

DBC Gasifier&Vessel Products



一、企业概况 COMPANY PROFILE

1、公司简介 ABOUT DBC

东方锅炉股份有限公司（简称“东方锅炉”）是中国先进装备制造业的杰出代表，具有火力发电设备、核电站设备、电站辅机、化工容器、环保设备、煤气化设备等装备的设计制造能力，为中国东方电气集团有限公司下属核心子公司。

Dongfang Boiler Group Co., Ltd. (DBC) is the outstanding representative of advanced equipment manufacturing industry in China. DBC is a core subsidiary of Dongfang Electric Corporation, possessing strong design and manufacture capabilities of thermal power equipment, nuclear power equipment, power plant auxiliaries, chemical vessels, environmental protection equipment and coal gasification equipment, etc..

东方锅炉建于 1966 年，经过 48 年的建设与发展，形成了以四川省自贡市为注册地，辐射成都、德阳、嘉兴、深圳，多地域、多产业的分布格局。东方锅炉秉承“社会、企业、员工和谐统一”的核心价值观，“终身服务，终身先进”的服务观和“一次干好”的质量观，致力于为世界能源及环境保护提供先进装备和一流服务。

DBC was founded in 1966. Through 48 years of effort, DBC has been developed into a multi-region and multi-industry company, with its registered address in Zigong, two branches located in Chengdu and Deyang and two subsidiaries located in Jiaxing and Shenzhen. Adhering to the core value of “Harmony and Unification of Society, Enterprise and Employees”, the service concept of “Lifetime Service and Advancement” and the quality view of “Success at First Attempt”, DBC is committed to providing the advanced equipment and the first-class service for energy and environmental protection industries in the world.

2、员工结构 Employee Structure

东方锅炉拥有高级职称 262 人

262 employees with senior professional titles

正高级工程师 25 人

25 professor engineers

享受政府特殊津贴的专家 24 人

24 experts enjoying government special allowance

突出贡献的优秀专家 2 人

2 outstanding contributors of Sichuan Province

学术和技术带头人 2 人

2 pioneers of academy and technology of Sichuan Province

学术和技术带头人后备人选 11 人

11 pioneer candidates of academy and technology of Sichuan Province

3、体系保障 Assurance systems

东方锅炉建立了完善的质量管理体系。持有国家 A 级锅炉设计、制造许可证，A1、A2、A3 级压力容器设计、制造许可证，民用核安全设备制造许可证，美国机械工程师学会（ASME）颁发的 NB、S、U、U2、N、NPT、NS、MO 授权证书和制造钢印，通过了 GB/T19001-2008 idt ISO9001:2008 质量管理体系认证。

DBC has set up a perfect quality assurance system, possessing Manufacture License of Special Equipment (Boilers Class A), Manufacture License of Special Equipment (Pressure Vessels Class A1, A2 and A3, Manufacture License of Civil Nuclear Pressure Retaining Equipment, and ASME Certification Mark with Designator S, U & U2 and ASME Certification Mark with Designator N, NPT, MO & NS, and has passed GB/T9001-2008 idt ISO9001:2008 Quality System Accreditation.

东方锅炉拥有国内一流的研发团队和管理团队，设立了博士后科研工作以及锅炉、环保、材料、焊接和自动控制等相关专业研究机构。作为国家高新技术企业，东方锅炉建立了先进的冷热态燃烧试验平台、生物质液化分离试验平台、太阳能储热换热试验平台、高温高压材料及焊接试验室，具备燃料清洁利用机理研究、材料及焊接研究、应力应变分析、炉内燃烧

和煤化学反应动力学研究和数值模拟计算等强大的新技术、新产品研发能力。

DBC has the domestic first-class R&D team and management team and has established a postdoctoral scientific research workstation and professional scientific research institutions with regard to boiler, environmental protection, material, welding and automatic control, etc.. As a national high-tech enterprise, DBC has set up such advanced facilities as cold and hot state combustion test bed, biomass liquefaction separation test bed, solar heat storage and transfer test bed and high temperature & high pressure materials and welding laboratory so as to make certain that DBC possesses strong R & D capabilities of new technology and new product, including doing clean fuel utilization mechanism research, materials and welding research, stress and strain analysis, coal combustion chemical reaction kinetics research and numerical simulation calculation, etc..

4、容器产品 Vessle Products

东方锅炉具有重型容器、轻型容器、特种容器制造能力，装备有大型卷板机、4MeV 直线加速器、三轴数控深孔钻床、ESAB 双丝窄间隙焊机、带极堆焊机、4000 吨水压机及 350 吨吊车等先进的生产设备。公司为石油化工、核能、机械、航天等部门生产了各种高、中、低压容器、真空容器和换热器、蓄势器。

Now DBC has capability of manufacturing heavy pressure vessels, light pressure vessels, special pressure vessels, equipped with large plate bending machine, 4MeV linear accelerator, triaxial numerical control drilling machine, ESAB double wire narrow gap welder, strip surfacing welding machine, 4000t hydraulic press and 350t hoist. DBC has manufactured a variety of HP, MP and LP vessels, vacuum vessels, heat

exchangers and accumulators for petrochemical industry, nuclear power industry, machinery industry and space industry.



300000 t/y ammonia converter



**Gasification equipment (CWS) with multi-nozzles in opposite arrangement
Under shipment**



Headless deaerator for Saudi Arabia Rabigh 600MW power plant project



Floating-head heat exchanger for Pengzhou Petrochemicals 800000 tons/year ethylene project under installation



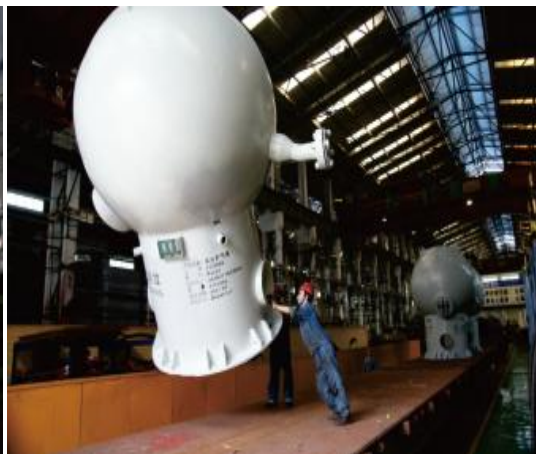
Outlet cooler for hydrogenation reactor for Puguang Gas Field project



HP heater



high-pressure gas cylinders



HP gas storage tank



Liquid Ammonia Tank

二、东锅化工装备主要业绩 Sales Record of DBC's Chemical Equipment

东方锅炉数十项产品填补了中国化工装备制造业的空白。经过半个世纪的发展，东方锅炉形成了批量供应锅炉、辅机、气化炉、高压容器、除氧器、甲醇合成塔、换热器、废锅、水处理等设备的能力。公司产品完全满足石化炼化领域高起点、高标准的建设要求，能为化工行业提供品种齐全、质量优异的动力和化工装备及相关服务。

Dozens of products of DBC have filled the Chinese blank chemical equipment in the Chinese chemical equipment manufacturing industry. Through development over a half century, DBC has formed the capability bulk supplying various type of boilers, auxiliary engines, gasifiers, high pressure vessels, deaerators, methanol synthesis towers, heat exchangers, exhaust boiler, waster water treatments etc. Hereto, DBC is capable to fully meet the high starting point and high standard requirements in the petrochemical refinery industry, and is able to provide the power and chemical equipment with full range of varieties as well as outstanding quality.

一) 数十个中国首台套

Dozens of “First” sets in China

1. 国产首套加氢反应器进出口换热器——中石化普光气田、元坝气田加氢反应器进出口换热器，国产质量远超进口，效果超预期。

The first domestically produced hydrogenation reactor’s in/output heat exchanger – It is used in the Sinopec Puguang gas field as well as the Yuanba gas field. Its quality is far much better than the exported ones, and its effect has exceeded the expectations.

2. 国产首台 20 万吨合成氨合成塔——新疆泽普化肥厂 20 万吨/年氨合成塔。

The first domestically produced synthetic tower for providing 200,000 tons of synthethic ammonia – Its client is the Xinjiang Zepu Fertilizer Plant.

3. 国产首台 30 万吨合成氨合成塔——四川美丰化工 30 万吨合成氨合成塔。

The first domestically produced synthetic tower for providing 300,000 tons of synthethic ammonia –Its client is Sichuan Meifeng Chemical Co., Ltd.

4. 中国首套最大的低温容器塔群——沈阳加压气化厂低温塔器。

The first and biggest low temperature vessel tower group in China – Its client is the Shenyang inflating gasifying Co., Ltd.

5. 中国首台清华二代冷壁式气化炉——荆门盈德气体气化炉(4×1500 t/d)。

The first Qinghua 2nd cold wall gasifier in China – Its client is Jingmen Yingde Co., Ltd.

6. 中国首台最大规模气化炉——内蒙古荣信四喷嘴水煤浆气化炉(3×2500t/d)。

The first and the biggest gasifier with four nozzle CWS in China – Its client is the Inner Mongolia Rongxin Chemical Co., Ltd.

7. 中国首台嘴对置粉煤水冷壁气化炉——贵州开阳化工气化炉(1×1500t/d)。

The first dry PC waterwall type opposed multi-nozzle gasifier – Its client is Guizhou Kaiyang Chemical Co., Ltd

8. 国产首套壳牌气化炉内件——大同煤矿气化炉(1X2700t/d)。

The first set of Shell gasifier internal (1X2700t/d) – Its client is Datong Coal Mine Group.

9. 国产首台壳牌下行水激冷气化炉——惠生(南京)清洁能源气化炉(1X1000t/d)。

The first Wison-Shell hybrid technology gasification equipment (1X1000t/d) - Its client is the Wison(Nanjing) Clean Energy Co., Ltd.

10. 国产首台壳牌废锅流程气化炉(内件+外壳)——山西潞安矿业气化炉(2×3250t/d)，并完成现场组装。

The first set of Shell exhaust boiler gasifier with internals and the outer shells (2×3250t/d) - Its client is the Shanxi Lu'an Mining Group Co., Ltd.

11. 国产首台科林 CCG 煤粉气化炉（内件）——康乃尔化学气化炉（2X1200t/d）。

The first Colin CCG dry PC gasifier with internals (2X1200t/d) - Its client is the Inner Mongolia Connell Chemical Industry Co., Ltd.

二）国际化工行业认可

The formal approval from the international chemical industries

1. 获壳牌、科林气化炉设计、制造授权，目前已实现设计、制造国产化。

Gasifier designing and manufacturing authorization by Shell and Colin – Up till now, DBC has already accomplished the localization of these process stated above.

2. 获 JM Davy 甲醇合成塔制造授权，属中国第一家获该制造授权的公司。

Methanol synthetic tower manufacturing authorization by JM Davy – DBC has been the first of such authorized Chinese company by JM Davy.

3. 获卡萨利废锅、过热器产品制造认可。

DBC has obtained the formal approval of the Casali exhaust boiler as well as the superheater.

4. 与 GE 在气化炉、辐射废锅产品上达成开发合作。

DBC and GE have come to an agreement on the jointly cooperating and developing the products of gasifier and radiant syngas cooler.

5. 与 Topsoe 开展废锅、过热器制造授权认证。

DBC is working on the manufacturing of the exhaust boiler and the superheater with Topsoe.

三) 东方锅炉制造的设备分类

Equipment classification manufactured by DBC

1. 按设备分类 Classification by equipment kind

1) 炉类设备: Furnace kind equipment

管式加热炉 (含常减压、催化裂化、裂解炉、重整炉等各类加热炉)。

Tube heating furnace (including the heating furnaces of the atmospheric and vacuum, catalytic cracking, cracking and the reformatory kind etc.)

2) 塔器类设备:

Tower kind equipment with functional classification

①蒸馏塔; ②吸收塔; ③萃取塔; ④洗涤塔; ⑤反应塔; ⑥再生塔; ⑦干燥塔; ⑧合成塔。

① Distillation tower; ② Absorption tower; ③ Extraction tower; ④ Washing tower; ⑤ Reaction tower; ⑥ Regenerating tower; ⑦ Drying tower; ⑧ Synthetic tower

3) 换热器类 (含高压) 设备:

Heat exchanger kind equipment (including high pressure vessels)

①夹套换热器; ②蛇管换热器; ③列管换热器 (固定管板、浮头式、U型管式); ④绕管式换热器

① Jacketed heat exchanger ② Coil heat exchanger ③ Tubular heat exchanger (Fixed tube sheet kind, Floating head, U-tube kind) ④ Wound tube heat exchanger

4) 容器类设备

Vessel kind equipment

费托反应器; 高压分离器; 高温高压厚壁容器、低温压力容器、储存容器、低温甲醇洗。

Feto reactor, high pressure separator, high temperature, high pressure and thick wall vessel, low temperature pressure vessel, storage vessel, low temperature methanol washing vessel

(5) 配套动力中心装置：锅炉、辅机、环保岛等

Mating facility of the central power equipment: boiler, auxiliaries and environment protection island etc.

(6) 锅炉尾部烟气综合治理一体化环保岛

Integrated environmental protection island of boiler exhaust fume

四) 典型项目业绩

Sales record of typical projects

1、恒力石化 2000 万吨/年炼化一体化项目

该项目计划投资 690 亿元，建设以 450 万吨/年芳烃联合装置为核心的 2000 万吨/年炼油化工装置。东方锅炉为本项目提供了 7 台 670t/h 循环流化床锅炉、辅机、气化炉、高压容器、除氧器、甲醇合成塔、换热器、废锅、水处理等一系列核心设备，从动力设备到化工装备，东方锅炉正以雄厚的技术实力和制造实力，得到市场的广泛认可。项目计划 2018 年 10 月份全面投产。

1) Hengli Petrochemical's 20 million tons/year refinery integration project, this project is planned to invest 69 billion RMB to construct a 20 million/year chemical refinery plant with a core plant of 4.5 million/year aromatics complex plant. For the Hengli project DEC is providing 7 sets of 670t/h CFB boilers, 5*300 MW auxiliary engines, 6*3000t/d gasifiers, as well as high pressure vessels, deaerators,

methanol synthesis tower, heat exchanger, exhaust boiler, 3*15000 t/d seawater desalination etc.

2、潞安集团高硫煤清洁利用油化电热一体化示范项目

Lu' an Group' s oil thermal integration demonstration project by the utilization of cleaned high sulfur coal

该项目位于山西省长治市襄垣县潞安油化电热一体化综合示范园区，采用粉煤加压气化、费托合成等技术，生产 180 万吨/年油品及化学品。项目分二期建设，其中一期建设 100 万吨/年铁基费托油品装置，二期建设 80 万吨/年钴基费托蜡加工装置。东方锅炉为本项目提供 2 套煤制气核心设备 SHELL 废锅流程气化炉。

The project is located in the Lu' an oil thermal integration demonstration zone in Xiangyuan County of Changzhi City, Shanxi Province. This project is integrated with pressurized pulverized coal gasification technology as well as the Feto synthesis technology, and is aimed to produce 1.8 million tons /year oil and chemical product. The project is divided into two construction phases. The first one is planned to construct 1 million tons/year iron-based Fischer-Tropsch oil product plant, and in the second phase, a cobalt-based Fischer-Tropsch wax product plant for 80 tons/year is planned. For this project, DBC has provided 2 sets of SHELL syngas cooler typed gasifiers. The project is successfully under operation right now.

Past Projects Presentation

Srl #	Customer Name	Product Supplied	Location	Year of supply
1	刘家峡化肥厂 Liujiaxia Fertilizer Plant	氨合成塔 ammonia converter	Gansu Province ,China	1980
2	岳阳化肥厂 Yueyang Fertilizer Plant	氨合成塔 ammonia converter	Hubei Province ,China	1982
3	新疆泽普化肥厂 Zepu Fertilizer Plant,Xinjiang	氨合成塔 ammonia converter	Xinjiang Province ,China	2000
4	四川美丰集团 Meifeng Group,Sichuan	氨合成塔 ammonia converter	Sichuan Province ,China	2002
5	贵州化肥厂 Guizhou Fertilizer Plant	尿素合成塔 urea synthesizer	Guizhou Province ,China	2005
6	衢州化肥厂 Quzhou Fertilizer Plant	尿素合成塔 urea synthesizer	Zhejiang Province ,China	2006
7	资江化肥厂 Zijiang Fertilizer Plant	尿素合成塔 urea synthesizer	Hunan Province ,China	2008
8	三明化肥厂 Sanming Fertilizer Plant	尿素合成塔 urea synthesizer	Fujian Province ,China	2009
9	重庆氮肥厂 Chongqing Nitrogen Fertilizer Plant	尿素合成塔 urea synthesizer	Chongqing City ,China	2009
10	四川化工总厂 , Sichuan Chemical Works	高变废锅 HT shift exhaust boiler	Sichuan Province ,China	2002
11	四川化工总厂 Sichuan Chemical Works	甲烷化炉进出口换热器 Methanator feed/effluent heat exchanger	Sichuan Province ,China	1989
12	新疆泽普化肥厂 Sinkiang Zepu Fertilizer Plant	高变废锅锅炉给水预热器 HT shift exhaust boiler feedwater preheater	Xinjiang Province	2000

Srl #	Customer Name	Product Supplied	Location	Year of supply
			,China	
13	四川化工总厂 Sichuan Chemical Works t	氨合成塔进出口换热器 Ammonia converter feed/effluent heat exchanger	Sichuan Province ,China	2000
14	新疆泽普化肥厂 Sinkiang Zepu Fertilizer Plan	氨合成塔进出口换热器 Ammonia converter feed/effluent heat exchanger	Xinjiang Province ,China	2000
15	蓝星化工厂 Lanxing Chemical Plant	转化气一段 废锅 Shift gas first section exhaust boiler	Sichuan Province ,China	1999
16	蓝星化工厂 Lanxing Chemical Plant	转化气 废热锅炉 Shift gas exhaust boiler	Sichuan Province ,China	1999
17	卢州碳黑化工 Luzhou Carbon Black Chemicals	甲醇合成塔 Methanol converter	Sichuan Province ,China	2000
18	鸿鹤化工厂 Honghe Chemical Plant	第二废热锅炉 Second exhaust boiler	Sichuan Province ,China	1999
19	海南大化 Hainan Chemical Plant	氨合成塔出口冷却器 Ammonia converter outlet cooler	Hainan Province ,China	2003
20	海南大化 Hainan Chemical Plant	中间冷却器 Intercooler	Hainan Province ,China	2013
21	建峰化工厂 Jianfeng Chemical Plant	锅炉给水预热器 Boiler feedwater preheater	Chongqing City ,China	2003
22	赤天化 Chitianhua Group	第二废热锅炉 Second exhaust boiler	Guizhou Province ,China	2007
23	彭州石化 Pengzhou Petrochemicals	汽油加氢一段进/出料换热器 Gasoline hydrogenation first section feed/effluent heat exchanger	Sichuan Province ,China	2010

Srl #	Customer Name	Product Supplied	Location	Year of supply
24	彭州石化 Pengzhou Petrochemicals	脱丁烷塔冷凝器 Debutanizer condenser	Sichuan Province ,China	2010
25	彭州石化 Pengzhou Petrochemicals	裂解气压缩机 4 段后冷却器 Cracked gas compressor fourth section aftercooler	Sichuan Province ,China	2010
26	彭州石化 Pengzhou Petrochemicals	裂解气压缩机 3 段后冷却器 Cracked gas compressor third section aftercooler	Sichuan Province ,China	2010
27	彭州石化 Pengzhou Petrochemicals	碳二加氢进料冷却器 C ₂ hydrogenation feed cooler	Sichuan Province ,China	2010
28	彭州石化 Pengzhou Petrochemicals	碳二加氢反应器 1#段间冷却器 C ₂ hydrogenation reactor 1# interstage cooler	Sichuan Province ,China	2010
29	彭州石化 Pengzhou Petrochemicals	碳二加氢反应器 2#段间冷却器 C ₂ hydrogenation reactor 2# interstage cooler	Sichuan Province ,China	2010
30	彭州石化 Pengzhou Petrochemicals	碳四加氢循环冷却器 C ₄ hydrogenation recirculation cooler	Sichuan Province ,China	2010
31	彭州石化 Pengzhou Petrochemicals	碳三汽提塔中间再沸器 C ₃ stripping tower intermediate reboiler	Sichuan Province ,China	2010
32	普光气田 2011 年 Puguang Gas Field	加氢反应器出口冷却器（柔性管板） Hydrogenation reactor outlet cooler (flexible tube sheet type)	Sichuan Province ,China	2011
33	普光气田 2011 年 Puguang Gas Field	加氢反应器出口冷却器（刚性管板） Hydrogenation reactor outlet cooler (rigid tube sheet type)	Sichuan Province ,China	2011
34	元坝气田 2012 年 Yuanbag Gas Field	加氢反应器出口冷却器（柔性管板） Hydrogenation reactor outlet cooler (flexible tube sheet type)	Sichuan Province ,China	2012
35	Yingde gas Co., Ltd.	Methanol converter	Hubei Province ,China	Under fabrication

Srl #	Customer Name	Product Supplied	Location	Year of supply
36	Yingde gas Co., Ltd.	ammonia converter	Hubei Province, China	Under fabrication
37	Yingde gas Co., Ltd.	Shift gas exhaust boiler	Hubei Province, China	Under fabrication
38	Yingde gas Co., Ltd.	heat exchanger	Hubei Province, China	Under fabrication
39	Yingde gas Co., Ltd.	heat exchanger	Hubei Province, China	Under fabrication
40	荣信化工 Rongxin Chemical Plant	气化炉 gasifier	Neimeng Province, China	2010.
41	开阳化工 Kaiyang Chemical Plant	气化炉 gasifier	Guizhou Province, China	2011.
42	同煤集团 Tongmei Chemical Industry Co., Ltd.	气化炉 gasifier	Shanxi Province, China	2011.
43	惠生工程 Wison	气化炉 gasifier	Jiangsu Province, China	2011.
44	陕西未来能源 Shaanxi Future Energy	气化炉 gasifier	Shanxi Province, China	2012.
45	宁波中金 Zhongjin, Ningbo	气化炉 gasifier	Zhejiang Province, China	2012
46	山西潞安矿业（集团）有限责任公司 Shanxi Lu'an Mining Group Co., Ltd.	气化炉 gasifier	Shanxi Province, China	2014
47	Hulunbeier Jinxin Chemical Co., Ltd.	气化炉 gasifier	Neimeng Province	2015

Srl #	Customer Name	Product Supplied	Location	Year of supply
			,China	
48	Inner Mongolia Connell Chemical Industry Co., Ltd.	气化炉 gasifier	Neimeng Province ,China	2015
49	Hengli Group Dalian PETROCHEMICAL	气化炉 gasifier	Liaoning Province ,China	Under fabrication
50	Yingde gas Co., Ltd.	气化炉 gasifier	Hubei Province ,China	Under fabrication

名称 Name	压力 MPa Pressure MPa		温度℃ Temperature °C		尺寸 mm Size mm		材料 Materials	
	管侧 Tube side	壳侧 Shell side	管侧 Tube side	壳侧 Shell side	换热管 Heat exchange tube	壳体 Shell	换热管 Heat exchange tube	壳体 shell
高变废锅 HT shift exhaust boiler	3.7	1.6	455	345	φ19.05×2.77	φ1140×100 长度/length 13000	SA213T11	P355GH
甲烷化炉进出口 换热器 Methanator feed/effluent heat exchanger	4.8	3.48	475	475	φ19×2	φ1200×36 长度/length 11000	15CrMo	15CrMoR
高变废锅锅炉给水预热器 HT shift exhaust boiler feedwater preheater	17.5	3.2	306	408	φ19×2.5	φ1550×26 长度/length 13500	SA240TP304	15CrMoR

氨合成塔进出口 换热器 Ammonia converter feed/effluent heat exchanger	15.7	15.7	340	315	φ12.7×1.24	φ1070×100 长度/length 22500	SA213T12	13CrMo44
转化气一段 废锅 Shift gas first section exhaust boiler	1.95	2.75	352	230	φ38×3.5	φ1600×34 长度/length 9500	15CrMoG	15CrMoR
转化气 废热锅炉 Shift gas exhaust boiler	3.0	4.6	830	259	φ38×3.5	φ1200×40 长度/length 8500	15CrMo	15CrMoR
甲醇合成塔 Methanol converter	5.8	5.8	275	250	φ38×2	φ1600×46 长度/length 8800	00Cr18Ni5 Mo3Si2	15CrMoR
第二废热锅炉 Second exhaust boiler	3.34	11.55	400	385	φ25.4×4.2	φ1194×70 长度/length 11500	SA213T12	13CrMo44
氨合成塔出口冷 却器 Ammonia converter outlet cooler	1/ -0.1	16.2	150	70	φ19.05×2.8	φ1100×80 长度/length 11000	SA179	SA516Gr70
中间冷却器 Intercooler	1/ -0.1	16.2	150	150	φ19.05×2.11	φ750×30 长度/length 9500	SA179	SA516Gr70
锅炉给水预热器 Boiler feedwater preheater	17.5	3.2	306	408	φ19.05×2.5	φ1500×26 长度/length 14500	0Cr18Ni9	15CrMo
第二废热锅炉 Second exhaust boiler	3.33	11.57	400/385	329	φ25.4×4.19	φ1194×75 长度/length 3662	SA-213T12	16MnR

汽油加氢一段进 /出料换热器 Gasoline hydrogenation first section feed/effluent heat exchanger	4.24	4.24	-7/145	-7/255	φ19×2	φ1500×34 长度/length 5008	16Mn	Q345R
脱丁烷塔冷凝器 Debutanizer condenser	1.0	0.77	-7/65	-7/95	φ19×2	φ2100×20 长度/length 6860	10	Q345R
裂解气压缩机 4 段后冷却器 Cracked gas compressor fourth section aftercooler	1.85	2.4	-7/65	-7/120	φ19×2	φ2200×32 长度/length 6750	10	Q245R
裂解气压缩机 3 段后冷却器 Cracked gas compressor third section aftercooler	1.0	1.28	-7/65	-7/120	φ19×2	φ2300×20 长度/length 7160	10	Q345R
碳二加氢进料冷 却器 C ₂ hydrogenation feed cooler	3.44	4.47	-7/65	-7/115	φ19×2	φ1600×30 长度/length 6720	10	Q345R
碳二加氢反应器 1#段间冷却器 C ₂ hydrogenation reactor 1# interstage cooler	3.44	4.47	-7/65	-7/415	φ19×2	φ1300×42/52 长度/length 6660	10	Q345R
碳二加氢反应器 2#段间冷却器 C ₂ hydrogenation reactor 2# interstage cooler	3.44	4.47	-7/65	-7/415	φ19×2	φ1200×38 长度/length 6670	10	Q345R

碳四加氢循环冷却器 C ₄ hydrogenation recirculation cooler	3.36	4.37	-7/65	-7/145	φ19×2	φ2100×36 长度/length 5970	16Mn	Q345R
碳三汽提塔中间再沸器 C ₃ stripping tower intermediate reboiler	2.0	2.6	-7/120	-7/95	φ25×2.5	φ1950×40/φ2900×40 (32) 长度/length 8857	16Mn	Q345R
加氢反应器出口冷却器（柔性管板） Hydrogenation reactor outlet cooler (flexible tube sheet type)	0.4	0.7/FV	343	200/150	φ38×3	φ3652×26×13052	20G	Q245R
加氢反应器出口冷却器（刚性管板） Hydrogenation reactor outlet cooler (rigid tube sheet type)	0.4	0.7/FV	343	200/150	φ38×3	φ3652×26×13052	20G	Q245R
加氢反应器出口冷却器（柔性管板） Hydrogenation reactor outlet cooler (flexible tube sheet type)	0.4	0.7/FV	343	200/150	φ38×3	φ3652×26×13052	20G	Q245R