IG tank integrated gas supply device

Technical specifications
(liquid carbon dioxide)

Qingdao Sains Gas Technology Co.,Ltd

2024

SAINS GAS

Technical Specifications

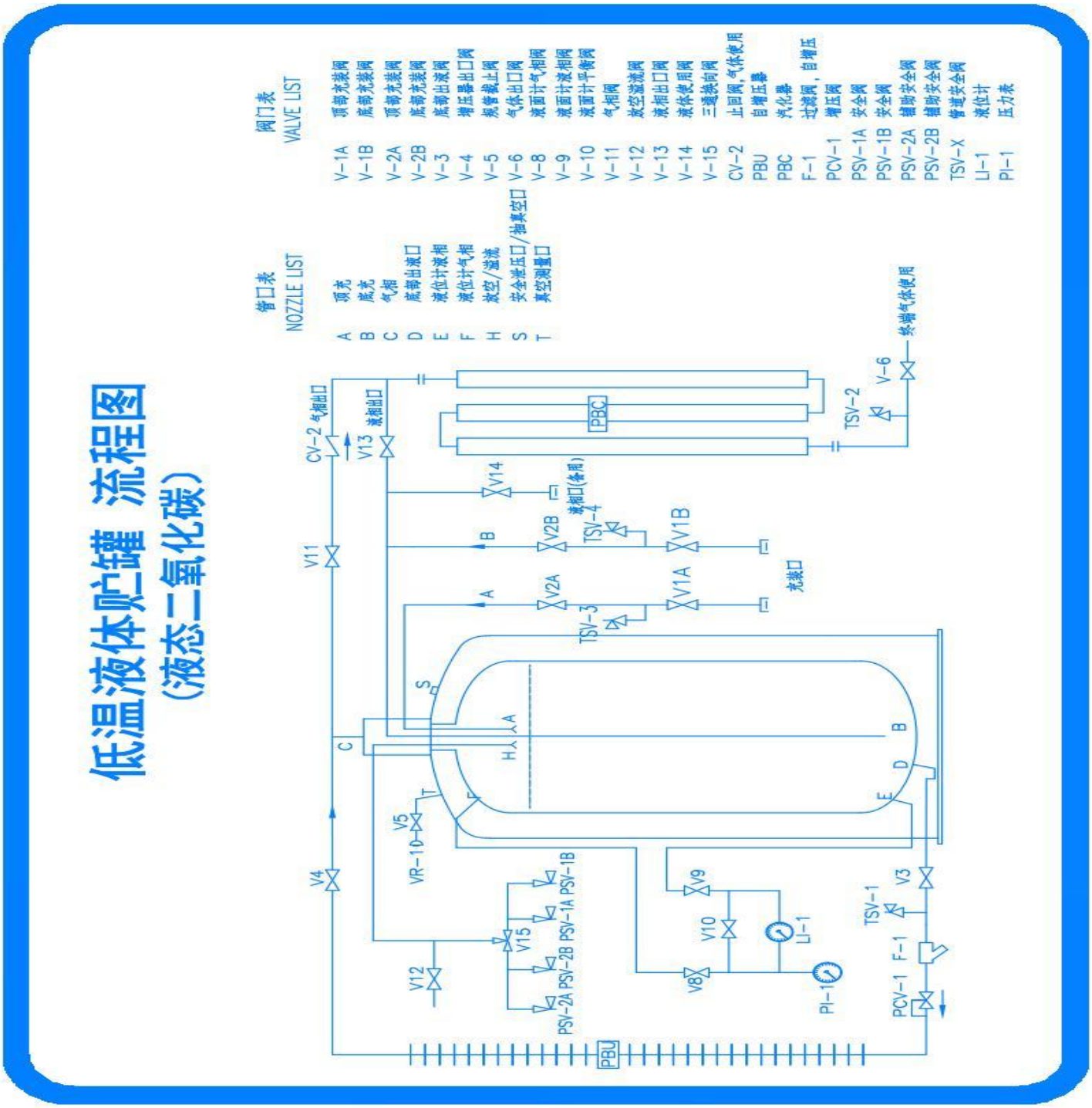
1、Cryogenic storage tank design technical parameters

1	Model		ET3-CS	ET5-CS	ET7.5-CS	ET10-CS
2	Type		Vertical flat bottom			
3	Standard		TSG 21、GB/T150、GB/T18442(Reference)			
4	Design pressure (inner/outer)		2.25MPa/-0.1MPa	2.3MPa/-0.1MPa	2.3MPa/-0.1MPa	2.3MPa/-0.1MPa
5	Maximum work pressure (inner/outer)		2.30MPa/-0.1MPa	2.40MPa/-0.1MPa	2.40MPa/-0.1MPa	2.40MPa/-0.1MPa
6	Minimum Design Metal Temperature		-40 ℃/50℃			
7	Full volume after stretching		2.91m³	4.90m³	7.40m³	9.80m³
8	Filling rate		95%			
9	Main material	Inner	16MnDR GB/T3531			
10		Outer	Q345R GB/T713（Carbon steel housing）S30408 GB/T24511（Stainless steel housing）		Q345R GB/T713（Carbon steel housing）	
11	Filling Medium		LCO2			
12	Interlayer medium		High vacuum multi-layer winding			
13	Helium leak test		YES			
14	Vacuum interlayer leakage rate		≤1x10^{-8} Pa.m3/s			
15	Static evaporation rate (liquid nitrogen)		N/A			
16	Inner container holding pressure when leave the factory		20KPa			
17	Factory vacuum degree		≤0.01Pa			
18	Paint brand film thickness		Jordan 200um			
19	Support form		Top suspension + support			
20	Dimension (L*W*H)m		≈1.9×1.9×2.7	≈2.2×2.1×3.2	≈2.4×2.5×3.3	≈2.8×2.7×3.4
21	Chassis size (L*W) mm		1700x1700	1900x1900	2250x2250	2600x2600
22	Equipment weight (including chassis bracket)		≈2.5 Ton	≈3.4 Ton	≈5.2 Ton	≈6.3 Ton
23	Internal and external piping materials		S30408 GB/T14976			
24	Supercharger		20Nm3/h	25Nm3/h	25Nm3/h	30Nm3/h
25	Vaporizer		75Nm3/h	105Nm3/h	150Nm3/h	200Nm3/h

2. Valve and instrument list

Code	Name	Specification	Function	Material
V1A	Cryogenic long-axis globe valve	DN25	Top filling valve	Stainless steel
V2A	Cryogenic long-axis globe valve	DN25	Top filling valve	Stainless steel
V1B	Cryogenic long-axis globe valve	DN25	Bottom filling valve	Stainless steel
V2B	Cryogenic long-axis globe valve	DN25	Top filling valve	Stainless steel
V3	Cryogenic long-axis globe valve	DN15	Self-pressurizing inlet valve	Stainless steel
V4	Cryogenic short-axis globe valve	DN15	Self-pressurizing outlet valve	Stainless steel
V5	Corrugated tube globe valve	1/8"MPT	Regulated stop valve	Copper
V6	Cryogenic long-axis globe valve	DN20	Vaporizer outlet valve	Stainless steel
V8	Angle needle valve	1/4"M.NPT	Liquid level gauge gas phase valve	Copper
V9	Angle needle valve	1/4"M.NPT	Liquid level gauge balancing valve	Copper
V10	Angle needle valve	1/4"M.NPT	Liquid level gauge valve	Copper
V11	Cryogenic short-axis globe valve	DN15	Throttle valve	Stainless steel
V12	Cryogenic short-axis globe valve	DN15	Vent/Relief Valve	Stainless steel
V13	Cryogenic long-axis globe valve	DN15	Carburetor inlet valve	Stainless steel
V14	Cryogenic long-axis globe valve	DN15	Spare liquid valve	Stainless steel
V15	Three way ball valve	1/2"NPT	Three-way reversing valve	Stainless steel
CV-1	One-way valve	DN25	Check valve, filling line	Stainless steel
CV-2	One-way valve	DN15	Check valve, gas use	Stainless steel
PBC-1	Self turbocharger	By order	Self turbocharger	Aluminum
PBC-2	Vaporizer	By order	Vaporizer	Aluminum
PCV-1	Boost valve	1.6~3.0Mpa	Cryogenic boost pressure regulating valve	Copper
PI-1	Pressure gauge	0~0.4Mpa	Pressure Gauge	Stainless steel
LI-1	Liquid level gauge	/	Liquid level gauge	Finished products
PSV-1A	Safety valve	By order	Safety valve	Brass
PSV-1B	Safety valve	By order	Safety valve	Brass
PSV-2A	Secondary safety valve	By order	Safety valve	Brass
PSV-2B	Secondary safety valve	By order	Safety valve	Brass
TSV-1,2	Pipeline safety valve	By order	Pipeline Safety Valve	Brass
F-1	Filter valve	DN15	Filter valve	Stainless steel
VR-1	Vacuum gauge	1/8"NPT	Vacuum regulator	Finished products

3、Cryogenic Tank PID Diagram



4、GA picture

See attachment

5、Other technical features

(1) The tank body adopts high vacuum winding insulation design and auxiliary high-efficiency vacuum maintenance technology, which has good insulation effect and low IG evaporation;

(2) The tank body adopts a large diameter design and a low vertical transportation height to ensure product performance and save transportation costs;

(3) The main structure is compact, occupies a small area, and is quick and easy to install. It can be easily installed and used on the same day it arrives;

(4) The pipeline layout is neat and beautiful. The top adopts a whole forging welding structure to prevent gas or liquid leakage caused by thermal expansion and contraction.

(5) Compared with the traditional gas supply method of storage tank + vaporization pressure regulating skid, it has better cost performance;

(6) Liquid level and pressure remote monitoring can be installed to achieve digital and information management.

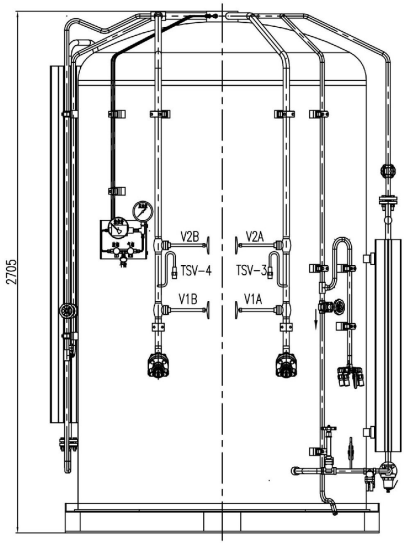
(7) The filling speed is 62% faster than that of peers, saving an average of 37.5% of filling time per unit.

(8) The external pipeline valves are reasonably located and within easy reach. No need to climb to the top of the tank to operate the valves, reducing safety risks.

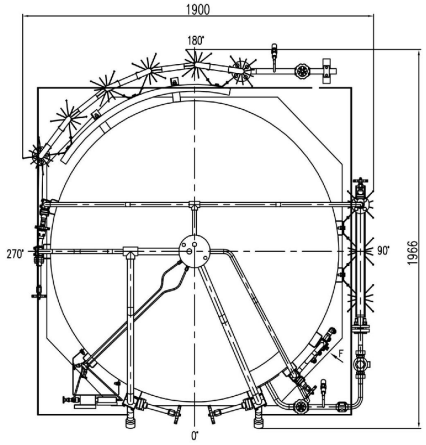
END!

SAINS GAS

Technical Specifications



俯视图top view



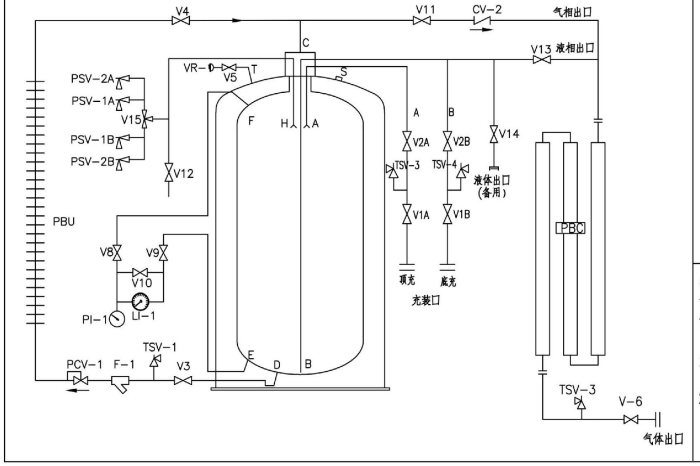
设计参数表

1	产品型号MODEL		ET3-CS
2	放置形式Tank Type		立式平底Vertical& Flat-Bottom
3	设计标准Design Standard		TSG21、GB/T150、参照GB/T18442-2019
4	设计压力Design Pressure（内容器INNER/夹套JACKET）		2.25MPa/-0.1MPa（INNER /JACKET）
5	最大工作压力MAWP（内容器INNER/夹套JACKET）		2.25MPa/-0.1MPa（INNER /JACKET）
6	最低设计温度MDMT		-40℃/50℃
7	全容积Volume		2.91
8	充装率FILLITNG RATIO		95%
9	主体材料	内筒体/封头INNER /HEAD	16MnDR GB/T3531
10	MAIN Material	外筒体/封头JACKET/HEAD	Q345R GB/T713
11	充装介质FLUID NAME		液态二氧化碳 LCO2
12	夹套保温型式Insulation Type of JACKET		高真空多层缠绕High vacuum multilayer winding
13	真空夹层漏气速率Leakage rate of vacuum interlayer		≤ $1x10^{-8}$Pa.m^3/s
14	静态蒸发率 NER		N/A
15	出厂真空度 VACUUM DEGREE		≤ 0.01Pa
16	产品外形尺寸boundary dimension		见右图
17	底盘尺寸(长x宽)pallet dimension(LxW)		1700mmx1700mm
18	设备空重weight		≈2.5吨
19	可充装介质重量Medium weight		液态二氧化碳 2840kg
20	增压器+汽化器（PBU+VAP）		20Nm^3/h+75Nm^3/h
21	内部管道材料（PIPE of inner ）		S30408 GB/T14976
22	外部管道材料（PIPE of External）		S30408 GB/T14976

管口表

管口	Function	管口	Function
A	顶部充装 Top Fill	H	溢流/安全装置 VENT&Full trycock
B	底部充装Bottom Fill	K	气相 Economic
C	增压回气 PBU OUTLET	S	安全泄压/抽真空口 Dual Safety/Vacuum pumpout
D	底部出液 PBU INLET	T	测真空口Measuring vacuum
E	仪表液相 Liquid Phase of level Garge		液体出口 Liquid OUTLET
F	仪表气相 Vapor Phase of level Garge		气体出口 GAS OUTLET

流程图（P&ID）



阀门表 VALVE LIST

V-1A, 2A	顶部充装阀 VALVE,Top Fill	CV-2	止回阀,气体使用 Check valve, Economic
V-1B, 2B	底部充装阀 VALVE,Bottom Fill	PBU	自增压器 PBU
V-3	底部出液阀 VALVE,PBU INLET	PBC	汽化器 VAPORIZER
V-4	增压器出口阀VALVE,PBU OUTLET	F-1	过滤阀，自增压 Strainer valve, PBU
V-5	规管截止阀 VALVE,Measuring vacuum	PCV-1	增压阀 regulating valve, Booster valve
V-6	气体出口阀 VALVE,VAPOR OUTLET	PSV-1A	安全阀 Safety valve
V-8	液面计气相阀 VALVE,Vapor Phase	PSV-1B	安全阀 Safety valve
V-9	液面计液相阀 VALVE,Liquid Phase	PSV-2A	二级安全阀 Safety valve
V-10	液面计平衡阀 VALVE,Equilibrate	PSV-2B	二级安全阀 Safety valve
V-11	气体使用阀 VALVE,Economic	TSV-X	管道安全阀 Safety valve (pipe)
V-12	放空阀 VALVE,VENT&Full trycock	LI-1	液位计 Level garge
V-13	液相根部阀 VALVE, Liquid Phase Outlet	PI-1	压力表 Pressure garge
V-14	液体出口阀 VALVE, Liquid USE		
V-15	三通换向阀 Safety valve switch		

技术要求Technical Requirements

1、本设备应根据<<固定式压力容器安全技术监察规程>>的要求定期检验、维护和抽真空。

1. The equipment shall be regularly inspected, maintained and vacuumed according to the requirements of the << Fixed Pressure Vessel Safety Technical Supervision Regulations >>

2、焊接应符合NB/T 47014-2011《承压设备焊接工艺评定》. NB/T47015-2011《压力容器焊接规程》及制造厂焊接工艺的要求

2, welding should comply with NB/T 47014-2011《Pressure equipment welding process assessment》, NB/T47015-2011《Pressure vessel welding procedures》 and the manufacturer's welding process requirements.

					工程名称	/	
设 计			低温液体贮罐		设计项目	ET3-CS	
校 核					设计阶段	/	
标准化					图 号	/	
审 核					版 次	1	重量(kg)
批 准			比 例 1:12	图 幅 A1	第1页	共1页	

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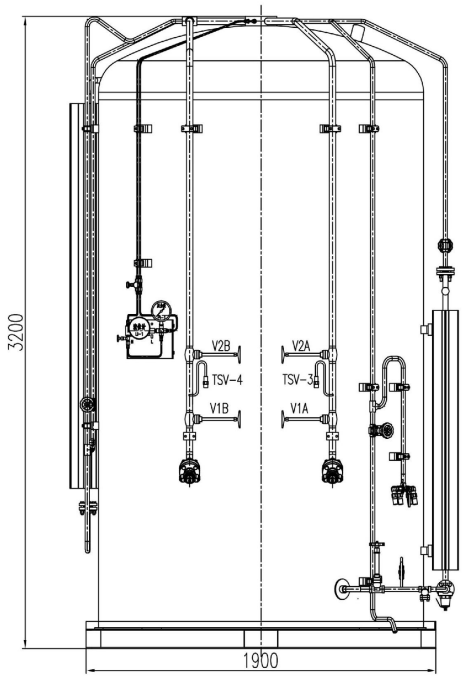
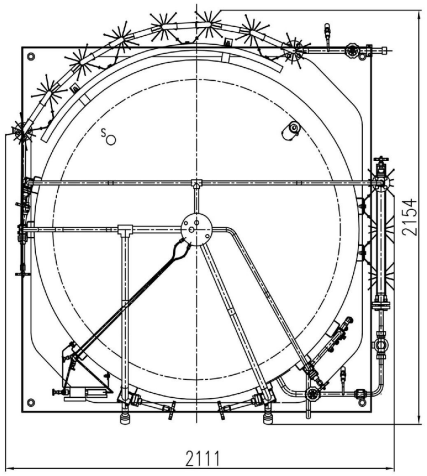
SAINS GAS

Technical Specifications



俯视图top view



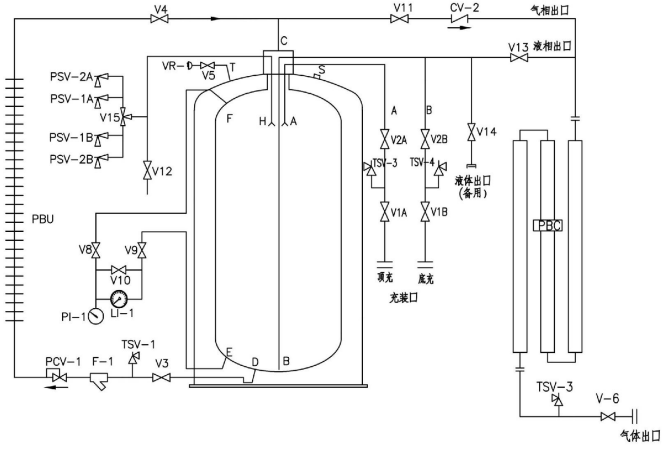
设计参数表

1	产品型号MODEL		ET5-CS
2	放置形式Tank Type		立式平底Vertical& Flat-Bottom
3	设计标准Design Standard		TSG21、GB/T150、参照GB/T18442-2019
4	设计压力Design Pressure（内容器INNER/夹套JACKET）		2.3MPa/-0.1MPa（INNER /JACKET）
5	最大工作压力MAWP（内容器INNER/夹套JACKET）		2.3MPa/-0.1MPa（INNER /JACKET）
6	最低设计温度MDMT		-40℃/50℃
7	全容积Volume		4.90
8	充装率FILLITNG RATIO		95%
9	主体材料	内筒体/封头INNER /HEAD	16MnDR GB/T3531
10	MAIN Material	外筒体/封头JACKET/HEAD	Q345R GB/T713
11	充装介质FLUID NAME		液态二氧化碳 LCO2
12	夹套保温型式Insulation Type of JACKET		高真空多层缠绕High vacuum multilayer winding
13	真空夹层漏气速率Leakage rate of vacuum interlayer		≤ $1x10^{-8}$Pa.m^3/s
14	静态蒸发率 NER		N/A
15	出厂真空度 VACUUM DEGREE		≤ 0.01Pa
16	产品外形尺寸boundary dimension		见右图
17	底盘尺寸(长x宽)pallet dimension(LxW)		1900mmx1900mm
18	设备空重weight		≈3.4吨
19	可充装介质重量Medium weight		液态二氧化碳 4795kg
20	增压器+汽化器（PBU+VAP）		25Nm³/h+105Nm³/h
21	内部管道材料（PIPE of inner ）		S30408 GB/T14976
22	外部管道材料（PIPE of External）		S30408 GB/T14976

管口表

管口	Function	管口	Function
A	顶部充装 Top Fill	H	溢流/安全装置 VENT&Full trycock
B	底部充装Bottom Fill	K	气相 Economic
C	增压回气 PBU OUTLET	S	安全泄压/抽真空口 Dual Safety/Vacuum pumpout
D	底部出液 PBU INLET	T	测真空口Measuring vacuum
E	仪表液相 Liquid Phase of level Garge		液体出口 Liquid OUTLET
F	仪表气相 Vapor Phase of level Garge		气体出口 GAS OUTLET

流程图（P&ID）



阀门表 VALVE LIST

V-1A，2A 顶部充装阀	VALVE,Top Fill	CV-2	止回阀,气体使用 Check valve，Economic
V-1B，2B底部充装阀	VALVE,Bottom Fill	PBU	自增压器 PBU
V-3	底部出液阀 VALVE,PBU INLET	PBC	汽化器 VAPORIZER
V-4	增压器出口阀VALVE,PBU OUTLET	F-1	过滤阀，自增压 Strainer valve, PBU
V-5	规管截止阀 VALVE,Measuring vacuum	PCV-1	增压阀 regulating valve，Booster valve
V-6	气体出口阀 VALVE,VAPOR OUTLET	PSV-1A	安全阀 Safety valve
V-8	液面计气相阀 VALVE,Vapor Phase	PSV-1B	安全阀 Safety valve
V-9	液面计液相阀 VALVE,Liquid Phase	PSV-2A	二级安全阀 Safety valve
V-10	液面计平衡阀 VALVE,Equilibrate	PSV-2B	二级安全阀 Safety valve
V-11	气体使用阀 VALVE,Economic	TSV-X	管道安全阀 Safety valve (pipe)
V-12	放空阀 VALVE,VENT&Full trycock	LI-1	液位计 Level garge
V-13	液相根部阀 VALVE, Liquid Phase Outlet	PI-1	压力表 Pressure garge
V-14	液体出口阀 VALVE, Liquid USE		
V-15	三通换向阀 Safety valve switch		

技术要求Technical Requirements

1、本设备应根据<<固定式压力容器安全技术监察规程>>的要求定期检验、维护和抽真空。

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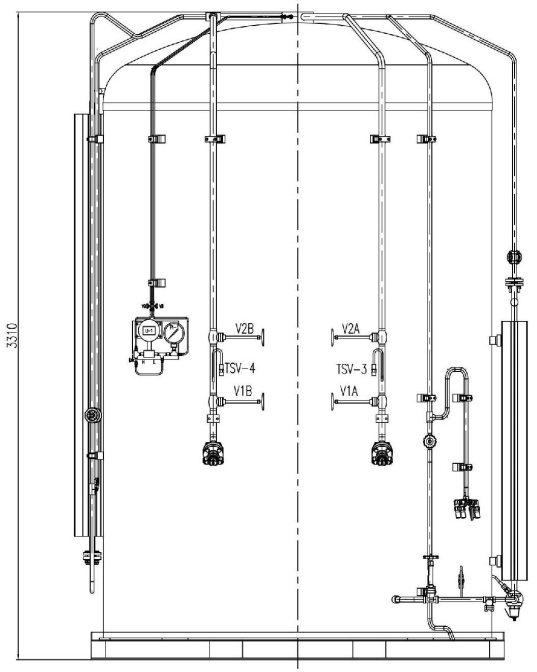
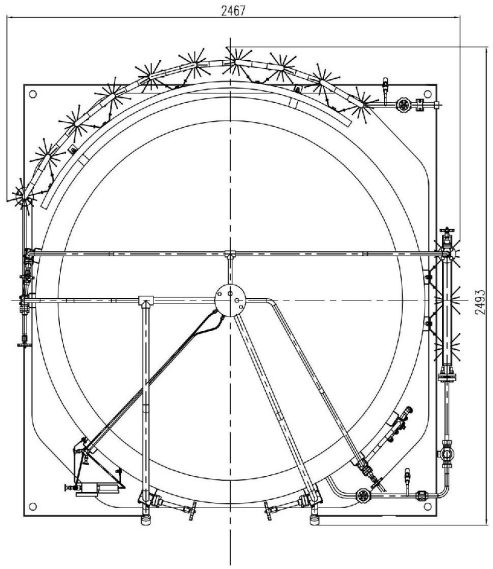
2、焊接应符合NB/T 47014-2011《承压设备焊接工艺评定》. NB/T47015-2011《压力容器焊接规程》及制造厂焊接工艺的要求

2, welding should comply with NB/T 47014-2011《Pressure equipment welding process assessment》, NB/T47015-2011《Pressure vessel welding procedures》and the manufacturer's welding process requirements.

					工程名称	/	
设 计			低温液体贮罐		设计项目	ET5-CS	
校 核					设计阶段	/	
标准化					图 号	/	
审 核					版 次	1	重量(kg)
批 准			比 例 1:12	图 幅 A1	第1页	共1页	



俯视图top view



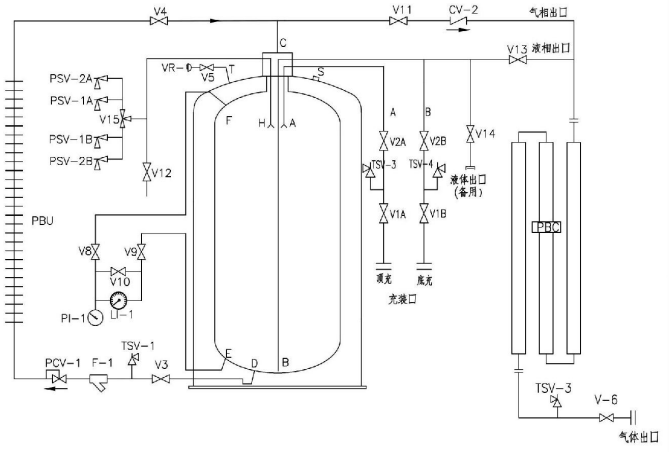
设计参数表

1	产品型号MODEL		ET7.5-CS
2	放置形式Tank Type		立式平底Vertical& Flat-Bottom
3	设计标准Design Standard		TSG21、GB/T150、参照GB/T18442-2019
4	设计压力Design Pressure（内容器INNER/夹套JACKET）		2.3MPa/-0.1MPa（INNER /JACKET）
5	最大工作压力MAWP（内容器INNER/夹套JACKET）		2.3MPa/-0.1MPa（INNER /JACKET）
6	最低设计温度MDMT		-40℃/50℃
7	全容积Volume		7.40
8	充装率FILLITNG RATIO		95%
9	主体材料	内筒体/封头INNER /HEAD	16MnDR GB/T3531
10	MAIN Material	外筒体/封头JACKET/HEAD	Q345R GB/T713
11	充装介质FLUID NAME		液态二氧化碳 LCO2
12	夹套保温型式Insulation Type of JACKET		高真空多层缠绕High vacuum multilayer winding
13	真空夹层漏气速率Leakage rate of vacuum interlayer		$\leqslant 1\times10^{-8}$Pa.m^3/s
14	静态蒸发率 NER		N/A
15	出厂真空度 VACUUM DEGREE		⩽ 0.01Pa
16	产品外形尺寸boundary dimension		见右图
17	底盘尺寸(长x宽)pallet dimension(LxW)		2250mmx2250mm
18	设备空重weight		≈5.2吨
19	可充装介质重量Medium weight		液态二氧化碳 7240kg
20	增压器+汽化器（PBU+VAP）		25Nm^3/h+150Nm^3/h
21	内部管道材料（PIPE of inner ）		S30408 GB/T14976
22	外部管道材料（PIPE of External）		S30408 GB/T14976

管口表

管口	Function	管口	Function
A	顶部充装 Top Fill	H	溢流/安全装置 VENT&Full trycock
B	底部充装Bottom Fill	K	气相 Economic
C	增压回气 PBU OUTLET	S	安全排压/抽真空口 Dual Safety/Vacuum pumpout
D	底部出液 PBU INLET	T	测真空口Measuring vacuum
E	仪表液相 Liquid Phase of level Gorge		液体出口 Liquid OUTLET
F	仪表气相 Vapor Phase of level Gorge		气体出口 GAS OUTLET

流程图（P&ID）



阀门表 VALVE LIST

V-1A，2A 顶部充装阀 VALVE,Top Fill		CV-2	止回阀,气体使用 Check valve，Economic
V-1B，2B底部充装阀 VALVE,Bottom Fill		PBU	自增压器 PBU
V-3	底部出液阀 VALVE,PBU INLET	PBC	汽化器 VAPORIZER
V-4	增压器出口阀VALVE,PBU OUTLET	F-1	过滤阀，自增压 Strainer valve，PBU
V-5	规管截止阀 VALVE,Measuring vacuum	PCV-1	增压阀 regulating valve，Booster valve
V-6	气体出口阀 VALVE,VAPOR OUTLET	PSV-1A	安全阀 Safety valve
V-8	液面计气相阀 VALVE,Vapor Phase	PSV-1B	安全阀 Safety valve
V-9	液面计液相阀 VALVE,Liquid Phase	PSV-2A	二级安全阀 Safety valve
V-10	液面计平衡阀 VALVE,Equilibrate	PSV-2B	二级安全阀 Safety valve
V-11	气体使用阀 VALVE,Economic	TSV-X	管道安全阀 Safety valve (pipe)
V-12	放空阀 VALVE,VENT&Full trycock	LI-1	液位计 Level garge
V-13	液相根部阀 VALVE，Liquid Phase Outlet	PI-1	压力表 Pressure garge
V-14	液体出口阀 VALVE，Liquid USE		
V-15	三通换向阀 Safety valve switch		

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					工程名称	/	
设 计			低温液体贮罐		设计项目	ET7.5-CS	
校 核					设计阶段	/	
标准化					图 号	/	
审 核					原 次	1	重量(kg)
批 准			比 例 1:12	图 幅 A1	第1页	共1页	

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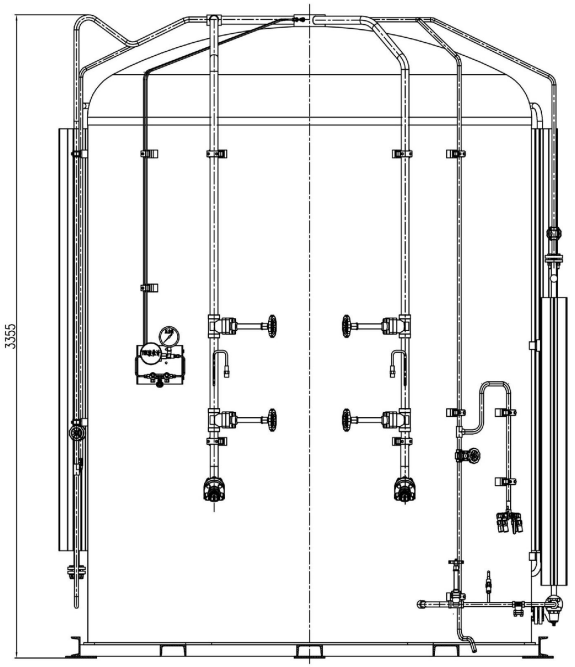
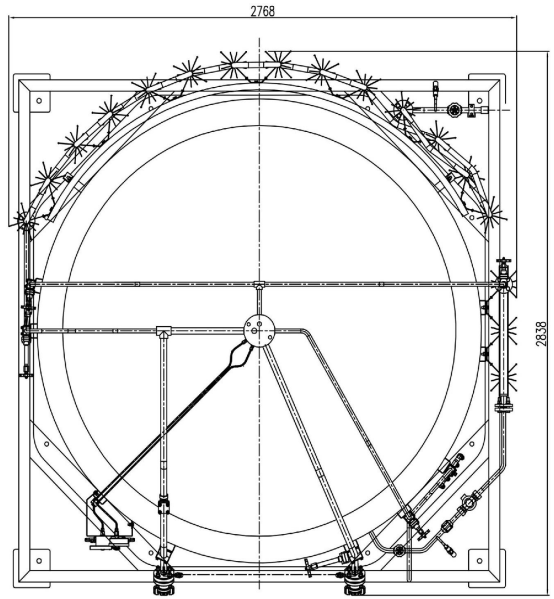
SAINS GAS

Technical Specifications



俯视图top view



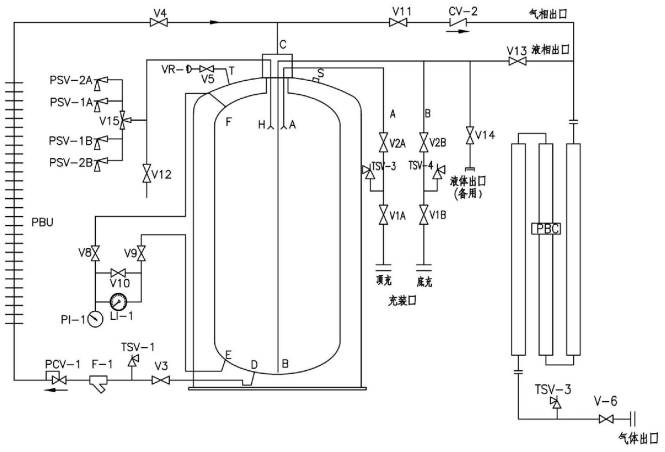
设计参数表

1	产品型号MODEL		ET10-CS
2	放置形式Tank Type		立式平底Vertical& Flat-Bottom
3	设计标准Design Standard		TSG21、GB/T150、GB/T18442-2019
4	设计压力Design Pressure（内容器INNER/夹套JACKET）		2.3MPa/-0.1MPa（INNER /JACKET）
5	最大工作压力MAWP（内容器INNER/夹套JACKET）		2.3MPa/-0.1MPa（INNER /JACKET）
6	最低设计温度MDMT		-196℃/50℃
7	全容积Volume		9.80
8	充装率FILLITNG RATIO		95%
9	主体材料	内筒体/封头INNER /HEAD	16MnDR GB/T3531
10	MAIN Material	外筒体/封头JACKET/HEAD	Q345R GB/T713
11	充装介质FLUID NAME		液态二氧化碳（LCO2）
12	夹套保温型式Insulation Type of JACKET		高真空多层缠绕High vacuum multilayer winding
13	真空夹层漏气速率Leakage rate of vacuum interlayer		$\leqslant 1\times10^{-9}$Pa.m³/s
14	静态蒸发率 （液氮 ）NER (LIN)		N/A
15	出厂真空度 VACUUM DEGREE		⩽ 0.01Pa
16	产品外形尺寸boundary dimension		见右图
17	底盘尺寸(长x宽)pallet dimension(LxW)		2600mmx2600mm
18	设备空重weight		ET10≈6.3吨
19	可充装介质重量Medium weight		液态二氧化碳 9590kg
20	增压器+汽化器（PBU+VAP）		30Nm³/h+200Nm³/h
21	内部管道材料（PIPE of inner ）		S30408 GB/T14976
22	外部管道材料（PIPE of External）		S30408 GB/T14976

管口表

管口	Function	管口	Function
A	顶部充装 Top Fill	H	溢流/安全装置 VENT&Full trycock
B	底部充装Bottom Fill	K	气相 Economic
C	增压回气 PBU OUTLET	S	安全泄压/抽真空口 Dual Safety/Vacuum pumpout
D	底部出液 PBU INLET	T	测真空口Measuring vacuum
E	仪表液相 Liquid Phase of level Garge		液体出口 Liquid OUTLET
F	仪表气相 Vapor Phase of level Garge		气体出口 GAS OUTLET

流程图（P&ID）



阀门表 VALVE LIST

V-1A，2A 顶部充装阀 VALVE,Top Fill		CV-2	止回阀,气体使用 Check valve，Economic
V-1B，2B底部充装阀 VALVE,Bottom Fill		PBU	自增压器 PBU
V-3	底部出液阀 VALVE,PBU INLET	PBC	汽化器 VAPORIZER
V-4	增压器出口阀VALVE,PBU OUTLET	F-1	过滤阀，自增压 Strainer valve, PBU
V-5	规管截止阀 VALVE,Measuring vacuum	PCV-1	增压阀 regulating valve，Booster valve
V-6	气体出口阀 VALVE,VAPOR OUTLET	PSV-1A	安全阀 Safety valve
V-8	液面计气相阀 VALVE,Vapor Phase	PSV-1B	安全阀 Safety valve
V-9	液面计液相阀 VALVE,Liquid Phase	PSV-2A	二级安全阀 Safety valve
V-10	液面计平衡阀 VALVE,Equilibrate	PSV-2B	二级安全阀 Safety valve
V-11	气体使用阀 VALVE,Economic	TSV-X	管道安全阀 Safety valve (pipe)
V-12	放空阀 VALVE,VENT&Full trycock	LI-1	液位计 Level garge
V-13	液相根部阀 VALVE, Liquid Phase Outlet	PI-1	压力表 Pressure garge
V-14	液体出口阀 VALVE, Liquid USE		
V-15	三通换向阀 Safety valve switch		

技术要求Technical Requirements

1、本设备应根据<<固定式压力容器安全技术监察规程>>的要求定期检验、维护和抽真空。

1. The equipment shall be regularly inspected, maintained and vacuumed according to the requirements of the << Fixed Pressure Vessel Safety Technical Supervision Regulations >>

2、焊接应符合NB/T 47014-2011《承压设备焊接工艺评定》、NB/T47015-2011《压力容器焊接规程》及制造厂焊接工艺的要求

2, welding should comply with NB/T 47014-2011《Pressure equipment welding process assessment》, NB/T47015-2011《Pressure vessel welding procedures》and the manufacturer's welding process requirements.

					工程名称	/	
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审 核					版 次	1	重量(kg)
批 准			比 例 1:12	图 幅 A1	第1页	共1页	