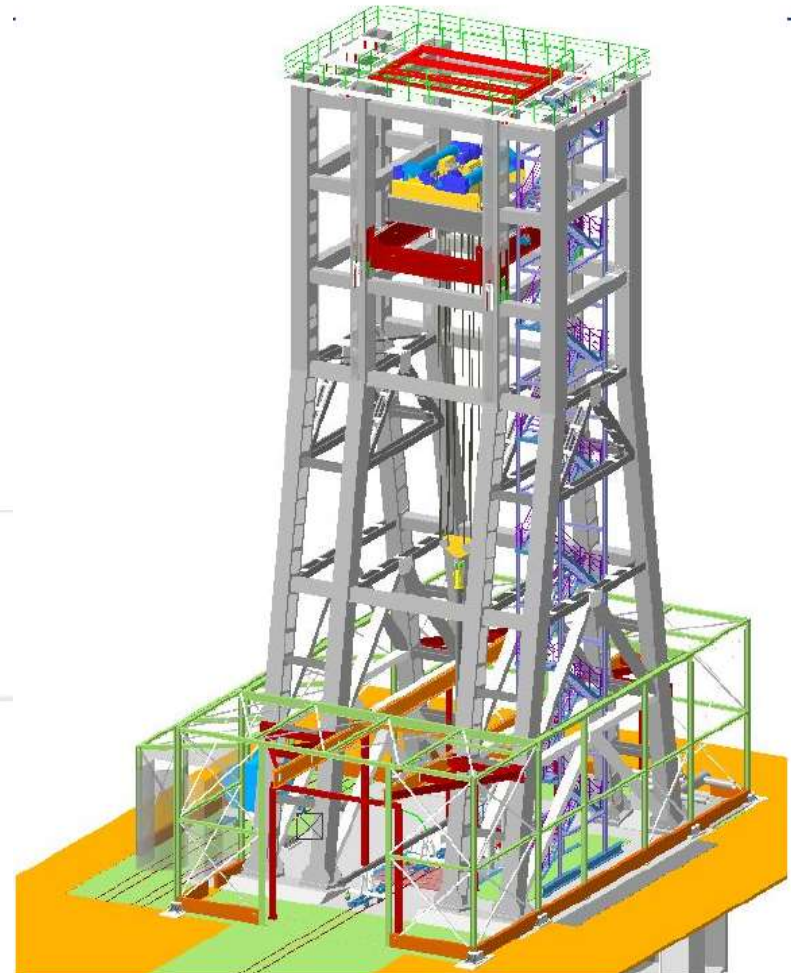




Carl Hamm PPS

Presented by
Carl Hamm PPS



Carl Hamm
Pipes | Pumps | Solutions

Carl Hamm PPS Turnkey Solutions



Carl Hamm PPS Turnkey Solutions



- Carl Hamm Pipes Pumps Solutions (PPS) is a South African company which is a subsidiary of the German company Carl Hamm GmbH. We would appreciate an opportunity to present the company's products and services to you and your colleagues.
- Carl Hamm GmbH has more than 90 years of experience in the mine industry, our ZSM flangeless couplings have been an innovative leader in the piping industry above and below ground level, specializing in vertical suspended applications i.e. dewatering of flooded mines, retrofitting new columns etc.
- The ZSM system is used to suspend pumps and dewatering from surface. No need to enter the mine. We provide complete Turnkey solutions from pump to motor including Electrical Switch gear and Variable Speed Drives. Power Generation and E-House infrastructure can be included in the scope of supply.

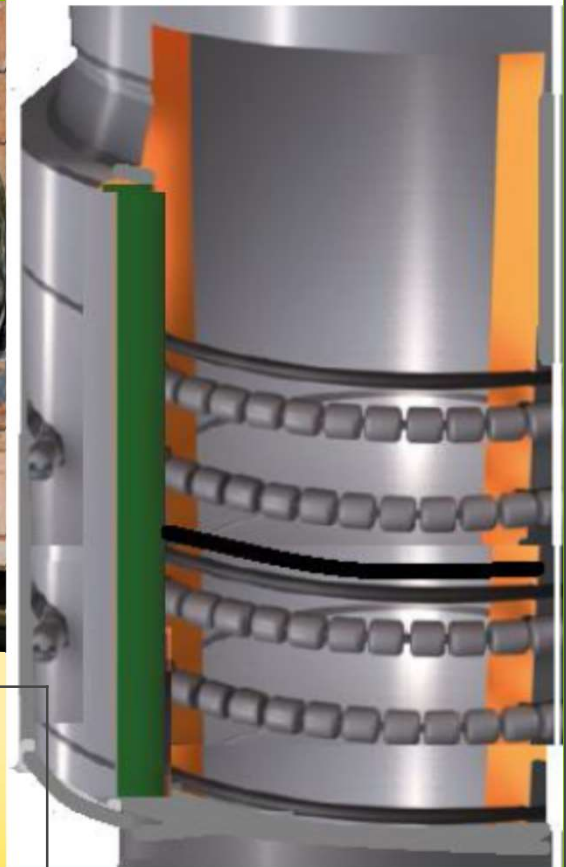
- The ZSM product can also be applied to services infrastructure in a raise bore catering for Refrigerated water, Fuel, Air, water, pumping columns as well as being used for batching concrete.
- We also introduce Dichtung Pumps. This range of pumps is of robust design and technologically advanced to offer reduced wear in the most challenging high pressure mining applications with the HPX range.
- As example the HPX multistage units can cope with 5% per volume (50 000 PPM*) – conventional mine dewatering pumps would cope with 300-500 PPM* (*Parts Per Million)
- Our experience in Water Management makes us a competent partner in abstraction and drainage projects.

Carl Hamm PPS Turnkey Solutions



- We are experts in piping and geotechnics who serve drilling intensive industries worldwide.
- Our products and services deliver above and below the ground applications in water and waste management, piping systems to the power and mining sectors, as well as tunnel construction, well sinking, and domestic installations.
- By combining our nearly 90 years of experience with modern production equipment, we continue to manufacture innovative solutions for critical on-site operations.
- At Carl Hamm we are non-negotiable about competent and committed personnel, and we are proud to be the preferred piping partner for leading industries worldwide.

ZSM Connection



ZSM Connection



Technical Planning & Static Calculation

3. Technical Planning and Static Calculation

All prefabricated parts need to be designed to reach **2 – time Safety –factor** against yield strength. The following needs to be satisfactorily shown in the documentation by static calculations:

- FEM Calculation for the ZSM – Components against internal pressure
- FEM Calculation for the ZSM – Components against axial forces
- FEM Calculation of the pipes against internal pressure
- FEM Calculation of the assembling table
- FEM Calculation of the supporting pipe
- FEM Calculation of the pump adaptor
- FEM Calculation of the lifting device
- Stability analysis of the riser pipes against the overturning of the electrical motor
- The layout design of the anti – twist – protection must be calculated against the torque of the used pump/motor

According the executed calculations a tensile test (destructive) has to be made to determine the effectively breaking load.

Also a hydraulic – pressure test needs to be done with 1.5 x operating pressure (highest pressure the used pump can reach).

4. Permissions and Certificates

To ensure a safe and proper manufacturing process the following Permissions and Certificates are the basis for production and need to be part of the documentation:

- | | |
|---------------------------------------|------------------------------|
| - Quality management system | DIN EN ISO 9001:2008 |
| - Welding quality requirements | DIN EN ISO 3834-3 |
| - Certificate of the production shops | PED 97/23/EC |
| - In-house quality control | EN 1090-1:2009 + A1:2001 |
| - Manufacture of steel structures | EN 1090-2 exc. 3 |
| - Process inspections | DIN EN ISO 15641-1 |
| - Welding staff | DIN EN 287-1 and DIN EN 1418 |
| - NDT (RT, PT, MT, VT) | DIN EN 473 – Level 2 |

5. Tests during Manufacturing

- All semi – finished materials need to be delivered with a material quality certificate according APZ 3.1 acc. EN 10204
- All ZSM – Parts need to be quality – checked by a 3D – Measurement and Monitoring – Device.
- X-Ray of circumference welds (100%)
- Dye penetrant testing or magnaflux test (100%)

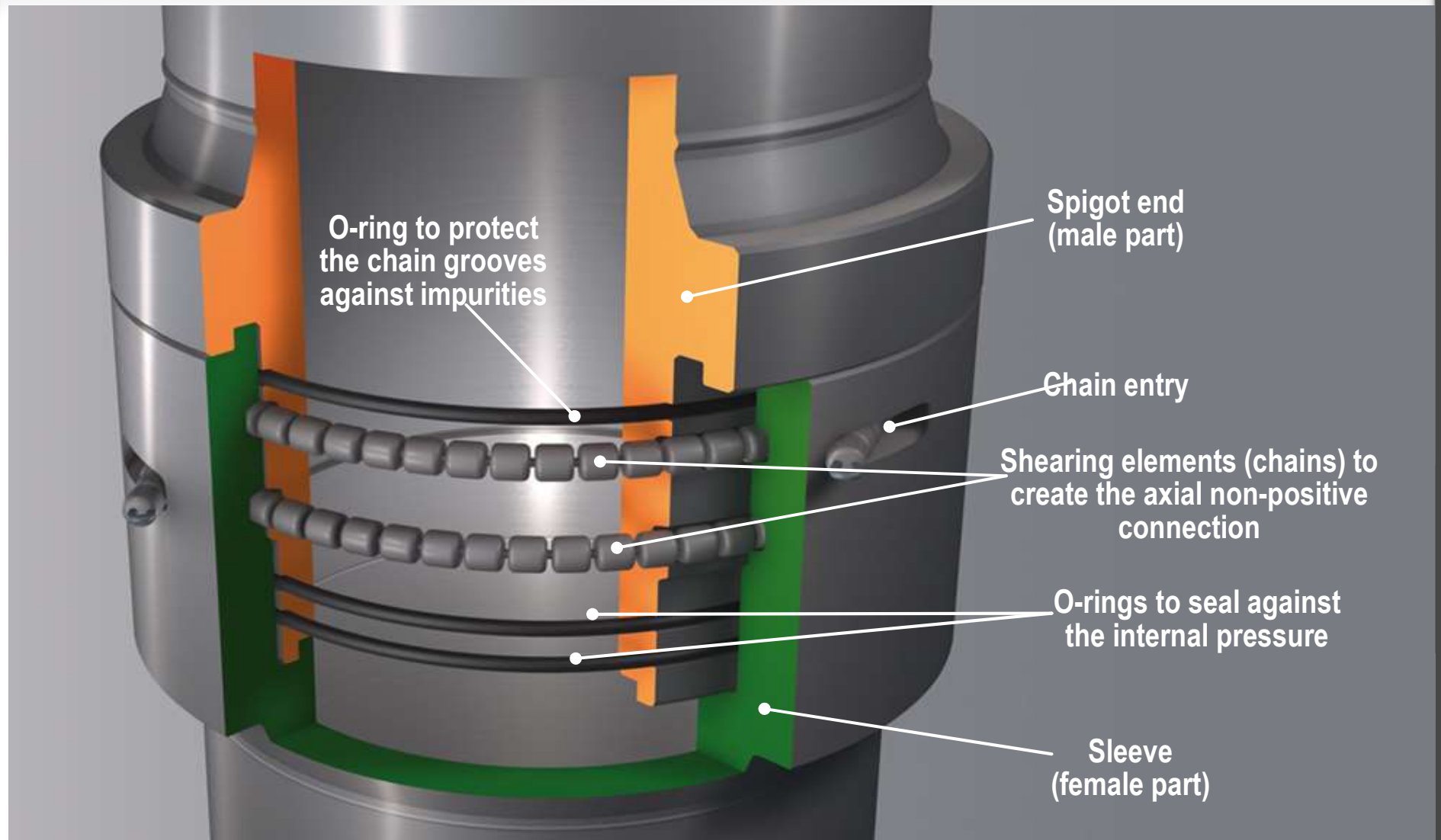
All Tests must be traceable by batch – numbers on pipes and coupling – parts.

6. Documentation

The documentation will be transmitted in Paper – Form (DIN A4 2x) and on a digital device (2x) and includes the following:

- All test certificates stated in this document
- Drawings necessary for Installation
- Parts – Lists with Article – Numbers

ZSM Coupling and Components



ZSM Easy installation



STEP 1

- The spigot end (male part) has min. two sealing grooves and also two chain grooves on the outside.
- The sleeve (female part) has two chain grooves on the inside.
- O-rings are inserted into the sealing grooves of the spigot end.

ZSM Easy installation



STEP 2

- The spigot end and sleeve are pushed together without any additional aids.
- The seal is created in this way.
- The optional anti-torsion devices absorb the torsional moments of the pump

ZSM Easy installation



STEP 3

- The chain grooves form two annular cavities.
- Shearing elements (chains) are inserted manually through openings in the sleeve. Special tools are not required.
- The spigot end and sleeve therefore have an axial non-positive connection.

ZSM Easy installation



STEP 4

- The chains can be simply withdrawn again for disassembly. The pipeline can be separated

ZSM Vs. Flange



- Low installation dimensions
- Assembling/Disassembling
- No special tools

	ZSM	Flange
Hydrostatic forces	O-Ring	Screws, nuts, gaskets with a defined tightening torque
Axial forces	Shearing chain	
Torsion forces	Torsion safety element	
Tools	–	Impact wrench

ZSM Vs. Flange

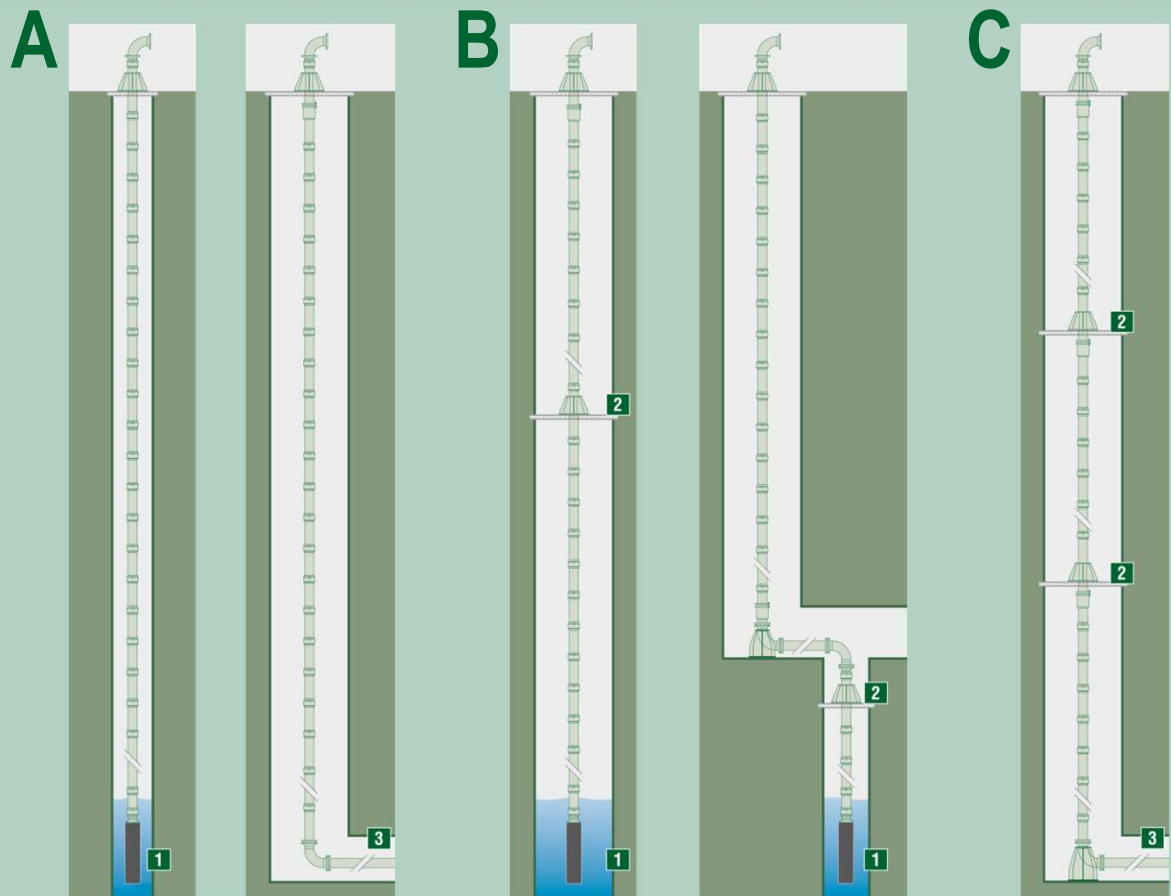
LOW INSTALLATION DIMENSIONS



Using the example of a ZSM Pipeline:
DN 400 dimensioned for a length of 1,000 m

	ZSM	Flange
Diameter, broadest part	485 mm	750 mm
Equipment per connection	2 chains	20 screws M39 x 300
Equipment in total	180 chains	1.800 screws, 1.800 nuts, 3.600 washers

Installation situations



A – Freely suspended

B – Partially
suspended

C – Standing pipe
column

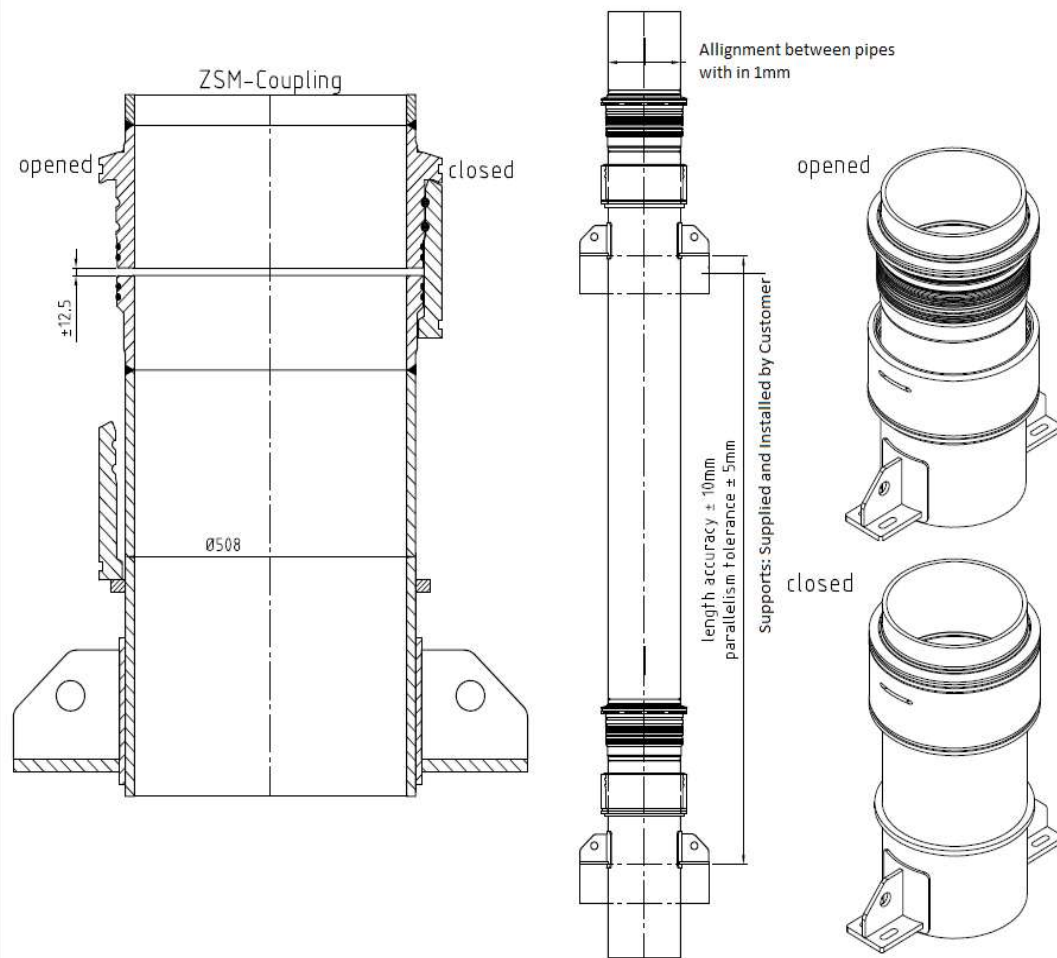
1.Pump

2.Intermediate support
point

3.To pump station

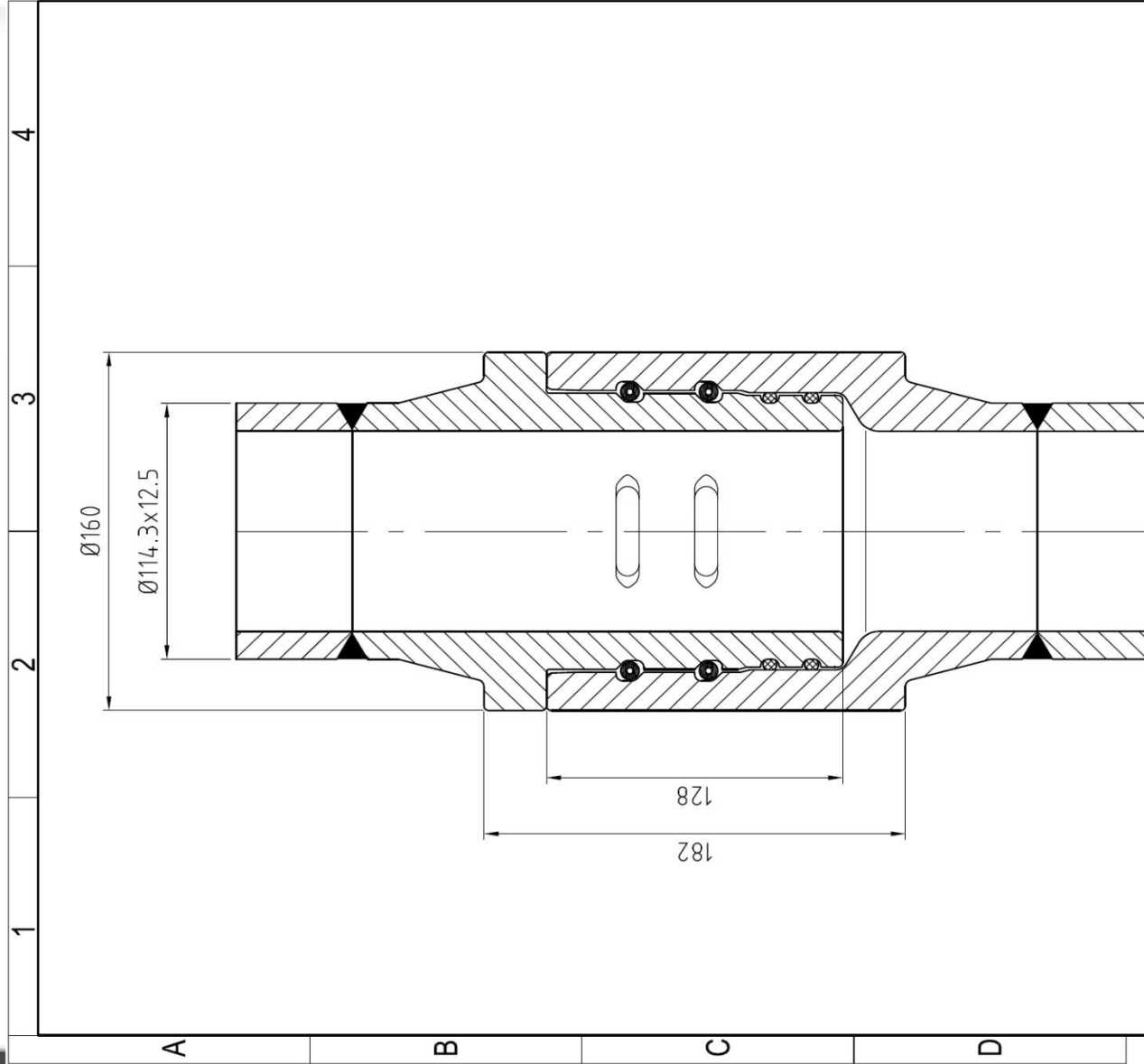
Supported ZSM Sliding Coupling

Supported Pipe Installation (Shaft)



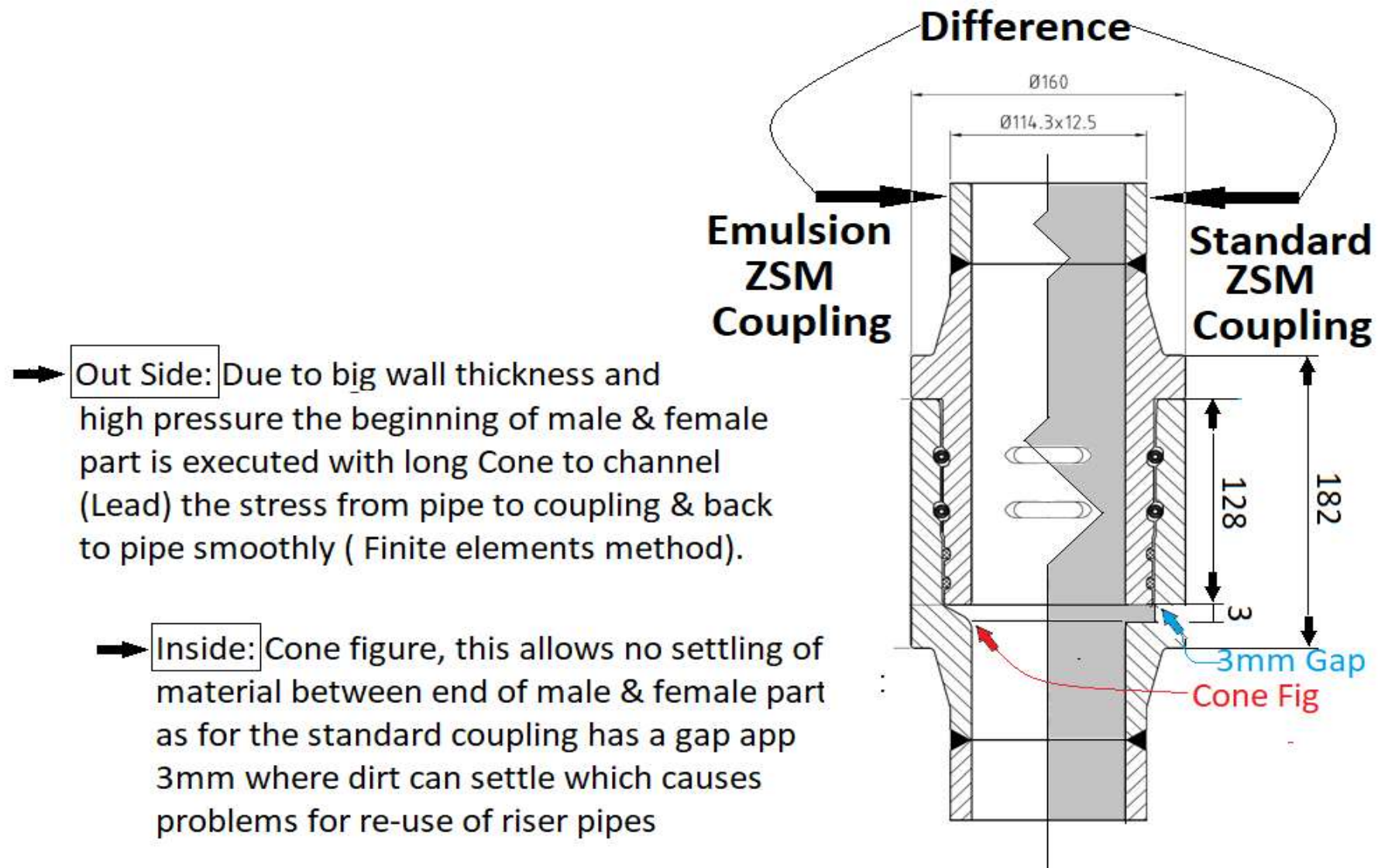
- Wall thickness of the system becomes thinner due to the fact that is supported.
- A gap of 12,5mm will compensate linear expansion due to temperature changes.
- Support plates will be connected to the support to avoid vertical or horizontal movement of the pipes, even in the event of surge pressure (Water hammer).
- Sliding ZSM coupling will be lifted with a special tool and lock chains will be inserted.

Emulsion ZSM Coupling

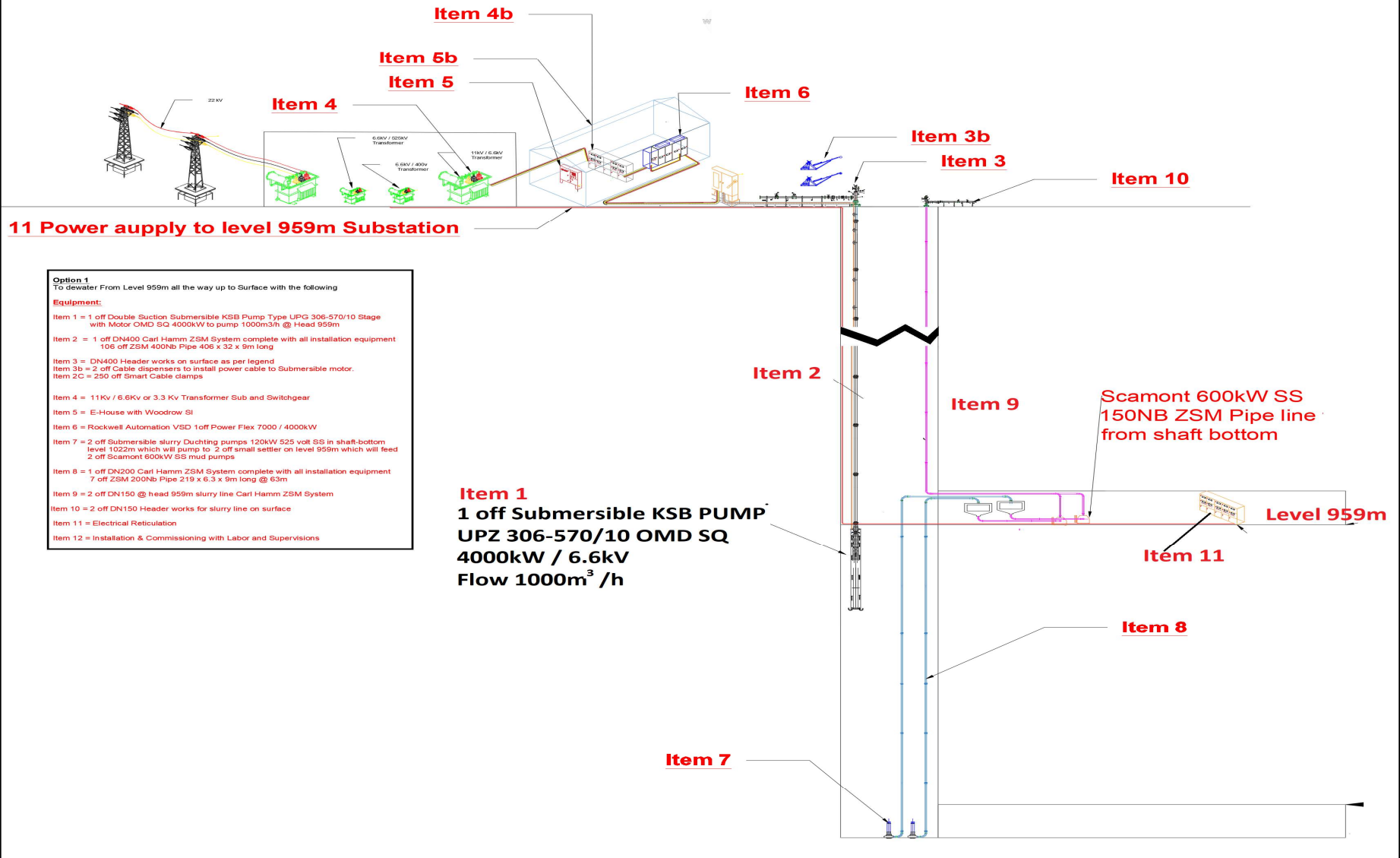


Verwendung:	Maßstab: 1:2,5		Position:		Menge:
	Oberflächen: ISO 1302 Reihe 2		Gewicht: Rohmaterial:		
Allgemeintoleranzen: mech. Bearbeitung ISO 2768-mk Schweißkonstr. EN ISO 13920 - BF		Benennung: ZSM-Kupplung DN100 Ø114,3 x 12,5		Zeichnungs-Nummer: RK-ZSM-K-0114-12-8K CT (rev_d)	
Datum		Name		Blatt	
Bear.	16.01.2019	JS		Bl.	
Gepr.					
Norm					
Schweißtechn. gepr.					
		Datei:			
Zust.	Änderung	Datum	Name		

Standard ZSM Vs Emulsion ZSM

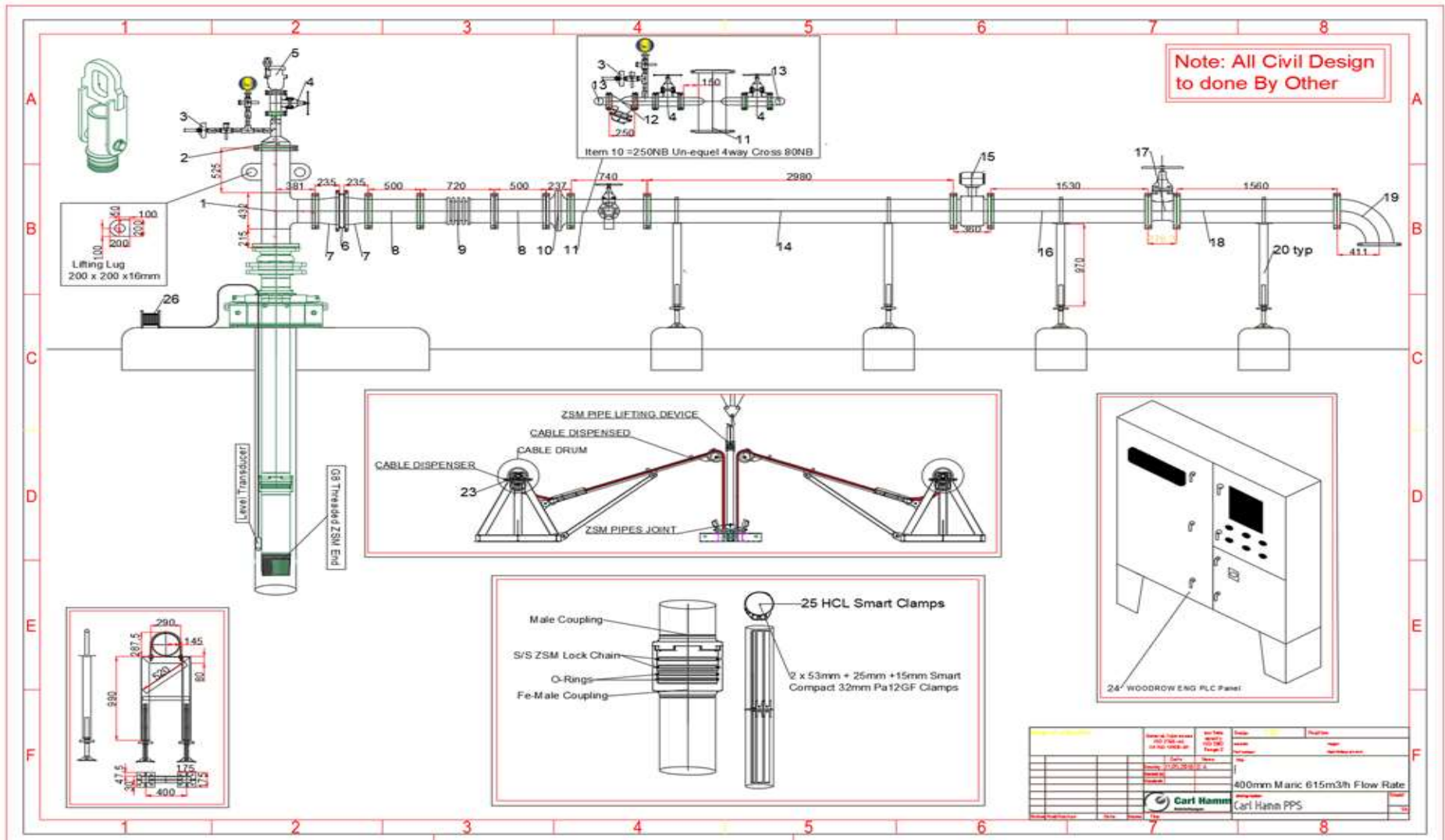


Turn Key offer



- Option 1**
To dewater From Level 959m all the way up to Surface with the following
- Equipment:**
- Item 1 = 1 off Double Suction Submersible KSB Pump Type UPG 306-570/10 Stage with Motor OMD SQ 4000kW to pump 1000m³/h @ Head 959m
 - Item 2 = 1 off DN400 Carl Hamm ZSM System complete with all installation equipment 106 off ZSM 400Nb Pipe 406 x 32 x 9m long
 - Item 3 = DN400 Header works on surface as per legend
Item 3a = 2 off Cable dispensers to install power cable to Submersible motor.
Item 2C = 250 off Smart Cable clamps
 - Item 4 = 11Kv / 6.6Kv or 3.3 Kv Transformer Sub and Switchgear
 - Item 5 = E-House with Woodrow SI
 - Item 6 = Rockwell Automation VSD 1off Power Flex 7000 / 4000kW
 - Item 7 = 2 off Submersible slurry Ducting pumps 120kW 525 volt SS in shaft-bottom level 1022m which will pump to 2 off small settler on level 959m which will feed 2 off Scamont 600kW SS mud pumps
 - Item 8 = 1 off DN200 Carl Hamm ZSM System complete with all installation equipment 7 off ZSM 200Nb Pipe 219 x 6.3 x 9m long @ 63m
 - Item 9 = 2 off DN150 @ head 959m slurry line Carl Hamm ZSM System
 - Item 10 = 2 off DN150 Header works for slurry line on surface
 - Item 11 = Electrical Reticulation
 - Item 12 = Installation & Commissioning with Labor and Supervisions

CHPPS Header works



CHPPS Header works: Legend

Item	Description	QTY	Item	Description	QTY
1	250NB Equal T- Piece Combined with Air Release Valve	1off	14	250NB Spool Piece = 3230 mm lg ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg	1off
a	250NB Wrought Steel But-Wel E-Qual Tee Sched 40	1off	a	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	2off
b	250NB Extension Pipe ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg = 525mm Lg	1off	15	250NB in-line MAG Flow meter	1off
c	250NB Extension Pipe ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg = 215mm Lg	1off	16	250NB Spool Piece = 1530 mm lg ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg	1off
d	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	3off	a	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	2off
e	250NB Slip-on Flange SABS1123-T4000 /3 - o/d450 - PCD 385 x 38mm - 40Bar	1off	17	250NB RSV Gate Valve	1off
f	Weld - On Lifting Lug 200 x 200 x 16mm	1off	18	250NB Spool Piece = 1560 mm lg ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg	1off
2	250NB to 80NB Reducer	1off	a	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	2off
a	250NB Extension Pipe ASNI B36.1 Sch 20 x 6,35wt x 41.7 Kg =50mm Lg	1off	19	250NB Wrought Steel But-Weld 90-Degree Elbow Bend Sched 40	1off
b	250NB 100NB Concentric Reducer Astm A234 WPB Sched 20	1off	20	Pipe Support Brackets	4off
c	100NB Extension Pipe ASNI B36.1 Sch 20 x 6,35wt x 41.7 Kg =150mm Lg	1off	a	Angle Iron 80 x 80 x 8 = 970mm lg	8off
d	100NB 80NB Concentric Reducer Astm A234 WPB Sched 20 / 40	1off	b	Angle Iron 80 x 80 x 8 = 480mm lg	4off
e	80NB Extension Pipe ASNI B36.1 Sch 20 x 6,35wt x 41.7 Kg =150mm Lg	1off	c	Angle Iron 50 x 50 x 6 = 464mm lg	8off
f	80NB Slip-on Flange SABS1123-T2500 /3 - o/d200 - PCD 160 x 22mm - 25Bar	1off	d	Angle Iron 50 x 50 x 6 = 400mm lg	8off
g	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	3off	e	M16 X250mm U-Bolt -Non Clamping	4off
3	Pressure Transducer Unit		f	ISO 7089 - M16 Washer	8off
a	20mm Weld-on Socket	6off	g	ISO 4032 - M16 Nut	8off
c	20mm T-Piece	2off	h	SCAFFOLD JACK ASSY (TYP)	8off
d	20mm 3 Way Ball Valve	4off	i	Jack Base Plate	8off
e	20mm Pressure Gauge - 40Bar	2off	21	Bolts	
f	20mm Screw in Pressure Transducer	2off	a	M16 x120mm lg Hot Dip Galvanized Bolt set with Nut & Washer	64off
4	80NB RSV Gate Valve	3off	b	M24 x120mm lg Hot Dip Galvanized Bolt set with Nut & Washer	156off
5	D-060-HFNS Combination Air Valve for High Flow Non Slam 80NB Flange	1off	c	M32 x120mm lg Hot Dip Galvanized Bolt set with Nut & Washer	16off
6	400mm Manic Rate Flow Control Valve 615m3/h Flow Rate	1off	22	Gaskets	
7	250mm to 300mm Concentric Reducer	1off	a	250NB x 3mm Ring Gasket Reinforced	14off
a	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	2off	a	80NB x 3mm Ring Gasket Reinforced	14off
b	300NB Slip-on Flange SABS1123-T2500 /3 - o/d485 - PCD 430 x 32mm - 25Bar	2off	23	Cable Dispenser	2off
8	250NB Spool Piece = 500mm lg ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg	2off	24	Woodrow ENG - PLC Panel	1off
a	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	4off	25	2 x 53mm + 25mm +15mm Smart Compact 32mm Pa12GF HCL Clamps	
9	250NB Single Free Type Bello - Expansion Joint	1off	26	Level Transducer	1off
10	250NB Rienzi Wafer Diaphragm None Return Valve Model 325 = 25Bar	1off			
11	250NB Unequal 4 way cross with 80NB branch Pipe 150mm lg	1off			
a	250NB Slip-on Flange SABS1123-T2500 /3 - o/d425 - PCD 370 x 30mm - 25Bar	2off			
b	80NB Slip-on Flange SABS1123-T2500 /3 - o/d200 - PCD 160 x 22mm - 25Bar	6off			
c	80NB Spool Piece = 150mm lg ASNI B36.1 Sched 20 x 6,35wt x 41.7 Kg	2off			
12	80NB Ultra Surge Anticipation Valve = 25Bar	1off			
13	80NB 90degree Elbow Bend	1off			

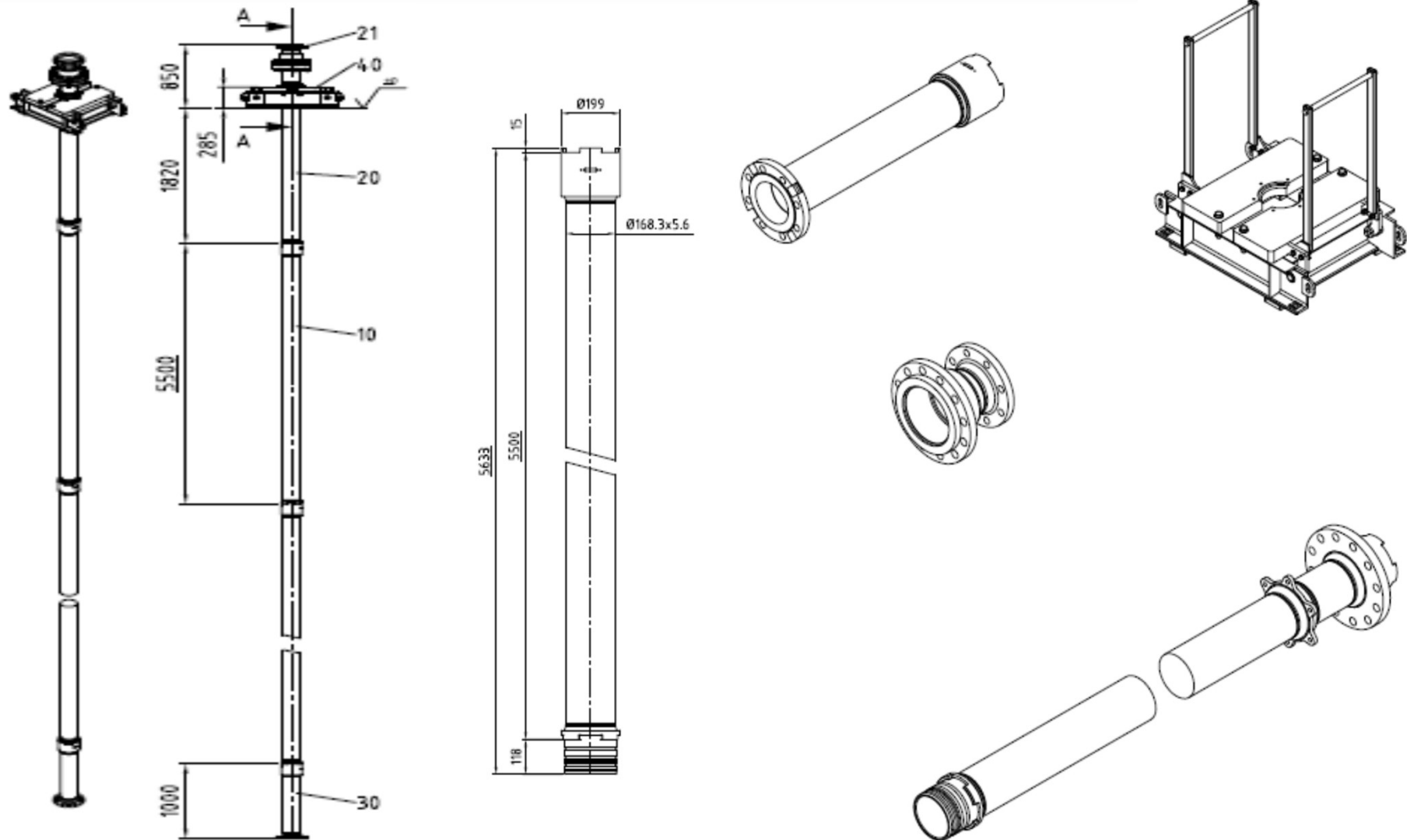
CHPPS Header works: Notes

The Header works has been built in Consultation with KSB / Carl Hamm PPS / JTA.

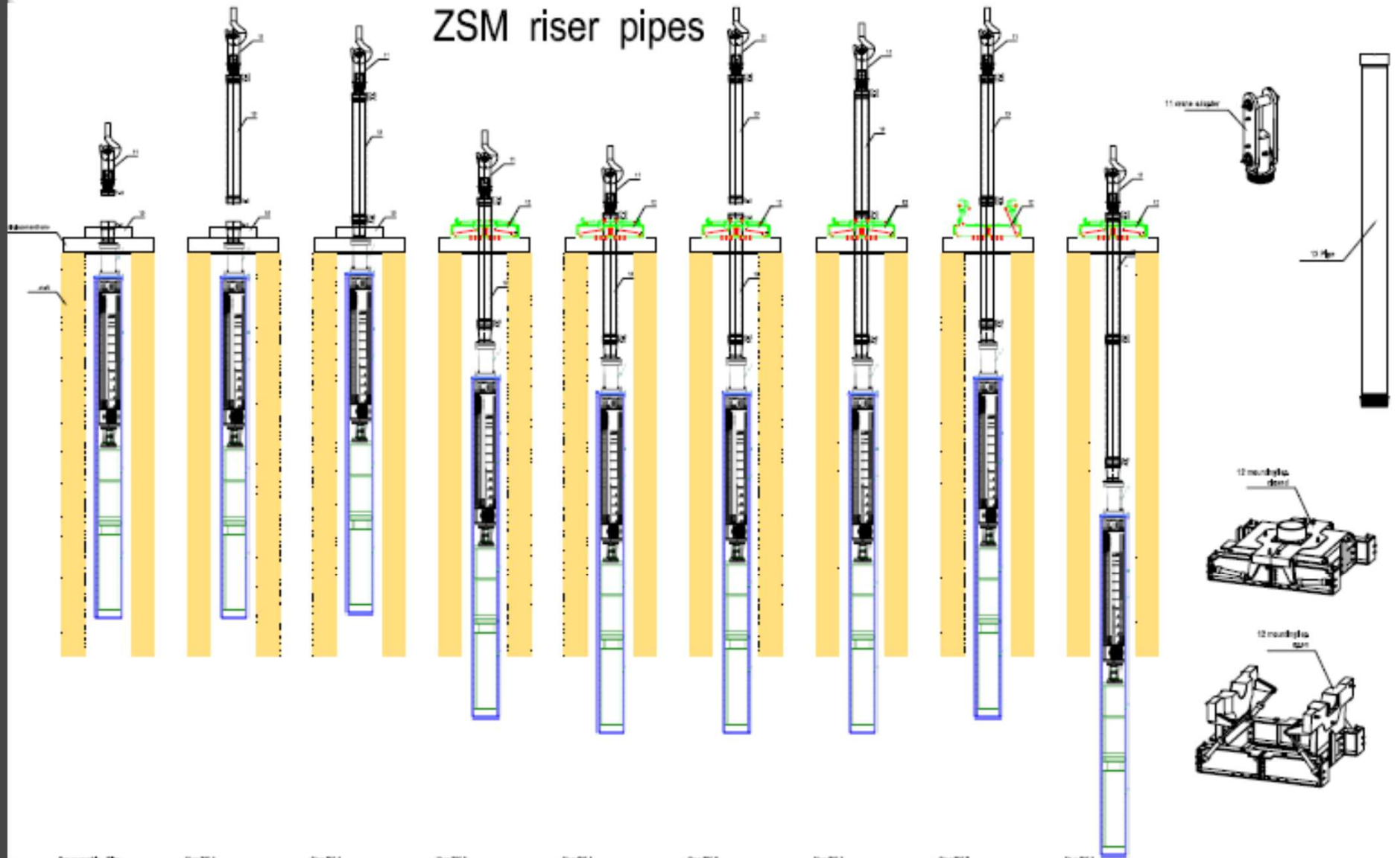
- A 1). The Header works comprises of 250 nb body rated @ 25 Bar and is Hot Dipped Galvanized.
- 2). Individual instruments are installed for specific functions but all are geared to common goal - protection of Pump and System while supplying operational information.
- 3). Level Transducer @ Item 26. This unit is lowered with Pump and is positioned just above Pump outlet.
- B 4). Pressure Transducer before Non - Return Valve @ 3. This unit measures the system pressure while Pumps running.
- 5). Pressure Transducer after Non - Return Valve @ 3. This unit measures the system pressure while Pumps is stationary.
- 6). Flow Meter @ Item 15 measures rate of flow.
- 7). By utilizing the information 3 - 7 means the pump duty point can be de determined at all times. This can be related to Motor KW if overall picture is required.
- C 8). Air relief Valve @ item 5 is installed to eliminate Air entrapment, to assist with reducing water hammer and to ensure that there is no Vacuum built up.
- 9). MARIC Rate of Flow Control Valve @ Item 6. This Unit will work in event of a burst pipe or if something goes wrong on controls. The Pump physically cannot go into over-pump / overload and such pump is protected.
 - Duty 330m³/h = 300nb MARIC
 - Duty 500m³/h = 400nb MARIC
- D 10). Surge Anticipation Valve @ item 12. This unit will work in event of power outage and VSD cannot slow pump down. The valve will vent excess pressure limiting water hammer protecting pipe, fittings and Pump.
- 11). Scour Valve @ item 13. This unit is used to drain the system rising main if required. It must always be placed after Flow meter and after pressure transducers so that the valve is used for secondary purposes i.e. to fill water tanker the pump still measure this as part of system.
- E 12). We can offer a stand alone PLC unit can be programmed above as well as temperature sensors from Motor. Convert it to points required to be transmitted to central control.
- 13). Transmission can be done via Internet, line of site transmitter or GPRS.
- 14). This PLC unit can accept input from VSD and give information to VSD. With this information the Team in Charge of abstraction will have first hand information at all time.
- F 15). Not Mentioned but can be offered separately is Carl Hamm Cable dispensers will reduce damage to cables and reduce installation time. They will also insure cables comes down vertically with pipe so strapping system HCL Smart Clamps can be used to fasten cable and remove all slack.

Item No.	Description	Quantity	Unit	Location	Remarks
1	Header Works	1	nb	250nb	
2	Pressure Transducer	2	pcs	Before/After NRV	
3	Flow Meter	1	pc	Item 15	
4	Air Relief Valve	1	pc	Item 5	
5	MARIC Valve	1	pc	Item 6	
6	Surge Anticipation Valve	1	pc	Item 12	
7	Scour Valve	1	pc	Item 13	
8	PLC Unit	1	unit	Control Room	
9	Cable Dispenser	1	pc	Item 15	
10	HCL Smart Clamps	1	pc	Item 15	

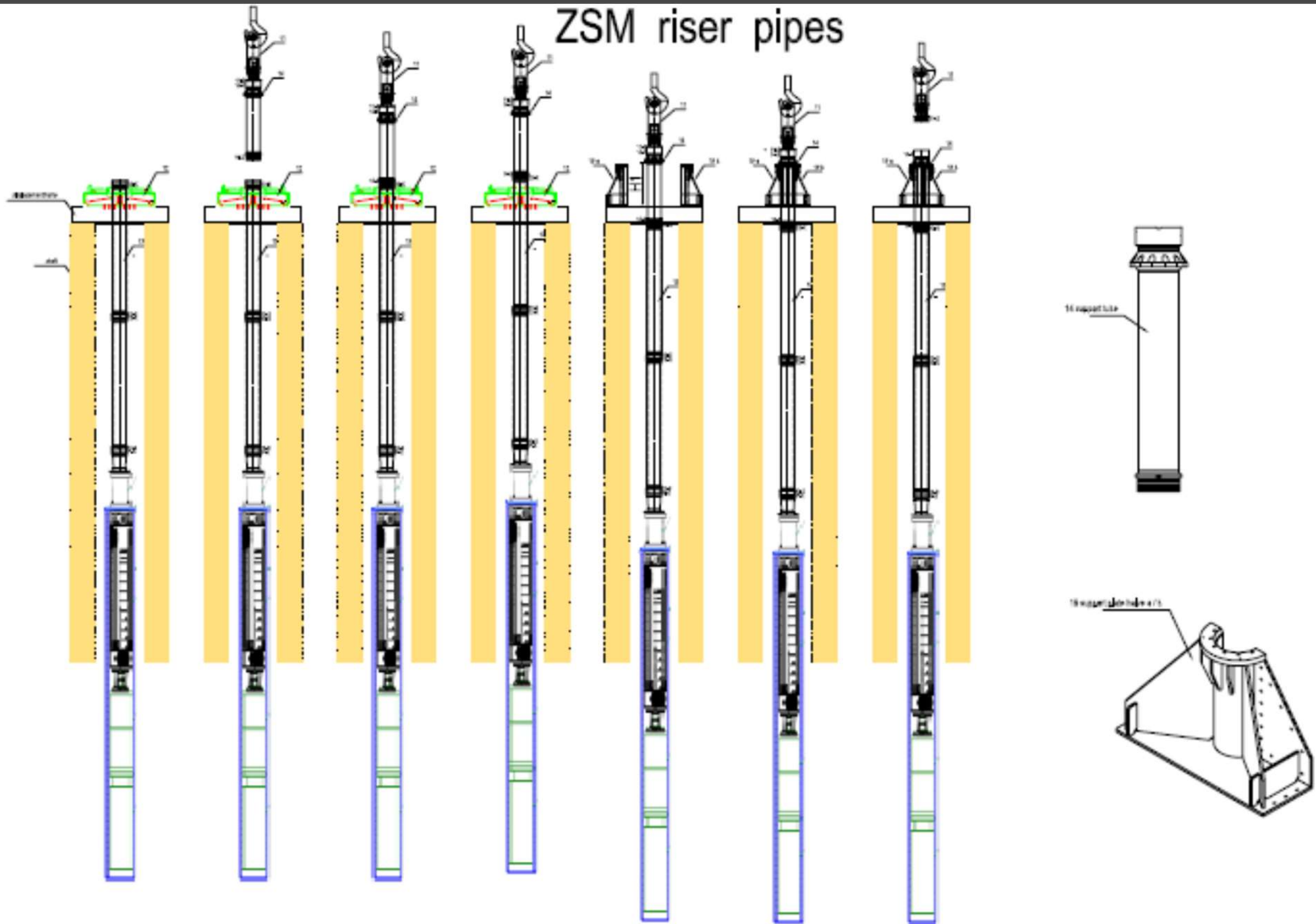
ZSM Installation Components



ZSM riser pipes



ZSM riser pipes

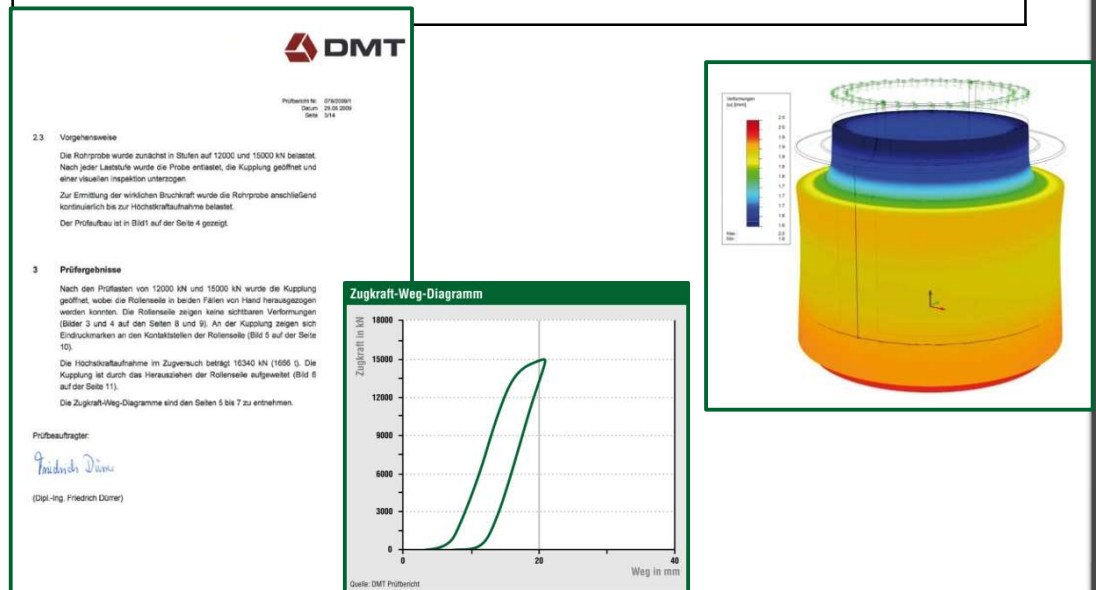


Everything from one source



Planning & conceptual design

- Budget planning
- Static calculations
- Preparation of the overview and detail drawings



Everything from one source



Manufacturing

- In-house process
- Professional production
- Depending on the requirement, we produce ZSM Pipelines made of:
 - Carbon steels (e.g. P355 ff)
 - Stainless steels (e.g. 1.4571)
 - Duplex steels (e.g. 1.4462)
- Inside and outside coating systems



Carl Hamm PPS Quality Management



- Our quality management system is certificated under DIN EN ISO 9001:2000. As an approved specialized company for welding applications (AD 2000 HP0 and DIN EN ISO 3834-3, formerly DIN EN 729-3) we fulfill both local and international requirements.











- We can produce various certificates of process reviews and individual welding qualification certificates for all our MAG, TIG, and submerged arc welders, as well as authorization to transfer markings for metallic products with test certificate 2.2 and 3.1 according to DIN EN 10204:2005.



- The DIN EN 473 certificated personnel In our Quality Assurance department ensure a consistently high quality standard with radiation (RT), dye penetration (PT), and magnetic particle (MT) tests done throughout the production process.

DÜCTING Agents



		MAX. FLOW [m³/h]	MAX. PRESSURE [bar]	PH - VALUE	MAX. DENSITY [g/l]	MAX. PARTICLE SIZE [mm]	MATERIAL
MC		1500	10	0-13	1,700	2	SICast®
MCC		20000	6	0-13	1,700	2	SICast®
MCS		3200	10	0-13	1,700	2	SICast®
MCV		12500	8	0-13	1,700	2	SICast®
WR		12000	16	0-14	1,700	100	various metals
WRX		5000	16	0-14	2,500	240	various metals
WRS		550	10	0-14	1,700	10	various metals
WRV		4000	16	0-14	1,700	50	various metals
IP		4200	15/100	0-14	1,250	1	various metals
HPH / HPE		3500	250	0-14	1,250	1	various metals
HPXL / HPXM / HPXU		3500	160	0-14	1,400	4	various metals

- Carl Hamm PPS is the South African Agents for **DÜCHTING PUMPEN**
- **All staff of CHPPS will receive training on the full range eg: HPXL / HPXM /HPXU which will allows CHPPS to offer in House.**
 - Rebuild, Repairs & Damage Analysis.
 - Vibration Analysis
 - Re-balancing of the Pump runner

CHPPS will be able to do the following on site

- Commissioning Assistance & Troubleshooting.
- Laser Alignment & Condition / Vibration Analysis.
- Flow Rate measuring
- Pump rebuild and repair in workshops on site.
- Supervision

Clients will be invited to our inhouse training centre where they will receive training on DÜCHTING Range

HPXL / HPXM / HPXU



- Normal Pressure up to 160Bar.
- Flow Rate 3.500 m³/h
- Available in almost all metallic materials from Cast Iron to Super Duplex
- 4-Pole Pumps for liquids with abrasive Content
- Maximum Density up to 1,400g/l
- Can handle approx. 50.000ppm which is 5 % per volume more than other pumps in the market that can handle 300ppm.
- Low Speed = Low wear

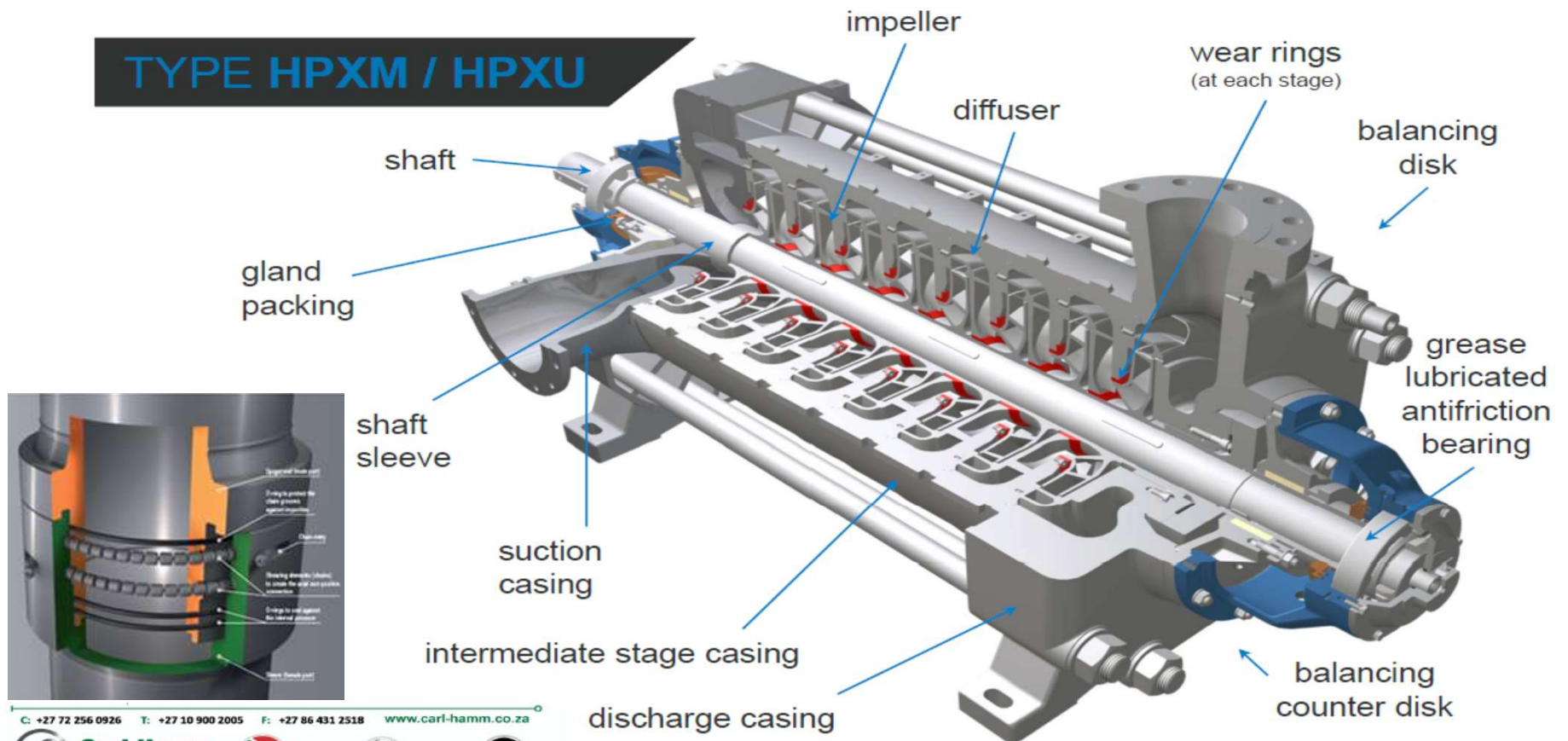
Thank you – Questions ?



MULTISTAGE PUMPS



TYPE HPXM / HPXU



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