



## HYDROHAMMER®

### THE HYDRAULIC IMPACT HAMMER FOR ALL OFFSHORE PROJECTS

The hydraulic impact hammer can be used for offshore wind foundation installation such as monopiles, pin piles for jackets and tripods, and anchor piles for mooring systems. In the Oil & Gas market, it can be used to install pin piles for jackets, anchor piles for mooring systems, conductor and riser piles, and various other subsea infrastructure such as manifold structures and pipeline support. It installs piles efficiently, safely and can be used in combination with our

noise mitigation systems, the Integrated Monopile Installer and PULSE®.

With its unique design, the Hydrohammer® is suitable for all types of offshore piling and foundation work, ranging from starter piles to the biggest monopiles in the world. The Hydrohammer has been active since 1984 and has an extensive track record in the Oil & Gas and Offshore Wind markets.

# HYDROHAMMER®

## THE HYDRAULIC IMPACT HAMMER FOR ALL OFFSHORE PROJECTS

IQIP's hammer fleet comes in a diverse range of series: the IQ series, the S Series and the SW series.

### IQ SERIES HYDROHAMMER

The IQ Series represents the future of intelligent pile driving. Developed in response to the growth of wind turbines for increased production of green energy, the Hydrohammer IQ Series pushes the boundaries of current technologies to facilitate the installation of the world's largest monopiles. Building on the reliable technology of IQIP's world class S Series of Hydrohammers, the innovative IQ Series delivers IQIP's largest range of impact hammers for intelligent pile driving on a grand scale.

The IQ series rental fleet is currently equipped with IQ2 and IQ4 for the current generation of monopiles and the world's largest Hydrohammer IQ6, ready for the future generation of monopiles.

### S SERIES HYDROHAMMER

IQIP's reliable and world-renowned, first generation Hydrohammer S Series, was developed in the early 80's and has been deployed for use on Onshore construction, Oil & Gas and Offshore Wind projects the world over. The S Series is known for its unique robust design and its reliability in the field. Over 30+ years, multiple ranges of hammers in the S Series have been developed to cater for all types of piling and foundation work.

The S Series ranges from S-30 to S-2000 and is available for rent and purchase.

### SW SERIES WATERHAMMER

The Waterhammer® is an environmentally friendly hydraulic piling hammer using water (fresh or salt) as a medium instead of hydraulic oil. It can be used for all offshore piling jobs, including driving pipeline initiation pile, piles for jackets, conductors and mooring systems but has been especially designed for ultra-deep waters. The hammer is operated with a single hose (no return hose) without the need for a high voltage cable.

The SW series is available for rent and purchase with hammer types SW-90 and SW-500 and pile sleeves up to 96"



IQ Series Hydrohammer



S Series Hydrohammer



SW Series Hydrohammer



### FEATURES OF THE HYDROHAMMER

- For use above and under water
- Installation of foundation piles for conductors, jackets, tripods, FPS mooring, starter piles for pipe laying and monopiles
- Available ranges: S-30 to S-2000 (30kJ - 2000kJ), SW-90 to SW-500 (90kJ - 500kJ) and IQ2-IQ6 (3600-6600kJ)
- Wide range of sleeves up to 8.5 meters currently available, ready for the next generation of monopiles
- Additional acceleration of ram weight through Nitrogen gas spring includes Pile Inclination Measurement Equipment (PIME) for measuring the level of inclination
- Can be used for driving free standing anchor piles through the Fast Frame (or pile guide frame)
- Possible to operate at full power at any inclination
- Advanced piling techniques available, such as HiLo (high frequency, low energy) driving in order to minimise fatigue damage

- Designed for driving steel piles / profiles (sheets)
- Can be used for driving free standing anchor piles through the Fast or Slotted Frame

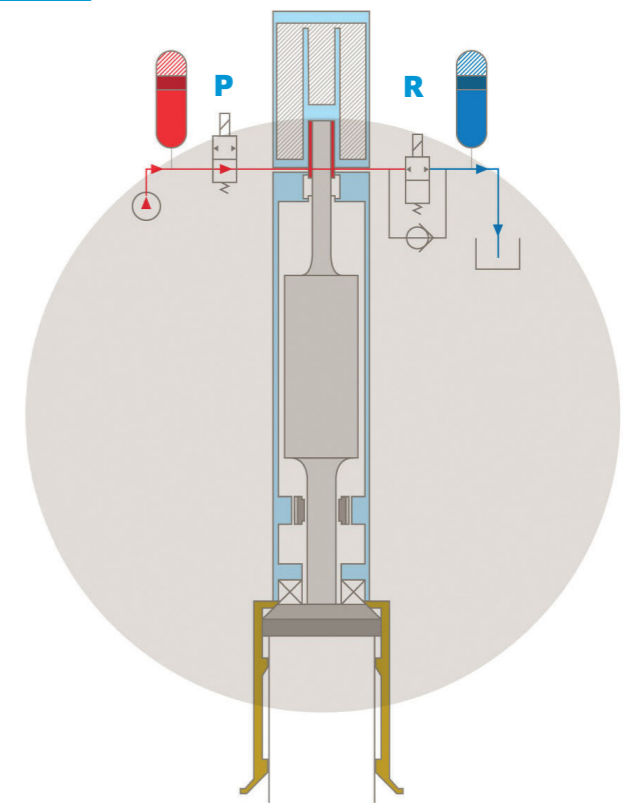
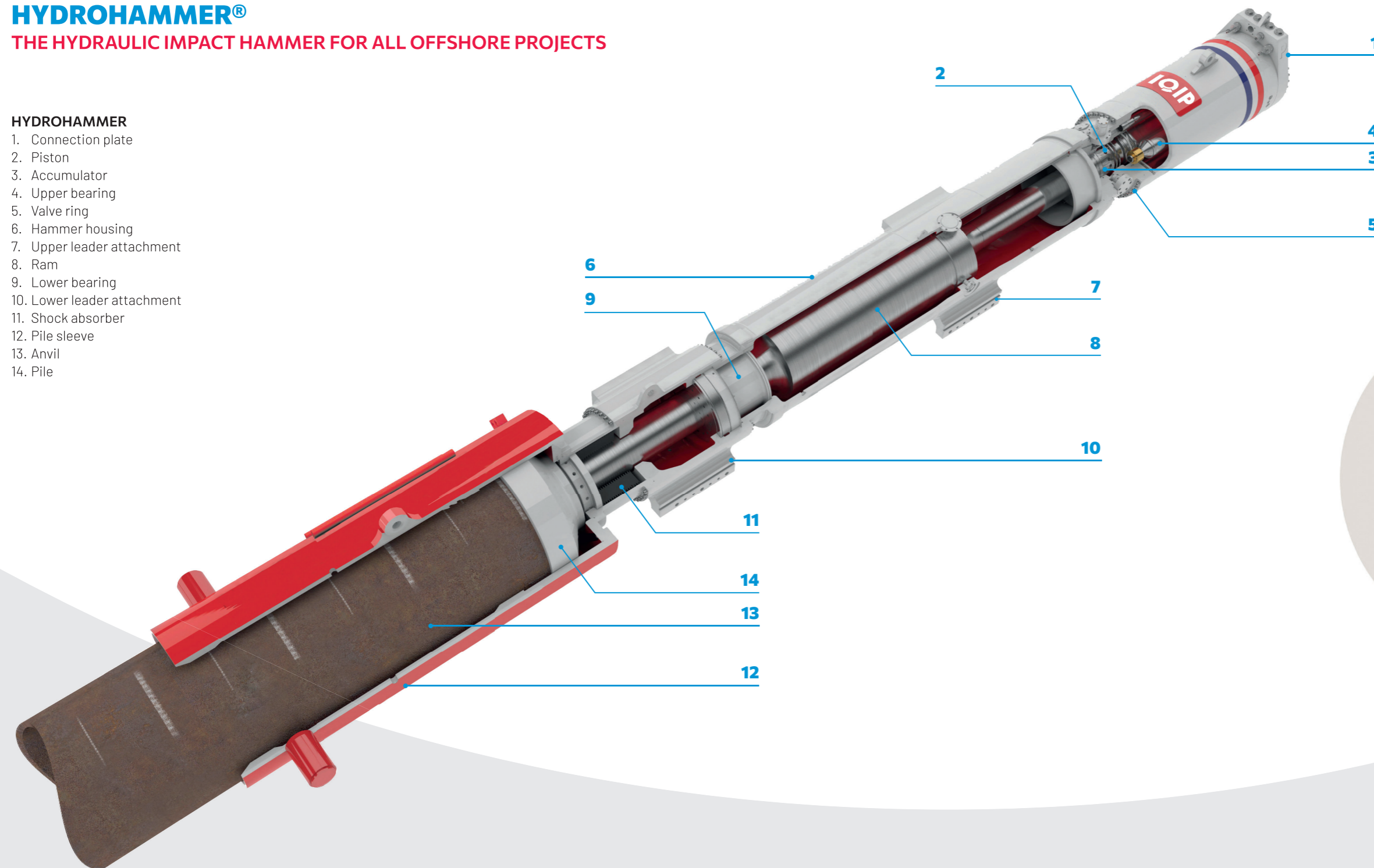
### ADVANTAGES OF THE HYDROHAMMER

- Great track record since 1984
- Very low down time rate
- Verifiable piling records for pre-and post-analysis assessments
- Full energy at nearly all positions (0 - 90 degrees)
- Infinitely applicable energy up to 100%, for the IQ series an adjustable energy up to 120% for a certain period of time\*

\* May vary depending on piling configuration and soil conditions

## THE HYDRAULIC IMPACT HAMMER FOR ALL OFFSHORE PROJECTS

1. Connection plate
2. Piston
3. Accumulator
4. Upper bearing
5. Valve ring
6. Hammer housing
7. Upper leader attachment
8. Ram
9. Lower bearing
10. Lower leader attachment
11. Shock absorber
12. Pile sleeve
13. Anvil
14. Pile



The operating cycle begins with the lifting phase of the ram (ram weight, ram pin and piston rod are forged in one piece). Here, valve P in the pressure line is opened and valve R in the return line is closed. When the preset stroke position is reached, the valves are automatically reversed allowing the ram to start its downward stroke. The ram is accelerated by gravity and by the pressure of the gas above the piston and reaches a maximum acceleration of  $2g$ . This reduces the maximum stroke that is required and at the same time increases the blow rate of the hammer.

## HIGHLIGHTS

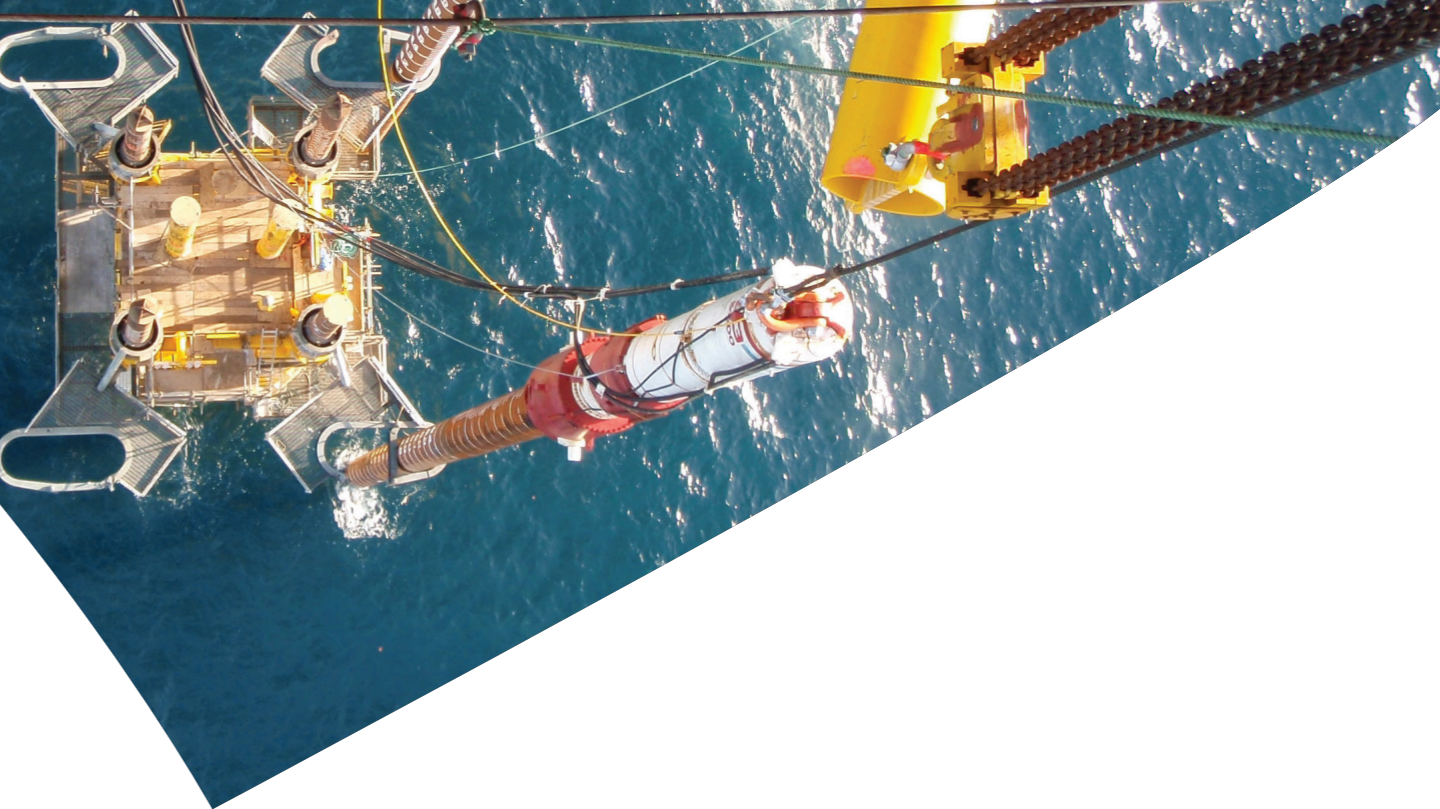
- Energy transfer: Steel-to-steel energy transfer ensures extremely high peak force in the pile.
- Solid piece Ram: Ram weight, ram pin and piston rod are forged into one piece, eliminating the risk of the parts separating.
- Material: Forged alloy steel guarantees durability and allows unlimited piling on steel at full power.
- Shock absorber: The robust and tested construction sustainably resists the reaction forces from the pile.
- Multifunctional: Suitable for operation above and below

- the water.
- Acceleration energy: Relatively low weight and high peak force ideal to overcome soil resistance.
- Hammer control: Adjustable blow count per minute and impact energy.
- Real time monitoring: Piling data is directly printed on site and/or stored to allow detailed analysis.
- Environmentally friendly: Biodegradable oil can be used, and noise reduction is optimised with noise reduction packages.

SPREAD POSSIBILITIES

OIL & GAS					
	STRUCTURE INSTALLATION	(ULTRA) DEEP WATER	SUBSEA FIELD DEVELOPMENT	CONDUCTOR INSTALLATION	MOORING
Hydrohammer	S-200 to S-2000 IQ2 IQ4 IQ6	SW-90 SW-500 S-90 to S-2000 IQ2 IQ4 IQ6	up to S-280	up to S-280	up to S-800
Follower	●	●	●	●	●
Sleeve	60" to 120"	30" to 96"	up to 60"	up to 48"	up to 96"
Control cabin	●	●	●	●	●
Hose bundle winch	●	●	●	●	●
Hydraulic power pack	P1100 P2200 P3300	WP1000W	P1100 P2200 P3300	<P1100	P1100 P2200 P3300
Up-end cradle	●	●	●	●	●
Control cable winch	●	●	●	●	●
Hydraulic hose reel	●	●	●	●	●
Control cable reel	●	●	●	●	●
Spare parts container	●	●	●	●	●
Up-end and overboarding frame	●	●	●	●	●

OFFSHORE WIND			
	MONOPILE (XL) INSTALLATION	JACKETS & TRIPODS	MOORING OF FLOATING WIND TURBINES
Hydrohammer	S-1200 to S-2000 IQ2 IQ4 IQ6	S-800 to S-2000 IQ2	up to S-800
Follower	●	●	●
Sleeve	4.5m to 8.5m	2m to 3.5m	up to 96"
Control cabin	●	●	●
Hose bundle winch	●	●	●
Hydraulic power pack	P1100 P2200 P3300	P1100 P2200 P3300	P1100 P2200 P3300
Up-end cradle	●	●	●
Control cable winch	●	●	●
Hydraulic hose reel	●	●	●
Control cable reel	●	●	●
Spare parts container	●	●	●
Up-end and overboarding frame	●	●	●



C-66 CONTROL UNIT AND MONITORING

All hydraulic hammer functions are electronically controlled and monitored by our new generation control and monitoring system C-66. This system focuses on automatic pile driving based on the desired pile velocity, blow rate and blow energy, making the system flexible and easy to use. The pile driving process is controlled from the first monitor. The second monitor, shows the settings of the power pack and the third monitor displays the pile driving process. The data logging feature stores all piling data automatically in the control system.

POWER PACKS

Our current range of offshore power packs, includes types P-1100, P-2200 and P-3300. From October 2022, IQIP will launch new types of offshore P-2200 and P-3300 power packs. The new series will meet the following norms\*:

- IMO Tier 3: the latest emission standards for offshore set by International Maritime Organisation to reduce nitrogen oxide (NOx) emissions.
- DNV ST-E272: the safety norm set by SOLAS (Safety of Life at Sea), the international maritime treaty which establishes \ safety measures for offshore equipment.

\* Above mentioned norms will only apply to the new power pack series.

SLEEVES

The main construction of the sleeve consists of the housing for anvil and a pile-guiding section that fits over the top of the pile. The purpose of the sleeve is to ensure that the blow energy of the Hydrohammer is transferred with the highest possible efficiency, while remaining fully in-line with the pile. To safeguard the accurate delivery of the blow energy, the

connection flange of the sleeve is bolted to the lower section of the Hydrohammer. The blow of the ram weight is transferred to the anvil, which is located inside the sleeve's housing. The Hydrohammer sleeves are currently available in the diameter range up to 8.5 meters (top diameter).

PULSE®

PULSE, a modular addition to the Hydrohammer, minimises noise during pile driving to deliver an environmentally-friendly foundation installation. The elongated blow of PULSE is twice the duration of the blow of a conventional hammer, increasing piling efficiency while reducing pile fatigue and impact noise. PULSE can be adapted for different conditions and is able to perform at maximum peak force.

Combine PULSE with the Hydrohammer for an efficient and environmentally-friendly installation with reduced noise, pile fatigue and operating costs.

DRIVEABILITY AND ADVISORY SERVICES

The correct choice of hammer can only be made after careful interpretation and assessment of the properties of the soil. To support customers, IQIP employs a team of experienced engineers to assist with pre- and post-pile driving analysis. These driveability studies are carried out using the most sophisticated computer programs (GeoWave). Driveability studies are performed for a best estimate but also take into account an upper bound situation. In the upper bound situation, a 30% higher soil resistance is taken into account. This gives a good indication of the expected driveability.

