

25<sup>th</sup> June 2021

Dear Sirs,

## **GD ENGINEERING, A CELEROS BRAND GENERATIONS OF EXPERIENCE**

Established in 1944, GD Engineering has gained a worldwide reputation for pioneering work in the design and manufacture of advanced pipeline access and pigging solutions. Serving the oil/gas, petrochemical and industrial processing sectors, as well as the emerging biofuels industry, we are instrumental in helping our customers to maximize their investment in pipeline infrastructure by facilitating any necessary maintenance or upgrade work.

Our quick-opening closures enable rapid access (either vertically or horizontally) to vessels once they have been depressurized. This can be done without the need for any special tools, and while ensuring complete safety for field operatives through a series of proprietary protection mechanisms. These state-of-the-art closures are capable of dealing with even the highest levels of pressure.

Suitable for both onshore and offshore deployment, our pig signalling solutions allow the accurate monitoring of pigs/scrapers while carrying out cleaning or inspection activities, so that the precise location of any potential problems can be determined. These are accompanied by our high-reliability pig stop & bypass system, which is suitable for both surface level (topside) and subsea application scenarios, and do not impinge on the pipeline flow. All our products can be supported by comprehensive project managed maintenance schemes.

Based at our facility in Worksop, Nottinghamshire, England, we have a highly professional and dynamic team with extensive experience of these industries. We provide advanced solutions where design innovation, performance and reliability need to go hand in hand in the most cost-effective way.

Our strategy is to create market advantages through technology, service and product leadership, by expanding our market focus to offer full customer solutions. From this dedication has come advancements in equipment development and applications; advancements that have changed the way industry experts solve problems.

At GD Engineering, we think leadership is the key to our culture - a culture focused on turning managers into leaders, and employees into owners. GD associates are driven, energetic, global thinkers who constantly challenge the status quo to find better ways to do things. Our high-speed culture is driven by high-performance work teams, who are guided by a set of clearly stated Values ([www.celerosft.com](http://www.celerosft.com)).

We trust that you will find the enclosed information of interest and look forward to working with your company in the future.



Gary Lee  
Site Lead – Worksop

## **Mechanical Design and Drafting Capability**

## 设计能力

Detailed Engineering involving design calculations, 3D solid modelling, Finite Element Analysis (FEA) and shop manufacturing drawings can be provided.

工程设计包括了设计计算, 3D建模, FEA, 图纸

A team of qualified and experienced design engineers can produce quality design documents that meet the requirements of international codes, specifications, standards and design practices worldwide.

一只具备资质的设计工程师队伍提供满足国际标准, 规范, 规则的设计文件

International and National design codes frequently used by us are ASME Section VIII Division 1 and 2, PD5500, CODAP, AD MERKBLATT, CSAZ 662 and STOOMWEZEN.

我们常用的国际规范是ASME VIII DIV.1 AND 2, PD5500, CODAP等

All products are compliant with the Pressure Equipment Directive (PED) 97/23/EC.

所有产品满足 (PED)97/23/EC

Holder of ASME U Certificate of Authorisation number 34,006.

公司有ASME U证书

Holder of ASME U2 Certificate of Authorisation number 41,720.

公司有ASME U2证书

The specifications, standards and design practices frequently used by us are those of SAUDI ARAMCO, BP EXPLORATION, SHELL, BECHTEL, KELLOGG BROWN & ROOT, FLUOR DANIEL, SNAMPROGETTI, JOHN BROWN, FOSTER WHEELER, ETC.

公司满足SAUDI ARAMCO, BP,SHELL等规范的要求

The following software is utilised for design:

如下软件应用于我们的设计

- a. Autodesk Inventor Series 2014
- b. Autodesk Autocad 2014
- c. ANSYS version 14.5 (Finite Element Analysis)
- d. Beacon (Boundary Element Analysis)
- e. Mathcad

Full email and Internet facilities are available in house to enable the secure electronic transmission of documents.

Onshore and Offshore Service and Maintenance      技术服务及维修能力

- a. As well as providing world class products to the oil, gas and process industries, GD Engineering prides itself on being able to provide manpower and equipment to meet your maintenance requirements. 作为快开盲板的全球领导者，GD为能提供现场技术服务的人力和设施而倍感骄傲

GD Engineering can reduce operational maintenance costs through extended product life cycles and increase efficiency with a Project Managed Maintenance Scheme that will be designed to function within existing operational commitments.

GD拥有专业的队伍可以提供压力容器的一揽子检验和维修服务

With a fully trained and experienced team of technicians and engineers GD Engineering offer the complete onshore/offshore inspection and maintenance service package for pressure vessels. Our services are available for all types of vessel and closure manufacture.



Our fully trained technicians and engineers can also perform operator training while out on-site or by specific request to keep your equipment in fully operational condition.

我方技术人员还可以应用户要求完成远程培训

- b. To facilitate our pressure vessel management scheme, we consider it essential to include Non Destructive Testing (NDT) and ultrasonic thickness testing. This inspection, if required, encompasses the whole scraper trap and is not confined to the closure only.

我们可完成无损检测和超声厚度检测，如果需要可以对整个球筒而不仅仅是盲板提供检测

With life expectancy of existing Pipeline Trap and Closure being extended, it is also inevitable that to meet modern day requirements and to facilitate for Intelligent Pigging, in-situ vessel modifications must be given due consideration. This service can be provided by GD Engineering 我们还可以对就有的管道上的球筒或盲板进行改造以适应现代的要求

- c. Closure seal faces that have been subject to highly corrosive operating conditions or poor maintenance procedures can also be refurbished on site even in hazardous areas.

盲板密封面如被腐蚀，我们可以提供打磨服务包括危险区域

A purpose built pneumatically operated cutter is used to re-machine the seal face area; this sealing face area can then be renewed with a permanent leak free inert surface. If it is found during routine maintenance that a closure not of a GD Engineering design requires a machining operation to be undertaken, then the original manufacturer will be approached for clarification.

Our machining capability includes:

RTJ 'V' Groove, Joint Rings, Weld Preps and Flange Facing.

## **Manufacturing Facility and Equipment List** 加工设施及设备

List of equipment includes, but not limited to the following:

Shop floor area 72 metres x 18 metres 面积

Craneage	1 x 15 tonnes top running crane
起重	1 x 10 tonnes top running crane
	1 x 1 ton free standing pillar crane
	3 x 0.5 ton free standing pillar cranes
	6 x 0.5 tonnes jib cranes
	1 x 0.25 tonnes jib crane

Machine tools 加工设施

- Mori Seiki NH8000 DCG With 8 Pallet Fastems system, 180 tools and integrated Kelch tool measuring system
- Massa 1600 CNC Vertical Turning Lathe c/w Live Tooling and C Axis
- Massa 1200 CNC Vertical Turning Lathe c/w Live Tooling and C Axis
- 2 x Webster & Bennett 72" Vertical Lathe
- Centre lathes (turret)
- Shaper
- 2 Radial arm & Pillar drills
- 4 x Band saws
- 2 x custom designed/built rolling machines
- Bead blasting facilities

Welding	MAW, TIG, MIG
NDT	MPI, Dye penetrant
Hydrotest facilities	Up to 25,000 psi

Office Area	4,520 sq. feet
Workshop Area	15,300 sq. feet
Yard Area	8,180 sq. feet

Overall Capacity

We have a highly trained and multi-skilled workforce which enables us to flexibly manage our resource availability to meet the demands of a dynamic market environment.

As a guide, approximately 1000 closures are produced each year in the full range of sizes / pressure classes and over 800 Pig Signallers

### **Logistics**

Ideally located in Worksop, Nottinghamshire, we have easy access to all major roadways to provide direct access to all major Air / Seaports enabling cost effective and prompt material movement worldwide.



## **Partial Client and Project Reference Lists**

### 主要客户名称及部分业绩清单

Major Clients Include:

ABB Offshore Systems	ADNOC, UAE
AMEC Engineering, UK	Amerada Hess APS, Denmark
Amoco UK	Bechtel UK
BG Transco, UK	Bord Gais Eireann, Ireland
BP ETAP Development	BP Exploration – Worldwide
Cairn India Ltd	Chevron UK Limited
China Petroleum	Conoco Phillips Petroleum
EPMI, Malaysia	Esso Petroleum - Worldwide
Exxon Chemicals	Fluor Daniel Inc, USA
Foster Wheeler	Gas Authority of India
Gasco	GEA Energy Systems, India
Gujarat State Petronet	Halliburton
Hyundai Heavy Industries	Indian Oil Corporation
J. Ray McDermott	Kellogg Brown & Root
Laing Engineering	Larsen & Toubro, India
Maersk Olie O/G Gas, Denmark	Mobil Oil Nippon Steel Corporation
Nanjing Aerospace, China	Occidental Petroleum
Oil & Natural Gas Corporation	Origin Energy
Petrobras, Brazil	PetroChina
Petroleum Development Oman	Petronas, Malaysia
Phillips Petroleum Limited	Powergen
Repsol Oil Operations	Saipem
Saudi Aramco, Saudi Arabia	Shell – Worldwide
Single Buoy Moorings, Monaco	SMOE Pte Limited, Singapore
Sonatrach, Algeria	Statoil, Norway
Tengizchevroil	Texaco North Sea UK
Total South Pars	TotalFinaElf - Worldwide
Trans-Canada Pipelines, Canada	Unocal Thailand
Wood Group	

## Partial Client and Project Reference Lists

### **Middle East & Africa Reference List** 中东和非洲典型业绩:

#### **Gasco Black Powder Filters**

Gasco undertook a gas treatment project to increase production in one of its facilities from 45million cf/d to 90million cf/d. The works included the installation of Hydrogen sulphide removal units and installation of facilities to remove black powder from the feed gas being piped to the Industrial City of Abu Dhabi (ICAD) in Mussafah.

2 x 90", 2 x 72" Bandlock™2 Closures have been supplied for this Project for Black Powder Filtration Units.

**GD为该项目提供了2台90寸及2台72寸  
BANDLOCK 2 型**



#### **Saudi Aramco Master Gas Expansion Phase I**

Expansion of the Saudi Arabia's existing master gas system. The first part of the project involves construction of two compressor stations. Up to three additional compressor stations in a subsequent phase of this expansion is also planned for the future. The project also involves construction of a 500 km, 56 inch pipeline as well as the associated facilities. SEPCO has been awarded a \$1.3 billion EPC contract for the construction of two booster compressor stations, as well as all associated works including offsite and utilities.



24 x 74", 16 x 72", and 40 x 6" Bandlock™2 Closures supplied for Filtration Vessels and 12 x 64" have been supplied for Scraper Trap Systems on this Project.

**GD为该沙特项目提供了24台74", 16台72", 40台6", 12台64" BANDLOCK 2型**

#### **NASR Full Field Development**

The Nasr / Al-Nasr oil field is located approximately 130km northwest of Abu Dhabi City in UAE, the seventh biggest oil producing country. The Nasr Phase II Full Field Development Project, aimed at increasing the field's oil production capacity to 65,000 barrels per day (bpd) from the existing capacity of 22,000bpd, is underway and is expected to conclude in the first half of 2019.

A full range of Bandlock™2 Closures are being supplied for this Project, from 10" ASME Class 600# through to 24" ASME Class 2500#.

**GD为该项目提供了从10"600磅到24"2500磅级的BANDLOCK 2型盲板**

## **Middle East & Africa Reference List cont.**

### **Umm Al-Lulu Oil Field Development**

Umm Al-Lulu field is located in the Arabian Gulf 30km north-west of Abu Dhabi, UAE. The offshore oil field is being developed by Adma-Opco, a joint venture of Abu Dhabi National Oil Company (Adnoc, 60%), BP (14.67%), Total (13.33%) and Japan Oil Development Company (Jodco, 12%).

The Umm Al-Lulu field is being developed as part of Adnoc's strategic initiative to reach 1.75 million barrels of offshore crude oil production a day by 2017. It is part of the plan to increase Abu Dhabi's total crude oil production to 3.5 million barrels a day.

A full range of GD Engineering equipment was supplied to the project including, specialist high temperature closures for hot oil filtration in stainless steel material, Hydrocyclone Closures, 8 x 52" Super Duplex Bandlock™2 Closures for injection water filters, 12 x 20" to 54" Bandlock™2 Closures for Pig Launchers and Receivers.

### **Egina FPSO Project**

The Egina oil field is located 150km off the coast of Nigeria. The field is being developed by Total Upstream Nigeria (24%) in partnership with CNOOC (45%), Sapetro (15%) and Petrobras (16%). Egina is the third deep offshore development of Total in Nigeria.

Located about 20km away from Akpo field, Egina field lies within the block Oil Mining Lease OML 130 and covers an area of around 500 square miles. It is situated at a water depth of up to 1,750m.

Egina field infrastructure will include an FPSO unit, an oil offloading terminal and subsea production systems such as risers, 52km of oil and water injection flowlines, 12 flexible jumpers, 20km of gas export pipelines, 80km of umbilical, and subsea manifolds.

Total began the development of a new FPSO for the project. The FPSO will measure approximately 330m in length, 61m in width and 33.5m in depth, and is expected to have an oil storage capacity of approximately 2.3 million barrels. The FPSO will have topside modules with a gross dry weight of 34,000t.

The supply by GD Engineering included 22 off 2500lb Valved Mechanical Pig Passage Indicators

[GD为该项目提供了22台2500磅级的清管指示器](#)

### **In-Salah Gas Project, Algeria**

In-Salah gas is the largest dry-gas joint development project in Algeria and one of the largest joint investment energy projects ever undertaken in cooperation with Sonatrach. Gas deliveries will plateau at 9 billion cubic meters per year, increasing Algerian gas exports by about 15%.

Bandlock™2 Closures have been supplied in sizes 28", 42", and 52" diameters for this project.

## Middle East & Africa Reference List cont.

### Saudi Aramco (Sadara Phase 1)

Saudi Aramco, one of the leading energy suppliers to the world, and The Dow Chemical Company, a leading science and technology company of the world, have formed a joint venture, Sadara Chemical Company, which will construct, own and operate a world-scale integrated chemicals complex in Jubail Industrial City II, in the Eastern Province of the Kingdom of Saudi Arabia. Once completed, the Sadara complex will represent the largest petrochemical facility built in a single phase.

A full range of Bandlock™2 Closures were supplied on this project in various sizes / pressure classes

为该项目，GD提供了各种尺寸压力的BANDLOCK 2盲板

### Badra Oilfield, Iraq

The Badra oil field is located in the Wasit Province in eastern Iraq. According to preliminary estimates, the geological reserves of the Badra field total 3 billion barrels of oil.

Production began on the oil field in 2013, and is expected to reach 170 thousand barrels per day (approx. 8.5 million tons per year) by 2017 and to maintain that level for seven years. A total 17 production wells and five injection wells are planned at the field.

6 x 28" ASME Class 300# Bandlock™2 Closures were supplied on this project

为该项目提供了6台28"300磅级BANDLOCK 2快开盲板

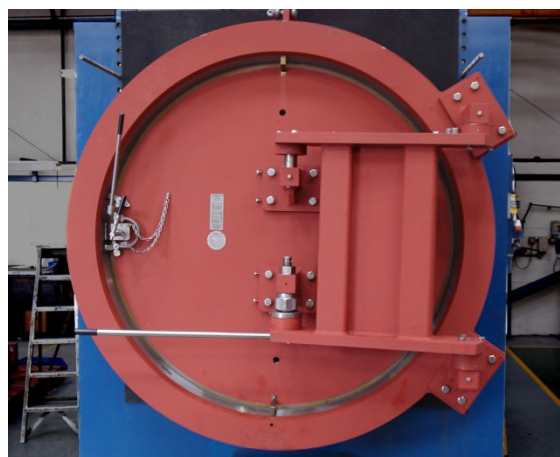
### Black Power Filter Station BI-10-01067-KRZTG-2, Saudi Arabia

Black powder is a solid contamination in finished product pipelines which may be wet and have a tar-like appearance, or dry and be a very fine powder, sometimes like smoke.

Black powder can cause a range of problems, including product contamination, erosion wear in compressors, instrument and filter clogging and equipment contamination for product consumer, erosion and sealing problems for valves, and flow reduction

80" ASME Class 600# Bandlock™2 Closures have been supplied for this project of large diameter filtration vessels.

GD为该项目提供了80"600 磅级  
BANDLOCK 2 盲板



### Kuwait Oil Company EF1713#, Kuwait

The EF1713# project involves the installation of Low Sulphur Fuel Oil (LSFO), FG and Gas Oil Pipelines from Mena Al Ahmadi to Sabiya & Doha Power Stations.

57 x Bandlock™2 Closures have been supplied for this project.

GD为该项目提供了57台BANDLOCK 2盲板

## **Middle East & Africa Reference List cont.**

### **Manifa Offshore, Saudi Arabia**

The \$11 billion Manifa (also known as Moneefa) project will be Saudi Aramco's largest offshore field, when fully operational will add 900,000 bpd of extra capacity to Saudi Arabia's oil output.

As well as the heavy crude, the Manifa field will also produce 120 million standard cubic feet per day of sour gas, 50,000 bpd of condensate, and 950,000 bpd of produced water.

40" ASME Class 1500# Bandlock™2 Closures have been supplied for this project.

**为该项目GD提供了40"1500磅级 BANDLOCK 2 盲板**

### **EPIC Strategic Gas Project, Qatar**

QATAR PETROLEUM CO. (QPC) is currently involved in the construction of a new gas pipeline that is intended to link Ras Laffan and Mesaieed.

Construction calls for the installation of a 120 km-long, 36-inch, pipeline that will run between the two industrial cities. The line is intended to transport sweet gas produced in the North Field and replace sour gas currently delivered to Mesaieed from the onshore Dukhan Field.

6 off 40" ASME Class 600# Horizontal Bandlock™2 Closures have been supplied for this project.

**GD提供了6台40"600磅级BANDLOCK 2盲板**

### **Transneft, Republic of South Africa**

The new multi-product 700 km pipeline from Durban to Gauteng was commissioned in 2010. Petronet, a Transneft subsidiary currently operates 3,000 km of pipelines in five provinces, transporting 17 bn litres of fuel a year. Petronet's new pipeline will increase annual capacity to 25 bn litres with the Durban-Gauteng pipeline's capacity being about 8 bn litres a year.

6 x 20" ASME Class 600#, 8 x 28" ASME Class 900#, 4 x 28" ASME Class 600# Horizontal Bandlock™2 Closures have been supplied for this project.

**GD为该项目提供了6台20"600磅级，8台28"900磅级，4台28"60磅级BANDLOCK 2盲板**

### **Sonatrach GTL Project, Algeria**

Sonatrach has allocated the Tinher Block for the upstream element of the GTL Project in Algeria, This block contains approximately 120 BCM (4.24 TCF) of wet gas reserves and has the potential to produce 400 MCF/d.

Tendered as part of an integrated GTL JV to produce 36,000 b/d of ultra-clean fuels for export, the GTL plant should eventually be expanded to 65,000 b/d.

80" Vertical ASME Class 600# Bandlock™2 Closures have been supplied for this project for large diameter Filters.

**GD为该项目提供了80"600磅级立式BANDLOCK盲板**

## **Middle East & Africa Reference List cont.**

### **Karan Offshore Project, Saudi Arabia**

The Karan Project, about 160 kilometers north of Dhahran, will produce 1.8 billion standard cubic feet per day of Karan Khuff gas when completed, and will include facilities to transport gas from the field via a 110-kilometer subsea pipeline to onshore processing facilities at the Khursaniya Gas Plant.

The offshore facilities at Karan consist of four wellhead topside platforms with auxiliary facilities connected to a main tie-in platform that will feed the sour gas to the subsea pipeline.

High Pressure ASME Class 1500# Horizontal Bandlock™2 Closures have been supplied on this project for critical service Traps.

**GD为该苛刻工况提供了1500磅级盲板**

### **Khursaniyah Project, Saudi Arabia**

The Khursaniyah Programme will develop oil and gas production for the onshore Abu Hadriya, Fadhili and Khursaniyah oil fields near Jubail, a major sulphur exporting port in Eastern Province, with its production capacity expected to reach 500,000 bpd of crude oil.

A full range of Bandlock™2 Closures were supplied on this project including 56", 64", 52" and 22" for both Horizontal and Vertical Filter vessels for Saudi Aramco.

**GD为该项目提供了56", 64", 52", 22"卧式及立式BANDLOCK 2**

### **EWG-1 Project, Saudi Arabia**

This onshore construction in Saudi Arabia will convert the existing East-West (EWG-1) pipeline from oil to gas transport. The renovated pipeline will deliver gas to the industrial zone in Yanbu. The turnkey contract was awarded by the Saudi Arabian oil company, Saudi Aramco, and requires de-cruding, cleaning and purging the 960-kilometre-long EWG-1 pipeline.

The contract also calls for detailed design, fabrication, construction, installation and commissioning of new sections of EWG-1 line and related communication facilities.

64" and 48" ASME Class 600# Horizontal Bandlock™2 Closures have been supplied on this project.

**GD为该项目提供了64"和48"600磅级BANDLOCK 2型盲板**

### **Shaybah Pipeline Project, Saudi Arabia**

The US\$1.2B Shaybah Oil Development involved new facilities to produce, process and transport 600,000 BPD of light crude oil for export from Robalkhali in the east region of Saudi Arabia peninsula to existing facilities at Abqaiq.

The facilities comprised 638 km of 48" diameter crude oil pipeline, four pump stations, two meter stations, SCADA system and an upgrade of the receiving facilities.

A full range of Horizontal Bandlock™2 Closures were supplied on this project including 30", 36" and 42" ASME Class 600#.

## Middle East & Africa Reference List cont.

### Hawiyah Gas Project, Saudi Arabia

Aramco's first facility to process large quantities of non-associated gas from gas reservoirs was the Hawiyah Gas Plant. In addition to delivering gas, Haradh Gas Plant has a design capacity to deliver 170,000 bpd of condensate to Saudi Aramco's Abqaiq processing facility and can produce 90 tons of sulphur per day for export.

A full range of 38 x Bandlock™2 Closures were supplied for this project including 30", 36", 42", 50", 54" and 64" nominal diameter for Scraper Launchers, Receivers and Filter Vessels.

为该项目提供了38台包括  
30"36"42"50"54"64" BANDLOCK 2盲板



### Bonga Field Development, Nigeria

Shell's Bonga Field development is being developed using a floating production, storage and off-loading (FPSO) system. At 300,000 DWT (Dead Weight Tonnes) and with a storage capacity of 2 million barrels of crude oil, the Bonga FPSO will be one of the largest in the world. A full range of Bandlock™2 Closures were supplied on this project in sizes 12", 16", 18", 20", 24", 54" and 60" nominal diameters.

GD为该项目提供了各种尺寸包括12"16"18"20"24"54"60" BANDLOCK 2盲板

### QATIF Gas Project, Saudi Arabia

Saudi Aramco are developing the Qatif and Abu Sa'fah fields as a single large-scale project. The Qatif-Abu Sa'fah development lies in the Eastern province and was completed in October 2004.

The new onshore and offshore facilities along the Gulf coast will have the capacity to produce, process and transport 500,000 barrels per day (bpd) of Arabian light crude from Qatif field, and 300,000bpd of Arabian medium crude from Abu Sa'fah field as well as 370 million standard ft<sup>3</sup> per day of associated gas.

A full range of Bandlock™2 Closures and Pig Signallers have been supplied on this project in sizes 10", 12", 16", 22", 26", 30" and 36" diameters

GD为该项目提供了10"12"16"22"26"30"36" BANDLOCK 2盲板

### Saudi Aramco Jazan

Jazan Refinery and Terminal, wholly-owned and operated by Saudi Aramco, is a new refinery and terminal in the Kingdom's southwest, scheduled to begin commissioning in 2017.

The complex, becoming an integral part of their refining and distribution network, will have the capacity to process 400,000 bpd of Arabian Heavy and Medium crude oils to produce gasoline, ultra-low-sulphur diesel, benzene, and paraxylene.

20 x 28" ASME Class 600# Fully Clad and 4 x 52" Vertical Bandlock™2 Closures are being supplied for this Project.

GD为该项目提供了20台28"600磅堆焊及4台52"立式 BANDLOCK 2盲板

## European Reference List 欧洲典型业绩清单

### BP Kashagan

The Kashagan field is an offshore oil field in Kazakhstan's zone of the Caspian Sea. Discovered in 2000 and located 80 km off the coast of Kazakhstan near Atyrau, the Kashagan site lies in the northern area of the Caspian Sea. Water depths range from 2m to 6m, and temperatures fluctuate between -40°C and 40°C in a year.

Kashagan is the most important field in the 11 blocks falling under the North Caspian Sea Production Sharing Agreement (NCSPSA), covering a total of 5600 km<sup>2</sup> in the Kazakhstan part of the Caspian Sea.

4 x 32" ASME Class 600# and 4 x 24" / 2 x 10" ASME Class 900# Bandlock™2 Closures were supplied for this Project.

**GD为该项目提供了4台32"600磅，4台24"，2台10"900磅级 BANDLOCK 2盲板**

### BP South Caucasus Pipeline Expansion

The expansion of the South Caucasus Pipeline is part of the Shah Deniz Full Field Development project. This expansion will involve the laying of new pipeline across Azerbaijan and the construction of two new compressor stations in Georgia. This will triple the gas volumes exported through the pipeline to over 20 billion cubic metres per year.

6 x 52" ASME Class 600# Bandlock™2 Closures were supplied as part of this major expansion Project.

**GD为该项目提供6台52"600磅级BANDLOCK 2盲板**

### Tempa Rossa Onshore Oil Field, Italy

Tempa Rossa is an Italian onshore oil field located in the Gorgoglione concession, in the Basilicata region. It is estimated to contain about 200 million barrels of total proven reserves. The field came on stream in the first quarter of 2016.

The field is being developed jointly by Total and Shell. Total is the operator of the field and owns 75% working interest. Shell owns the remaining 25% share. The field was developed with an investment of \$1.9bn (€1.6bn).

6 x 12" ASME Class 2500#, 6 x 10" ASME Class 900#, 1 x 24" ASME Class 300#, 1 x 24" ASME Class 900# and 1 x 10" ASME Class 600# Bandlock™2 Closures were supplied for this Project.

**为该项目提供了6台12"2500磅级，6台10"900磅级，1台24"300磅级，1台24"900磅级盲板**

### Fluxy's, Belgium

50" ASME Class 600# Inconel Fully Clad Bandlock™2 Closures have been supplied for large diameter Filters for Fluxy's, Belgium.

**为该项目提供了50"600磅级全堆焊BANDLOCK 2盲板**

## European Reference List cont.

### Cygnus Field Development, UK

The Cygnus field is the sixth largest gas field in the southern North Sea and the largest to be discovered in the last 25 years within the Southern Gas Basin. In 2012, the project partners sanctioned investments to develop the field. Production started late 2015. At peak production, the field is expected to meet the demand of around 1.5 million homes.

Cygnus is located about 150 kilometres off the coast of Lincolnshire. It has gross 2P reserves of approximately 18 billion cubic metres.

16" ASME Class 2500# Closures were supplied on this project along with a range on Non-Intrusive Ultrasonic Pig Signallers.

**GD为该项目提供了16"2500磅级的盲板**

### Baku-Tbilisi-Ceyhan (BTC) Pipeline

The Baku-Tbilisi-Ceyhan (BTC) project is a \$2.9 billion investment to unlock a vast store of energy from the Caspian Sea by providing a new crude oil pipeline from Azerbaijan, through Georgia, to Turkey for onward delivery to world markets.

The GD Engineering Bandlock™2 Closure was supplied in sizes up to 56" nominal diameter in a range of pressures to meet the requirements of this project.

**GD为该项目提供了最大56"涵盖各种压力范围的盲板以满足项目要求**

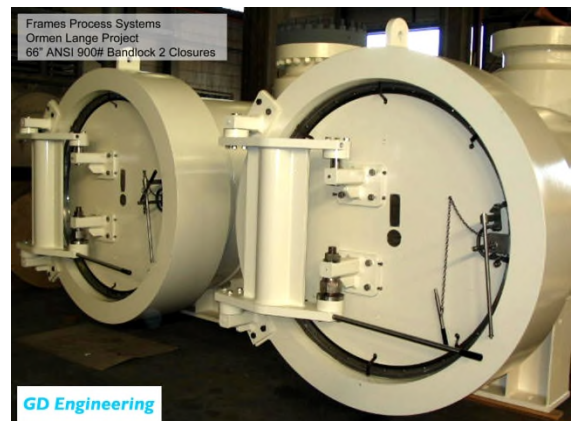
### Ormen Lange Project, Norway

The Ormen Lange field is located in the Norwegian Sea, 120 kilometres North West of the coast of Møre, Mid-Norway. It is Norway's largest gas field, and was proven through drilling by Norsk Hydro in 1997.

The field will be developed with seabed installations at depths of between 800 and 1100 metres, and will be linked to a processing plant on land at Nyhamna in Aukra municipality, from where the gas will be exported. When it reaches full production, the field will meet 20 percent of the UK demand for gas.

The GD Engineering Bandlock™2 Closure was specified for this project and has been supplied in a range of sizes including 54" ASME Class 2500#, 38" ASME Class 1500# and 66" ASME Class 900# to meet the requirements of this project.

**GD为该项目提供了54"2500磅级，  
38"1500磅级，66"900磅级盲板**



## European Reference List cont.

### Buzzard Oil Field, UK

EnCana (U.K.) Limited operates the Buzzard development - one of the U.K.'s most significant development projects in the past decade. Not only is it one of the largest North Sea discoveries in recent years with over a billion barrels of oil in place; it is also one of the fastest to be sanctioned for development by UK authorities.

The GD Engineering Bandlock™2 Closure was sole specified for this prestigious project and was supplied for Scraper Launchers, Receivers and Filter applications.

**GD为该项目提供了所有收发球，过滤器用的所有盲板**

### ACG Full Field Development Project, Azerbaijan

The Azeri-Chirag-Gunashli (ACG) full-field development, led by BP as project operator, contains an estimated 5.4 billion barrels of recoverable crude oil reserves. Bandlock™2 Closures have been supplied and installed on all active phases of this project.

**GD BANDLOCK 2 快开盲板使用在该项目各期上。**

### Shah Deniz Offshore Gas Field

The Shah Deniz gas and condensate field lies under the seabed of the Caspian Sea, some 100 kilometers south of Baku in water depths of up to 600 metres. Discovered in 1999, it is estimated to contain more than 400 billion cubic metres of gas reserves.

A multiple pig launching system has been supplied for the BP Shah Deniz Caspian Sea Project.

Designed for installation on the TPG500 'Jack-up' platform, its use will enable pipeline pigs to be launched into the condensate pipeline, at specified intervals, without the need for manual intervention.



**GD为该项目提供了自动收发球系统**

## Americas Reference List 美洲项目典型业绩：

### Lone Star NGL LLC

A joint venture between Energy Transfer Partners and Regency Energy Partners. Lone Star already have two natural gas liquid (NGL) fractionator's (breaking down of hydrocarbon fractions) at its facility in Mont Belvieu, Texas, that brings their total fractionation capacity to 200,000 barrels per day. These original units include blind flanges.

For the third fractionator at the Mont Belvieu facility, we were able to demonstrate the benefit of installing Bandlock™2 Closures on the amine sweetening separators which replace the coalesces from Frac II.



1 x 72" ASME Class 600# and 3 x 78" ASME Class 600# Bandlock™2 Closures were supplied for this Project.

1台72寸600磅级和3台78寸600磅级 BANDLOCK 2盲板在该项目上应用

### Petrobras FPSO MV24, Brazil

The FPSO Cidade de Mangaratiba MV24 will be installed in the BM-S-11 block (Cernambi South) in the giant "pre-salt" region of the Santos Basin, with a depth of 2,300m.

The FPSO will be capable of processing 150,000 barrels of oil per day, 280 MM standard cubic feet of gas per day and has a total storage capacity of 1,600,000 barrels of fluids.

3 off 46" Vertical (St/St.) Bandlock™2 Closures were supplied on this project

该项目使用了3台46寸立式BANDLOCK 2盲板

### FPSO Marlim Sul, Brazil

South Marlim was discovered in November 1987 by the wildcat well 4-RJS-382. The field is located 110km off the northern shore of the Rio de Janeiro state. Bandlock™2 Closures were supplied and installed on this project in sizes from 8" to 14".

GD为该项目提供了8至14寸的盲板

### Balao Heavy Crude Oil Pipeline, Ecuador

The 298-mile (506 km) pipeline is projected to deliver between 390,000 and 450,000 barrels per day (bpd) of heavy crude from oil concessions in Ecuador's eastern rainforest region to refineries in Esmeraldas on the Pacific Coast. From there, the crude is shipped to international markets via an offshore loading facility at Balao.

Bandlock™2 Closures have been supplied in sizes 28", 36", 38" and 48" diameters for this project.

GD为该项目提供了28寸，36寸，38寸，48寸的BANDLOCK 2快开

## Americas Reference List cont.

### Petrobras Taratuga Field – TUP10 MV20 FPSO 巴西石油FPSO 项目

The FPSO will be moored at a water depth of 765m and capable of accommodating up to 62 flexible risers and umbilical's. The deadweight tonnage of the vessel will be 248,000t.

Cidade de Campos dos Goytacazes MV29 will have a processing capacity of 150,000 barrels of crude oil a day or 180,000 barrels of total fluids a day, 176 million standard cubic feet of gas a day, 200,000 barrels of water injection capacity, and a crude oil storage capacity of approximately 1.6 million barrels.

Tartaruga Verde (formerly Aruanã) and Tartaruga Mestiça (formerly Oliva) fields are located in concession BM-C-36 (block C-M-401) in the post-salt of Campos Basin, Brazil. The block is solely owned by Petrobras.

Large Diameter Bandlock™2 Closures have been supplied ranging from 62" in Duplex Stainless Steel for the project.

**GD**为该项目提供了**62寸双相不锈钢 BANDLOCK 2 盲板**

## Asia Pacific Reference List 亚洲太平洋地区业绩清单:

### WEPP III West Section, China

The 7,378km WEPP III will be laid between south eastern China and the west from Xinjiang autonomous region to the Guangdong province. The pipeline includes a 5,220km long main line and eight branches. The main line originates at Horgos and terminates at Fuzhou of Fujian Province. The WEPP III is designed to deliver 30bcm annually at 10-12Mpa.



A total of 120 Bandlock™2 Closures have been supplied for this phase of the project including 84 off 60" ASME Class 900#.

为中国西气东输三线提供了120台盲板其中84台为60寸900磅

### BP Clair Ridge, Phase II

The development will involve the construction and installation of two new, bridge-linked platforms, installation scheduled in 2015 with production expected to commence in 2016. The new facilities are being designed for 40 years of production and will require a total capital investment of circa £4.5 billion.

The new development will have the capability to produce an estimated 640 million barrels of oil and will provide a hub for future expansion. Peak production is expected to be up to 120,000 barrels of oil per day.

A full range of Bandlock™2 Closures were supplied on this project including special Hydrocyclones and Pig Launchers/Receivers.

GD为该项目提供了多种尺寸的BANDLOCK

### Icthyus Project, Australia

The Icthyus Field is located in the Browse Basin off the north-west coast of Western Australia and approximately 820 kilometres south-west of Darwin with resource estimates of 12.8 trillion cubic feet of gas and 527 million barrels of condensate produced over an operational life of more than 40 years.

A full range of Bandlock™2 Closures were supplied on this project for both Filtration and Pig Launcher/Receiver applications.

GD为该项目提供了各种尺寸的BANDLOCK

### Gorgon Gas Project, Australia

The Gorgon gas project is a natural gas project in Western Australia, involving the development of the Greater Gorgon gas fields, subsea gas-gathering infrastructure, and a liquefied natural gas (LNG) plant on Barrow Island. The project also includes a domestic gas component and once completed, will become Australia's fourth LNG export development.

1 x 38" and 1 x 44" ASME Class 2500# Bandlock™2 Closures have been supplied for this project

GD为该项目提供了1台38寸和1台44寸2500磅级

## Asia Pacific Reference List cont.

### Shanjing III, China

The Shanjing III pipeline supplies natural gas from the western province Shanxi to China's capital Beijing and operated by PetroChina.

A range of Bandlock™2 Closures have been supplied for this project, 46" Class 600# for Pig Launchers & Receivers and 50" ASME Class 600# for Filters.

为中国陕京三线，GD提供了50多台46寸及50寸600磅级盲板

### West East Pipeline Project, China

The West-East pipeline will run from gas fields in China's western province Xinjiang which adjoins Krygystan and Kazakhstan, to Shanghai on the east coast. GD Engineering has supplied the Bandlock™2 Closure in sizes between 12" and 46" up to ASME Class 900# for this project.

为中国西气东输一线提供了300多台从12寸到46寸，600磅至900磅级盲板

### WEPP II East and West Section (Phase I & II), China

Following completion of WEPP I, the WEPP II, West-East pipeline will run from gas fields in China's western province Xinjiang which adjoins Krygystan and Kazakhstan, to Shanghai on the east coast.

GD Engineering has supplied the Bandlock™2 Closures in sizes between 12" and 54" up to ASME Class 900# for this project, for Pig Launchers & Receivers, Filters and Combined Filter Separators.

为中国西气东输二线提供了所有12寸到54寸，压力至900磅级盲板



### Sinopec, Yu Ji Pipeline, China

Yulin-Jinan gas transmission pipeline project is another important gas pipeline project constructed by China Petroleum & Chemical Corporation.

GD Engineering has supplied Horizontal Bandlock™2 Closures in sizes between 26" and 50" up to ASME Class 600# for this project for the Pipeline Traps.

GD为中国榆济线提供了26寸到50寸600磅级的盲板

### Angsi Phase III, Malaysia

The Angsi field is an integrated oil and gas development project undertaken by PETRONAS Carigali and ExxonMobil Exploration and Production Malaysia Inc.

Developed in three phases, the field is now producing about 100,000 barrels of oil and 200 million standard cubic feet of gas per day. 10" and 14" Bandlock™2 Closures have been supplied and installed on this project.

## Asia Pacific Reference List cont.

### Kupe Gas Development Project, New Zealand

The Kupe Gas/Condensate Field Development is located in PML38146 in the offshore Taranaki Basin, New Zealand, approximately 30km off the coast and in water depth of about 25m.

The development will comprise a normally unmanned offshore platform, a 30 km pipeline to shore, an onshore production station, and up to six wellheads. The onshore production station, 12 km west of Hawera, will process the raw gas to meet the specification for the main gas transmission system and separate out the condensate and liquid petroleum gas (LPG).

A multiple pig launching system has been supplied for this Project and designed for installation on the unmanned platform to enable remote pigging operations to be performed, at specified intervals, without the need for manual intervention.

该项目安装了GD公司多球自动收发系统



### GAIL India HVJ Network Upgradation Projects

This project was approved by the Government in March, 1994. The capacity of the HBJ pipeline which was 18.2 MMSCMD has been upgraded to 33.4 MMSCMD by adding extra compression facilities and a new 36 inch loop line from Bijaipur to Dadri. The pipeline was commissioned in March 1997 and the compressor stations during 1997-98.

Bandlock™2 Closures in sizes 14", 46" and 48" have been supplied and installed on this project.

The original HVJ Gas Pipeline (Hazira Vijaipur Jagdishpur) took a different route from Vijaipur to Jagdishpur. During HBJ Upgradation Phase II, additional pipelines were added from Dahej to Vijaipur to transport LNG where we supplied 7 x 48" and 7 x 46" Bandlock™2 Closures as well as a range of Intrusive Pig Signallers.

The Vijaipur Dadri Bawana Pipeline takes off from Vijaipur to Dadri and Bawana where a total of 40 Bandlock™2 Closures and 23 Pig Signallers have been supplied.

40台盲板安装在该项目上，尺寸涵盖了14寸，46寸及48寸

### Gujarat Gas Grid Project, India

The Gas Grid Project promoted by Gujarat State Petronet Ltd. envisages transporting indigenous natural gas from production centers and LNG from terminals to demand centers all over Gujarat through a high pressure Trunk Pipeline. It is a pipeline transmission project to deliver gas to end users and for local distribution.

A full range of Bandlock™2 Closures and Pig Signallers have been supplied on this project.

GD为该项目提供了各种尺寸盲板

## **Asia Pacific Reference List cont.**

### **The Rajasthan Onshore Block**

The Rajasthan Onshore Block is not one Project, but a series of projects that is being developed on a continuous basis. We have supplied a full range of Bandlock™2 Closures and Pig Signallers for various phases of the project including the special pipeline. It is the worlds longest continuously heated and insulated pipeline.

Cairn India Ltd operates the largest producing oil field in the Indian private sector and has pioneered the use of cutting-edge technology to extend production life.

The Ravva Block is an Offshore Block related to the same development.

该区块包括一系列项目，GD为各期提供了多种尺寸盲板