



NKT
Flexibles



NKT 6000 tonnes carousel. The outer diameter is 41 meter and the height is 4.6 meter.

HIGHLY ENGINEERED FLEXIBLE PIPE SYSTEMS

With more than 40 years of experience, NKT Flexibles is a leading supplier of highly engineered flexible pipe systems to the offshore oil & gas sector, the subsea industry as well as the chemical & water sector. With a clientele base comprising of major oil companies, contractors, engineering houses and suppliers in the industry, NKT Flexibles' services range from FEED studies and conceptual work across complete solutions including total riser and flowline design, engineering, procurement, manufacture, testing, documentation and delivery to integrity management services including life expectancy studies.

Given the versatility of flexible pipe based solutions, NKT Flexibles is able to provide key elements for both upstream and downstream systems. Our custom designed products are predominantly used for the inter-connection of subsea wellheads, PLEMs, PLETs, manifolds, riser bases, riser support structures, conventional steel or concrete platforms, FPSOs, FPU's, FSUs, TLPs, SPARs, offloading buoys and many other offshore applications.

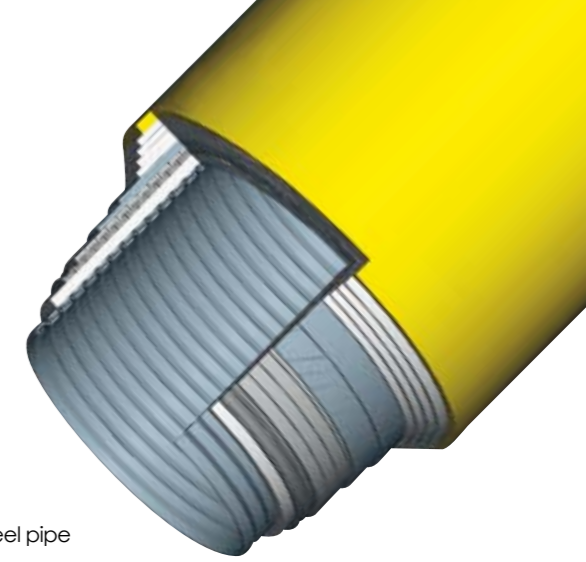
Today our flexible pipe systems are used worldwide by many companies involved in the extraction of oil & gas in the offshore industry. We devote our entire Research & Development efforts to develop innovative and highly engineered solutions that meet or exceed the requirements of leading international oil companies and their contractors, for safe, reliable and cost effective seabed-to-surface flexible pipe connections.

Our highly committed employees and the use of in-house research and production test laboratories, ensure that product quality is never compromised. We are devoted to maintaining the company's unrivalled field track record, thereby providing all our clients throughout the world with the most reliable flexible pipe systems available on the market.



ADVANTAGES OF FLEXIBLE PIPES

- » Purpose designed product optimized for each specific application
- » A design that combines the flexibility of a polymer pipe with the strength and weight of a steel pipe
- » Follows the natural contours of seabed thus eliminating the susceptibility to free pipeline spans
- » Minimization of external corrosion effects owing to encapsulation of the steel armour inside a continuous polymer outer sheath
- » Accommodate misalignments during installation and tie-in operations
- » Diverless installation is possible - no metrology required
- » Load-out and installation safer, faster and cheaper than any other pipe application
- » Retrieval and reusability for alternative application thus enhancing the overall field development economics and preserving the environment
- » Excellent inherent thermal insulation properties
- » Good corrosion resistance against transported fluids, incl. water injection applications



A TRUE GLOBAL PARTNER

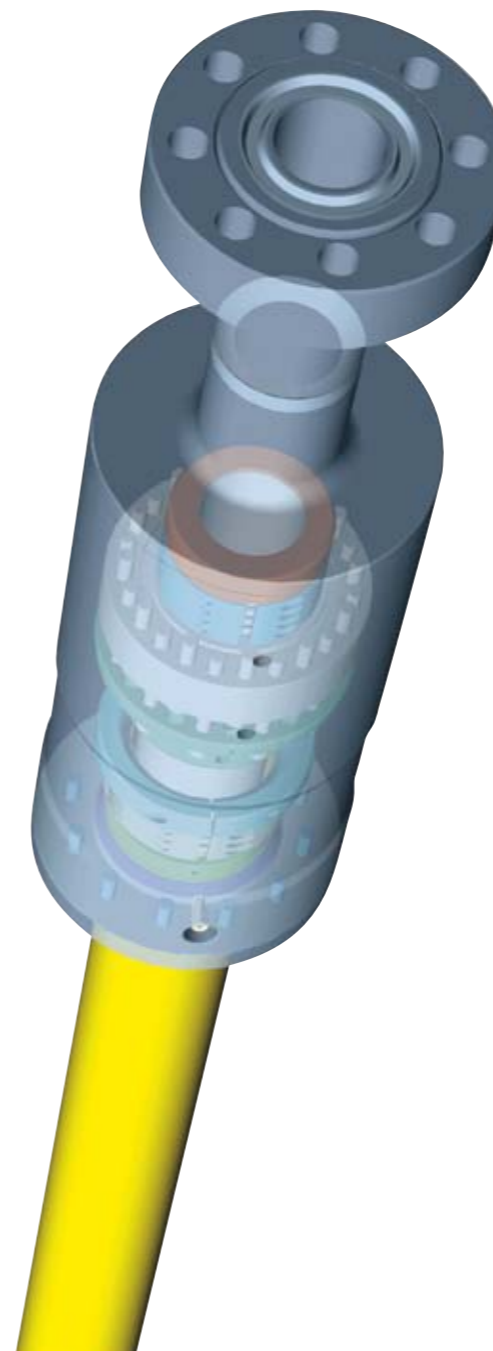
NKT Flexibles installed its first flexible pipe system in 1968, thereby pioneering the commercialisation of this unique product for wider use. Since then we have broadened the range of uses of this unique product, from near coastal shallow waters to ultra-deep waters, whilst expanding pressure and temperature ratings. Moreover, we provide a full range of systems and engineering services that contribute to greater operational safety of flexible pipes.

A key factor in evolving to this position has been our long term plans and continuous success in developing, acquiring and consolidating new and ground-breaking flexible pipe technology, material knowledge and process know-how. We strive to offer our clients a comprehensive array of products and services from which to find the best solution - transforming NKT Flexibles into a true long term global partner. In this process we wish to build on our experiences and learn from our clients and partners in order to continue supplying even better solutions and services.

NKT Flexibles' visions are; by excellent performance to become the preferred supplier of high quality flexible pipe systems based on the best in class technology. In doing so we will endeavour to provide "best in class" technology that will provide the basis of performance that will constitute a vital part of a timely, cost effective and successful implementation of NKT Flexibles' products in all applications for flexible pipe.

To focus on core technological skills that will enable NKT Flexibles to continuously extend the boundaries for flexible pipe usage. Areas of focus include extreme deepwater applications, high temperature, sour service, low heat loss, condition monitoring, and other features applied to the wide array of applications available for production of oil & gas as well as transport of water & chemicals.

To maintain independence allowing NKT Flexibles to partner with clients as well as subsea contractors for the provision of full EPIC type projects - always with a view to optimise synergies, and offer value added services on a global basis.





The manufacturing facilities in Kalundborg occupy a total site of 150,000 m², of which 45,000 m² is under roof. We have our own quayside with water depths ranging from 7 m to 10 m.

KALUNDBORG FACTORY

The plant is located at the harbour of Kalundborg some 100 km west of Copenhagen. The manufacturing facilities occupy a total site of 150,000 m², of which more than 45,000 m² is under roof. The factory has its own quayside with water depths ranging from 7 m to 10 m thereby allowing virtually any installation vessel or heavy lifter access to handle all sizes and lengths of flexible pipe. Along the quayside a reinforced concrete deck enables NKT Flexibles to store offshore reels for direct loading on to the transport or installation vessels.

The factory has a production capacity well in excess of 150 km of flexible pipe per year, dependent on the distribution of designs and sizes. From mid 2010 the capacity will be more than 200 km of flexible pipe per year. The factory is equipped with dual production lines allowing the simultaneous manufacture of both long continuous lengths and shorter reel based products.

In the entire production sequence, the pipe is under roof in order to protect components of the flexible pipe from being exposed to sunlight and weather conditions such as rain, snow, moisture, etc. Once completed the products are stored outdoor.

End-fitting mounting is performed at a dedicated location off-line the flexible pipe manufacturing. The end-fitting mounting building is fully enclosed thus ensuring a stable and protected environment for both mounting and FAT (Factory Acceptance Test) testing.

The facility further comprises warehouse and office accommodation and all other facilities necessary for the state of the art and efficient manufacture of flexible pipe.



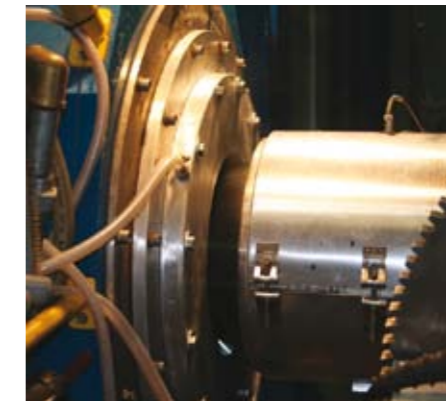
LOAD-OUT

The Kalundborg factory is equipped with five turntables designed to match the capacity of the largest installation vessels. This enables NKT Flexibles to provide flowlines in very long lengths without subsea joints. Alternatively, the pipe can be delivered on 9.2 m diameter NKT Flexibles installation reels.

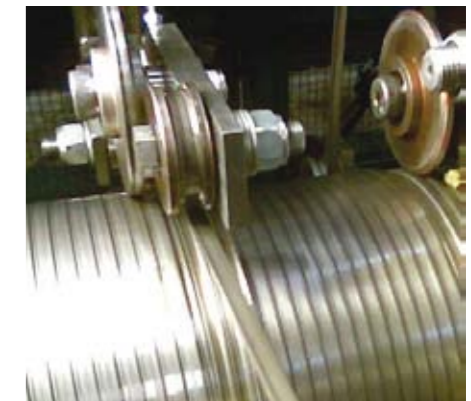
MACHINERY	FUNCTION
Carcass	Manufacture of interlocked conduit
Polymer extruder line	Extrusion of inner liner intermediate and outer sheath of thermo plastic polymer material
Pressure armour line	Armouring with C-shaped profiles or steel strips to provide resistance to radial loads
Tensile armour line	Armouring with rectangular steel wires for longitudinal reinforcement to provide resistance to axial loads
Thermal insulation line	Applying thermal insulation tape layers
End-fitting workshop	Mounting of end-fitting onto flexible pipe
Turntable	Intermediate process storage as well as mounting of end-fitting and execution of Factory Acceptance Test
Reel and underroller station	For intermediate process storage
Test facility	Hydrostatic pressure test (FAT)



Carcass



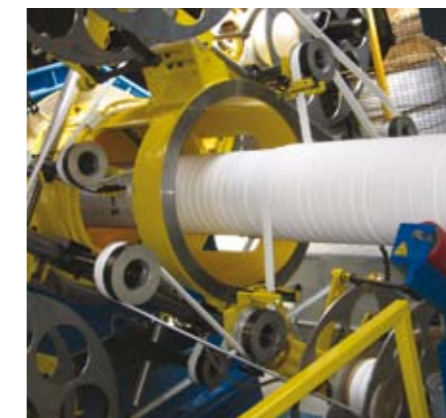
Polymer extrusion



Pressure armouring



Tensile armouring



Thermal insulation



End-fitting workshop

	FAMILY II	FAMILY I + III	
Parameter	Flowlines with combined tensile and pressure armour	Flowlines with steel strip pressure armour	Flowlines and risers with C-shape pressure armour
Design Pressure	Up to 3,000 psi *	Up to 7,500 psi	Up to 15,000 psi
Design Temperature	-50°C - +130°C	-50°C - +130°C	-50°C - +130°C
Pipe Size (ID)	4" ID - 8" ID *	2½" ID - 16" ID	2½" ID - 16" ID
Fluid	oil/gas/water/chemicals	oil/gas/water/chemicals	oil/gas/water/chemicals

* Boundaries may be expanded on a project basis following design review.

Design pressures are from 15,000 psi for the smallest pipe bores to 5,000 psi for the largest. NKT Flexibles is the industry leader in design and manufacture of flexible pipes for high temperature applications with design temperatures as high as 130°C for both static and dynamic service.



Dynamic fatigue test rig at plant in Kalundborg.

QUALIFICATION OF DESIGN

NKT Flexibles participated in the development of API Spec. 17J - ISO 13628-2 identical - and we use the specifications as design code for all offshore flexible pipe products.

NKT Flexibles has performed a comprehensive qualification test programme to qualify the flexible pipe products. In order to cover a wide range of applications a Type Approval Programme was agreed with Bureau Veritas.

The Qualification Test Programme encompassed a wide range of material and full-scale tests successfully verifying the integrity of the flexible pipe and end-fittings. The capability to predict the failure mode combined with a high degree of consistency between calculated and actual test results have confirmed NKT Flexibles' design methodology and analytical tools.

On rare occasions a project specific flexible pipe application may be outside the qualified envelope of the Type Approval Programme. In such cases the flexible pipe application may be covered by Independent Review Certificate (IRC) confirming compliance with NKT Flexibles' design methodology in accordance with API Spec. 17J/ISO 13268-2.

FLEXIBLE PIPE FAMILIES	FAMILY I	FAMILY II	FAMILY III
	Smoothbore	Rough Bore	Rough Bore High Pressure
Carcass		•	•
Inner Liner	•	•	•
Pressure Armour	•		•
Crosswound Tensile Armour	•	•	•
Outer Sheath	•	•	•

Our present pipe size range is from 2.5 inches to 16 inches inner diameter.

FLEXIBLE PIPE DESIGN

The NKT flexible pipe is an un-bonded structure consisting of helically wound metallic armour wires or strips combined with concentric layers of polymers, textiles, fabric tapes and lubricants.

The API Spec.17J and the associated Recommended Practice 17B form the basis for the design of the NKT flexible pipe. This Specification and RP outline requirements for design, material selection, manufacture, testing, marking and packaging of flexible pipe. In order to confirm compliance with API Spec. 17J, NKT Flexibles has performed an extensive qualification programme aiming at verifying the soundness of the NKT flexible pipe design.

Carcass

An interlocking structure manufactured from a stainless steel strip. The carcass prevents collapse of the inner liner and provides mechanical protection against pigging tools and abrasive particles.

Pressure armour

A number of structural layers consisting of helically wound C-shaped steel wires and/or steel strips. The pressure armour layers provide resistance to radial loads.

Outer sheath

An extruded polymer layer. The function is to shield the pipe's structural elements from the outer environment and to offer mechanical protection.

Insulation (not shown)

Additional layers of material with low thermal conductivity can be applied in order to obtain specific thermal insulation properties of the pipe.

Inner liner

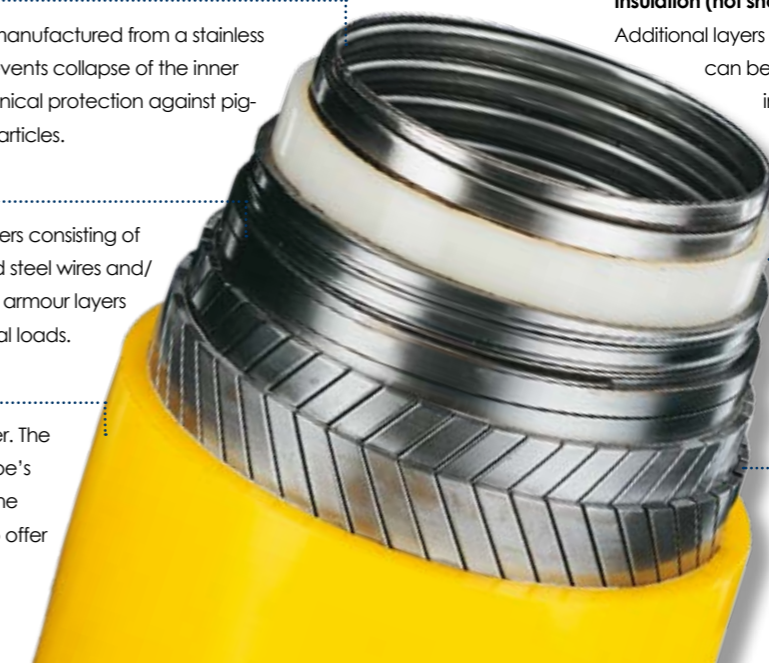
An extruded polymer layer providing internal fluid integrity.

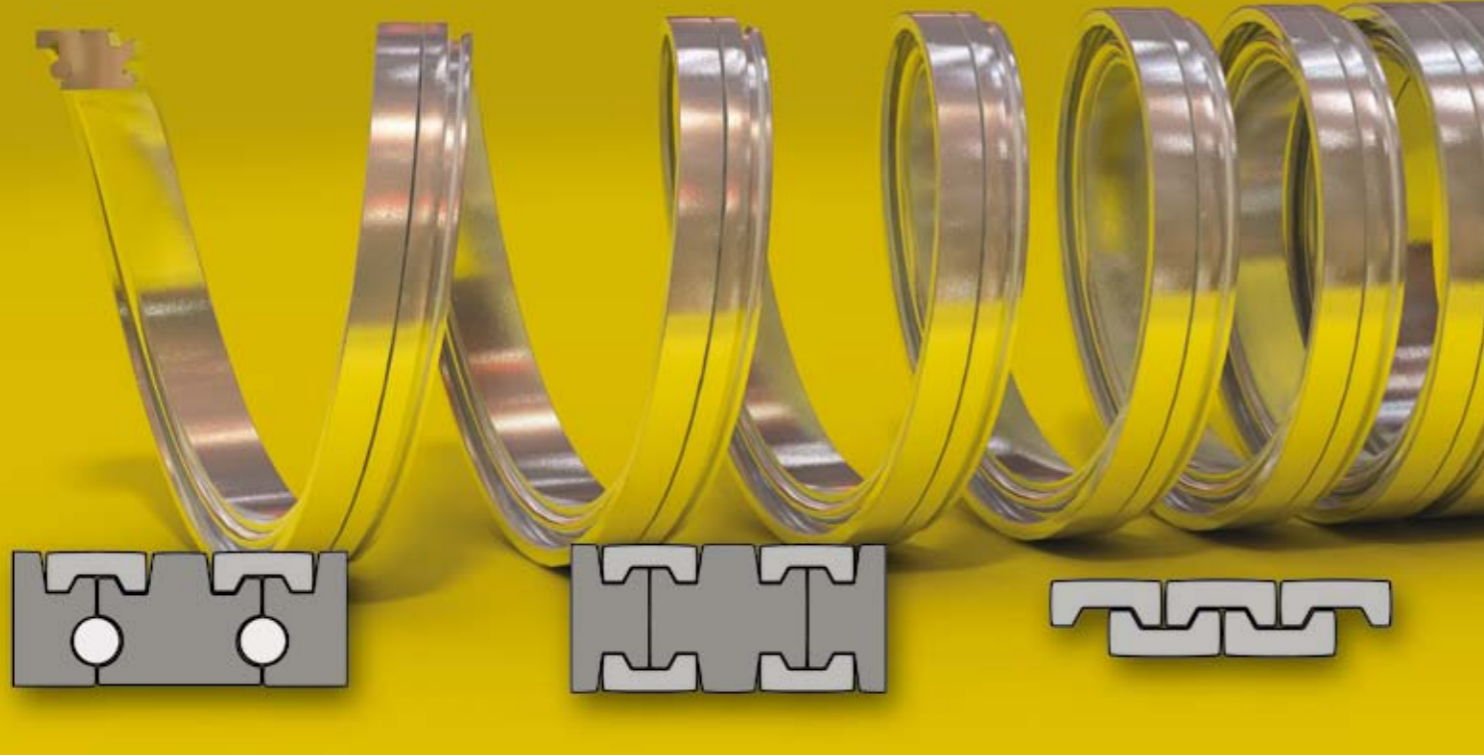
Tensile armour

A number of structural layers consisting of helically wound rectangular steel wires. The layers are counter wound in pairs. The tensile armour layers provide resistance to axial tensile loads.

Anti-wear layers (not shown)

Non-metallic layers are incorporated in order to prevent wear and tear between the structural elements.





Three different types of NKT armour profiles: K-link, X-link and C-link.

HIGH PERFORMANCE PRESSURE ARMOUR PROFILES

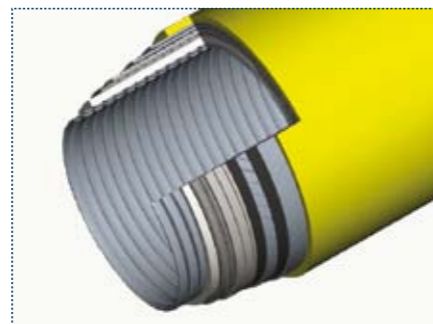
The structurally optimised C-shaped pressure armour has proven its unique fatigue robustness through many extensive full scale fatigue tests (both rotation bending and in-plane) as well as in operation. New high performance X- and K-shaped pressure armour profiles have been specifically developed to meet the challenging requirements for ultra deep-water applications. The different pressure armour profiles used by NKT Flexibles are symmetrical in shape thus ensuring a minimum of residual stresses within the applied armour layer.



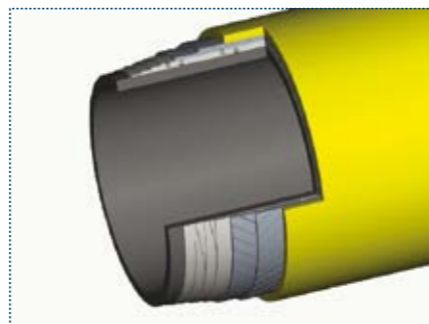
Rough bore insulated dynamic riser.



Rough bore static flowline.



Rough bore dynamic riser.



Smooth bore static flowline.



ANCILLARY EQUIPMENT

Accessories critical for the flexible pipe configuration such as bend stiffeners, bend restrictors, buoyancy systems, clamps, tethers, clump weights, etc. are specified by NKT Flexibles and procured from recognised and approved suppliers. The design of such items is performed in accordance with international industry standards and specifications drawn up by NKT Flexibles to ensure proper interface to the flexible pipe product as well as to other equipment.

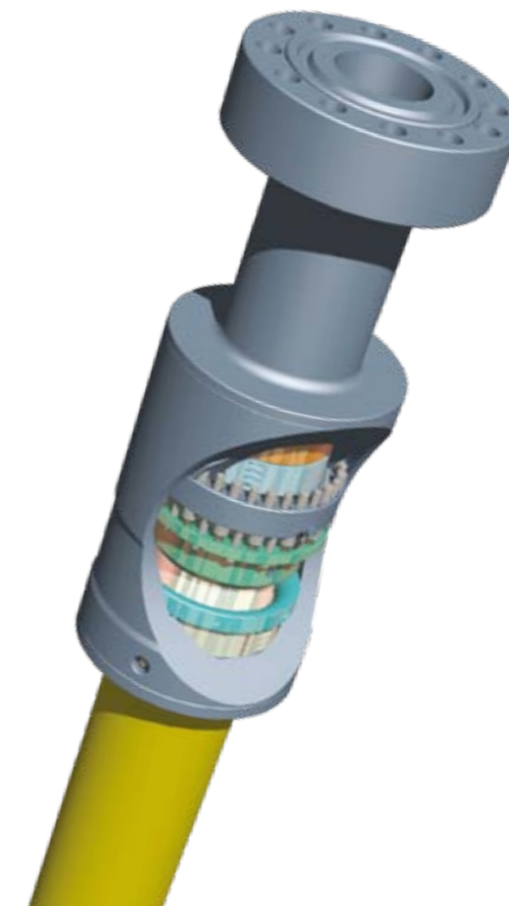
END-FITTINGS

The end-fitting forms the transition between the flexible pipe and the interfacing facilities such as FPSOs/FPUs, platforms, subsea installations, other flexible pipes, etc.

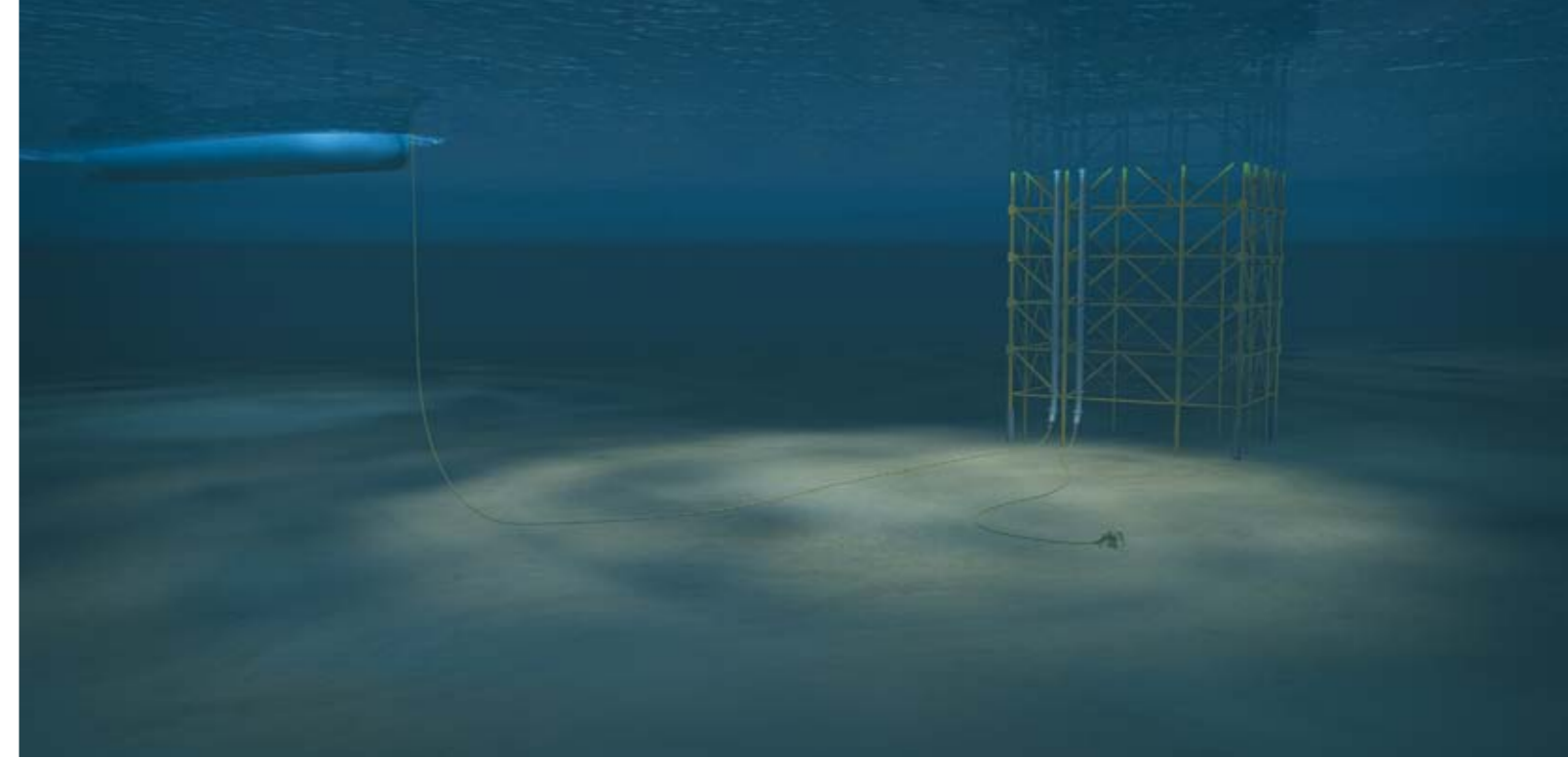
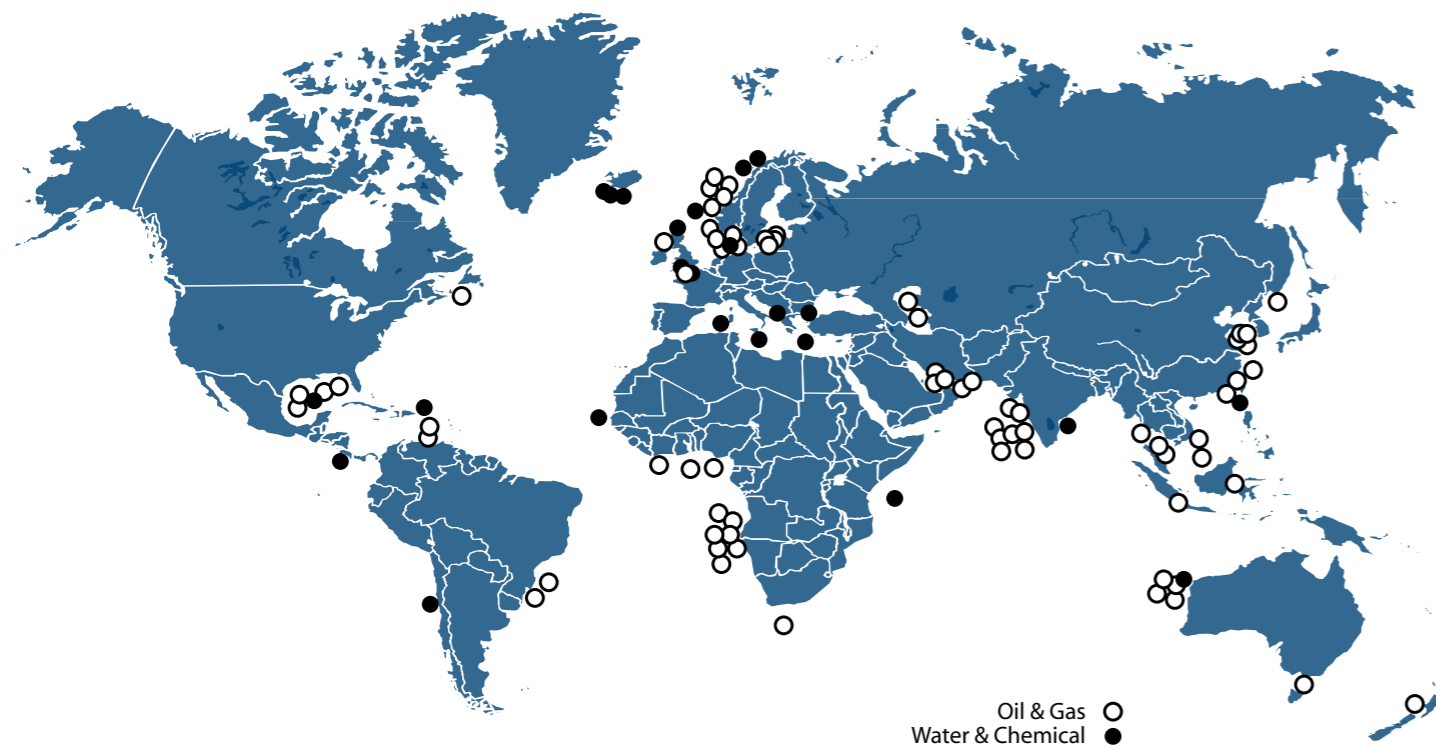
Each layer of the NKT flexible pipe is mechanically terminated inside the end-fitting in such a way that fluid seals are maintained under the specified design and operational conditions. Tests document that the patented NKT end-fitting design secures an unsurpassed anchoring of the armour layers and sealing capacity of the polymer liner materials as well as the main steel members of the flexible pipe.

NKT Flexibles' end-fitting design is based upon a unique patented twisted wire termination methodology. The entire void of the end-fitting is filled with high performance epoxy. To firmly anchor all pipelayers and end-fitting components with the end-fitting.

Flange connectors are manufactured to standards specified by the clients, eg. API 6A, ASME B16.5-1996, Grayloc type, techloc type, SPO type etc.



WORLDWIDE PROJECTS



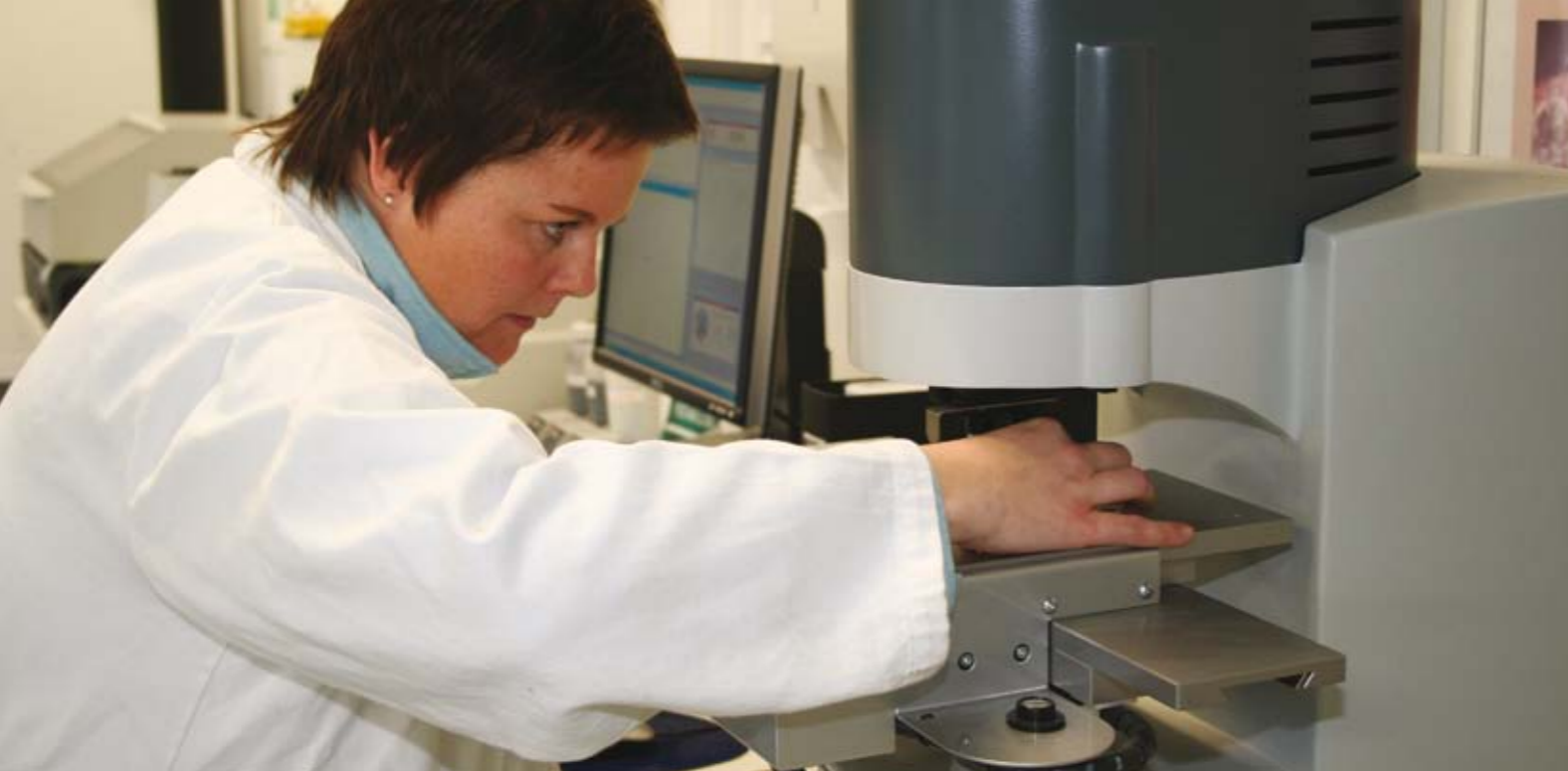
FLEXIBLE SOLUTIONS

The successful operation of a flexible pipe system relies on the correct specification, procurement and application of the requisite accessories. This is instrumental to the successful implementation of a flexible pipe solution, as such key components will maintain the flexible pipe products within the envelope of superior operational performance, thus ensuring a long lasting solution.

Accessories range from large, complex structures such as mid-water arches, riser bases, bend stiffeners, buoyancy modules and bend restrictors to smaller devices such as pull-heads, A&R wires, plugs, nuts, bolts and many other pieces of essential equipment.

Through our highly skilled and experienced engineering base NKT Flexibles has the capability to design, specify, procure, manage and incorporate the entire suite of required accessories. In doing so we offer a full system solution allowing the client to have only one responsible interface.

The flexible pipe solution's adaptability to a wide range of installation spreads and methodologies, together with its retrievability and reusability, makes it highly cost effective in terms of installation. Further to this the flexible pipe system is in many cases the most economic solution from a full life cycle cost perspective due to lower installation costs, less maintenance and finally a rather in-expensive decommissioning.



All materials used in NKT Flexibles' pipe products are subject to rigorous inspection and test.

CAREFUL SELECTION OF MATERIALS

The un-bonded composite structure of an NKT flexible pipe allows the careful selection of materials to meet specific requirements applicable for that particular layer. The materials used by NKT Flexibles are supplied by recognised and prequalified raw material suppliers.

Throughout the manufacturing process, NKT Flexibles utilises stringent procedures to ensure full traceability of materials used for the product. Complete material and manufacturing records are provided to the client in the final documentation package.

STEEL MATERIALS

Stainless steel AISI 316L type [UNS S31603] or Duplex 2101 [UNS S32101] are the standard choices for carcass based on the resistance of these materials against general corrosion, pitting corrosion and chloride induced cracking. AISI 316L and Duplex 2101 have been used by NKT as carcass material in flexible pipes for several years.

For more corrosive environments Duplex stainless steel grades such as Duplex 2205 [UNS-S32205], Duplex 2507 [UNS-S32750] or nickel based alloys grades may be applied.

The pressure and tensile armour layers are typically manufactured from low carbon steel – suitable for the specified service whether sweet or sour. Several different steel grades are available dependent upon the specified service condition.

POLYMER MATERIALS

The inner liner is manufactured from thermoplastic polymer materials such as High Density Polyethylene (HDPE), cross-linked Polyethylene (XLPE), Polyamide (PA) or PolyVinylidene Fluoride (PVDF). The choice of material is dependent upon service condition.

Polymer Type	Typical Applications	Typical Operating Temperature Range
HDPE	Inner liner for oil and gas lines (1-, 2- or 3-phase)	-50°C to +60°C
	Inner liner for water injection lines	0°C to +60°C
	Outer sheath	-50°C to +75°C
MDPE	Outer sheath for static pipe applications	-40°C to +60°C
PEX [XLPE]	Inner liner for oil and gas lines (1-, 2- or 3-phase)	-60°C to +95°C
	Inner liner for water injection lines	0°C to +95°C
PA-11	Inner liner for oil and gas lines (1-, 2- or 3-phase)	No water content: -20°C to +100°C Water content: -20°C to a maximum temperature dependent upon water phase pH and required design life. Short time peak minimum of -40°C
	Furthermore, outer sheath for dynamic pipe applications	-20°C to +80°C
PVDF-alloy (unplasticized)	Inner liner for oil and gas lines (1-, 2- or 3-phase)	-30°C to +130°C Lower temperatures can be accepted during short start-up periods – to be discussed on a project by project basis.

Typical maximum temperatures of polymer materials.

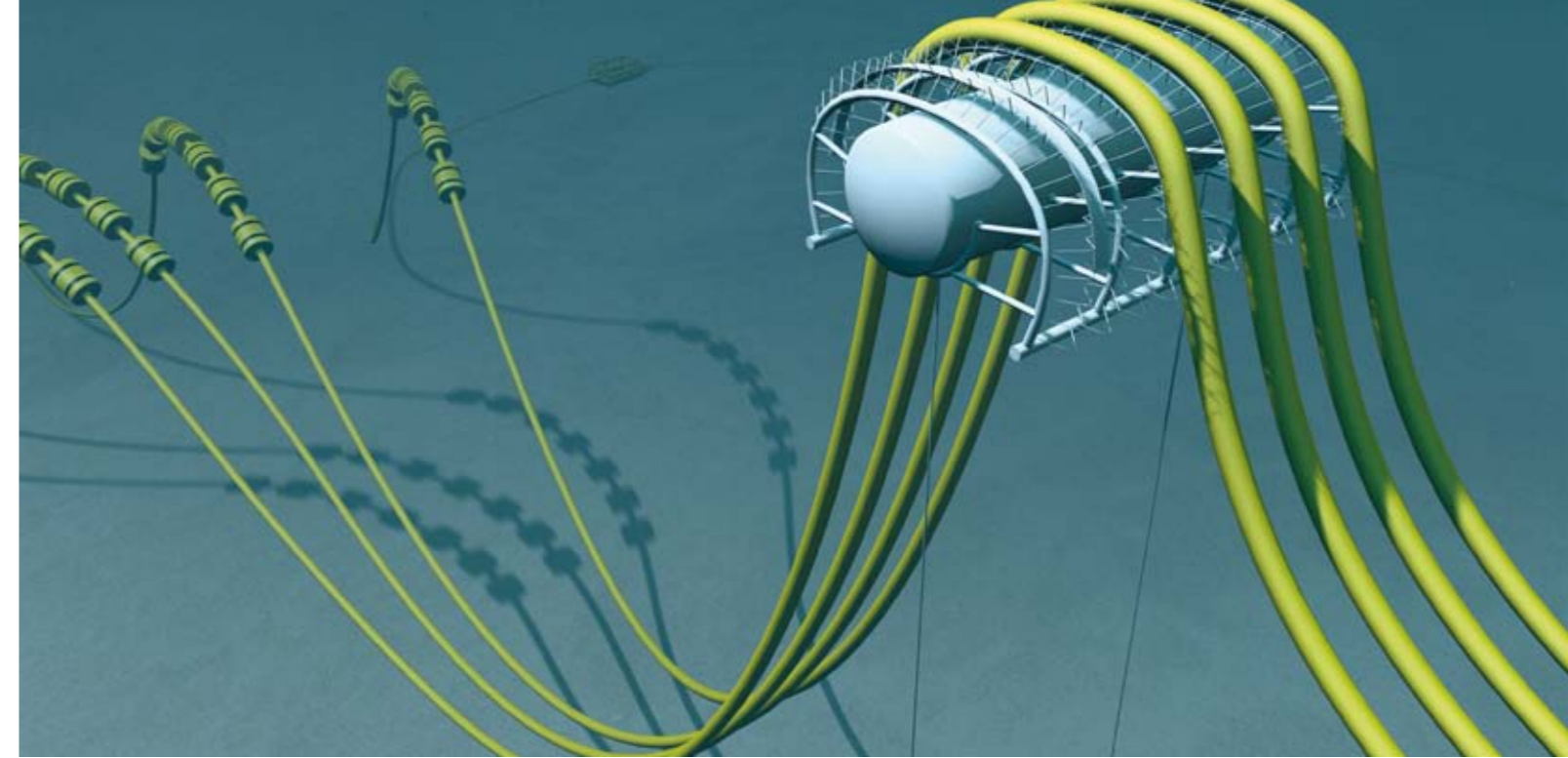
A particular and unique characteristic of the NKT flexible pipe product is the single layer PVDF inner liner in both static and dynamic applications. NKT Flexibles has eliminated the potential failure mode associated with pressure build-up of permeated gases in between multiple layer polymeric inner liners.

The outer sheath is manufactured from Polyamide (PA) or Medium Density Polyethylene (MDPE) extruded on to the structure as the outermost layer.

MATERIAL QUALIFICATION

As a consequence of the importance of using the right high performance materials in the flexible pipe NKT has an internal material qualification laboratory as a central part of the R&D department. The material qualification laboratory is highly advanced in material science and operates in the fields of test polymeric materials and composites, corrosion and sour service testing of carbon steels and corrosion resistant alloys as well as fatigue and corrosion fatigue testing of materials. The capability is matched to fulfill the requirement for documentation of material performance and qualification set by API Specification 17J.

Operating such an advanced internal material qualification laboratory is unique within the flexible pipe industry. It allows NKT to have a high activity level on material testing and development and be a frontrunner when it comes to understanding of materials performance within flexible pipe applications. Having the competences internally ensures direct communication between the project teams and the material experts if special material needs arise within a project.



Dynamic flexible pipes configured in a lazy S configuration across a mid water arch.

KNOWLEDGE & SERVICES

NKT Flexibles' Integrity Management & Services is based on more than four decades of expertise working with design, development and production of flexible pipe solutions.

Over the years we have accumulated advanced knowledge about flexible pipe behavior and represent a wide range of services that contribute to greater operational safety of flexible pipes.

Within this field NKT Flexibles deliver consultancy services of the highest quality; Pre Installation Services, Engineering Services and Post Installation Services. These services are listed below:

EXAMPLES OF ENGINEERING SERVICES

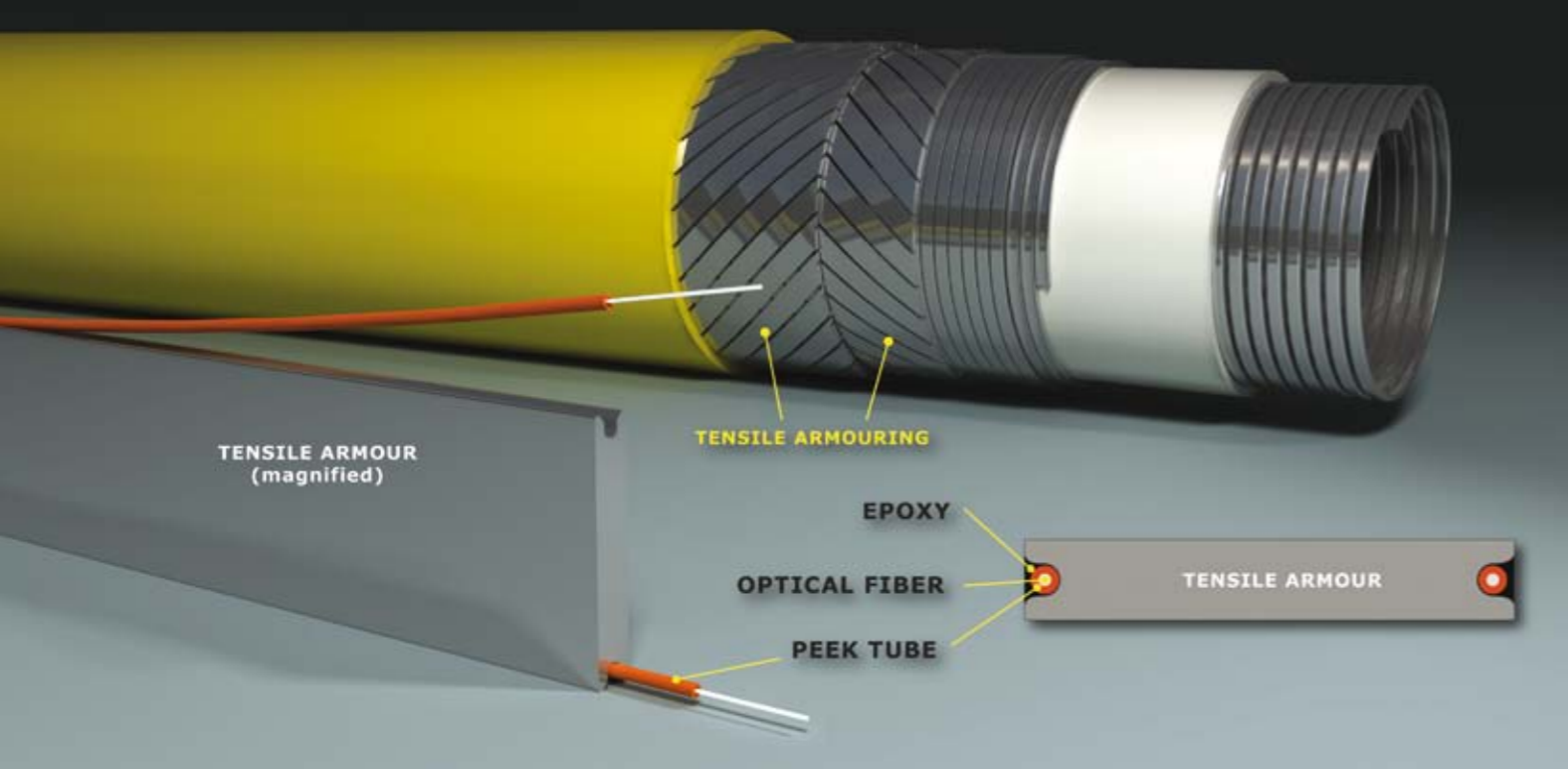
- » FEED studies - mainly system configuration and pipe design
- » Flow assurance studies
- » Upheaval buckling analysis
- » Input to Design Competitions
- » Delivery of software monitoring and analysis systems
- » Preparation of input for Client specifications
- » Re-evaluation of flexible pipe service life
- » Assessment effects of change in operational parameters
- » Evaluation of data collected from monitoring systems
- » Prepare, review and assessment of regular integrity reports

EXAMPLES OF PRE INSTALLATION SERVICES

- » Flow rate test to verify venting system
- » Outer sheath leak test to demonstrate intact outer sheath sealing mechanism
- » Annulus vacuum test to confirm no outer sheath damage and to estimate volume.
- » Samples of polymer/carcass coupons for referencing
- » Mounting of fibre-optic monitoring system for fatigue life assessment
- » Mounting of fibre optic monitoring system for temperature measurement
- » Mounting of annulus gas monitoring systems

EXAMPLES OF POST INSTALLATION SERVICES

- » Flow rate test to verify the venting system
- » Offshore annulus vacuum test
- » Calibration of fibre-optic monitoring systems
- » Retrofitting of gas analysis equipment on any flexibles including umbilicals
- » Ad-hoc repair work



By incorporating optical fibres in the flexible pipe annulus it is possible to monitor the actual conditions to which the steel armour wires are subjected.

RESEARCH & DEVELOPMENT

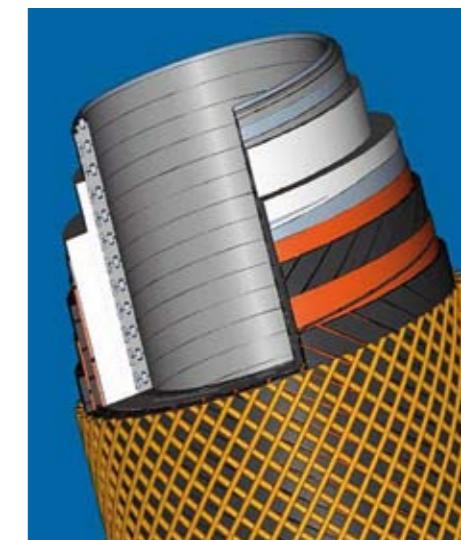
Innovative technical solutions form the platform for NKT Flexibles' product portfolio. By investing heavily in R&D related activity within metallurgy, polymeric materials, cross sectional flexible pipe structure optimization, small/medium/full scale testing the envelope of qualified solutions is continuously expanded. In addition to this NKT Flexibles also incorporate completely new materials and technologies into its flexibles pipe systems thereby offering new functionalities in line with market demands.

NKT Flexibles owns and operates a highly modern Research and Development laboratory located at the headquarters in Copenhagen, Denmark. The Research and Development laboratory has unique competencies within polymer technology, sour service steel testing facilities, etc; and is further involved in the validation and optimization of manufacturing processes, small scale and medium scale test programs at the Kalundborg facility.

By incorporating optical fibers into the flexible pipe annulus, NKT Flexibles offers condition monitoring of the flexible pipe to monitor the actual conditions to which the steel armour wires are subjected.



PEX/XLPE provides a wider temperature range.



FLEXTREME - ultra-deep water flexible pipe concept.

EXTREMELY HIGH TEMPERATURE APPLICATIONS

Reservoir fluids exceeding +130°C cannot be conveyed through standard type flexible pipes without prior cooling. In order to facilitate the need for high temperature capabilities exceeding +130°C new polymer materials are being investigated.

ULTRA DEEP WATER APPLICATIONS

The exhaustion of more mature oil regions at relatively low water depths is constantly pushing the requirements for water depth capability of the flexible pipe products. With conventional technology the weight of the steel armour layers introduces limitations to sizes and water depth of standard type deep water flexible pipe. In order to further push the limits replacement of steel armour wires by composite materials is under development.

DEEP IMMERSION PERFORMANCE (DIP) TEST

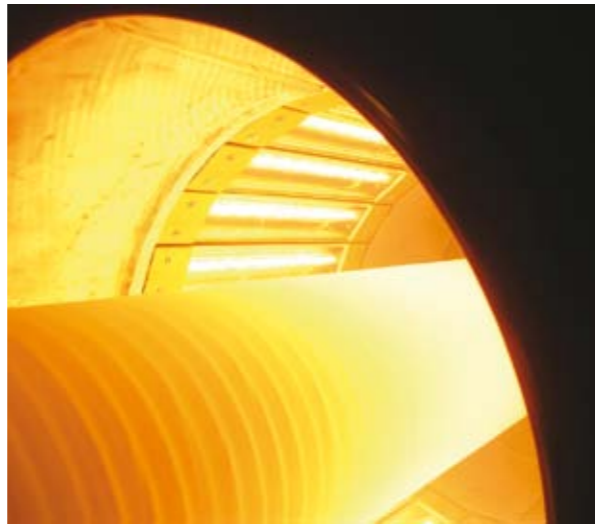
NKT Flexibles continuously strives to improve products for deep water installations by performing deep immersion performance (DIP) full scale tests in Brazil. NKT Flexibles pipes have been tested in water depths down to 2,000m.

FLEXTREME™

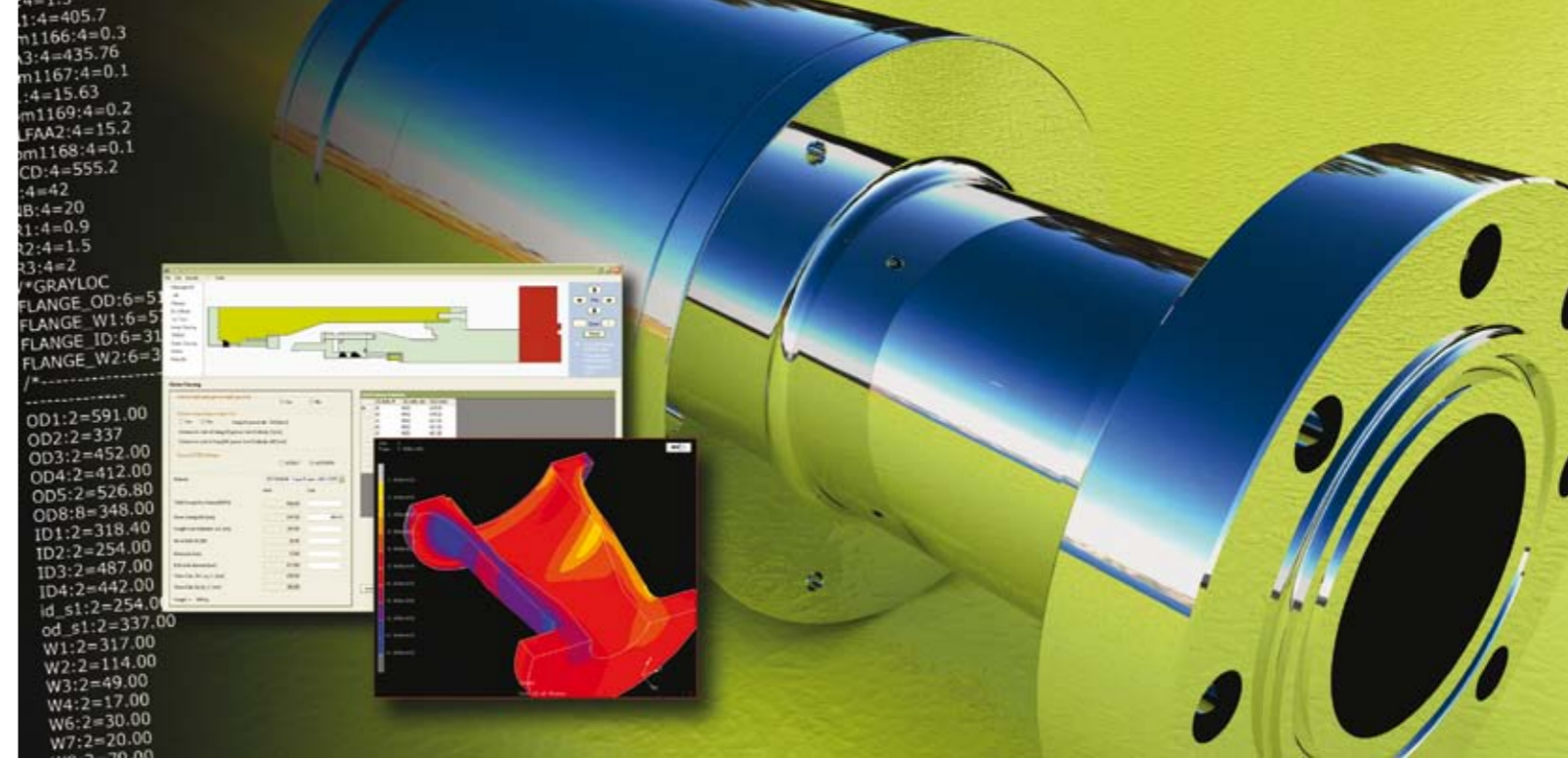
The development of flexible risers in connection with floating production systems at water depths beyond 2,000-2,500 meters is critical for the future success of ultra-deep water field developments. The NKT Flexibles FLEXTREME™ pipe concept is a hybrid composite/steel unbonded flexible pipe with a low weight and extremely high crushing, collapse and tensile capacities. The concept allows for the implementation of carbon fibre-reinforced polymer (CFRP) materials in the flexible pipes thus effectively pushing the envelope of composite pipes towards water depths which cannot be reached using the conventional flexible pipe technology.



Lateral buckling test in NKT R&D test facilities.



NKT has developed a new method to cross-link HDPE pressure sheath in flexible pipes using peroxide in combination with infra-red radiation.



CONDITION MONITORING

Responding to the industry's strong demand for means to determine the condition of a flexible pipe during its service life, NKT Flexibles can provide access to the newest technological developments. By incorporating optical fibres in the flexible pipe annulus it is possible to monitor the actual conditions to which the steel armour wires are subjected.

We are working on the development of other uses for fibre optic sensors. These include real-time sensing of pressure and gas composition within the annulus environment. These advances will greatly increase the ability to monitor annulus conditions and allow better estimation of remaining lifetime.

LATERAL BUCKLING (TENSILE WIRE INSTABILITY)

NKT Flexibles has established a laboratory test facility to simulate the touch down behaviour of the pipe during deep water installation. For installation of empty pipes, the external hydrostatic pressure generates axial compression on the pipe, and in case of damaged outer sheath, instability of the tensile armour wires can occur after a number of bending cycles. This instability failure is termed lateral buckling.

PVDF

NKT Flexibles has carried out a comprehensive test programme in order to qualify the PVDF grade for commercial use. The single layer unplastized PVDF grade is used by NKT in both dynamic riser applications as well as static flowlines for transport of hydrocarbons at elevated temperatures. Inner liners manufactured from the unplastized PVDF are highly resistant to hydrolysis and virtually any chemicals used in the offshore industry.

XLPE (PEX)

NKT Flexibles produces flexible risers and flowlines based on XLPE liner. The XLPE grade is the newest polymer material that NKT can offer, and the introduction of this material to the market has been driven by the obvious need for a qualified and more cost efficient solution suitable for a wider temperature range, bridging the low temperature features of an HDPE liner with the higher temperature capabilities of a PVDF liner. NKT Flexibles' XLPE is extremely tough and resistant, thus making it an obvious alternative for PA-11 and PVDF within its approved design limits.

METHODS & CAPABILITY

ANALYSES - PIPE SYSTEM DESIGN

- Data assessment
- Material selection
- Hydraulic flow assurance calculation
- Temperature profile calculation
- Pipe cross-section design
- End-fitting design
- Cathodic protection calculation
- Ancillary equipment design
- On-bottom stability calculation
- Upheaval buckling assessment
- Dynamic riser analysis
- Riser fatigue calculation

Engineering services encompass the entire design and analyses package required to validate the applicability of the nominated flexible pipe solution against specified system requirements. This includes flexible pipe cross-sectional related design tasks as well as all engineering associated with applicable interfaces to the flexible pipe product.

Using highly specialised proprietary design tools and engineering methodologies, we create innovative technical solutions that fine-tune the NKT flexible pipe product to meet the challenging demands of all offshore environments. Our flexible pipe systems are custom designed to the specific needs of each individual application in terms of unique design parameters such as bore size, internal and external pressures, fluid and surrounding temperatures, thermal insulation requirement, chemical compatibility, design life etc.

The NKT flexible pipe and the end-fittings are designed using a combination of qualified in-house software as well as recognised externally developed calculation tools. In the detailed design of the pipe system and the end-fitting, finite element analysis may be used both as support for the analytical approach and for verification purposes. Detailed investigations are carried out for several specific requirements in order to ensure an optimum design of flexible pipe structure, end-fittings and the flexible pipe regarded as a system.

DYNAMIC ANALYSES

Flexible dynamic risers are subject to careful evaluation with respect to global as well as local analyses of their behaviour under given project specified conditions. NKT Flexibles uses recognised time domain and 3D software to develop suitable riser configurations.



The project manager is the focal point of communication between the project team and the client, thus ensuring a direct, safe and efficient communication.

PROJECT MANAGEMENT

Our company operations are organised in a matrix of projects and supporting line departments, providing the necessary resources to the projects. This reflects the nature of flexible pipe systems where each solution is a unique project in itself. The project based value chain in NKT Flexibles is a common denominator for our operational approach, which we constantly strive to improve and balance against the expectations of our clients.

In considering an NKT flexible pipe system, a wide range of associated services form an integral part of the overall solution. In close partnership with our clients, we take responsibility for meeting all functional and technical requirements with the aim of offering the most cost-effective and reliable solution within our portfolio.

To facilitate this we form project teams together with our clients, that seamlessly merge creativity, flexibility, knowledge sharing and aligned objectives with traditional disciplines such as project management, communications, cost and schedule control.

Projects are managed through dedicated Project Management Units, with the nominated project manager acting as the focal point of communication. Stringent project management control systems ensure that we meet client expectations of reliable, high quality flexible pipe solutions delivered on time, to agreed specification and within budget.



PROJECT-RELATED ENGINEERING SERVICES:

- Conceptual feasibility studies
- System optimisation
- System interface issues
- Special component design
- Storage procedure
- Load-out & shipping procedure
- Installation studies



IPMA CERTIFIED PROJECT MANAGERS

NKT's project managers are IPMA certified at different levels. The certification is performed according to procedures developed and validated by the International Project Management Association (IPMA). The IPMA four level certification program is recognised internationally. It is competence based and provides standards by which project management performance can be measured.

LESSONS LEARNED

NKT performs internal Lessons-learned sessions on all projects in order to continuously improve the quality of the products and the processes.

After each phase of the project, involved project participants evaluate the completed phase based on an electronic questionnaire. The evaluation gives input to a Lessons-learned session at the end of the project, during which knowledge and experience is shared and actions are determined to consolidate improvements and transfer experience to future projects.

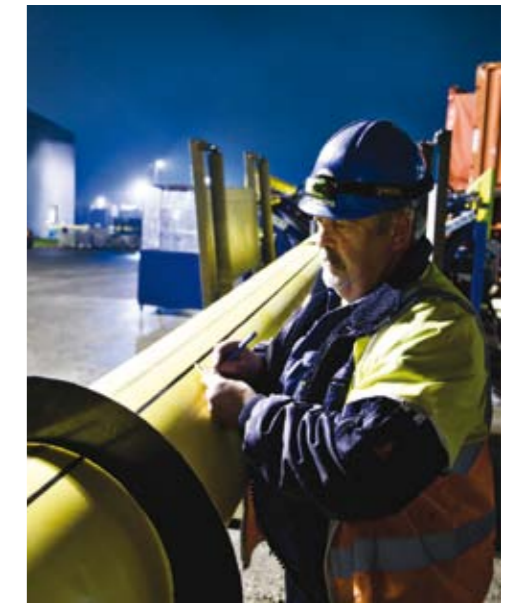
BUSINESS PROCESS SYSTEM

NKT has developed a project excellence model named SOLON to ensure a stringent and methodical procedure in carrying out project management and to maintain a consistent level of quality in each project. SOLON is the foundation of the entire project organisation and is continuously improved and optimised based on the lessons-learned processes.



NKT'S QUALITY MANUAL ENCOMPASSES THE FOLLOWING ACTIVITIES:

- Contract review
- Design review
- Qualified sub-suppliers
- Manufacturing quality plan
- Fabrication specification
- Qualified measuring methods
- As built documentation



HEALTH, SAFETY, ENVIRONMENT AND QUALITY

NKT Flexibles has implemented a dedicated Health, Safety, Environment and Quality [HSE&Q] policy outlining the company's intense focus in this area. The HSE&Q policy complies fully with the Danish Occupational Health & Safety Act and the Danish Working Environment Act. Further to this the policy is compliant with typical offshore requirements related to HSE&Q issues. Priority is given to minimise the risk of incident and accidents to personnel and/or the environment, as well as protecting assets whether belonging to the client or to NKT Flexibles. We constantly invest in staff training, site inspections, tool-box meetings, etc. with the aim of ensuring - to the extent this is reasonably practicable - a continuous improvement of the safety level, along with a protection of the environment.

QUALITY ASSURANCE

NKT Flexibles operates a robust quality system in accordance with the requirements of ISO 9001:2000, API Q1 and API 17J Monogram License certification. This quality system is focused on the entire company value chain from contract review, project management, design & engineering review, procurement, manufacturing, testing and as-built documentation. Our aim is to maintain a dynamic quality system thereby ensuring continuous improvement in all parts of our operation.

QUALITYFLEX

NKT Flexibles has developed an IT based system to raise, process, track and close improvements/suggestions. The system is named "QualityFlex" and is accessible to all employees.

The system has been operational since 2007 and has dramatically accelerated the continuous improvement process.

CORPORATE QUALITY POLICY

For NKT Flexibles quality means that we meet the requirements and expectations of our clients first time and every time. This is our goal.

To ensure that the level of quality continues to match the increased output, we aim to improve the organisation and procedures around quality. The focus on quality in a broader perspective ensures adequate quality capability in connection with the expansion of the plant as well as improving the ability to monitor suppliers and follow up on their performance. Furthermore we also focus on: supplier quality monitoring & visits, production quality, project quality and laboratory testing.

EXCELLENT RECORD

NKT Flexibles wishes to be known as a company with an excellent record in health, safety and environment (HSE) and shall as part of its normal business ensure that best practice is employed in the area of HSE.

All employees shall strive to reach a target of zero accidents, no detrimental effects to the health of the work force and no uncontrolled release of environmentally harmful substances.



PRIORPARKEN 480 • DK-2605 BRØNDBY • DENMARK • TELEPHONE: +45 43 48 30 00 • FAX: +45 43 48 30 10 • INFO@NKT FLEXIBLES.COM
VISIT US AT: WWW.NKT FLEXIBLES.COM