



Sea-Water Intake Systems

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Eddelbüttel + Schneider GmbH



Eddelbüttel + Schneider (E+S), part of Continental AG, is recognised as a leading specialist in the development and production of Sea-Water Intake Systems for use in floating oil and gas production installations and also Dredge, Mining and Deep Sea Mining Hose Systems. Our products can be found around the globe, in submerged cooling water systems or as floating lines, pumping seawater from great depths.

E+S, established in 1925 and with over 90 years of experience, has a worldwide reputation for its market leading Sea-Water Intake Systems. Based in Hamburg - Germany, and with three other production facilities in the UK, Hungary and Brazil, we are able to offer an excellent service for the local markets, by reducing lead times and improving ease of export.

As a leading innovator, our aim is to provide our customers with a complete solution for their system requirements, as well as providing assistance throughout the entire project lifecycle - from the feasibility stage, through to design, engineering and manufacture, as well as project management, installation, training and aftercare. So whatever a project requires, E+S can provide a complete bespoke solution for your technical challenges.

Our achievements are indorsed by the successful delivery of Sea-Water Intake Systems, consisting of hoses as well as lifting gear and auxiliary equipment for projects around the world, such as; EGINA in Nigeria (Disposal and Inlet Systems), PFLNG 2 in South China Sea, ICHTHYS FPSO and ICHTHYS CCPF in Australisa, MOHO NORD, CLOV, USAN, PAZFLOR, MOHO BILONDO, DALIA, KIZOMBA A/B, PLUTONIO and GIRASSOL in Angola, Cidade de Ilhabela/Marica, Petrobras P-62, Petrobras P-58, Petrobras P-54, Petrobras P-50, Barracuda P-43, Caratinga P-48, OSX-3, Tupi MV-22 and PapaTerra in Brazil, BELANAK in South Natuna Sea and KNARR in the North Sea.

The compounds used in the hose manufacturing process are produced in-house using the highest quality raw materials and sophisticated process controls. All materials, compound ingredients and reinforcements are specified to meet the requirements of high-tech applications. Our systems and hose designs assure long service life and outstanding operational and environmental safety.





Products

E+S provide a wide range of systems, rubber components and ancillary equipment for the offshore industry:

- Design and production of Sea-Water Intake Systems for FPSOs, FPU's and FLNGs
- Design and production of heavy-duty suction and discharge hoses (flexible joints) for almost every medium, load and strain, especially for hydraulic or pneumatic transport of suspended solids and other materials
- Buoyancy systems for floating hose pipelines and similar installations
- Large rubber profiles for various applications (e.g. for lock gates and tunnel sections)
- Consultation and engineering on planning of pipelines and dredging technology

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Sea-Water Intake Systems - Introduction

Specifically designed for cooling water systems
in the oil and gas industry

Designed specifically for Floating Production and Storage vessels (i.e. FLNG, FPSO, etc.), Sea-Water Intake Systems provide a means of obtaining low oxygenated water from the bottom of the vessel up to a water depth of 150m with bore sizes up to DN1300 from proven field projects. We are currently investigating depths of more than 350m and have received promising results from OrcaFlex analysis based on real-world conditions. The water is used for cooling, firewater, process, utility and/or water injection systems to enhance processing efficiency. Furthermore, our product range also includes systems for water disposal - or a combination of both.

We have developed a range of Sea-Water Intake Riser Systems that utilise flexible bonded rubber hoses. These are installed when moored offshore from inside the hull of the vessel or external to the vessel's hull, with a hook-up device, enabling field installation of the equipment without the need to deploy divers or ROVs for location, connection or recovery of the equipment.

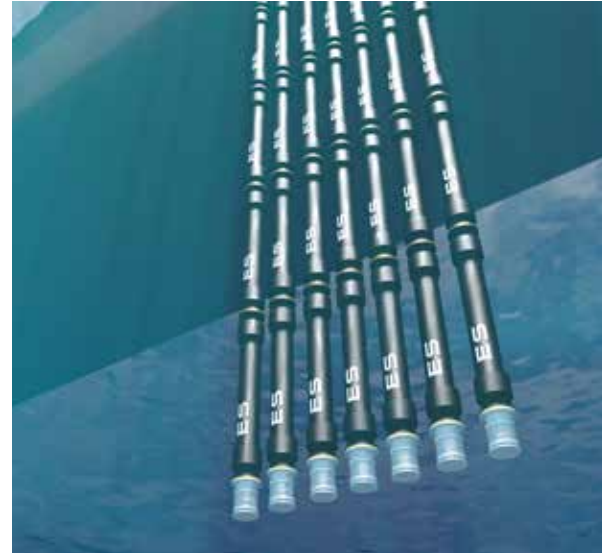
Designed for new builds, conversions or retrofits, the systems are either installed to caissons or water tanks from which the water can then be used for any purpose. The water tanks include a plugging system, allowing them to be emptied for maintenance purposes, for example. Sea-Water Intake and Disposal Systems withstand extreme conditions, are extremely robust and easy to install. In the event a vessel needs to be relocated, the systems are also retrievable within 24hrs.

A Sea-Water Intake System consists of several hose strings, the lifting and handling tools for installation as well as the connections to the vessel. Our SWI Systems include proven technology for preventing marine growth which increases life time and minimises maintenance efforts. Therefore, a service life of up to 50 years, with regular maintenance activities, is not uncommon.

In addition to the standard Sea-Water Intake, composed of rubber reinforced hoses, we are also able to offer Sea-Water Intake hybrid systems in which each string-line is composed of a minimum of one flexible rubber reinforced hose section, depending on the severity of the production field cyclonic conditions, and several HDPE pipes in order to reach the required underwater length.

The main advantages of the hybrid solution are related to the reduced weight of the HDPE pipes in comparison to flexible rubber reinforced hoses and bring reduced crane capacity, easier handling and installation, lower transportation costs, the possibility of reaching longer overall string-line designs and reduced loads acting on the vessel hull. A retrofit solution with HDPE pipes to an existing SWI system is also possible, after the verification of the system, with increased length based on customer metocean and vessel motion data.

The rubber flexible hoses and installation tools are designed and built in accordance with recognised guidelines (e.g. OCIMF and GMPHOM), abide by third party regulatory authorities (e.g. DNVGL and Bureau Veritas) and international standards (e.g. API 17K). Every project is unique and the hoses can be certified and monogrammed according to a specific project standard, if desired.



Floating Solutions



FPSO

Floating Production, Storage and Offloading (FPSO) units are the most flexible type of floating production system. E+S meets the growing global demand with reliable large volume intake systems. Our technology is deployed in most FPSO units worldwide and has proven capabilities under harsh project conditions.



FPU

Floating Production Units (FPUs) are constructed with multiple modules, placed individually and integrated on the hull of the vessel and located above the subsea wells. E+S can provide its customers with Sea-Water Intake Systems that are designed and engineered specifically for the unique requirements of the FPUs application.

FLNG

Floating Liquefied Natural Gas (FLNG) units configured for both processing and liquefaction offering capabilities to supply vast amounts of LNG. To meet the unique demands of FLNGs, our Sea-Water Intake Systems are specifically designed to supply the necessary volume and flow of cold water to cool down the topsides process.





Success Stories

Ichthys Project

Together we worked with Samsung Heavy Industries on the Ichthys Project, the world’s largest semi-submersible platform, located in the Browse Basin Offshore from Western Australia. The Ichthys LNG project is expected to produce 8,9 million tonnes of LNG and 1,6 million tonnes of LPG per annum, along with approx. 100,000 barrels of condensate per day at peak.

The complete in-house design and fabrication of Sea-Water Intake Hoses of E+S were specifically designed for the Floating Production, Storage and Offloading (FPSO) and the Central Processing Facility (CPF). Four FPSO hose strings with an inner diameter of 1,300mm and 93m in length were supplied to DSME for the FPSO facility, whereas another six CPF hose strings with an inner diameter of 610mm and 100m in length were provided to SHI for the CPF facility.

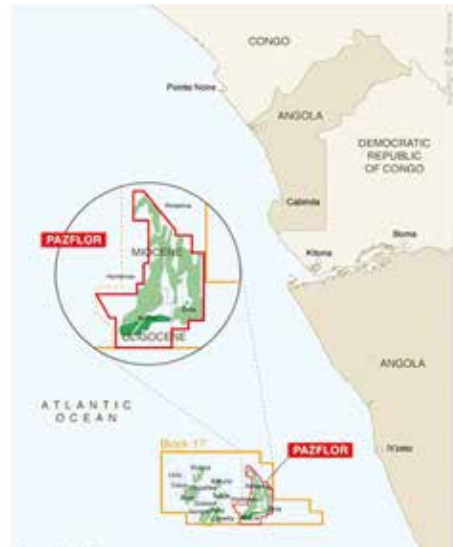
PFLNG 2 Project - API17K certified

We developed and certified the first API17K hoses for Sea-Water Intake purposes for the JGC Corporation. The full-scale SWI system supported the operation of the PFLNG 2 vessel, in deepwaters, located in the Rotan field at the South China Sea. The non-propelled vessel was designed to produce 1,5 Mt of LNG each year for at least 20 years without dry docking.

Due to unexpected market turbulence during this time period, we were able to react accordingly and supported the customer with optimised delivery times to reach the highest customer satisfaction.

The complete handling equipment, special tools and hoses were developed, fabricated and tested in-house, with highest quality standards witnessed by a third party authority (ABS).

Success Stories



Pazflor Project

The Pazflor project, located in Block 17 deep offshore Angola, also known as one of the world’s largest deepwater development, operated by Total E&P Angola and Daewoo Shipbuilding and Marine Engineering (DSME), entrusted their Sea-Water Intake System to E+S. Pazflor is the most complex site that Angola has ever built, encompassing a vast subsea gathering network of 180 kilometers of lines connected in 49 subsea wells, 10,000 metric tons of subsea equipment, an enormous FPSO vessel.

As the Pazflor field lies in water depth ranging from 600m to 1,200m, E+S supplied four Sea-Water suction hose strings with 660mm inner diameters and 100m in length, three Sea-Water suction hose strings with 385mm inner diameters and 100m in length and five Sea-Water disposal strings with inner diameters ranging from 385mm to 1000mm.

CLOV Project

Continental jointly managed to land their biggest order from Korea’s Daewoo Shipbuilding & Marine Engineering (DSME) for an FPSO (floating production, storage and offloading unit) to build CLOV offshore oil and gas field northwest, in Angola.

E+S supplied cooling water systems with inside diameters of 610mm and 660mm for the gigantic ship that processes and stores petroleum and natural gas on the high sea, until tankers are sent to retrieve the raw materials. Each of the six lines has a length of 100m and is composed of 15 separate hoses, which draw up cold, deoxygenated water from the depths of the sea. The scope of delivery also included two wastewater systems - 10m and 6m in length, with inside diameters of 410mm and 1,000mm.



Sea-Water Intake and Disposal System Components

Flexible reinforced rubber hoses

Our flexible rubber hoses are the most important components of the Sea-Water Intake and/or Disposal strings. They are designed with multi-layers of strong textile cord and are additionally reinforced with high tensile steel rings that are vulcanized into the body.

The hoses are covered with marine and weather resistant rubber and are equipped with rubber bumpers at each side of the hose.

The bumpers are mainly used to hang the string into the hang off tool and hold it in position while connecting the next string component.



The inner liner is manufactured from a wear and cut resistant rubber, which extends beyond the internal hose surface to provide full rubber encapsulation of build-in and vulcanized steel nipples and flanges.

Prior to delivery the hose will be pre-assembled with the internal hypochlorite hose by means of the hypochlorite supporter, which will be attached to the flange front face and four backing flange quadrants that are equipped with sacrificial anodes.



Riser Seat

The Riser Seat is the component that is directly connected to the vessel at the caisson or moonpool, either by welding or as a bolted connection. It is designed and manufactured together with the Riser Head to allow the two parts to fit together in the best possible way.

The Riser Seat holds the completely assembled string after it has been lowered into its final position at the bottom of the vessel.

The internal diameter of the Riser Seat is being adapted to the caisson dimensions provided by our customers or determined by ourselves, independent of the nominal hose string diameter.



Riser Head

The Riser Head is the component that is connected to the very top of the hose string. After being lowered down it hangs in the Riser Seat without any further fixing.

The Riser Head is equipped with plastic rings at the outside which are designed with the biggest outer diameter of the components. Therewith, the Riser Head will be perfectly aligned into the Riser Seat and its final position.

At the bottom of the Riser Head the hose string is attached by a bolted connection.

For hypochlorite injection into the string, the Riser Heads for Sea-Water Intake strings are additionally equipped with an internal hypochlorite pipe manufactured from titanium grade 2.



Special Lifting and Handling Tools

Hang off Tool

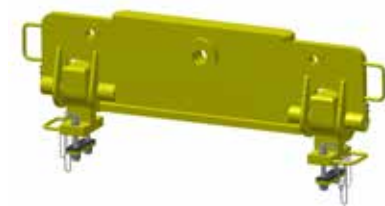
The Hang off Tool is installed on the top flange of the caisson and allows a step by step vertical installation of Sea-Water Intake and/or disposal hose strings. Every string component can be suspended by the tool to connect the next component.

We develop different tool designs that can be easily adjusted to fulfill the special requirements for each individual project, for example - to install various bore size hose strings with the same tool by using an adapter.

The tool is designed to either be operated by hydraulic cylinders or by manual operation, dependent on the clients requirements.



Lift Elevator



The Lift Elevator is designed to lift each single flexible hose from the horizontal to vertical position. While in this vertical position, the hose can be connected to the component suspended in the Hang off Tool via mechanical fasteners.

In the past, the development of different designs allowed us to adjust the tool for the requirements of the specific projects. For example, the addition of counter weights or a completely different modular design provides the possibility to obtain the most profitable handling of the tool for each individual project.

Protection Tool

The Protection Tool is designed to allow a safe connection of the internal hypochlorite hose line before the main component can be connected to the hose hanging in the Hang off Tool.

As a result of our continuous improvement measures the Protection Tool can be handled by one person, without the need for a crane.

Dependent on the bore size of the hoses, three to four single Protection Tools will be fixed on top of the hose flange that is held in the Hang off Tool.



Fish and Release Tool



The Fish and Release tool is being used for lifting and lowering of the complete hose string, including Riser Head, through the caisson to its final position in the Riser Seat at the bottom of the caisson/vessel.

The tool is designed to release the Riser Head with or without the assembled hose line at the bottom of the caisson. All current designs are released with manual wires. There are also designs available that can release the Riser Head automatically after reaching its final position. Furthermore, all designs can be adjusted to different string diameters, in special ranges, by additional adapters or exchange of single parts.

Spreader Bar

The Spreader Bar is used to safely handle the Suction or Discharge hoses in their horizontal position, e.g. for removing the hoses from cradles or boxes or for repositioning them for storage.

The Spreader Bar is delivered by us, including polyester slings to allow for the hoses to be suspend below the tool.



N.B. All tools are manufactured in accordance with the valid requirements for the individual projects and tested with the witness of a third party authority. If required, the tools can be supplied to the customer including a Certificate of Conformity. This certificate is also supported by the non-destructive examination reports of welding seams, the tool's SWL test report and a third party design and calculation verification.

Experiences and Knowledge

We have collected a wide range of experiences and knowledge in the manufacturing of Sea-Water Intake and Disposal components. The quality of our products is of high importance during the completion a project.

Material Certification

- All steel material will be supported by at least 3.1 material certificates
- All other materials will be supported by at least a certificate of conformity

Welding

- MCAW 138 is our preferred and proposed welding process for carbon steel components, which is supported at our sub-supplier by welding process test documents (WPS, WPQR and its test reports) in accordance to DIN EN ISO 15614-1
- All welders are certified according to ISO 9606-1
- GTAW 141 is our preferred and proposed welding process for components made from special material such as titanium or hastelloy, which is supported at our sub-supplier by welding process test documents (WPS, WPQR and its test reports) in accordance with DIN EN ISO 15614-1

NDE

- All steel components of the string are tested as a minimum for:
 - Longitudinal butt welds of tubes: 100% digital RT + 100% PT or MT
 - All remaining seams: 10% PT or MT
- Special lifting tools are at least tested as follows:
 - All welding seams: 100% PT or MT prior to the SWL test
 - All welding seams: 100% PT or MT after the SWL test
 - All inspectors are at least Level II certified
 - Dye penetration examination (PT) is performed according to EN 571-1
 - Magnetic particle examination (MT) is performed according to ISO 9934-1
 - Radiographic testing (RT) is performed according to EN ISO 17636-2

Coating

- Operators are professionally trained and supervised by a 3rd party Inspector
- All working steps are witness by an at least FROSIO level 3 Inspector
- Fabrication, preparation and testing, considering all common standards, for example; DIN EN ISO 12944, ISO 8501, ISO 8502, ISO 8503, ISO 2063
- Experience with different coating system for:
 - Submerged components: Thermal sprayed aluminum + Intermediate coat + Top coat
 - Components under marine atmosphere: Primer coat + Intermediate coat + Top coat
 - All coating layer configuration fulfilling at least the C5-M L class of the DIN EN ISO 12944-5



Quality

Certification

E+S, part of Continental AG, is committed to quality and respect for the environment. We work closely with customers and approved suppliers to ensure the highest quality standards. The quality management system is in accordance with ISO 9001. The system's performance is regularly checked and audited by independent auditors. Currently the Company's Quality Management System is approved and certified by DNV.

The environmental considerations of the management and the employees is reflected by their daily activities and documented by the ISO 14001 environmental management system applied in the company.



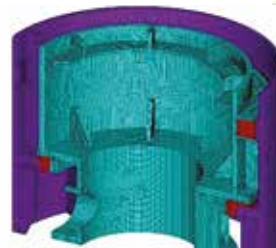
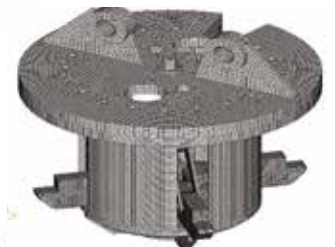
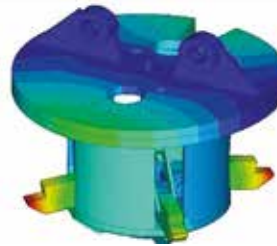
Manufacturing & Engineering

At E+S, our scope of supply for Sea-Water Intake Systems includes multi-section flexible assembly, installation tools, handling and onshore storage equipment.

With our high level engineering expertise, we develop Sea-Water Intake Systems based on specific customer requirements, through state of the art 3D Virtual Modelling, Finite Element Analysis and Computer Fluid Dynamics.

The success of our customers' projects is our top priority. Being a member of the International Standard Institutions, we guarantee and adhere to maximum security at all times.

We continuously strive for innovation to provide the best possible solutions for future projects regarding both operational performance and cost efficiency. We continually review the engineering services that we offer to our customers, with the promise of improving and tailoring our products to the demands of the ever evolving market.



Transportation

A global logistics network ensures smooth efficient delivery.

The success of a project depends on reliable delivery of the equipment - on time and safely to any destination around the world. With three production facilities, we are able to supply the Sea-Water Intake Systems to any location worldwide, providing the most efficient service for your project.





Hose Management Services

tailored, expert solutions for the maintenance of your flexible hose assemblies

Ensuring the safe and reliable operation of flexible hose assemblies, whether in offshore or onshore installations, is essential. Effective hose management not only ensures the operation will continue to run smoothly, but will also eliminate any potential safety or environmental issues and reduce downtime to keep your productivity levels high.

Continental is a world leader in the manufacturing of high-pressure drilling and bonded production hoses, crude oil transfer hoses as well as utility and hydraulic assemblies designed specifically for the oil and gas industry. Our expertise and knowledge in this field is unrivalled. With this in-depth capability we have helped to develop the industry standards and guidelines for best practice in the field of integrity management for flexible hose assemblies.

International oil and gas producers and operators across the globe rely on Continental throughout the lifecycle of their flexible hose assemblies, from design and specification through supply to full management of their fluid transfer systems in operation.

We can support our clients with a number of services, all designed to offer peace of mind as standard. These are:

Inspection, Testing & Repair

A complete range of inspection and testing services - including:

- inspection and repair of external protection, rubber cover and end fitting painting
- high pressure hydrostatic testing,

- boroscope inspection of the internal carcass or liner
- recertification

Tests and inspections can be carried out in dedicated facilities in a number of strategic locations and we also offer worldwide customer visits. In addition, we inspect and maintain reeling systems, such as bunker stations or offloading systems.

Inventory Management

An instant overview of all flexible hose assemblies on all of our customers' installations worldwide: ContiConnect is a web-based inventory management program designed for peace of mind. Being able to see the current status of our clients FHAs at the click of a button allows for easy scheduling of maintenance, order timely replacements and ensure trouble-free operations.

Installation and Commissioning

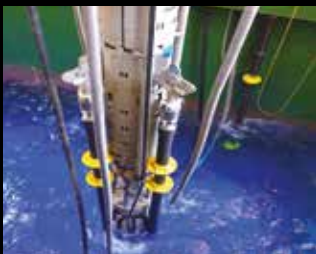
With our in-depth expertise in all aspects of fluid transfer in the oil and gas industry, we are your first-choice partner for advising and assisting in the specification, installation, commissioning and change-out of flexible hose assemblies and systems, including high-pressure drilling, production, utility, GMPHOM 2009, turret and FPSO seawater intake hoses and also reeling stations.

Hose failure analysis

We carry out various investigations on damaged high-pressure hoses or hose parts at our facility, to reveal the possible causes of damage and propose necessary actions to avoid similar failures in the future.

Continental

Global Leaders in Hose Solutions



High Pressure Hoses



Marine Hoses



Dock Hoses



Dredge Hose Systems



Industrial Hoses



Deep Sea Mining



Hose Management



Intelligent Hoses

Continental

The global partner of choice for industrial fluid product systems and services. For combined solutions - smart and sustainable.

Our products are created to the very specific needs of our customer's applications in nearly all industries. This results in hoses and hose systems for the construction industry, the food and drinks industry, for chemical and petrochemical production operations, oil & gas exploration, water treatment, mining, steel production and mechanical engineering.

Continental is made up of a host of sites across the globe and together boast an excellent track record in providing customised solutions in the most diverse environmental conditions in the world.

Locations - Production

Brazil

Fully operational since early 2016, our Macaé facility is dedicated to the production of large-bore oil and marine hoses, including floating and submarine hoses in compliance with GMPHOM 2009, Sea-Water Intake Systems for FPSOs and hoses for dredging and dock loading applications.



Hungary

The plant in Szeged, Hungary has a long tradition in hose design, development and manufacturing. Previously known as Taurus Emergé, our Szeged facility is the main competence centre for our range of high pressure hoses for the oil & gas industry.



UK

Our Offshore Marine Hoses, in accordance with GMPHOM 2009 and API 17K standards, are designed and manufactured at our plant in Grimsby - UK, the world's largest production facility for large bore hoses. From supplying hoses to the world's first single point mooring, to developing the industry's first double carcass hose, Dunlop Oil & Marine are proud to have led the way in offshore hose technology.



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The Continental Corporation is a development partner and original equipment supplier to numerous industries for high-quality functional parts, components and systems. With its know how in rubber and plastics technology,

We contribute significantly to industrial progress and mobility that is safe, comfortable and eco-friendly.

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