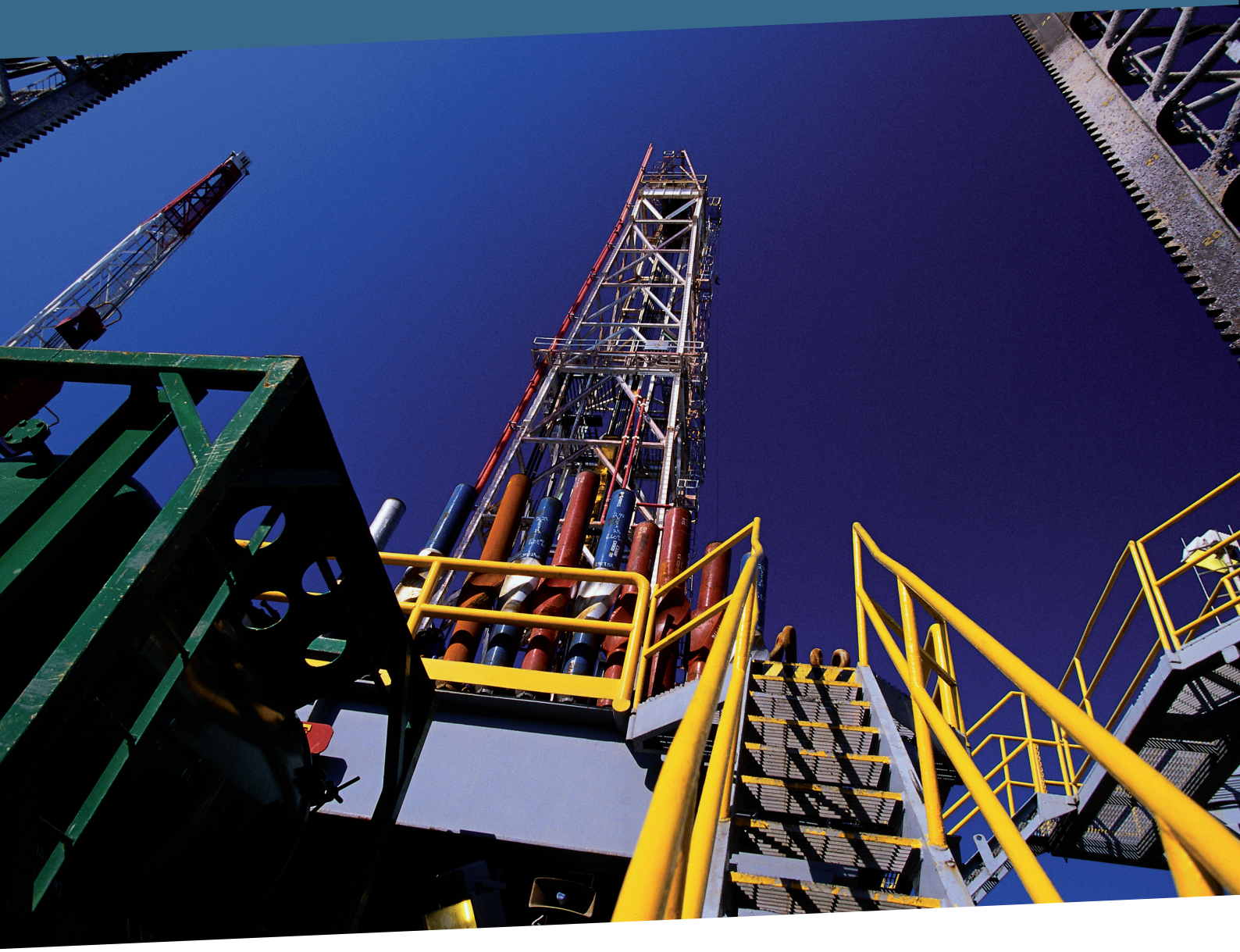
Prysmian Group

Top Drive Service Loops

Conventional, Enhanced and Superior Solutions for Drilling Applications



PRYSMIAN

Draka

Prysmian Group

Linking the future

As the worldwide leader in the cable industry, Prysmian Group believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities.

With this in mind, we provide major global organizations in many industries with best-in-class cable solutions, based on state-of-the-art technology. Through two renowned commercial brands – Prysmian and Draka – based in more than 50 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures, and achieve sustainable, profitable growth.

In our energy business, we design, produce, distribute, and install cables and systems for the transmission and distribution of power at low, medium, high and extra-high voltage. In telecoms, the Group is a leading manufacturer of all types of copper and fiber cables, systems and accessories – covering voice, video, and data transmission.

Drawing on over 130 years' experience and continuously investing in R&D, we apply excellence, understanding and integrity to everything we do, meeting and exceeding the precise needs of our customers across all continents, at the same time shaping the evolution of our industry.

What links the oil & gas industry from top to bottom?

Cable solutions to support the OGP industry around the world

In applications ranging from drilling, extraction, and storage equipment to platform and processing facilities operation, Prysmian' s state-of-the-art cable systems support many major customers in the oil, gas and petrochemical industry, along with related businesses.

Whether they're deployed in Brazil, the Gulf of Mexico, the North Sea or South-East Asia, our cable solutions are proving their value in harsh offshore and onshore environments; helping customers minimize environmental impact and achieve sustainable, profitable growth.

Top Drive Service Loops Solutions for Drilling Applications

The term “Top Drive Service Loop” refers to the electrical, pneumatic, and hydraulic supply lines which are required to provide service to a top drive drilling motor in oil and gas drilling applications. The very large electrical drilling motor is installed in a derrick and supplies sufficient torque to turn the drill string (consisting of the drill pipe and drill bit), and to drill into the formation to depths up to 10 km.

Electrical service loops represent the vital connection between the derrick and the top drive in any drilling rig, both onshore and offshore. They provide primary power to the main motor, auxiliary power for numerous functions (e.g. lighting, lube oil heaters, cooling fans, etc.) as well as a variety of control, instrumentation, and data functions. The newer generations of top drives almost exclusively utilize AC sourced motors with Variable Frequency Drive speed controllers. This creates a number of challenges with respect to high electrical stresses on insulation systems as well as operating issues related to high frequency harmonic currents and voltages.

Additionally, there are severe mechanical operating conditions imposed on these loops, which can often lead to premature failures. Historically, these service loops have consisted of a number of required components installed in a large industrial hose and suspended in the derrick. Newer available technology has resulted in the development of cable style loops that are proving to provide enhanced performance and extended service life.

Product Range

Hose Style Loops

Top Drive – power, instrumentation and control - Conventional Design

Hose Style BostDrive™ Loops

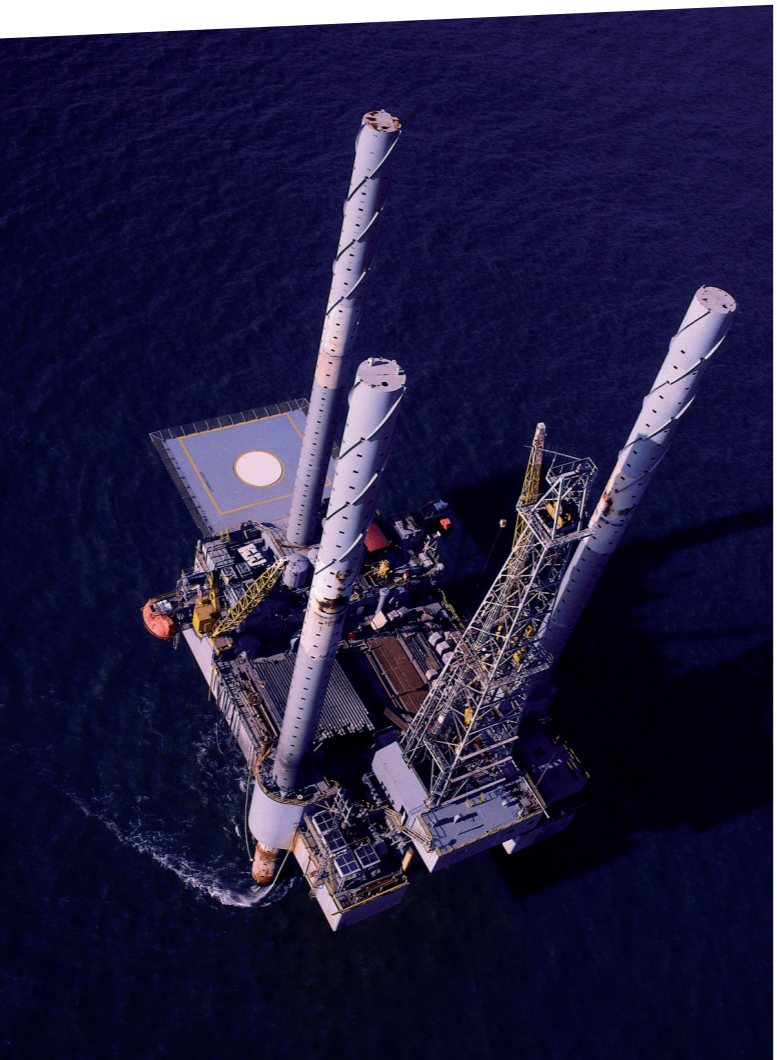
Top Drive – power, instrumentation and control - Enhanced Design

BostDrive™ Cable Service Loops

Top Drive – power, instrumentation and control - Superior Design

The BostDrive™ family of top drive service loops and components has been specifically designed to eliminate or significantly mitigate the failure mechanism common to the hose style loops currently employed. Utilizing the extensive global cable manufacturing experience and technical expertise of Prysmian Group in successfully designing cables for such rigorous flexing applications as elevators robotics, mining and crane applications, these loops are designed to have a life expectancy of multiple times that of conventional hose style loops.

BostDrive™ designs take a completely different approach, which is to treat the loop as a complete composite cable, not a number of cables pulled into a hose. By doing so, the stresses on the individual components can be predicted and controlled by the proper use of cable design and assembly techniques for continuous flexing applications. Cabling lay lengths and directions of lay components are adjusted to minimize torque and rotation, which could cause corkscrewing. Each component (power conductor, instrumentation pair, control conductor, etc.) is specifically designed for continuous flexing, and the resulting assembly of these components takes into consideration the location of each component within the cable to ensure that the imposed stress during long term operation will be within design guidelines for long life. Each BostDrive™ cable is specifically designed for the particular drive to be employed by the user, as well as the environment it will encounter.

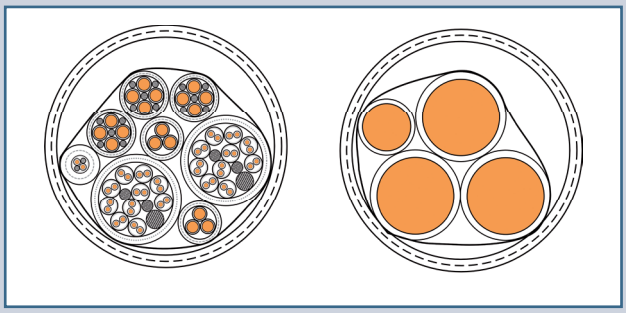


Service Loops

Service loops are offered in a variety of forms, generally considered as Conventional (Hose Style loops), Enhanced (Hose Style Loops with BostDrive™ Components) and Superior (Bostdrive™ Cable Service Loops) designs, in order to accommodate a broad spectrum of customer requirements.

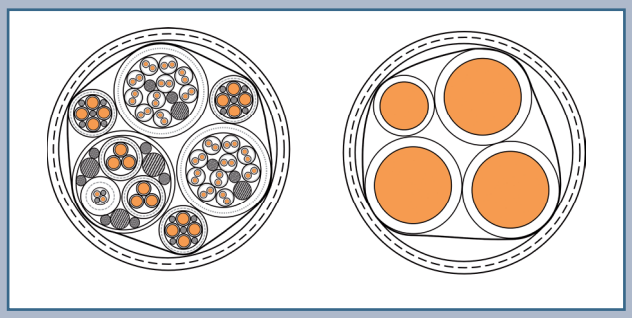
Hose Style Loops

- Conventional design
- High quality industrial hose
- Standard cable elements
- Cables can be connectorized to customer requirements



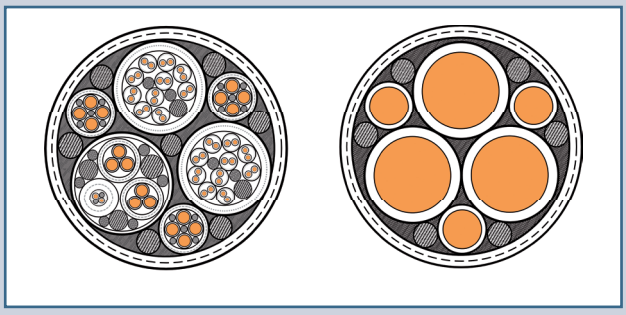
Hose Style Loops with BostDrive™ Components

- Enhanced design
- High quality industrial hose
- BostDrive™ cable elements specifically designed for continuous flexing
- Suitable for Zone 1 hazardous locations



Bostdrive™ Cable Service Loops

- Superior and innovative design
- Complete composite cable (no hose)
- Minimal impact of torque and rotation
- Longer life and higher reliability
- Cable elements specifically designed for continuous flexing
- Each BostDrive™ cable is specifically designed for the particular drive to be employed by the user, as well as the environment it will encounter
- Suitable for Zone 1 hazardous locations



BostDrive™ Service Loops Key Features

- Each cable element (power conductor, instrumentation pair, control conductor, etc.) is specifically designed for longer life under continuous flexing conditions.
- The cable elements exiting the breakout assembly will be individually armored, and will be sheathed with an ester based mud resistant (MR) jacket, as required for Zone 1 hazardous locations.
- Instrumentation pairs will employ individual shields consisting of copper braid in lieu of standard overlapped aluminum/polyester backed tape plus a drain wire. The higher conductivity of the braid provides superior shielding, even at high frequencies, and is not vulnerable to the deterioration under continuous flexing.
- The BostDrive™ mechanical hang-off system is designed to be compatible with current hang-off systems used by top drive manufacturers. This system has been tested to a minimum tensile strength of 20,000 lbs., well above the safety factor imposed by DNV and ABS for overhead loads (7 lbs).
- As the BostDrive™ loop is a cable, the ampacity of power conductors is based on "free air" ratings. If the same conductors in separate cables were installed in a hose or conduit, proper engineering guidelines require that, a derating factor of approximately 0.8 should be applied to the "free air" ampacities. This is due to the effect of the air inside the hose or conduit acting as a thermal insulation, and reducing the rate of heat conduction away from the hot conductors. As a consequence, for a given ampacity, BostDrive™ conductors will run cooler than those installed in a hose, or, at an equivalent temperature, will allow for higher ampacity.

BostDrive™ Testing Program

Prysmian's Research and Development group has developed a sophisticated service loop design methodology consisting of proven computer dynamic and thermal (ampacity) modeling techniques coupled with physical testing that, when combined, afford an accurate simulation of field operating conditions. As an example, BostDrive™ cable style loops, of the exact design as have been in service for more than two years to date with no evidence of impending failures, have been subjected to mechanical simulation and stress analysis coupled with laboratory flexing for more than 300,000 cycles under simulated field conditions with no detectable deterioration. Additional conditions, such as crush, impact, wind loading, etc. which can contribute to premature loop failure, are also simulated and/ or tested for accordingly, thus providing a solid and comprehensive basis for the development of the optimum state of the art designs for top drive service loop applications.

Linking the Oil&Gas industry from top to bottom

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