

CP System

CONSTANT PRESSURE BARRIER FLUID, SEALING TECHNOLOGY, COMPLIES TO
+ EXCEEDS API682 PLAN 53C REQUIREMENTS





SPX - An introduction

SPX is a Fortune 500 multi-industry manufacturing leader, headquartered in Charlotte, North Carolina. SPX manufactures and markets products, components, services and technologies that are integral to meeting today's challenges and tomorrow's needs. We are a place where innovation is fostered, and the real needs of business are understood. We transform ideas into powerful solutions to help our customers meet their goals, overcome business challenges and thrive in a complex, always changing marketplace.

SPX's Flow Technology segment designs, manufactures and markets engineering solutions and products used to process, blend, meter and transport fluids. We also offer equipment for air and gas filtration and dehydration. Our leading brands have global operations which service the food + beverage, power + energy, and industrial processes.



CLYDEUNION PUMPS, AN SPX BRAND - GENERATIONS OF EXPERIENCE

Whilst the name is relatively new, the ClydeUnion Pumps brand is known worldwide for supplying reliable and robust engineered pumping solutions stemming from over 140 years of industry expertise. Our experience spans across several complex industries including oil and gas, nuclear and conventional power generation, desalination and other key markets relevant to our product portfolio.

>ClydeUnion Pumps



Weir Pumps - Clyde Pumps - Mather & Platt -
Drysdale - WH Allen - Girdlestone -
Allen Gwynnes - Harland



Union Pump - David Brown Pumps
DB Guinard Pumps - American Pump - Pumpline



>ClydeUnion Pumps

High technology pumps for the most demanding services

ClydeUnion Pumps, an SPX Brand, specialises in the design and manufacture of API 610 centrifugal pumps and pumping packages. At ClydeUnion Pumps you will find a commitment to quality throughout the company. Our Quality Management System is fully approved to ISO 9001:2008 and independently verified to comply with the latest quality standards. ClydeUnion Pumps has a worldwide reputation for providing optimised reliability in the most severe duty applications.

REFINERIES

Today's complex refinery processes demand specialised pumping solutions. Extremes of temperature, high pressure and the ability to handle volatile fluids, calls for highly engineered pumps that can perform reliably in such arduous conditions. ClydeUnion Pumps has many years of worldwide experience in supplying process pumps to the refinery industry and is committed in providing its customers with solutions for the most complex of pumping requirements.

PETROCHEMICALS

ClydeUnion Pumps has worldwide experience of engineered pumping systems for petrochemical applications. The process and transferring of petrochemicals demands a high level of pumping reliability. ClydeUnion Pumps has a reputation for supplying reliable pumps which can be found working throughout the world in the most aggressive applications.



OIL + GAS PRODUCTION

Our pumps can be found operating wherever there are oilfields, both onshore and offshore. High efficiency and reliability are major benefits of ClydeUnion Pumps equipment - both of which are vital considerations in the oil and gas industry. Pumps have been supplied to satisfy a wide range of pumping services including high pressure seawater injection, crude oil transfer and pumps for handling all types of industry related fluids.

PIPELINES

ClydeUnion Pumps has worldwide experience of engineered pumping solutions for pipeline applications. Effective transferring of hydrocarbon products, often in remote locations, demands a high level of pumping reliability.

CP System - Improves safety + eliminates fugitive emissions

The ClydeUnion Pumps CP System is a constant differential pressure barrier fluid sealing system. All units comply with and exceed API 682 Plan 53C requirements

There are hundreds of ClydeUnion Pumps CP Systems operating worldwide providing a simple means of pressurising double, back-to-back and dual pressurised mechanical seals.

- Designed per ASME Section VIII, Division L
- Meets requirements of the European Pressure Equipment Directive 97/ 23/EC
- Available with either ANSI 600lb or 900lb flange pressure ratings
- Can be supplied for new pumps or retrofitted to existing pumps from any pump manufacturer
- Offers a proven history in improving seal life, particularly under varying suction pressures
- Provides an excellent mechanical sealing environment in the most demanding process conditions

PROVEN PRODUCT INTEGRITY

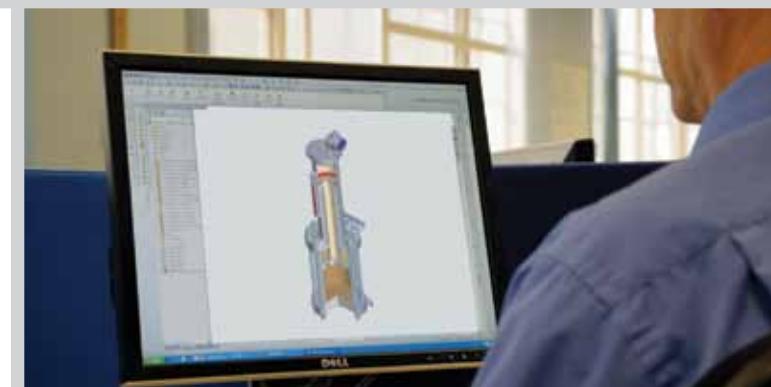
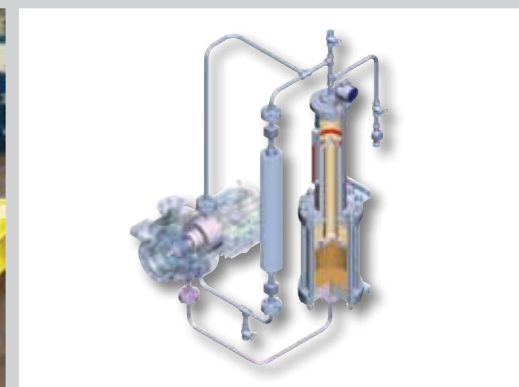
The Patented CP System improves safety, reliability and eliminates fugitive emissions. The CP System ensures zero leakage to atmosphere and achieves this without the need for external power or nitrogen gas source. The unit maintains constant differential pressure across the inboard seal, regardless of fluctuations in suction or discharge pressure.

EASE OF MAINTENANCE

The CP System has a high usable capacity (10 litres / 2.64 US gal) and can be topped up with the system pressurised and the pump running. The CP System requires only one channel of instrumentation. All instrumentation is magnetic and does not penetrate the pressure envelope wall, facilitating service and replacement whilst the CP system is pressurised. The simple construction of the CP System offers ease of maintenance and reliability.

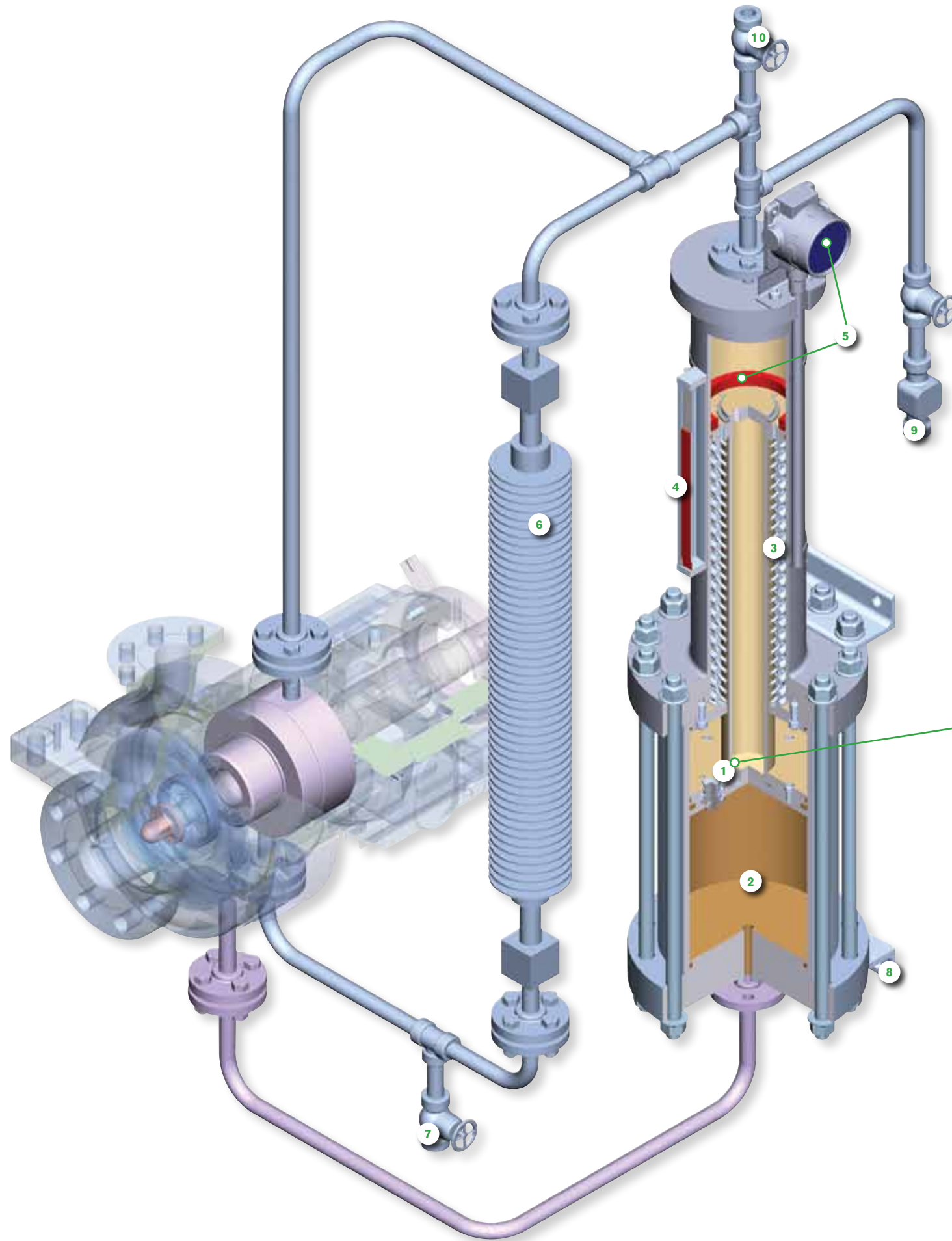
UNIT CONFIGURATION

With a CP System per mechanical seal, each system requires its own seal barrier fluid circulation piping. The closed loop is comprised of tubing or pipe with appropriate fittings and incorporates a barrier fluid cooler to remove excess heat generated at mechanical seal faces.

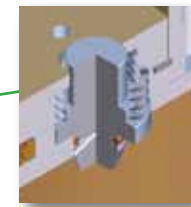


CP System - Features

- 1 STROKE LIMITING VALVE**
 - Prevents accidental overfilling of barrier fluid avoiding over pressurising of the mechanical seals
 - Provides a thermal pressure relief facility
- 2 BOTTOM CYLINDER**
 - 10 litres/2.64US gal working capacity maximises periods between refills
- 3 DOUBLE COIL SPRING**
 - Differential pressure is generated entirely by spring action
 - No need for any external supply of instrument air or nitrogen
 - No need for any circulating pump
- 4 PISTON POSITION INDICATOR**
 - Magnetically coupled sight gauge provides local visual indicator of barrier fluid level
- 5 PISTON POSITION SWITCH/TRANSMITTER**
 - Magnetically coupled switch or transmitter provides an alarm and/or trip signal when barrier fluid is low
- 6 BARRIER FLUID COOLER**
 - Options if required: Naturally air cooled single, double or triple length of finned pipe - standard
 - Shell/tube water cooled - optional
 - Fin/fan cooled - optional
- 7 SYSTEM DRAIN VALVE**
- 8 UNIVERSAL MOUNT**
 - Flexibility to mount the CP System remotely from the pump
- 9 FILL CONNECTION**
 - A separate line with a quick connect coupling, check valve and isolation valve
- 10 SYSTEM VENT VALVE**
- 11 MECHANICAL SEAL REQUIREMENT**
 - Mechanical seals selected for use with a CP System should be either dual pressurised or double "back-to-back" seals and should be fitted with a pumping ring or scroll to circulate barrier fluid through the barrier fluid cooler



Vertical pump arrangement



Stroke limiting valve

- 12 HAZARDOUS PUMPAGES**
 - The inner or primary seal should have a reverse pressure capability for hazard pumpages as follows:
 - Capable of operating at normal sealing pressure and zero barrier fluid pressure for a period of 15 seconds with the pump running at full speed
 - Capable of sealing at pump case design pressure with zero barrier fluid for an indefinite period with the pump stationary

Advantages of the CP System vs. conventional API 682 seal systems

USING A DUAL PRESSURISED OR DOUBLE, BACK-TO-BACK SEAL: CP SYSTEM VERSUS DUAL UNPRESSURISED SEAL WITH API PLAN 52 SYSTEM

DESIGN FEATURE	BENEFIT	API PLAN 52	CP
Barrier fluid is at a higher pressure than pumpage	Zero fugitive emissions	✘	✔
Primary mechanical seal interface film is barrier fluid, not product	Increased mechanical seal life, especially on light hydrocarbon pumpages	✘	✔
Barrier fluid remains uncontaminated by pumpage throughout its life	Increased mechanical seal life, especially the secondary seal faces	✘	✔
No need for the seal system to be connected to the plant flare system	Reduced load on plant vapour recovery system	✘	✔
Requires only one channel of instrumentation	Reduced installation and maintenance costs	✘	✔
Barrier fluid can be refilled with the system pressurised and the pump running	Reduces pump shutdown time and enables a pump with a leaking seal to continue running	✘	✔
Barrier fluid reservoir can be mounted off pump baseplate	Flexibility when retrofitting to existing pump assembly	✘	✔
Non-penetrating magnetic instrumentation	Able to service / replace instrumentation with the system full of barrier fluid and pump operating	✘	✔

USING A DUAL PRESSURISED OR DOUBLE, BACK-TO-BACK SEAL: CP SYSTEM VERSUS VARIOUS API PLAN 53 SYSTEMS

DESIGN FEATURE	API PLAN 53A	API PLAN 53B	API PLAN 53C	CP SYSTEM
Inter-seal barrier fluid pressure automatically changes with varying pumpage pressure	✘ (Fixed pressure seal)	✘ (Fixed pressure seal)	✔	✔
Differential pressure between seal barrier fluid and pumpage fixed	✘	✘	Partial ⁽¹⁾	✔ ⁽²⁾
Suitable for use with low suction pressures	✔	✔	✘	✔
Nitrogen gas free operation	✘	✘	✔	✔
No nitrogen absorption into barrier fluid	✘	✔	✔	✔
Requires only one channel of instrumentation	✘	✘	✘	✔
No external relief valves	✔	✔	✘	✔
Large volume of unsealable seal barrier fluid	✔	✘	✘	✔
System can be refilled while pressurised	Not usual	✔	✔	✔
Non-penetrating magnetic instrumentation	✘	✘	Partial	✔

⁽¹⁾ Differential pressure between seal barrier fluid and pumpage varies within range of pre-fixed pressure multiplier device
⁽²⁾ CP System is a pressure addition device maintaining barrier fluid pressure 15 to 30 psi (1 to 2 Bar) above pumpage pressure COMPLIES TO AND EXCEEDS API 682 PLAN 53C REQUIREMENTS



FIELD TRIAL SUCCESS

Enterprise Products:

Port Allen Facility, Louisiana, USA

The challenge was to combat short packing life and high volatile organic compound emissions on a butane service, CUP-TD60 reciprocating pump

Following the installation of: UNI-LOK® Zero

sealing systems emissions are now 33% of EPA allowable limits and packing life was extended by a factor of 4

"Enterprise Products is very pleased with the sealing arrangement ClydeUnion Pumps has developed. It has virtually resolved a recurring fugitive emissions issue that has always plagued positive displacement pumps in light hydrocarbon service"

The CP advantage is now available in reciprocating pumps



Sealing technology for the 21st century

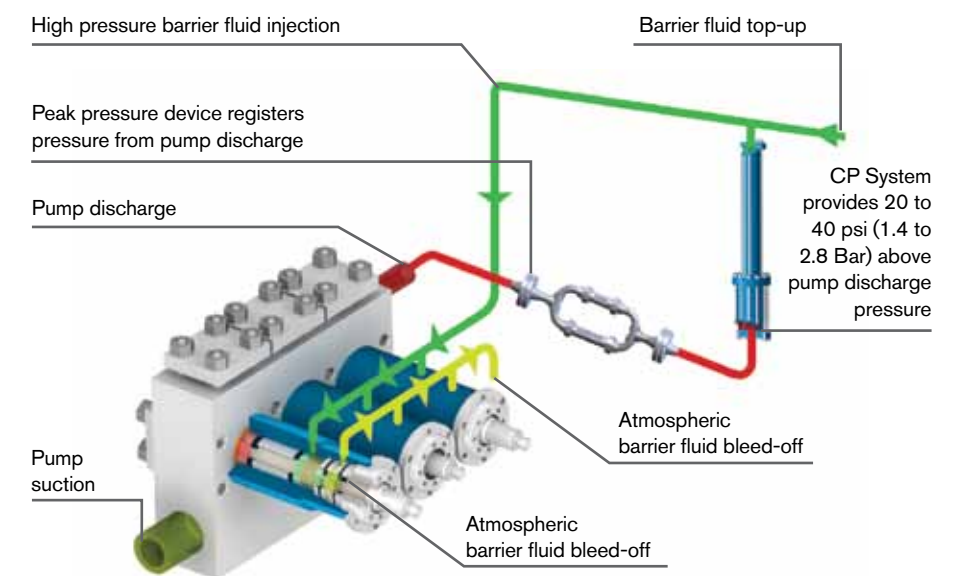
UNI-LOK® ZERO SEALING SYSTEM

Developed to control leakage of volatile organic compounds (VOCs) into the atmosphere, the UNI-LOK® Zero provides a simple means of pressuring the stuffing box to 20 to 40 psi (1.4 to 2.8 Bar) above the peak discharge pump pressure. This eliminates any migration of pumpage past the primary seal of the stuffing box and into the atmosphere (similar to an API 682 Plan 53C).

THE SYSTEM COMPRISES 3 MAIN COMPONENTS:

- A device that references only peak discharge pressure from the discharge line of the pump
- A patented CP barrier fluid reservoir that takes peak discharge reference pressure and adds 20 to 40 psi (1.4 to 2.8 bar) to the barrier fluid that is injected into the stuffing box. This is accomplished without the need for external nitrogen gas supplies, external pumps, power supplies or bladder accumulators
- A unique stuffing box designed to accommodate reverse pressure sealing. The barrier fluid injected behind the primary packaging is always 20 to 40 psi (1.4 to 2.8 Bar) above product pressure. Therefore, any leakage is barrier fluid into the pump, effectively sealing the pumpage from atmosphere

The UNI-LOK® Zero system is available for both new equipment and as an aftermarket retrofit to provide unparalleled protection from VOC emissions to comply with current and future environmental controls



For more information refer to the UNI-LOK® Zero brochure



Global aftermarket capability best in service + response

Our customer focused aftermarket organisation is positioned to provide comprehensive care for our varied and diverse product lines. Heritage and obsolete products benefit from the same level of attention and expertise ensuring that reliability and availability is maximised irrespective of a pump's length of service.

GENUINE HIGH QUALITY

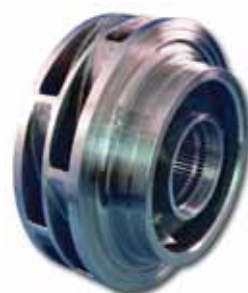
Original or upgraded specification spare parts, coupled with full engineering design capability, enables longevity of reliable operation. Highly skilled and experienced service engineers ensure accuracy in build and optimised performance. The worldwide presence of ClydeUnion Pumps offers local service facilities in over 40 countries.

SERVICE SOLUTIONS

ClydeUnion Pumps is committed to supporting our installed base wherever it may be. Depending on your location we will provide either direct service support or support via our local authorised service partners. Whichever option is provided, you can be assured of the best attention from fully qualified and experienced engineers.

- Upgrades + re-rates
- Service + overhaul
- Installation + commissioning
- Technical support
- Inventory management
- 3rd party equipment

Parts + maintenance:
Any brand, any material, anytime. Heritage products, upgrades + improvements





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