威海鸿通管材股份有限公司
Weihai Hongtong Piping Materials Co., Ltd.

Introduction of Glass Fiber Reinforced Plastic Composite Continuous Cable Containing Pipe

Weihai Hongtong Piping Material Co.,Ltd.

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Corporate Product Video

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Introduction of Glass-Fiber Reinforced Plastic Composite Continuous Cable-Containing Pipe

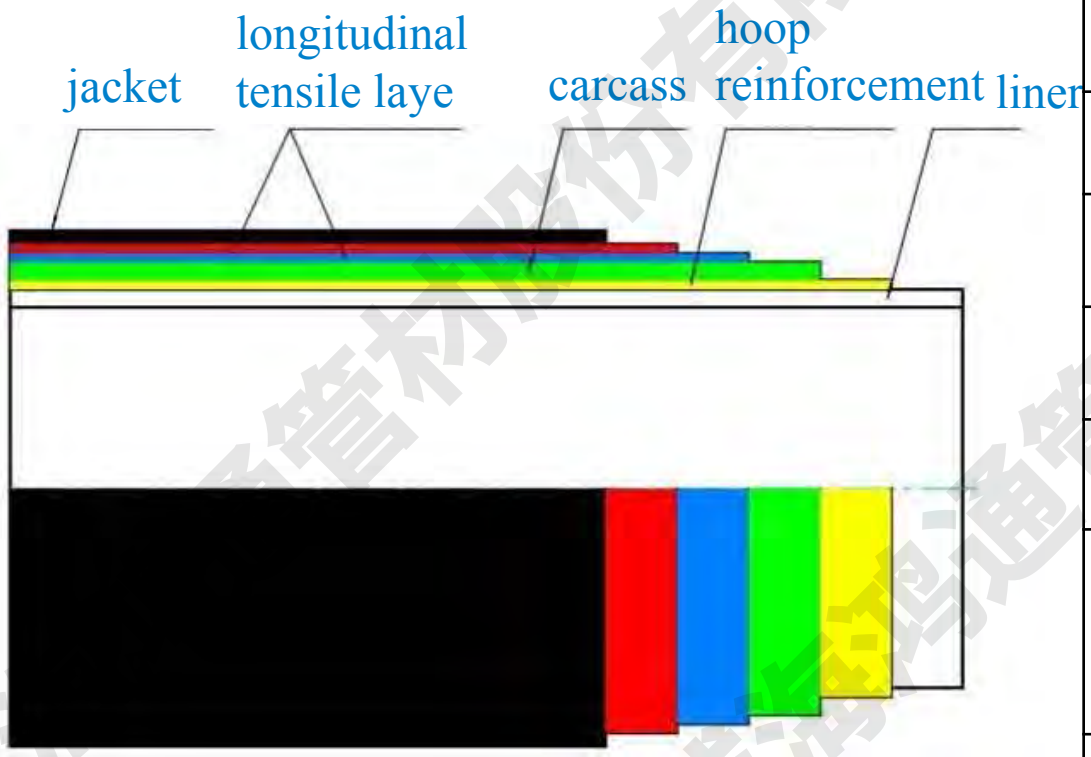
Part.02

Production Tubing Structure

Glass-fiber reinforced cable-containing scoolable composite pipe(FRCCSCP) is a totally non-metallic continuous plastics composite pipe. The design concept comes from the development of high-performance marine oriented flexible pipeline, thhe Chinese National 863 high-tech Program “Non-metallic Composite Offshore Pipes for Deep Water”, combined with exquisitely designed cable-laying technique to develop a new piping products., working together with automation control technology to form this high-performance, automatic controlled, cost-effecive and environmentally friendly intelligent production system.

Pipe structure

Production Tubing Structure



NO	name	material	function
1	Liner	Polymers	Seepage prevention, anti-corrosion, impact resistance
2	Hoop reinforcement	Resin,high strength fiber	Protective lining,resistance to hoop stress
3	Carcass	Resin, high strength fiber	Resistance to internal and external pressure
4	Longitudinal tensile layer	Resin, high strength fiber	Resistance to axial tension
5	Longitudinal tensile layer containing tables	F46 sheathed cables embed fiber-resin structure	Resistance to axial tension & Transport of power and signals
6	Jacket	Polymers	Anti-corrosion, wear resistance, Protection against leakage and protection of pipe

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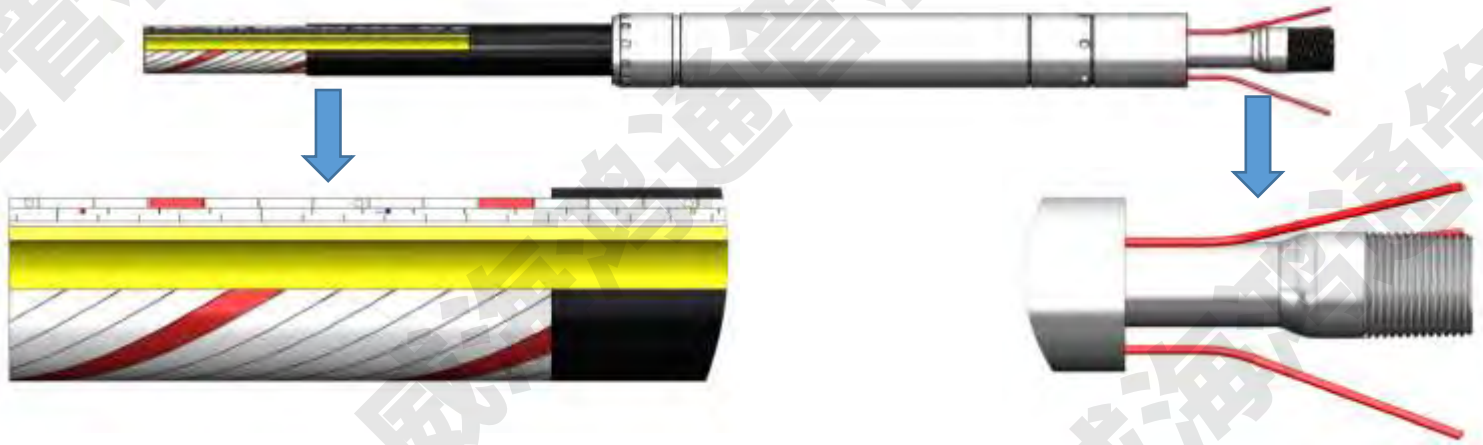
Rigid end--fitting specially designed for non-metallic un-bonded composite flexible piping system;

End-fitting material of Stainless Steel 316 & 625/825 recommended

Connections: continuous piping system, one well one pipe, basically no connector needed



Above: End-fitting structure of non-metallic unbonded composite flexible pipes

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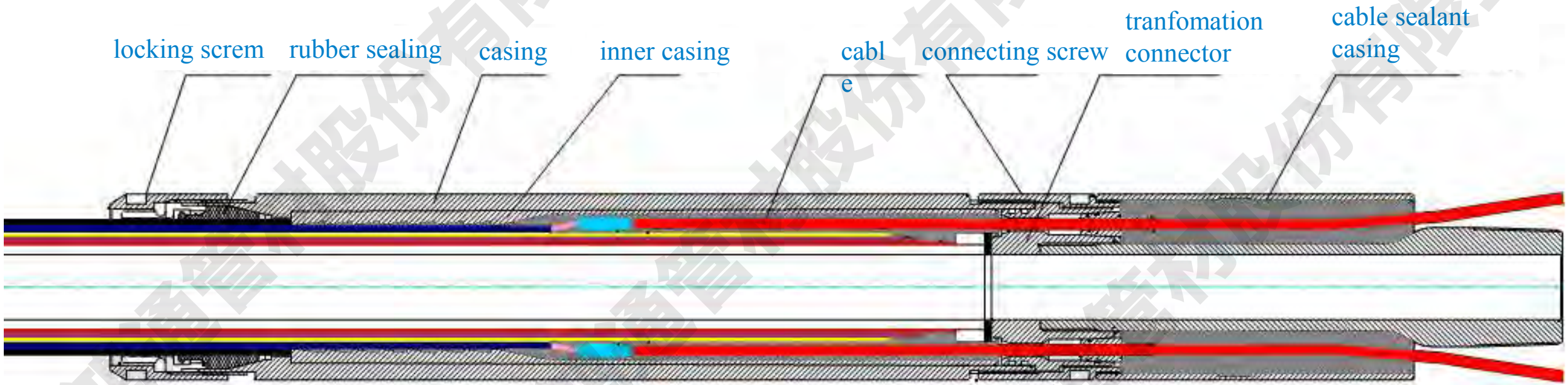

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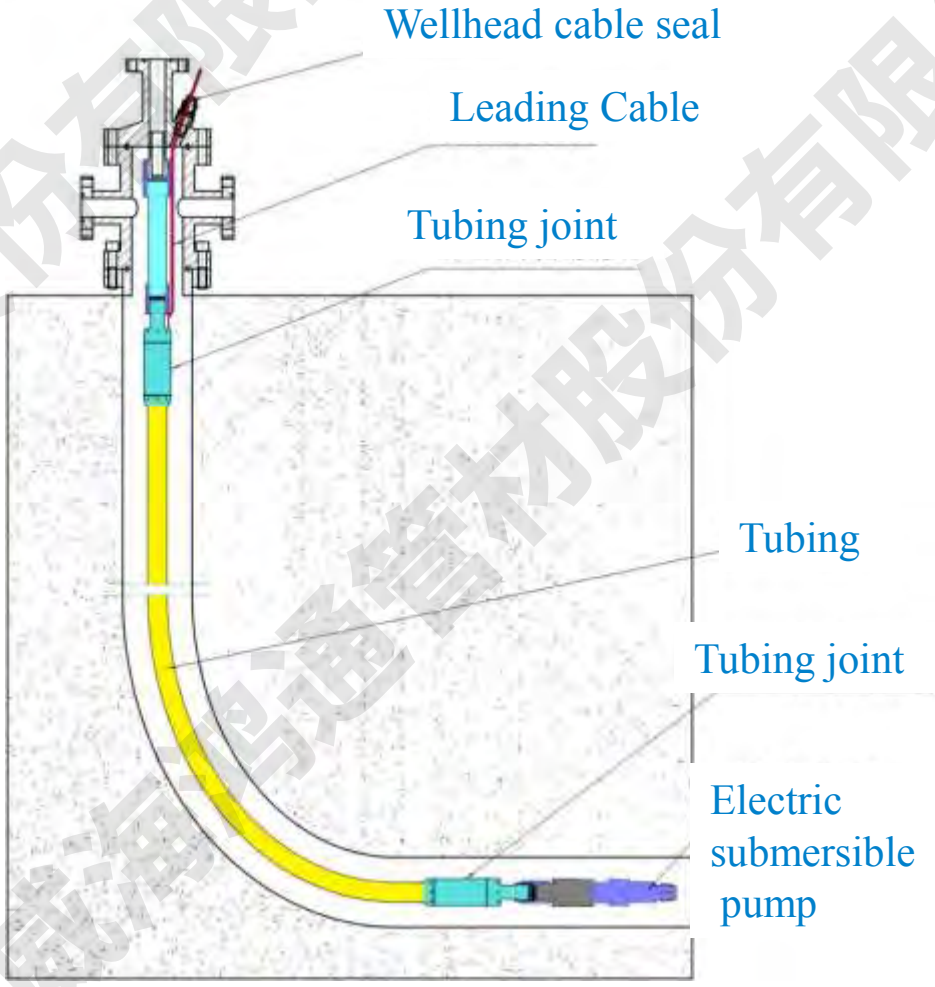
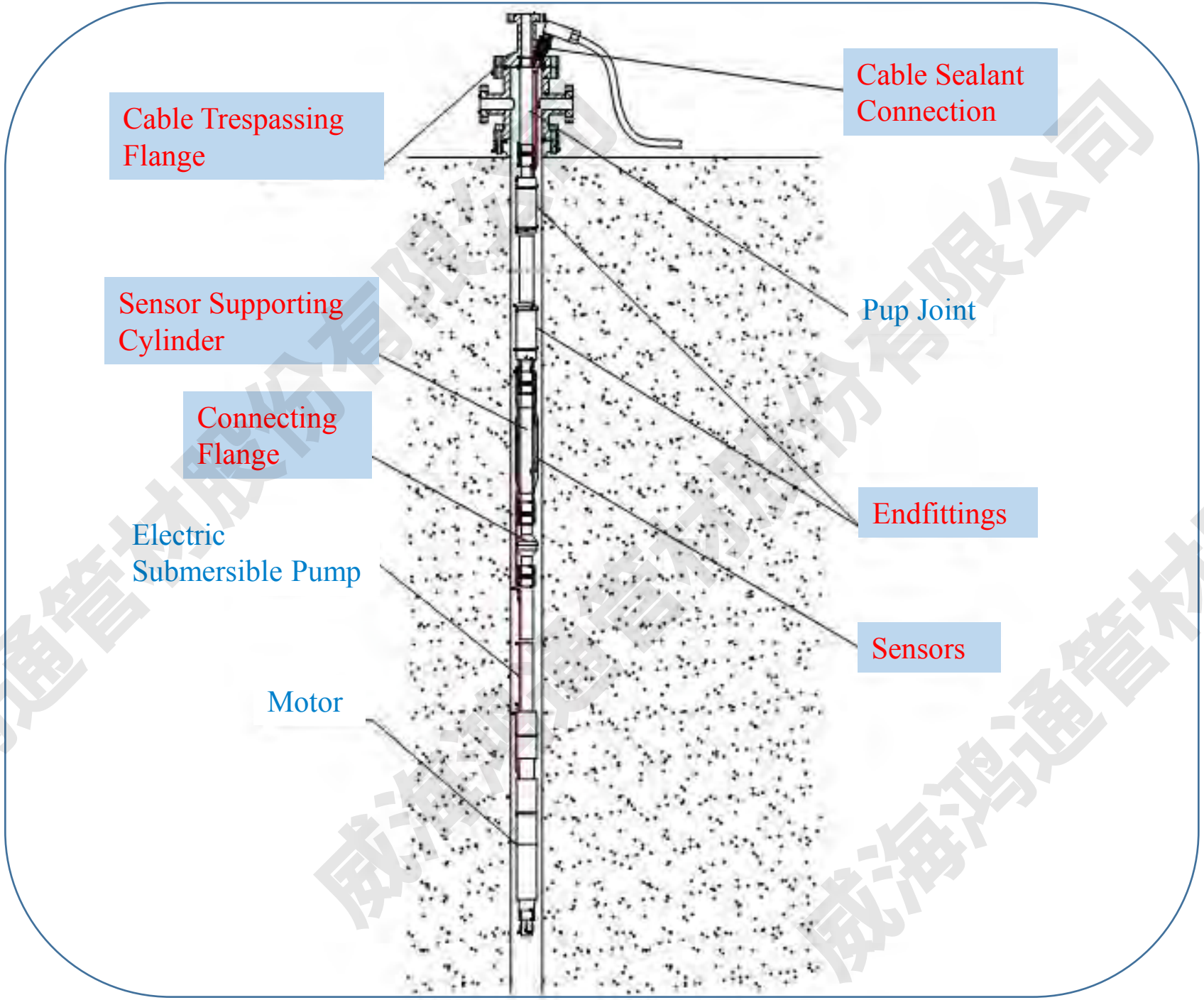
Glass-fiber reinforced cable-containing scoolable composite pipes(FRCCSCP) products and endfittings work together with automation control technology to form a high-performance, automatic controlled, cost-effecive and environmentally friendly intelligent production system.



Pipe structure



System Advantages:

1 Multi-layered high-performance continuous composite piping to provide high strength and flexible production system;

2 Inner contained power supply and signal cables which are laid within and well protected by fiber-reinforced plastic belts, supporting safe and durable working of electric submersible pump(ESP) system;

3 Continuous down hole piping system for quick and continuous installation of production system;

4 Totally plastic composite materials to sustain acid/alkaline conditions, Longer working lives;

5 Low maintenance, uninterrupted production processes;

6 Less labor needed, both in installation & production, better working conditions;

7 Automatic & intelligent production system from monitoring to office remote control management, cost & time effective;

8 No/least oil spill or other pollutions, environment friendly.

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Main technical characteristics of glass-fiber reinforced plastic composite cable-containing pipe

Basic parameters of glass-fiber reinforced plastic composite cable-containing pipe

	ID (mm)	OD (mm)	Pressure rating (MPa)	Reel length (m)	Net weight (Kg/m)	MBR (m)	Anti-crushing strength (MPa)	Maximum axial tension (t)	Anti-torque (N.m)
DN40	40	83	25	2000	6.3	0.9	> 8	≥30	1500
DN50	50	92	25	2000	7.1	0.9	> 8	≥30	1500
DN62	62	100	25	2000	8	1	> 8	≥30	1800

Performance parameters of glass-fiber reinforced plastic composite cable-containing pipe

Item	Coefficient of thermal conductivity (w/m·k)	Applicable temperature range (℃)	Absolute roughness (μm)	Axial elongation under internal pressure (‰)	Radial expansion under internal pressure (‰)
Parameter	0.21	-10~85	0.37	≤5	≤1

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Product operating conditions ，Adapt to the requirements of work wells

1、Glass-fiber reinforced cable-containing scoolable composite pipes(FRCCSCP) for vertical wells and directional wells up to 2000 meters deep（31°）。

2、 Downhole temperature does not exceed 80℃（ When the use temperature exceeds 80℃, it is necessary to replace the lining material with better temperature resistance, such as PVDF, and the cost will be greatly increased. ）

3、Corrosive media content

CO_2(PPM)	H_2S(PPM)	H_2SO_4	HNO_3	HCL	NaOH
< 100,000	< 100,000	< 30%	< 40%	< 30%	< 40%

Features of System and Products

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Three features of glass-fiber reinforced plastic composite continuous cable-containing pipe

01

Totally non-metallic pipe, free of corrosion

02

Flexible, continuous coil piping, reel transport & installation

03

Integrated pipe line structure, all cables contained within the pipe

1、Totally Non-metallic Pipe

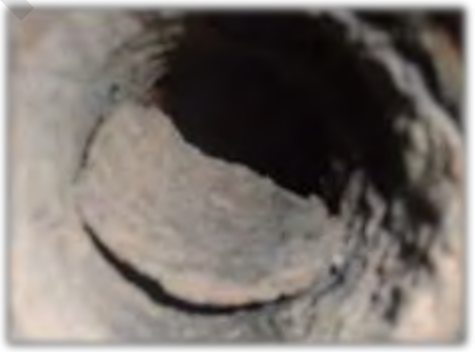
Glass-fiber reinforced continuous cable-containing plastic composite pipes are made totally of non-metallic materials except for stainless steel end joints and cable wires, thus are corrosion resistant.

The inner wall of the pipe is smooth and water proof, and multi-layered plastic thickness provides good insulation piping property, reducing the viscous resistance and over power consumption of the pump.

The main structural piping material is glass-fiber reinforced plastics, with its thermal conductivity is 0.21W/(m·K), while the thermal conductivity of steel is about 45W/(m·K), so glass-fiber reinforced plastics have much better heat insulation performance compared with that of steel pipes, thus effectively reduce the heat loss in conveying. processes.

The following pictures show the comparision of inner wall appearances of the two piping matereials after two years of usage.

Multi-layered Pipe inner wall



Steel wellhead hanger inner wall

2、Flexible,continuous coil

Glass fiber-reinforced plastic composite continuous cable-containing pipe (FRCCSCP) is a multi-layered unbonded composite structure. This structure gives the pipe better bending properties through relative slippage behavior among different layers, thus provides higher anti-crushing strength, low deformation and better protection to cables when bending.

On the contrary, the bending of traditional bonded pipe is realized by elastic deformation of the materials, which leads to the lack of rigidity of the material, thus has higher risk while bending.

Product pipeline

3、Pipe line integration, all the cable contained within the piping

Integrated pipe section

Integrated piping system with all power cables, signal cables and heating cable (when needed) contained in piping walls, to supply power for submersible electric pump, and signal cables to provide independent signal transport,.

Intelligent system can real-time monitor down hole data during the pump stop or working periods .Heat preservation and auxiliary heating cable can raise the temperature of pipe string, used for heavy oil viscosity reduction or broken down prevention.

Protected cables embedded within the pipe wall are free of collision and abrasion during the process of lifting and lowering operations，cable and casing walls will be protescted from outside damage，cable binding and unbinding can be avoided, with no need for separate cable reeling equipment.

Improved operation efficiency and avoidance of motor & tubing vibration-induced wear and tear of cables, can raise the cable service life as long as the piping .

3.1 Cable performance characteristics

The Glas-fiber reinforced plastic composite continuous cable-containing pipe is manufactured according to the pipe structure characteristic and using special order.The outer surface of the cable coreis is sintered with a polyimide film layer, which is further protected by fluoroplastic layer outer sheath which has high temperature & electricity insulation performance,as well as other high physical and chemical properties.

Cable in coil

Cable section

3.2Digital automatic control system

Intelligent control system can use downhole data acquisition system.The parameters such as liquid level control and temperature are collected through the PID operation to adjust the operating speed of the electric pump to achieve the intelligent closed-loop control of the submergence of the electric pump, so that the submergence degree has always been the best, to avoid the occurrence of high liquid level control or dry pumping phenomenon.

All the data collected together with the parameters of the electric pump is uploaded to the remote online monitoring system withmobile phones and other mobile terminals.The system will alarm or stop the pump to prevent the system from ill running, to avoid peak operation according to the need, so and to achieve the goal of reducing cost.

The signal transmission system provides necessary conditions for the realization of the automatic control.

4. Product-specific introduction--Oil production system features of glass-fiber reinforced continuous cable-containing plastic composite pipes

- 1. The tubing and cable are integrated, and the cable is embedded in the wall of the tubing to make the cable and tubing have the same life
- 2. Complete non-metallic structure, light weight, corrosion resistance, long service life.
- 3. The inner wall of the pipe is smooth, with low friction, low energy consumption, no hydrophilicity and no scaling.
- 4.Complete non-metallic structure, low thermal conductivity, low temperature drop during transport.

Features of System and Products

- 5. The continuous length is long, a well is a pipe, and there is no joint in the middle.
- 6. According to the downhole sensor can automatically adjust the electric pump operating parameters to achieve intelligent oil production.
- 7. Users can observe and read temperature, level and other parameters in real time through the Internet or mobile terminals.
- 8.The operation mode of the vehicle-specific working equipment has been transformed into continuous operation to reduce labor intensity and save labor time.
- 9. Energy-saving and environmental protection, saving 50% electricity compared to traditional pumping methods, and the operation is pollution-free.

Installation Operation Equipments Introduction

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Installation Operation Equipment includes wellhead repair operation vehicle and pipe reeling operation vehicle, the repair vehicle is used to lift and lowering down the pipe string, and the reeling vehicle is used to spool and release the piping on the reel vehicle. These equipment operations are highly automatic, and are equipped with operation parameter recorder, to record and store the repair data, making repai work more convenient and labor-effective.

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Characteristic operation parameters of installation equipment

reeling vehicle operation parameters		
characteristic operations	units	parameters
reel dimension（od×id×width）	m	3.2×1.8×2.38
speed of reeling	r/min	0～5
equippment dimension（length×width×height）	m	9.6×2.4×4
hydraulic working pressure	MPa	12
power capacity	Kw	8

installation/repair vehicle operationparameers		
characteristic operation	units	parameters
demesions（length×width×height）	m	13×3×4.3
crane lifting height	m	≤11
crane hooking force	t	≤20
tractor hauling force	t	≤15
lifting & lowering speed	m/h	0~450
hydraulic working pressure	MPa	≤16
hydraulic oil tank volume	m^3	1.2
power capacity	Kw	40

Ⅰ、Construction and Installation operation Characteristics of FRCCSCP

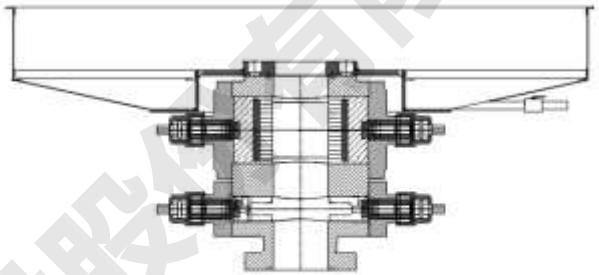
1、Highly automatic operation system

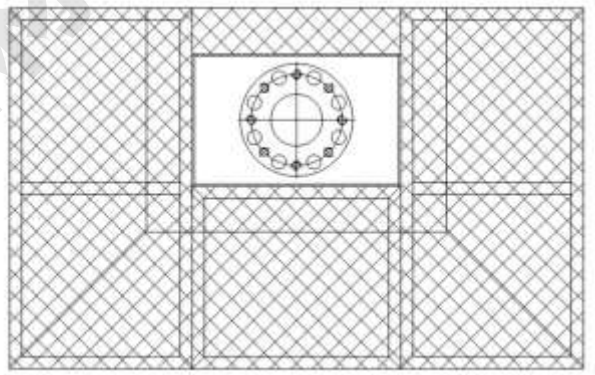
The sytem can can work automatically normally and can operate with only two workers (one operating the equipment, one observe) in pipe string lifting and downloading processes, reducing working strenth, with operation parameter recorded automatically。

2、Environmentally Operation Conditions

2.2 Wellhead pipe cleaning equippment

The wellhead lifting operation platform has automatic washing equipment around the pipestring, with high-pressure washing nozzles distributed evenly within the spraying cover casing, and the oil contamination scraping boards remove all the oil remains completely.





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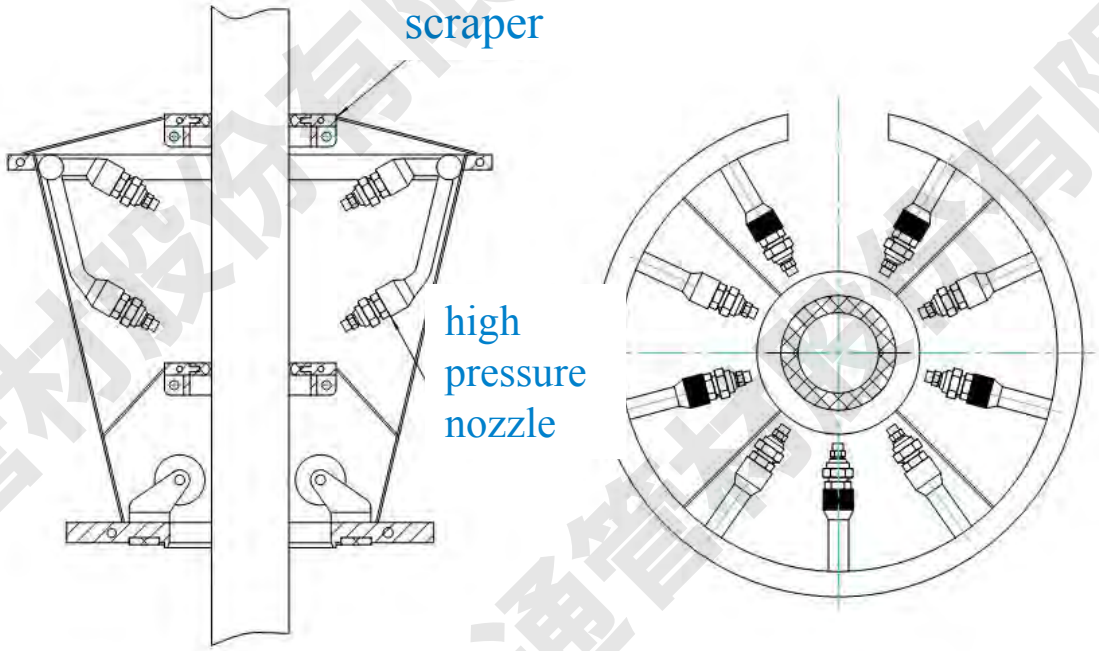

The pipe string cleaning equipment

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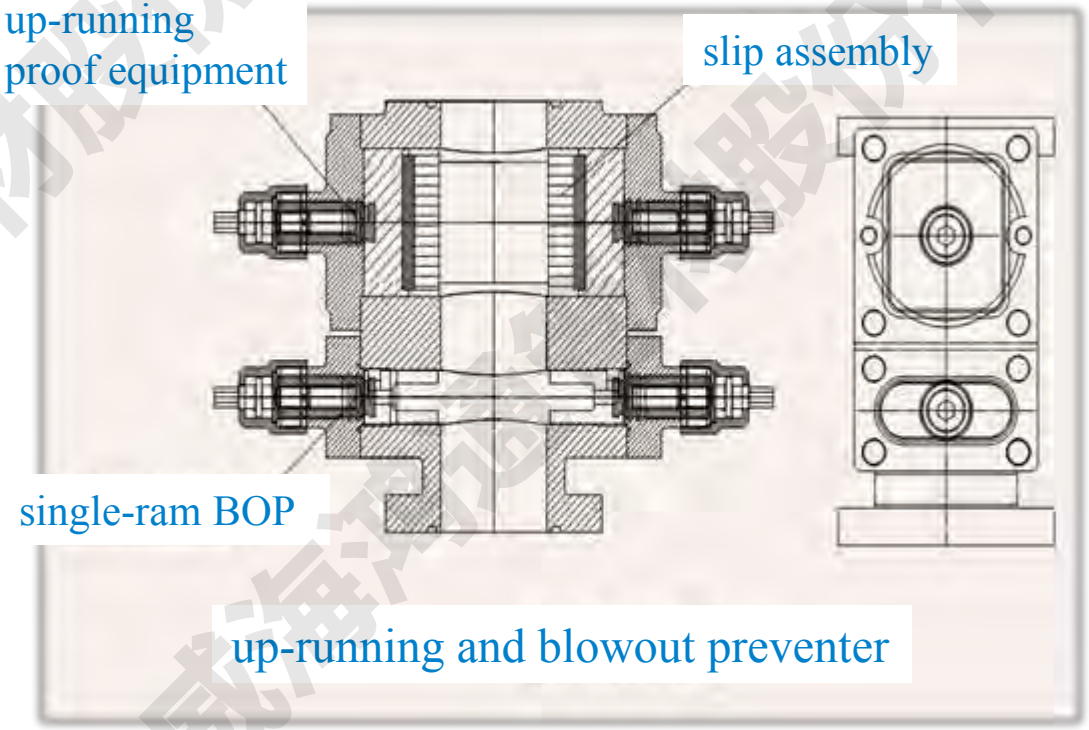
Ⅱ、Well repair operation equipments

1、Special flashboard gate blowout preventer

The flashboard blowout preventer is combined with pipe anti-extrution equipment to form a unified，



3.2 Endfitting sealing equipment

- The reeling vehicle has high pressure rotating joint and high pressure valves to connect high pressure hose with pipe endfitting, to ensure the valve can be closed or opened during reeling oparation and to meet the sealing and anti-extrution requirements.

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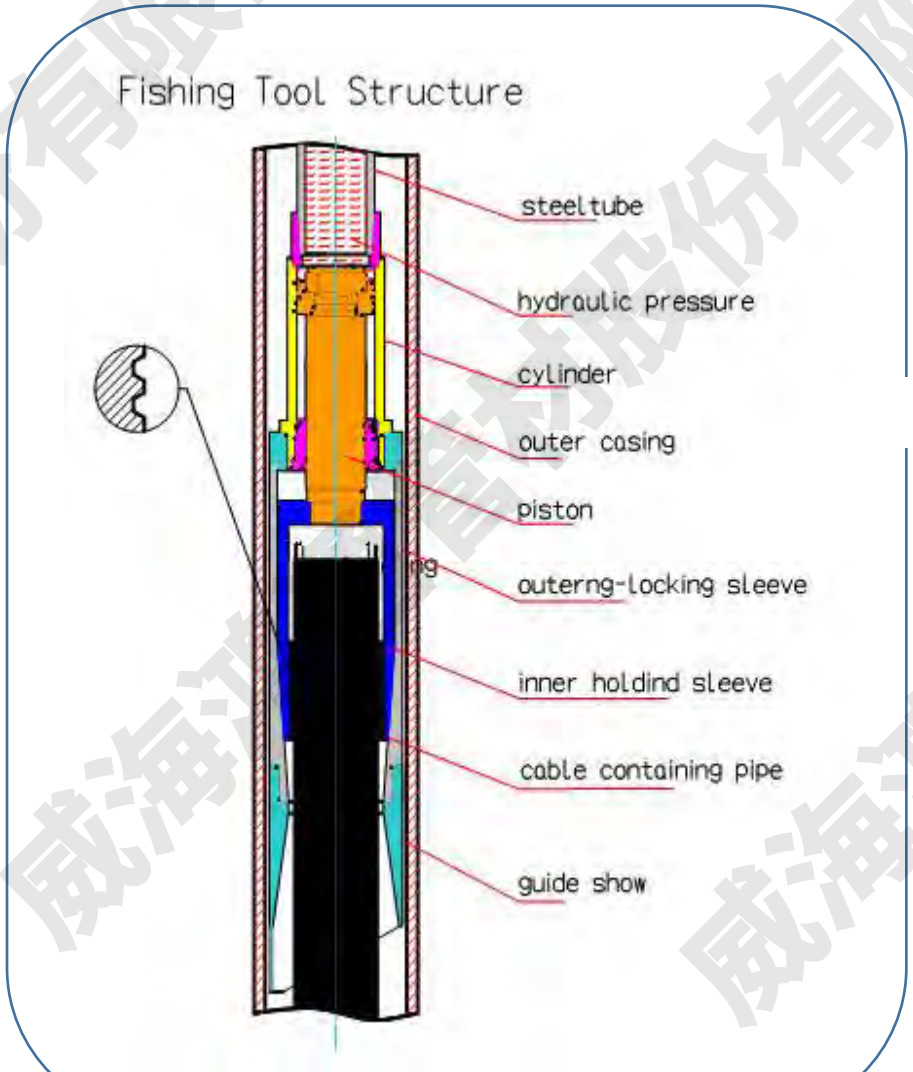
3.3 Glass fiber reinforced plastic composite continuous cable containing pipe is equipped with special fishing tools——Hydraulic active fishing cylinder, the fishing tool for the company's own design research and development, access to invention patents, provide a guarantee for workover operations.

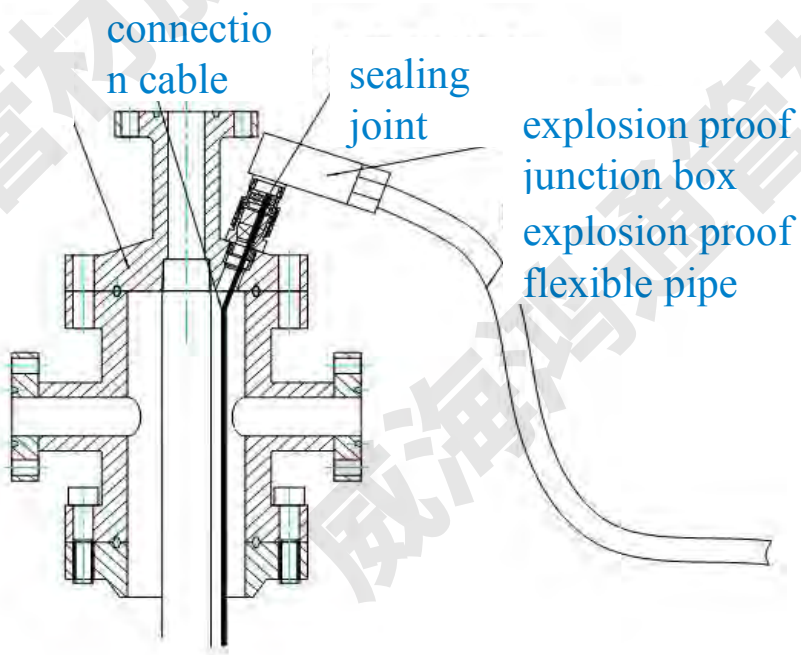



The guide shoe is spiral and the inner hole is tapered

Wellhead Leading Cable sealing

3.4 Sealin

The sealing equipment for wellhead trespassing leading cables consists of cable-conductor sealing franc and wellhead cable-sealing connectors, with cables in pipes trespassing the cable-conductor and connecting to outside wellhead, sealed by cable sealing joint on sealing francs, which are more advantageous than ordinary ones in the following:



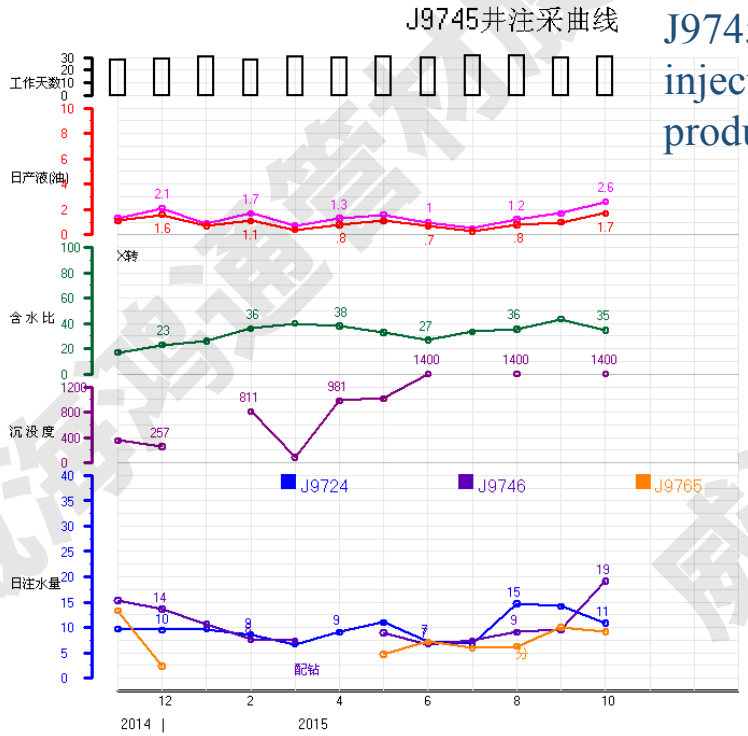
Application

Recent performance of Hong Tong coiled tubing

user	time	quantity	operation mode
CNPC Xinjiang Oil Field Branch Company	2015	3 oil wells	2 well hung reciprocating pump1 well hung screw pump（Baker Hughes）
CNPC Xinjiang Oil Field Branch Company	2017	76 wells	9 well hu 67 well hung reciprocating pump
CNPC Changqing Oil Field Branch Company	2017	2 oilwells, 1 injection well	2 well hung screw pump（domestic） 1wells are used for water injection
CNPC north China Oil Field; coalbed methane company	2017	3 wells	hung centrifugal pumps
Sinopec Shengli Oil Field Branch Company	2012	23 injection wells	water injection

Application case:

Glass fiber reinforced plastic composite continuous cable containing pipe continuous submersibleeters. Pump used in both vertical well and inclined wells (31 DEGinclination angle), the pump is located at a depth of 1400~1500 meters



J9745 Well injection production curve

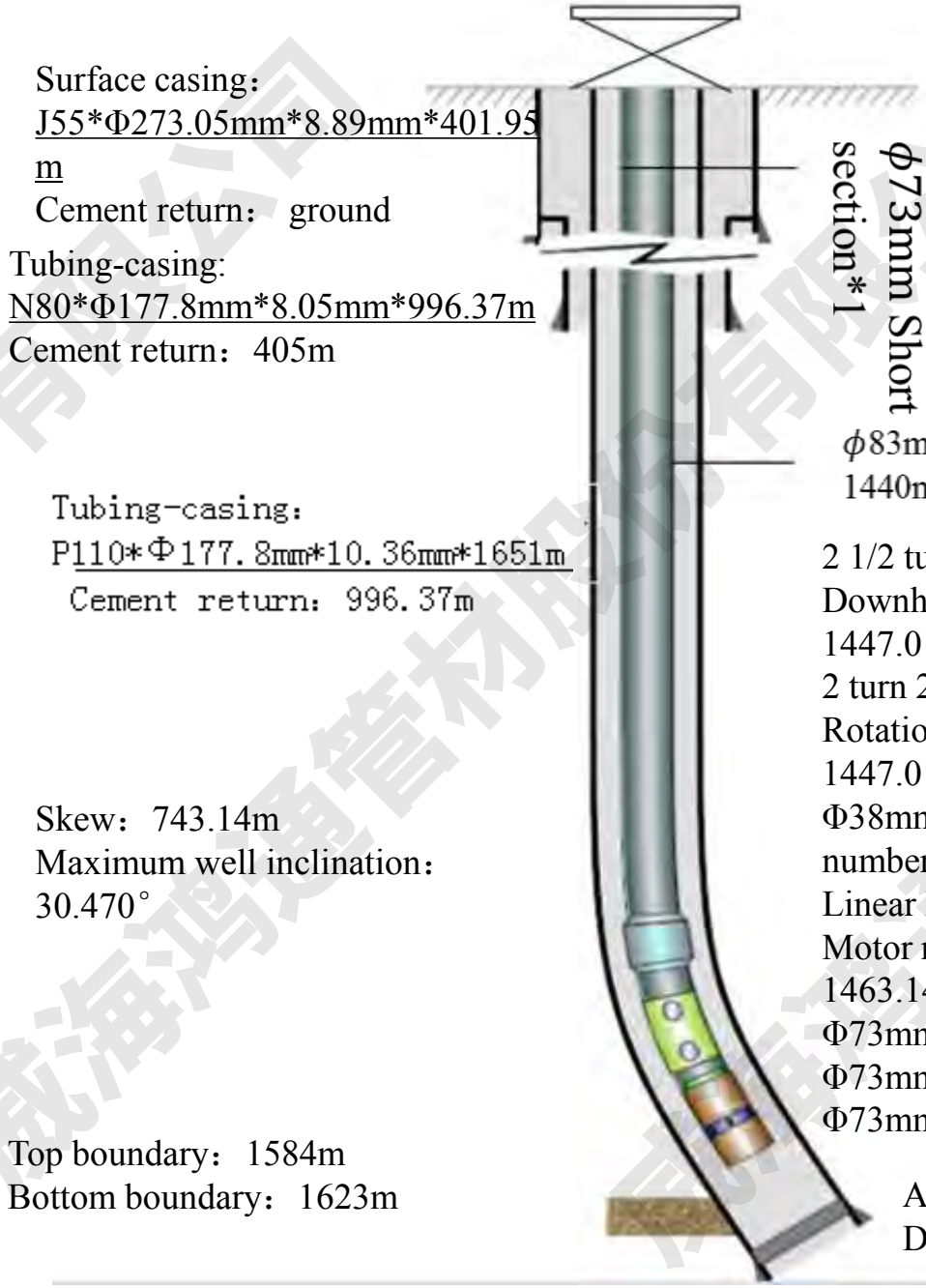
well crude oil property

Sampling date	Viscosity temperature (℃)	Dynamic viscosity (mPa·s)	density (20℃) (g/cm3)
2015/05/07	40	3264	0.9397
	50	1502	

Well section of perforation ：1554.0—1582.0m

Operation system: electric submersible pump + glass fiber reinforced plastic composite coiled tubing.

Completion structure diagram :



Surface casing：
J55*Φ273.05mm*8.89mm*401.95m
Cement return： ground

Tubing-casing:
N80*Φ177.8mm*8.05mm*996.37m
Cement return：405m

Tubing-casing：
P110*Φ177.8mm*10.36mm*1651m
Cement return：996.37m

Skew：743.14m
Maximum well inclination：30.470°

Top boundary：1584m
Bottom boundary：1623m

KY65-25C Electric submersible pump oil wellhead
Set distance：4.8m
high：0.42m

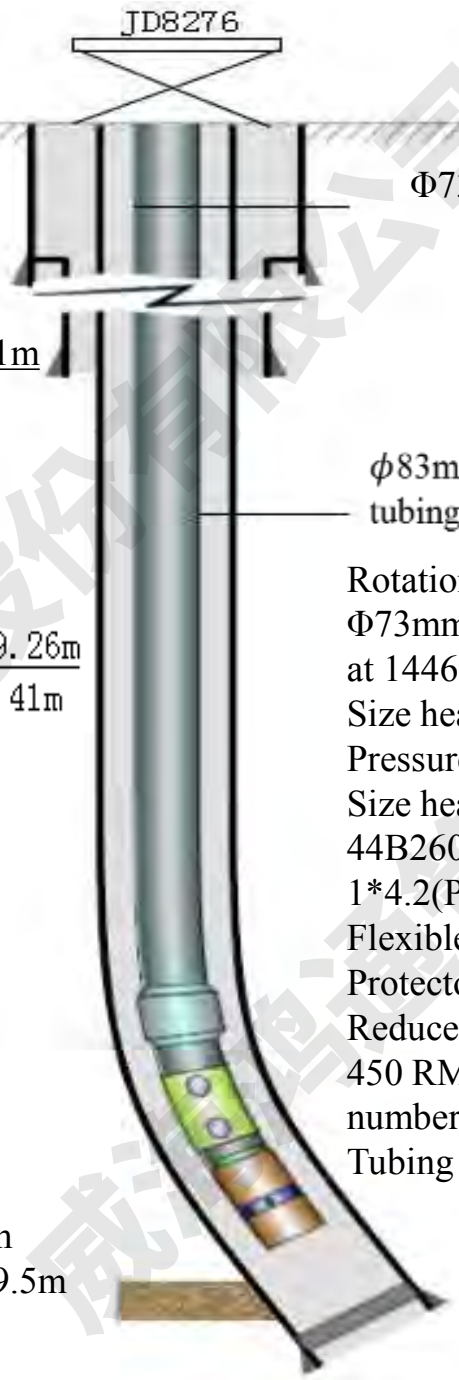
ϕ73mm Short section*1

ϕ83mm Coiled tubing 1440m

2 1/2 turn 2 hoop 1 *0.12m
Downhole data acquisition system*1m at 1447.01m
2 turn 2 hoop 1 *0.12m
Rotation-free connecting flange 1*0.36m at 1447.01m
Φ38mm Reciprocating pump 1*6.52m（Pump number：38-16-141）at 1453.53m
Linear Motor（WFQYDB-114-1140-(30~50）Motor number：1608119）1*9.61m at 1463.14m
Φ73mm Short section 1*0.3m
Φ73mm Tail pipe 1*9.57m at1473.01m
Φ73mm Flat plugging 1*0.1m at 1473.11m

Artificial bottom：1641.64m
Drilling depth：1652.00m

Completion structure diagram :



Surface casing：
J55*Φ273.05mm*8.89mm*402.09m
Cement return： ground

Tubing-casing:
N80*Φ177.8mm*8.05mm*1025.41m
Cement return：194m

Tubing-casing：
N80*Φ177.8mm*9.19mm*1579.26m
Cement return：：1025.41m

Skew：422m
Maximum well inclination：24.4°

Top boundary： 1508.0m
Bottom boundary： 1549.5m

Φ73mm short section 1*1.03m

ϕ83mm DGL Coiled tubing 1440m

Rotation-free connecting flange 1*0.36m at 1446.17m
Φ73mm Short section 1*0.2m+washing valve1*0.3m at 1446.67m
Size head 1*0.1m
Pressure gauge short section 1*0.77m at 1447.54m
Size head 4*0.5m
44B2600 Electric submersible screw pump 1*4.2(Pump number 13933404）at 1452.24m
Flexible shaft 1*2.7m at 1454.94m
Protector 1*2.0m at 1456.94m
Reducer 1*0.5m at 1457.44m
450 RM Motor 36HP 1*2.1m（Pump number:13974032) at 1459.54m
Tubing centralizer 1*0.22m at 1459.76m

Artificial bottom： 1573.26m
Drilling depth： 1580.00m

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Electric submergible pumping platform project in Xinjiang Oil Field

Average well depth of formation : 1550m in Zhundong oil well area

Ground crude oil density: average 0.935g/cm³.

Viscosity of crude oil at 50℃: average 1140.83mPa.s.

Freezing point: average -0.2℃.

Five oil production platforms are used in 76 wells in this oil fields .

Materials Testing Results

Material test of glass fiber reinforced plastic composite continuous cable containing pipe

Wear sample

Surface area measurement and weighing

1.1 Wear resistance test of the material liner and jacket layer

Test criteria :According to the ISO 175;1999 standard

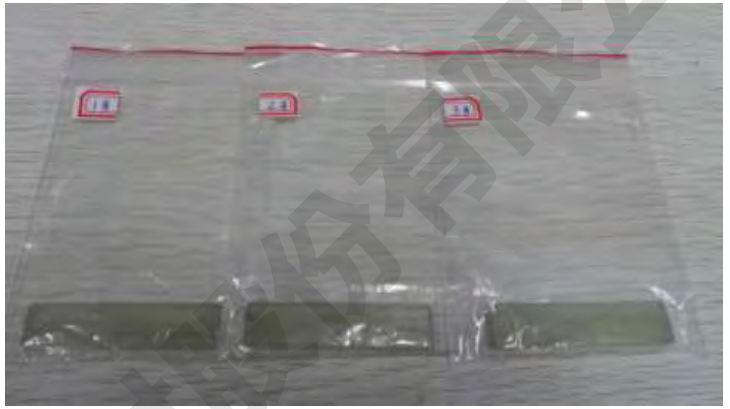
Acid and alkali corrosion data sheet

corrosion solution	Test pressure (MPa)	Test temperature (℃)	Average corrosion weight loss (g/m2*h)	Average corrosion rate (mm/a)
Hydrochloric acid	Atmospheric pressure	80	-0.24415	-0.0938
PH=8 NaOH solution	Atmospheric pressure	80	0.0536	0.0206

Conclusion: It can be seen from the table that the liner material has good corrosion resistance in acid and alkaline solution, and has slight swelling in acid solution.

Material test of glass fiber reinforced plastic composite continuous cable containing pipe

、	Test pressure（MPa）	Test temperature（℃）	Time（h）	Average corrosion weight loss（g/m2*h）	Mass loss rate（%）
Hydrochloric acid+ mud acid(PH=0-1)	Atmospheric pressure	80	6	3.006	0.038
Hydrochloric acid+ mud acid(PH=4)	Atmospheric pressure	80	6	3.3155	0.139
PH=8 NaOH solution	Atmospheric pressure	80	7*24	-0.4469	-0.082



Reinforced corrosion sample

Conclusion: The reinforcing layer has strong corrosion resistance in acidic environment, With the extension of time, the mass loss rate decreased gradually and tended to be gentle; Slight swelling in alkaline environment.

1.2 Corrosion resistance test of reinforced layer

Test criteria :The test is according to the QB/T 3801-1999 standard

Material test of glass fiber reinforced plastic composite continuous cable containing pipe

1.3 Wear resistance test of liner and jacket layer

Test criteria :According to the ASTM D4060 standard, the friction and wear properties of standard wear samples were tested

Wear sample

MMS-2A wear test machine

number	Average mass abrasion resistance(mg)	wear volume (cm3)	Average friction coefficient
1	3.5	0.003684	0.2662
2	3.3	0.003474	0.2645
3	3.9	0.004105	0.3427
average value	3.57	0.003754	0.2911

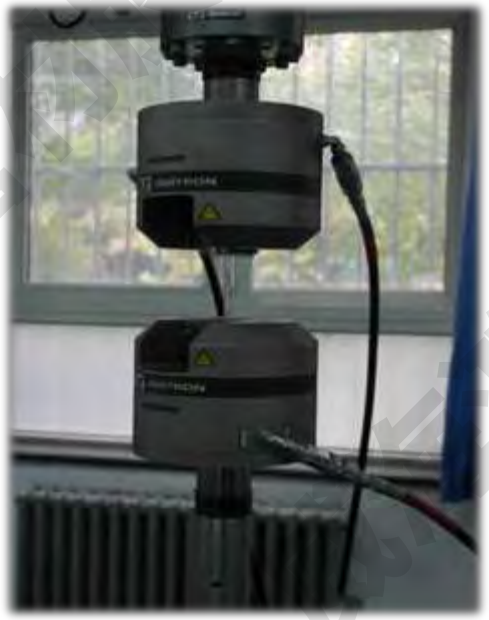
Wear test data sheet

Conclusion: When the test condition is 2000 meters deep and the lubrication is dry friction, the Average mass abrasion resistance of PE is 3.57 mg,and wear volume is 0.003754 cm3 ≤0.01 cm3,the Average friction coefficient of PE is 0.2911, The wear resistance of the material is good, and it can meet the requirements of downhole operation.

Material test of glass fiber reinforced plastic composite continuous cable containing pipe

1.4 The test of fatigue performance of composite structure material

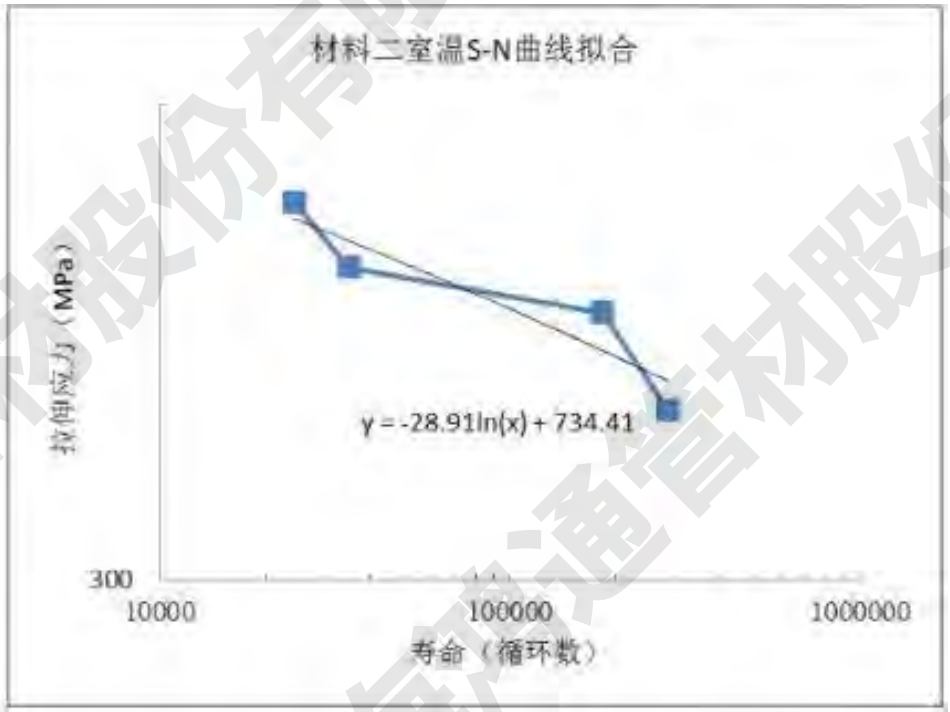
Test method: ASTM D3479 standard, the tensile fatigue test was carried out at room temperature and 80 ℃ respectively, and obtained the S-N curve of the material.



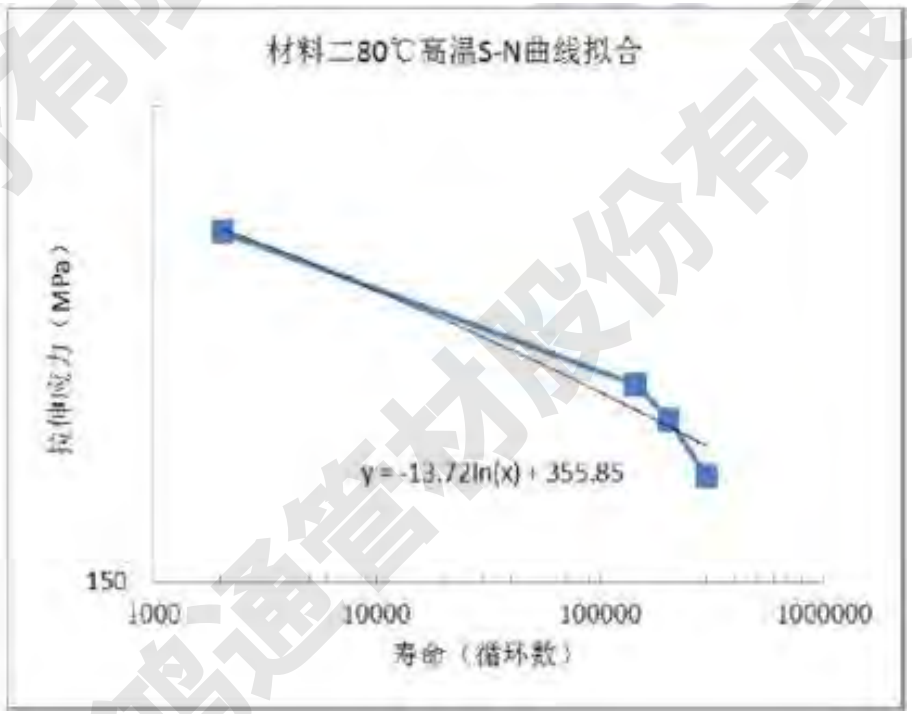
INSTRON Fatigue testing machine

Specimen damaged after fatigue test

Material test of glass fiber reinforced plastic composite continuous cable containing pipe



Room temperature S-N curve



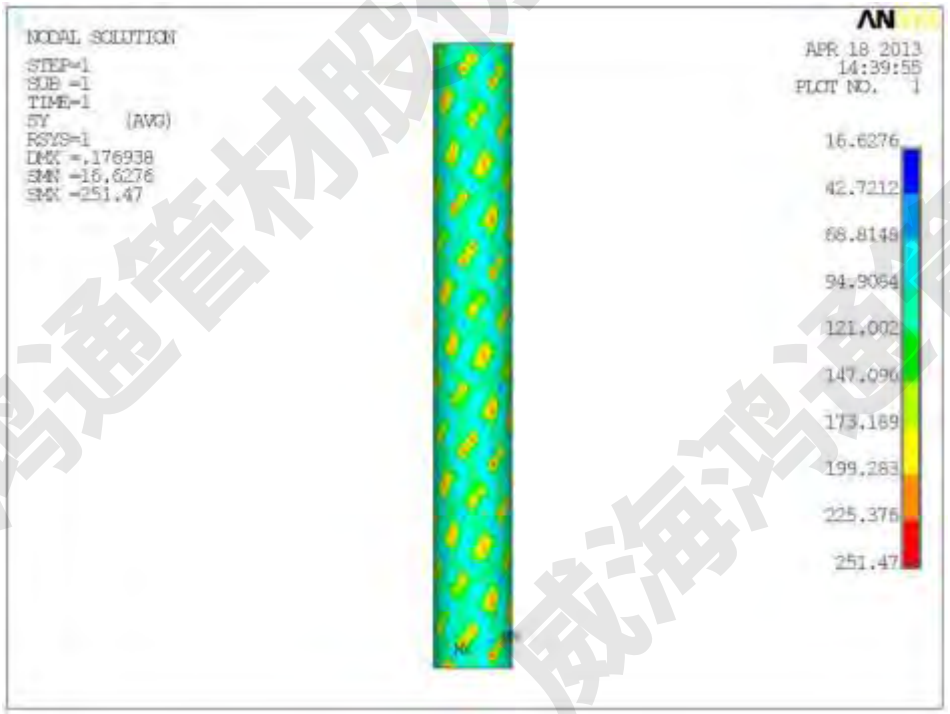
80℃ S-N curve

Evaluation of fatigue performance of composite structure material and S-N curve of material,.

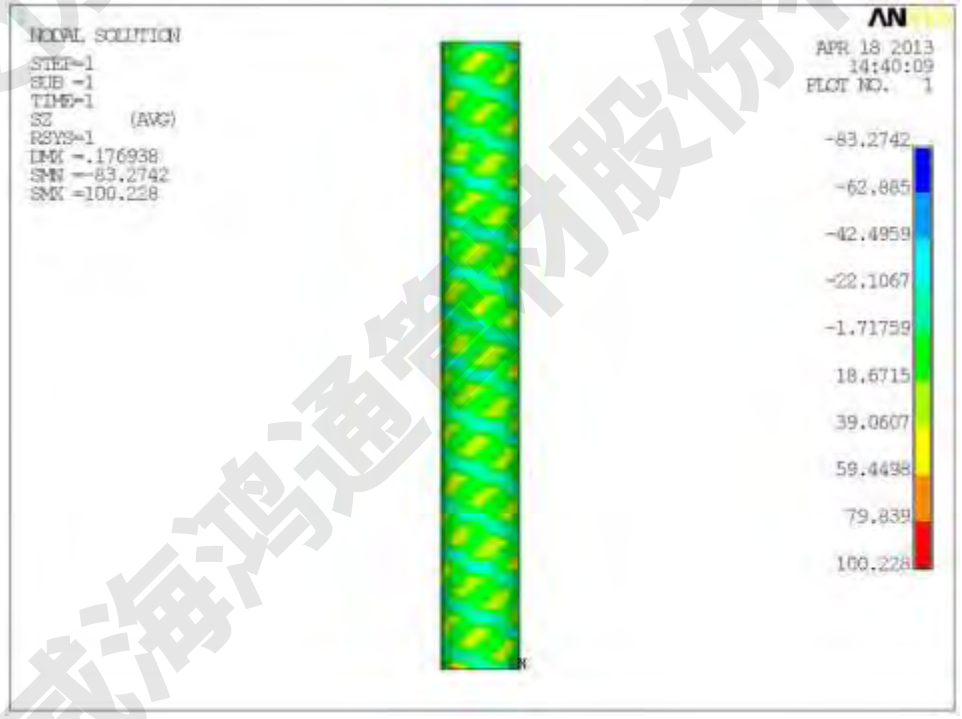
Finite element analysis of glass fiber reinforced plastic composite continuous cable containing pipe

1.5 Finite element analysis

The finite element simulation analysis of FRCCSCP, the model is established and calculated, and the structural design of the pipe is verified.



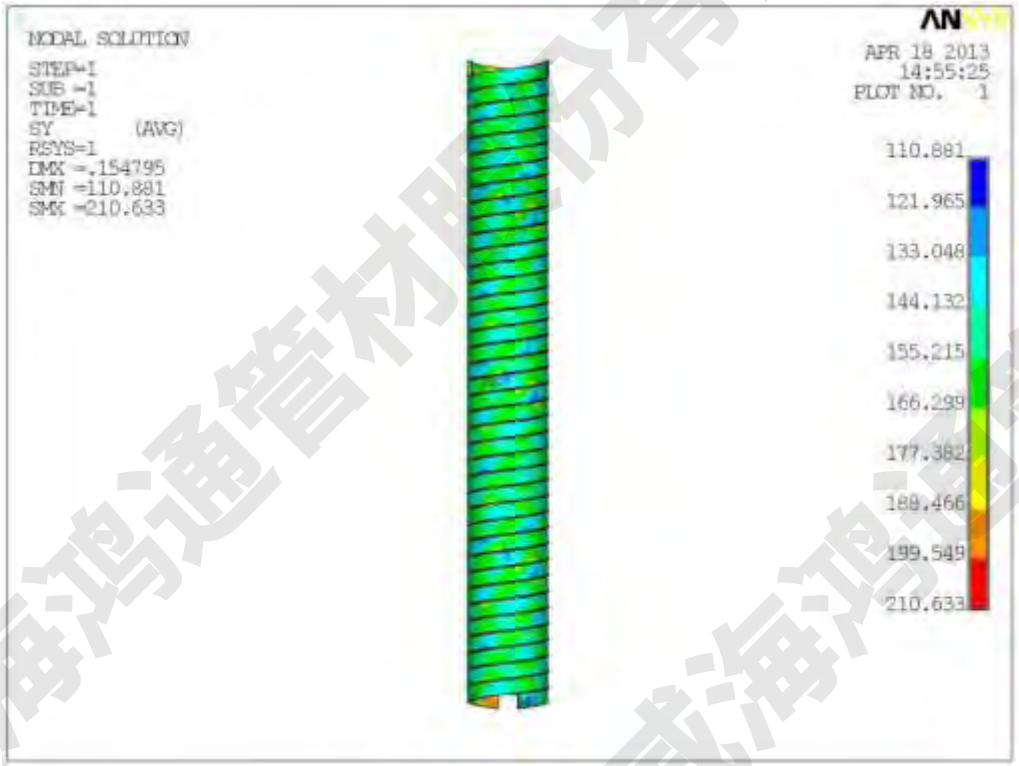
Hoop stress of the hoop layer (MPa)



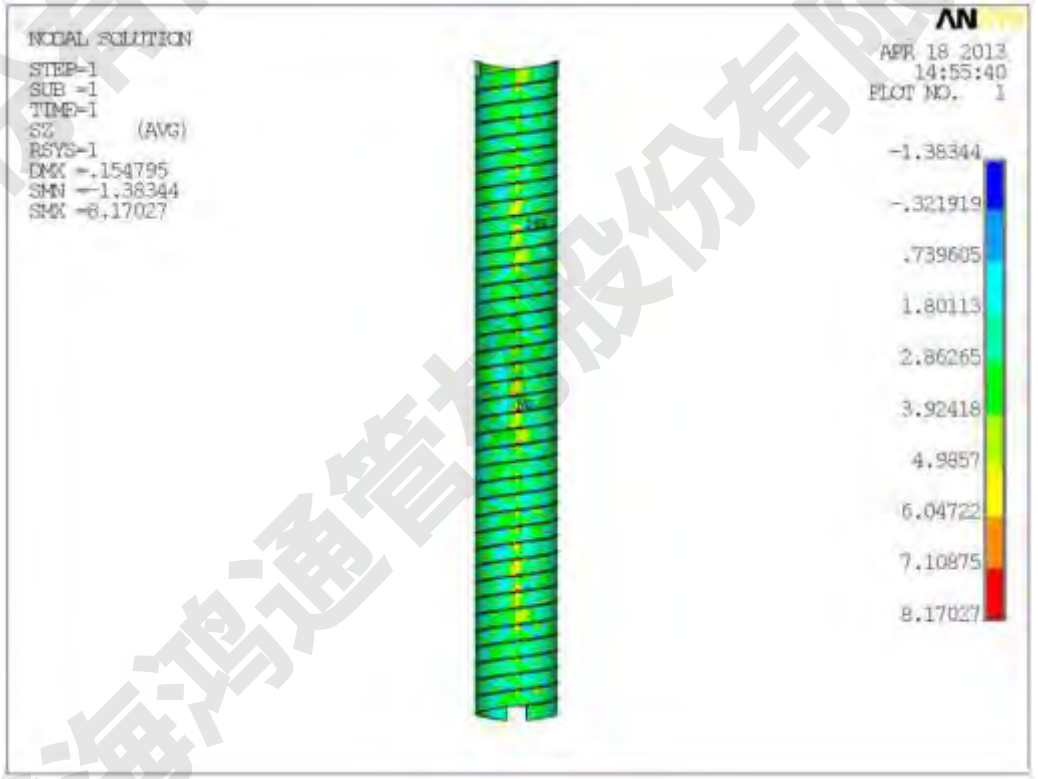
Axial stress of the hoop layer (MPa)

Finite element analysis of glass fiber reinforced plastic composite continuous cable containing pipe

1.5 Carcass layer simulation results



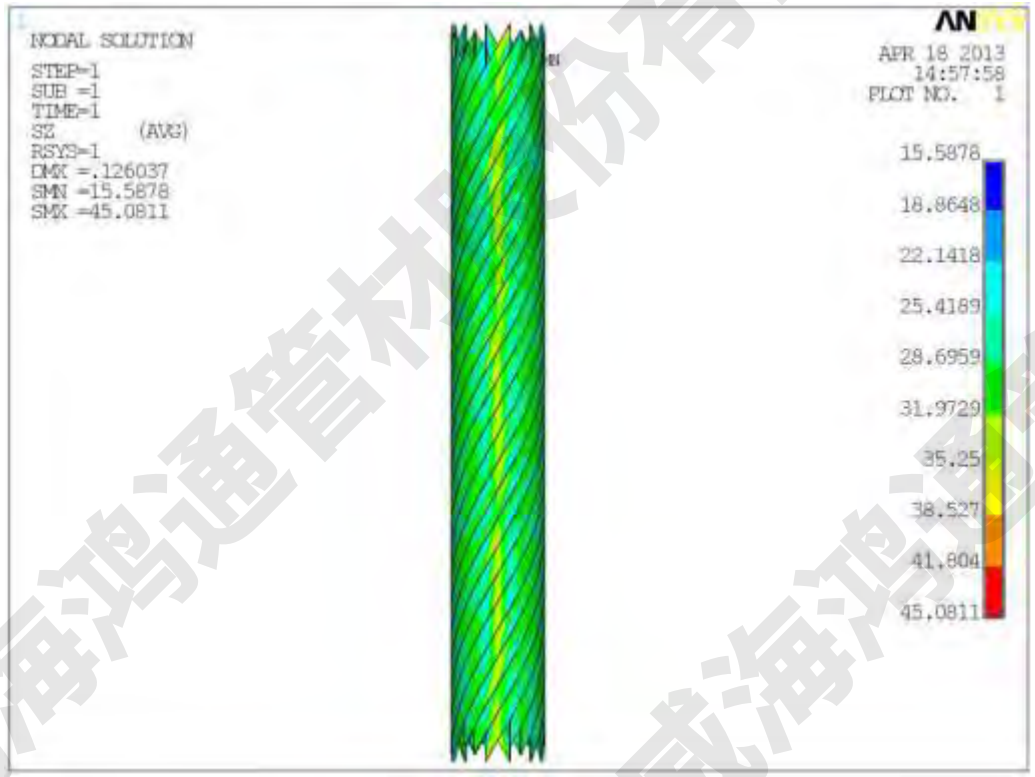
Hoop stress of the carcass (MPa)



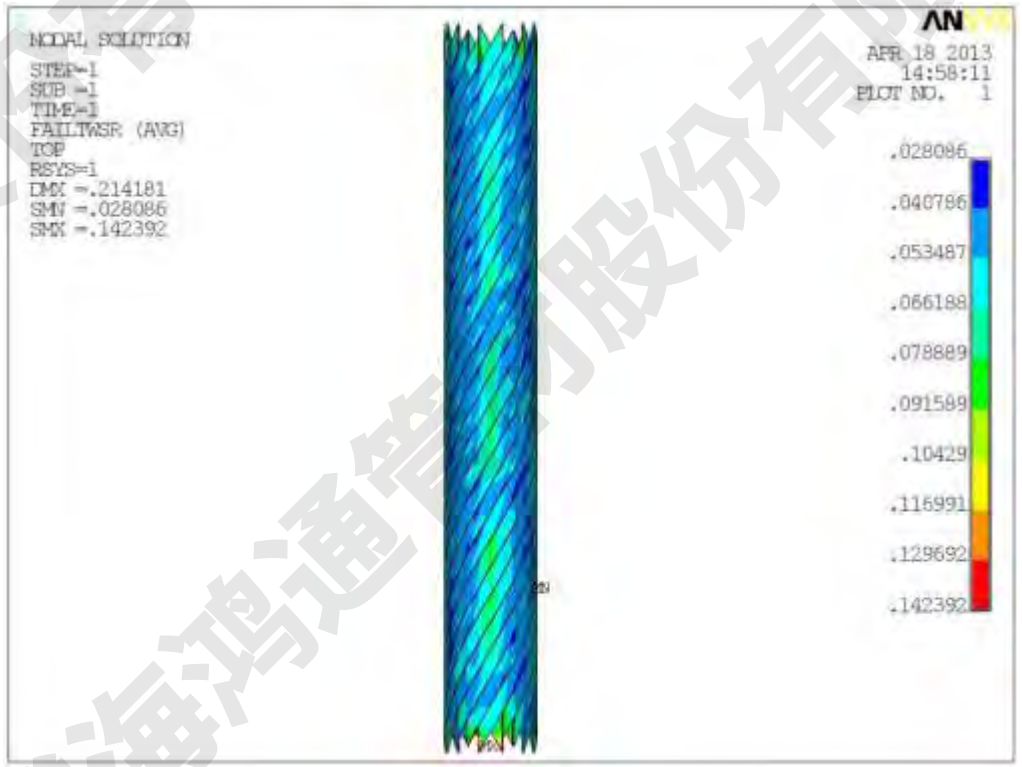
Axial stress of the carcass (MPa)

Finite element analysis of glass fiber reinforced plastic composite continuous cable containing pipe

1.5 Helical layer analysis



Axial stress of helical layer (MPa)



Radial stress of helical layer (MPa)

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Performance test of glass fiber reinforced plastic composite continuous cable containing pipe

2. Performance test of glass fiber reinforced plastic composite continuous cable containing pipe

2.1 Ability to withstand internal pressure

2.2 Resistance to external pressure

Performance test of glass fiber reinforced plastic composite continuous cable containing pipe

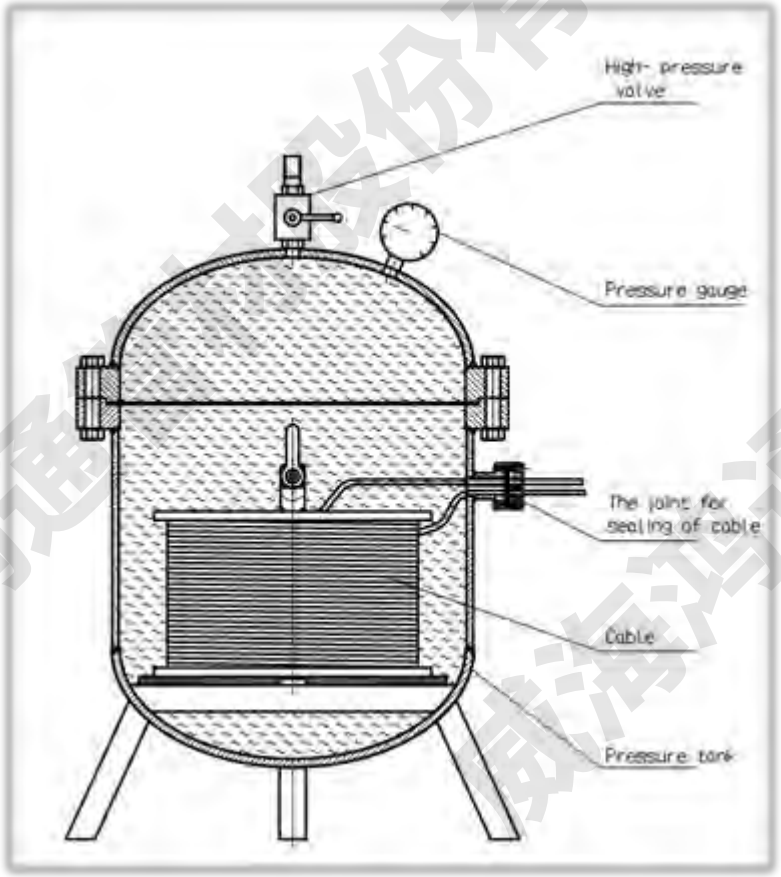
2.3 Tensile test

Testing Results

2.4 Tensile fatigue test

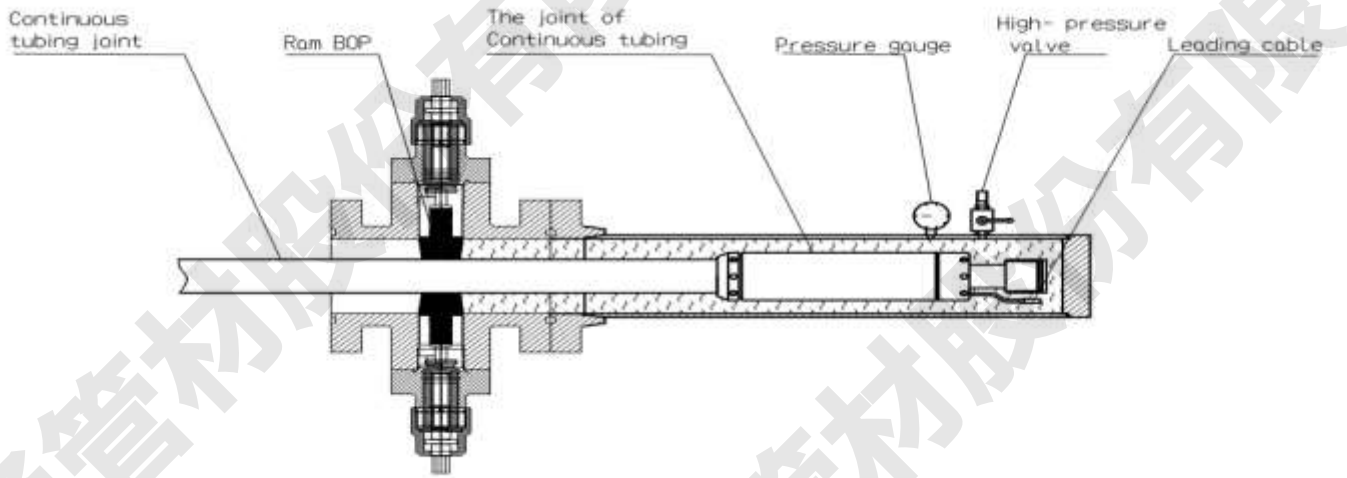
Features of System and Products

Bearing Capacity Test of Cables：



Features of System and Products

Joint seal insulation test：



鸿通管材
Hongtong Piping Materials

10000 hours static water pressure test report


检验报告

INSPECTING REPORT

（2017）质检字159号

产品名称：
PRODUCT
委托单位：
CLIENT
检验类别：
INSPECTING TYPE

国家石油管材质量监督检验中心
China National Quality Supervision, Testing and Inspection Center of Oil Tubular Goods

中国石油天然气集团公司管材研究所石油管检测试验室
The Testing Laboratory of Oil Tubular Goods, Tubular Goods Research Center of CNPC


检 验 报 告

（2017）质检字 159 号

产品名称		规格型号	DN100mm PN4MPa
生产单位		项目编号	5017-02-088
检验标准	/	检验类别	委托检验
委托单位		检样地点	
出厂编号	/	检样基数	
生产日期	/	样品编号	16-136
检样日期	/	样品数量	1支
型材订货	2015.4.23	样品状态	密封
检验日期	2015.4.25~2017.1.14	检 样 人	
报出日期	2017.6.5	记 录 人	汪汗军
检验项目/参数	静液压力试验、10000 小时长期静水压试验		
检验依据标准	SY/T 6794-2010《可燃性气体输送用塑料管道系统》		
检验结论	1）送检的 DN100mm PN4MPa 复合管材料静液压力平均值为 10.9MPa； 2）送检的 DN100mm PN4MPa 复合管 10000 小时长期静水压检测结果见附页检验报告，参考 SY/T 6794-2010，预测该规格复合管 50 年设计寿命相对应的最大压力等级（MPR）不低于 4.54MPa。		
备注	样品由委托单位提供		
批准		审核	李保科
编制	邵振东		


3 10000 小时长期静水压试验

（1）取样位置：委托单位提供管样；

（2）试验标准：SY/T 6794-2010；

（3）试验设备：XGNB-20/100M 型非金属管材耐压、爆破试验机；

（4）试验结果：试验数据统计见表 3，数据线性回归见图 1，线性回归方程为 $y=-0.054x+1.155$，参考 SY/T 6794-2010，预测该规格热塑性塑料内衬玻璃钢复合管 50 年设计寿命期对应的最大压力等级（MPR）不低于 4.54MPa。

表 3 10000 小时长期静水压试验结果

样品编号	试验温度	环压压力（MPa）	保压时间	试验结束日期	备注
30	常温	17	4'24"	2015.5.15	管体失效
40	常温	17	6'22"	2015.5.15	管体失效
50	常温	15	15'44"	2015.06.29	管体失效
60	常温	15	19'39"	2015.06.30	管体失效
70	常温	13	36 43'36"	2015.06.30	管体失效
80	常温	13	3h 6'37"	2015.06.30	管体失效
90	常温	11	105h 19'52"	2015.07.06	管体失效
100	常温	11	1065 12'58"	2015.07.06	管体失效
110	常温	10	8160h	2017.1.14	未失效
120	常温	9	8160h	2016.8.19	管近接头处管体失效
130	常温	9	11280h	2017.1.14	未失效

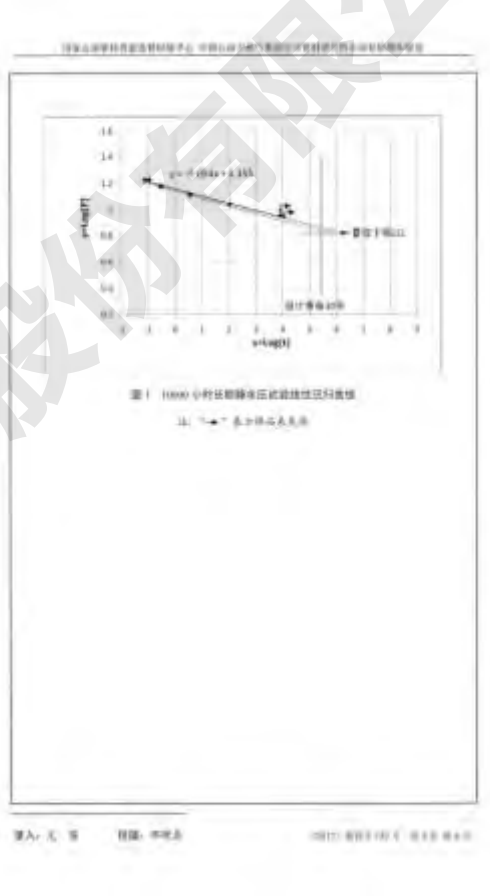


图 1 10000 小时长期静水压试验线性回归图

注：“→”表示该点未失效

3. 10000 hours static water pressure test report

The inspection report of glass fiber reinforced plastic composite continuous cable containing pipe

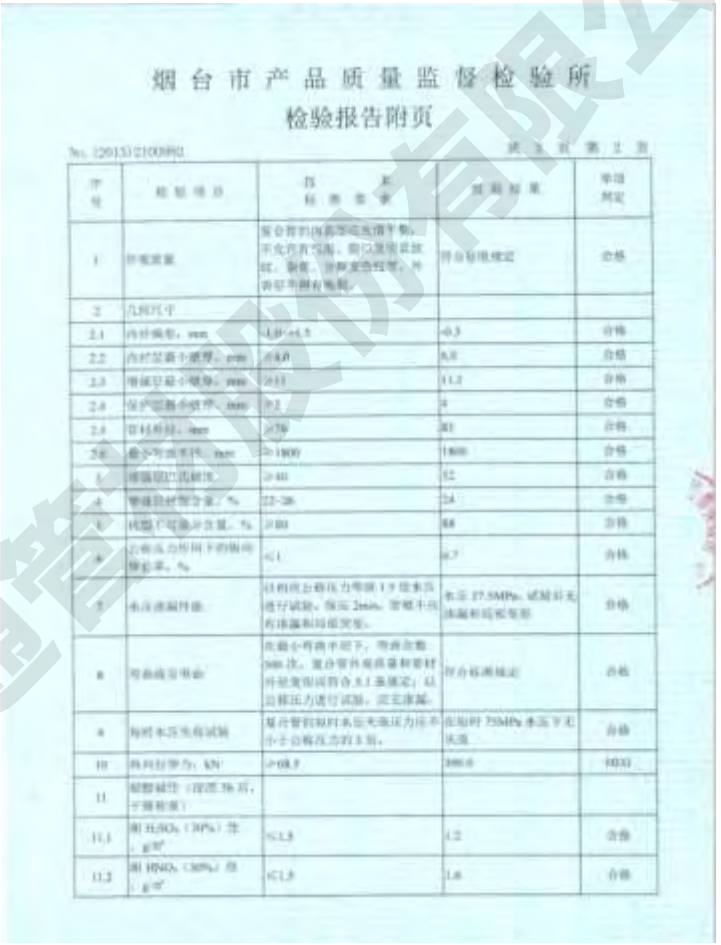
4. All the indicators meet the requirements of the enterprise standard Q/1081 WHT009-2016 "glass fiber reinforced plastic composite coiled tubing", these tests are completed by the third party Yantai Institute of product quality supervision and inspection.

烟台市产品质量监督检验所

检验报告

产品名称	数控智能采油连续复合管	注册商标	鸿通
规格型号	Φ40-25	检验类别	委托检验
受检单位	威海鸿通管材股份有限公司	样品等级	合格品
生产单位	威海鸿通管材股份有限公司	送 样 人	周海波
抽样地点	/	送样日期	2015-12-15
样品数量	2根×2米	检验日期	2015-12-15
样品基数		样品编号	210150998
样品状态	外表面无色泽，红色	生产日期	/
检验环境条件	温度： ℃ 相对湿度： / % 气压： / MPa		
检验依据	Q/1081WHT005-2015（已备案） GB/T2576-2005 GB/T3354-2005 GB/T3801-1999 GB/T1633-2000 GB/T8806-2008 GB/T2577-2005		
检验结论	所检项目符合企业标准规定。		
备 注	企业标准于2016年10月30日09点13分在企业产品标准信息公共服务平台备案。		

批准： 审核： 主检：



烟台市产品质量监督检验所

检验报告附页

The inspection report of Cable

MYFFB-0.6　3.6mm×11.4mm

类别	检测项目	标准要求	检测结果	单项评定
结构尺寸检查	导体直径	1.6×9.4mm	1.6×9.4±0.01	P
	绝缘标称厚度	1.0 mm	1.0±0.05	P
	外形尺寸	3.6×11.4	3.6×11.4±0.1	P
电性能	绝缘电阻(20℃)	≥ 3800 MΩ·km	5000 MΩ·km	P
	直流导体电阻(20℃)	≤ 1.15Ω/Km	1.14 Ω/Km	P
	直流电压试验(50HZ)	10KV / 5 min 不击穿	10KV/5min 不击穿	P
	泄漏电流 10KV/5min	≤ 10μA	≤ 8μA	P
	工作电压	1.5KV	1.5KV	P
物理性能	使用温度	200℃	200℃	P
	拉断力	200N	200N	P
外观	外观	良好	良好	P
包装		包装完好 标识齐全	完好 齐全	P
结论		合格		

注：　合格判定:P　　不合格判定:F　　不测判定:N

检验员：张超　　审核：刘建　　批准：

检 测 设 备 清 单

设备编号	设备名称	检定日期	下次检定日期
1300155	外径千分尺	2015.11.25	2016.11.24
1201055	直流高压发生器	2015.11.28	2016.11.27
120201	双臂直流电阻电桥	2015.11.10	2016.11.09
E26-201300053	电子秒表	2015.10.29	2016.10.28
19220028/J2011090 59250A01-0002	绝缘电阻需试仪	2015.11.02	2016.11.01
180053/J201490592 50A-0021	老化箱	2015.11.27	2016.11.26
1401246/J20140905 9250A01-0008	万能试验机	2015.12.03	2016.12.02
	以下空白		

线缆结构

Economical Analysis (Chinese Example)

Comparison of FRCCSCP Production System With Steel Pipe System

(Chinese Market Study）　　unit：

Item	FRCCSCP	Steel Pipe System(SPS)	Comparison
Characteristics 10^4	Cables Embedded	Cables Bound Outside	FRCCSCP Free of DamageSPS Damaged Each Repair
Initial Stage Investment			
Unit Price of Pipe with cables（RMB/m）	530	250	FRCCSCP>SPS
Costs In Service Life of 10 years			
Uninterrupted Service Lives(years)	10	3~5	FRCCSCP 2~3 times longer than SPS
Cable Replacement(RMB/m)	0	3×150	SPS 3 times cable replacement invest
Pipe Replacements(RMB/m)	0	2×100	SPS 2 times pipe replacement invest
Service Costs Sum(RMB/m)	0	650	
Total Costs (RMB/m)	530	900	FRCCSCP<SPS
Costs In Service Life of 15 years			
Uninterrupted Service Lives（year）	15	3~5	FRCCSCP 3~5 times longer than SPS
Cable Replacements	0	4×150	SPS 4 times cable replacement invest
Pipe Replacements	0	3×100	SPS 3 times pipe replacement invest
Service Costs Sum	0	900	FRCCSCP<SPS
Total（RMB/m）	530	1150	FRCCSCP<SPS
Other Operation Costs Comparison: (Pump check operation 8~10times)			
Time Savings（days）	15~20	27~30	FRCCSCP save 12~15 days
Cost Savings（）	15-20	25-30	FRCCSCP<SPS
Transportation and Installation Costs			
SPS 2 times FRCCSCP			FRCCSCP<SPS
Approximate Production days increase			
FRCCSCP 100 days			SPS 0
Labor Costs Savings			
FRCCSCP 1500 days			SPS 0

Quality Control Policy Statement

Policy Statement for Quality Controls, Supply Chain and Work Ethics:

- ❑Quality First.
- ❑Supplier verification of critical raw materials from local market or overseas must be **subjected to internal testing and evaluations** to meet company engineering parameters.
- ❑Research and Development will continue to be Hongtong's leading strength over global suppliers of Industrial flexible tubing on oil and gas sector.

Our Commitment

- Deliver products and services that meets standards and clients specifics requirements for Subsurface, Surface and Marine application of non-metallic reinforced line pipes.
- Undertake clients technical enquiries and operational challenges to be solved until technical proven otherwise.

鸿通管材
Hongtong Piping Materials

End of Report

Thank you !

Information Requirements

Information Requirements	
I Oil Field Environments	
Temperature	Maximum and minimum temperature
Transportation	Road conditions, dimensions limit
II Well Conditions	
Casing	Dimensions
Oil	Chemical components, viscosity,wax
Gas	Gas contents
Temperature	Maximum temperature, fluctuations
Depth	Well depth range, inclination
Flow	Flow rates of oil/gas
III Pump Requirements	
ESP Pumps	Pump type, Voltage, power rates, checking periods
Sensors	Sensor type, signal transmitting forms
IV Operation Conditions	
Well Flushing	Flushing method/ drainage path
Well Kill	Method/Path
Well Repair	Tools/dimensions allowed
V Service Requirements	
Installation Service	
Operation Maintenance Service	