank, etc. Now we have provided SI storage tanks for Beiqi Foton Motor Co., Ltd., Guiyang public transportation, Haikou public transportation, Dongfeng automobile, Shanxi heavy duty truck co., Ltd, etc.

车用LNG优点 Advantages of vehicle used LNG

环保性

Environmental protection

一辆公交车尾气污染物排放量相当于50辆小汽车排放量，如果将北京市1.5万辆公交车改为LNG车辆，相当于改造了75万辆小轿车，对改善首都大气环境、降低PM2.5排放具有重要意义。

A bus exhaust pollutant emissions is equivalent to the emissions of 50 cars. If convert 15,000 diesel buses into LNG fuel, that means 750,000 cars are converted, which is significant for capital environment improvement and the reduction of the emission of PM2.5.

尾气污染物 Exhaust pollutants	柴油汽车 Diesel bus	LNG汽车 LNG bus
二氧化碳 (CO ₂) (g/km)	1384	1109
氮氧化物 (NO _x) (g/km)	40.3	19.9
一氧化碳 (CO) (g/km)	11.1	0.30
碳氢化合物 (HC) (g/km)	2.4	0.50
车辆运行平均时速 (Average speed) (km/h)	15.6	17.7

经济性

economy

根据天然气燃烧特性和运行实验结果，1Nm³天然气的行驶里程等效于0.95升柴油。柴油按7.79元/升，天然气按4.5元/Nm³，测算如下：

According to LNG's characteristic and experimental result, 1 Nm³ of LNG mileage is equivalent to 0.95 liters of diesel fuel. Diesel is 7.79Yuan/L, LNG is 4.5Yuan/Nm³, estimated as follow:

车型 Bus types	选配气瓶 Gases (L)	天然气充量 LNG filling volume (Nm ³)	相当柴油量 Diesel volume (L)	行驶里程 mileage (km)	节省金额 Saved amount (元Yuan)
8米公交车 8M city bus	330	185	176	450	540
12米公交车 12M city bus	375	211	200	420	610
18米公交车 18M city bus	495	278	264	380	808

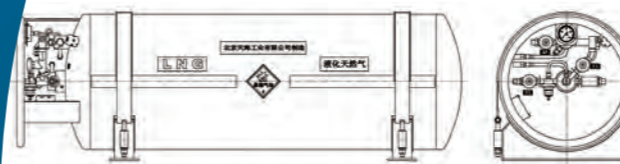
安全性

Safety

LNG遇到明火只会燃烧，不容易引发爆炸的危险，它的燃点和爆炸极限都大大高于汽油或柴油，因此使用LNG作为燃料更加安全。

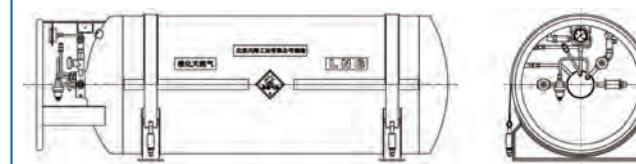
LNG will burn when contact with fire and has the lower risk of explosion since its burning point and explosion limit are much higher than that of gasoline and diesel. Therefore, LNG as fuel is more safe.

	天然气 LNG	汽油 Gasoline	柴油 diesel
燃点 burning point	650℃	427℃	220℃
爆炸极限 explosion limit	5-15%	1.4-7.6%	1.3-6.0%



CDPW500-150/200/240/275/310/330-1.45IV型
双阀座无自增压开放式

Open type double flanges without self-pressurized device

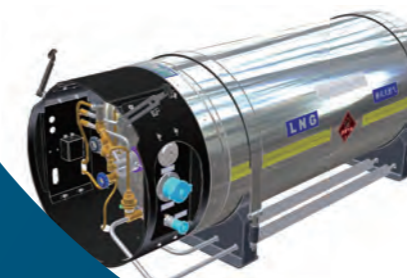
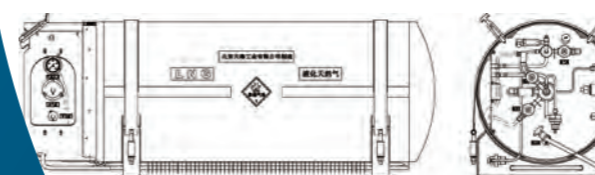


CDPW600-285/340/400/450/495-1.45 I型
单阀座无自增压开放式

Open type single flange without self-pressurized device

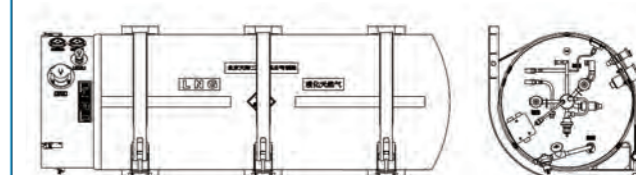
CDPW600-285/340/375/400/450/495-1.45IV型
双阀座外置自增压封闭式

Close type double flanges with external self-pressurized device



CDPW600-285/340/375/400/450/500-1.59 V型
机动车用液化天然气焊接绝热气瓶

Vehicle used LNG welded insulated cylinder



应用案例
Successful cases



贵阳公交
Guiyang City Bus



北汽福田
Beiqi Foton Motor Co., Ltd.



贵阳公交
Guiyang City Bus



北汽福田
Beiqi Foton Motor Co., Ltd.



湛江公交
Zhanjiang City Bus



海口公交
Haikou City Bus



福州公交
Fuzhou City Bus



蛇口公交
Shekou City Bus



中国重汽
China National Heavy Duty
Truck Group Corp., Ltd



斯堪尼亚卡车
Scania truck

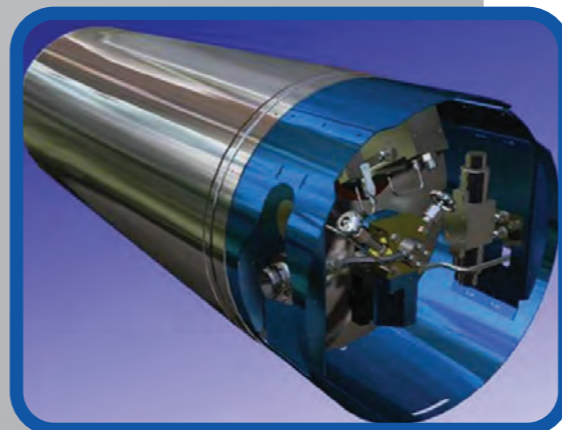
应用案例
Successful
Cases

高压直喷HPDI储罐

HPDI storage tank

HPDI 储罐是目前全球顶尖的车载LNG储罐，北京天海工业有限公司已向北美及澳大利亚出口数千台HPDI 储罐，主要应用于港口运输及重型卡车，这些储罐已良好的运行超过6年。北京天海工业有限公司致力于进行全球范围的LNG项目合作。

The HPDI tank is the world's top vehicle used LNG storage tank. BTIC has exported thousands of HPDI storage tanks to North America and Australia. They are mainly used in the port transportation and heavy duty truck. These tanks have been used over 6 years without problem. BTIC is dedicating to worldwide LNG project cooperation.



高压直喷储罐的广泛应用
The wide application of HPDI tank



美国加利福尼亚州奥兰治地区
Orange County, North Carolina



美国加利福尼亚长滩港
The Port of Long Beach, California



美国加利福尼亚州丰塔纳
Fontana, California



美国加利福尼亚清洁燃料
Clean fuel in California



加拿大温哥华
Vancouver, Canada



澳大利亚
Australia



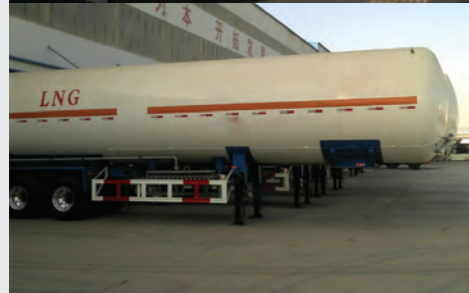
澳大利亚
Australia



美国加利福尼亚奥克兰
Oakland, California

LNG槽车

LNG tanker



公司具有车辆改装资质，并长期致力于低温液体运输槽车的研制与生产，产品广泛应用于LNG汽车加气站、LNG气化站、LNG城市调峰站、LNG瓶组供气站、LNG车载系统改造等各类LNG应用项目的建设。

BTIC has the qualification for vehicle conversion and is dedicating to the development and production of cryogenic liquid transportation tanker. Our products are widely used in LNG vehicle filling station, LNG gasification station, LNG city peak regulation gasification station, LNG bottle group gasification station, LNG vehicle used system improvement as well as all kinds of LNG application project construction.

特点 Characteristics:

- 高真空多层缠绕绝热技术，确保长途运输过程中温度升幅在标准范围内，压力稳定，长途运输安全可靠。**
High vacuum multi-layer winding insulation technique may ensure the temperature during transportation within standard range as well as the stable pressure. The long distance transportation will be guaranteed safe and sound.
- 深冷技术（-162℃）储存，容量大，运输成本低。**
cryogenic (-162℃) storage, big volume, low-cost.
- 储存量大，适宜工业和城市燃气调峰使用。**
Large storage capacity, suitable for emergency peak regulation of the industrial and city gas application
- 整体结构简洁，阀门管路少，方便维修和检修。**
The overall structure is simple, with a few valve pipelines, which is easy for repair and maintenance.
- 能够与40英尺半挂骨架车连接，符合中国机动车道路安全法要求。**
can be connected with 40 foot Semitrailer, meet the motor vehicle road safety law's requirements.
- 与各种牵引车的连接方便快捷，且配备驻车刹车系统，使其工作状态安全可靠。**
It's convenient to connect with a variety of tractors and be equipped with parking brake system so as to ensure the safety.

技术参数 Technical Parameter

执行标准/Standards	中国压力容器规范/China Pressure Vessel Regulation	容器类别/Type	III
罐体技术参数/Technical parameter of tank body		内容器 / Inner vessel	外容器 / Outer vessel
设计温度/Design temperature °C	-196		50
设计压力/Design pressure MPa	0.66		-0.1
安全阀开启压力/PRD open pressure MPa	0.7		-0.1
射线检测/ray detection	100%		20%
几何容积/geometric volume LITRE	51200		8930
充装系数/filling ratio	0.9		-
介质/medium	LNG		-
主题材料/Main material	S30408		Q345R+S30408
绝热方式/Insulation mode 高真空多层缠绕绝热/high vacuum multi-layer winding insulation			
日蒸发率（天然气）/Daily evaporation rate %/day			0.13%
真空度/Vacuum Pa			0.1pa
漏放气速率/leak and outgassing rate Pam ³ /s			≤1×10 ⁻⁶
油漆/Paint system (海虹老人牌)			
漆层/Paint coat	油漆型号/Generic type	油漆层数/Coats	最小干膜厚度/Min dry film thk
底漆/Primer paint	锌基环氧树脂漆/Zinc phosphate epoxy	2	0.1mm
面漆/Finish paint	聚胺脂漆/Acrylic Modified polyurethane	1	0.05mm
整（半挂）车参数 technical parameter of vehicle (semitrailer)			
执行规范规程 standards	压力容器安全技术监督规程 Supervision Regulation on Safety Technology for Pressure Vessel		液化气体汽车罐车安全监察规程 Regulation of safety supervision for liquefied gas tanker
	GB150-1998 《钢制压力容器》 Steel pressure vessel		JB/T4783-2007 《低温液体汽车罐车》 Cryogenic liquid tanker

整（半挂）车 vehicle (semitrailer)		紧急切断装置 emergency shutoff device		液位计 level gauge	
底盘型号/chassis type	行走机构厂给出	型号 type	底部充装/bottom filling	DJ61F-40P (工厂代号 supplier code)	
牵引车型号/tractor type	牵引头厂家提供	增压管路/pressure building pipeline	气相管路/vapor phase pipeline	DN50	
发动机功率/engine power KW	≥336	公称直径 nominal diameter	底部充装/bottom filling	DN25	
整车整备质量/vehicle mass kg	18000	增压管路/pressure building pipeline	气相管路/vapor phase pipeline	DN40	
充装质量/filling weight kg	19630	操作方式/operation mode	气动控制/pneumatic control		
满载总质量/fully loaded mass kg	37630	熔闭温度/fused close temperature	+70±5° C		
最大设计轴荷 max design axle weight	前轴/forward shaft kg 14328 后轴/back shaft kg 23302	型式/type	紧急切断阀与过流限制阀组合 combination of emergency shutoff valve and overflow valve		
外形尺寸/physical dimension	3000X2500X3900	熔闭时间/fused close time	DN40-5s DN50-10s		
型号/type	DA22Y-40P	型号/model	CVJ-1		
公称压力/nominal pressure MPa	4.0	型式/type	差压式液位计/differential pressure level gauge		
阀座喉径/flange radius mm	15	公称压力/nominal pressure MPa	2.5		
开启压力/open pressure MPa	0.7	测量范围/measuring range mm	0-2500		
回座压力/reseating pressure MPa	0.63	精度等级/accuracy grade	2.5级 grade		
排放压力/discharge pressure MPa	0.8				
主要技术参数 main technical parameter		单位 unit	指标 (参数) index (parameter)	备注 remark	
接近角 / 离去角 approach angle / departure angle		°	16		
轴数/axes number		个	3		
轮胎数/tire number		个	12+1		
轮胎规格/tire size			11 00R20	可根据客户要求配备真空胎、钢丝胎及线胎 can be equipped with vacuum tire, steel wire tire and cord tire as per customers' requirement	
钢板弹簧片数/steel plate spring leaf number		个	8/8/8	可选空气悬挂 can be option for air suspension	
车辆限速/speed limitation		Km/h	60(直线行驶，一级公路) travelling as straight-line on arterial road 20(转弯行驶) turning		