

合同附件 Contract Attachment:

35KV 三层共挤干法交联电缆生产线

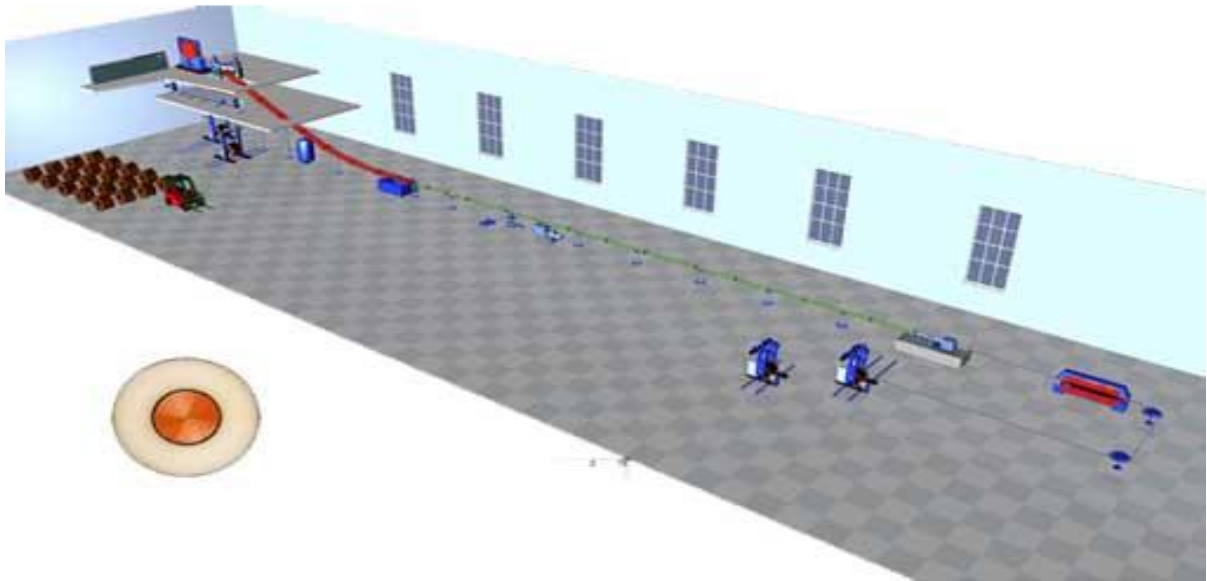
Technical Specification for 35KV Triple-layer Extrusion Dry

Cross-linking Cable Production line

6 段标准型技术说明

(35kV, 6 sections Standard Type)

标准 Standard: Q/BCSTQ.01-2010



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附件 Appendix 1:

三层共挤干法交联电缆生产线技术说明
Technical Specification for
Triple-layer Extrusion Dry Cross-linking Cable Production Line

本生产线适用于 35KV 电压等级交联聚乙烯绝缘电缆生产。
The production line is designed for manufacturing 35KV XLPE insulated power cable.

一、生产线主要技术规范 Main technical specification

1. 电压等级 Voltage Class
交联聚乙烯 XLPE: 35KV
2. 产品规格 Conductor Size
铜芯 Cu: 25~630mm²
铝芯 Al: 35~800mm²
3. 电缆最大重量 Cable weight: Max. 10kg/m
4. 电缆最大直径 Cable diameter: Max. 70mm
5. 电缆结构 Cable construction
导体屏蔽 Conductor shield: 0.5~2mm
绝缘 Insulation: 3.4~12mm
绝缘屏蔽 Insulation shield: 0.5~2mm
6. 材料 Material:
导体 Conductor: 紧压铜、铝绞线 compressed Cu, aluminium stranded conductor
导体屏蔽 Conductor shield: 交联导体屏蔽料
cross-linking conductor screening material
绝缘 Insulation: 交联聚乙烯 XLPE
绝缘屏蔽 Insulation shield: 可剥离绝缘屏蔽料 (35kV 及以下)
strippable insulation screening material (35kV or below)
不可剥离绝缘屏蔽料 (35kV)
free-strippable insulation screening material (35kV or below)
7. 设计线速度 Line design speed: 0~30m/min
8. 布管形式 Line execution: 半悬链式 half catenary
冷却段倾角 Inclination of cooling section: 1° ~2°
悬链系数 Catenary factor: 200~150

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- 交联段长度 Length of cross-linking section: about **36m/6** 段 sections
材 料 Material: 不锈钢 Stainless Steel 304 $\Phi 219 \times 4$
设计最高温度 Design temperature: max.: 450°C
预冷段 Length of pre-cooling section: 12m/2 段 Sections
不锈钢 SS 304: $\Phi 219 \times 4$
冷却段长度 Length of cooling section: **54m/9** 段 sections
材料 Material: 不锈钢 SS 304 $\Phi 150 \times 4$
(第一节冷却管 the first section of cooling tube is $\Phi 219 \times 4$)
设计压力 Design pressure: 1.6MPa
9. 挤出机排列方式 Extruders arrangement:
65-150-90 三层共挤 triple extrusion
65 线芯屏蔽 for conductor screen
150 交联聚乙烯 for cross linked polyethylene(XLPE)
90 绝缘屏蔽 for insulation screen
10. 管内加压介质 Pressurized medium in pipe: 氮气 nitrogen
11. 管内冷却介质 Cooling medium in pipe: 水 water
12. 动能消耗 Kinetic energy consumption:
电: 安装容量 Electricity: installation capacity 810kVA
380V \pm 10%, 50Hz \pm 1%, 三相五线 three-phase and five-wire
(2路电源进线 2-way power wire-in)
水 Water: 水压 water pressure 0.2~0.6MPa
用水量 Water consumption 15m³/h(水库循环水 circulating water from reservoir)
压缩空气 Compressed air: 0.6~0.8MPa 用气量 Air consumption: 0.8m³/min
氮 气 Nitrogen:
压力 pressure 2.0~2.5MPa,
纯度 purity 99.5%,
消耗量 consumption 1~2m³/h(标准状态 standard state)
为满足起车需要, 应备有不小于 5m³ 储氮罐
It is necessary to prepare a nitrogen storage container no less than 5m³ to start up the line.
13. 主机楼平台面积长*宽: 24 米*24 (2 条交联布局)
Needed area of main platform (L \times W): 24m \times 24m (For two lines)
(可根据需方厂房具体情况另行设计 Can be designed according to the specific conditions of the demander's workshop)
14. 主机楼高度 Height of main machine building \geq 12m (地面零点到三楼地面 From the ground zero to the ground of the 3rd floor)
主机楼分三层建造 Distribution for 3 floors: 1 层: 放线架, 2 层: 卧式储线器,

3 层: 3 台主机及包带式上牵引机, 三层共挤机头, 上密封器 1st floor: PO stand; 2nd floor: Horizontal accumulator; 3rd floor: 3 Extruders, upper capstan, crosshead, and splice box.

15. 厂房长度 Needed length of workshop: About 150m (上牵引包带式、下皮带式履带牵引机 Upper Disk type Metering capstan, lower belt caterpillar)

16. 设备主色 (诺基亚蓝或需方提供色板号)

Main equipment color: Nokia blue or color plate code supplied by customer

二、生产线主要组成及技术要求 Main components and technical requirements

1. 放线架 (龙门行走式) Portal Traveling Pay-off stand

a. 线盘直径 Drum diameter: 1600~2500mm GB4004-84 PN 型 Type

b. 线盘宽度 Drum width: 1180~1900mm

c. 最大盘重 Drum weight: Max. 16t

d. 放线张力 Pay off tension: 5000N

e. 主驱动采用直流电机, 可 4 象限运行, 功率 5.5kW

DC motor is used for main drive, running in four-quadrant with 5.5kw power

f. 驱动器 Drive: 派克 PARKER 590P (原英国欧陆 original Eurotherm)

g. 放线舞蹈器/Dancer: 调节放线速度, 维持电缆中心位置不变

To regulate the payoff speed, and keep the cable in the center when line is running

结构特点: 机电一体化龙门型结构, 整体移动往返, 维持放出中心线不变。放线盘安装形式为无轴式, 左右立柱上下移动、交流电机驱动。整体移动由交流电机经减速器驱动, 根据放线缆芯直径, 当放线盘每转一圈, 指令交流电机运动、行走一个节距, 放线架具备张力控制和速度控制, 采用舞蹈器控制速度。放线架能全线正反转, 具备联动和单动功能。放线架具有显示屏, 屏上可设置工艺参数, 放线架可单控还可主操作台控制。

Structure features: mechatronical portal type structure, totally move to and fro, keep the central line of payoff no changing. The mounting type of the payoff is shaftless type, left & right columns move up and down, driven by AC motor. Moving as a one is driven by the AC motor via the reducer. It can control the tension and speed. Adopting dancer to control the speed. Pay off stand can turn fro and back, has the function of linking action and single action. It has display screen and set technology parameters on the screen. It also can be controlled separately and by the master operating station.

2. 卧式储线器 Horizontal accumulator

- a. 储线长度 Accumulating length: 120m
- b. 导轮直径 Guide pulley dia.: 1600mm
- c. 张力 Tension: 西门子 PLC+派克 590P 驱动器(原英国欧陆 original Eurotherm)+ 西门子文本显示器等共同张力控制, 张力 300~3200N 可调 Siemens PLC+ PARKER 590 Drive+ Siemens text display unit and ect common tension controlled 300~3200N adjustable
- d. 动轮速度 Traction wheel speed: 0~2m/min
- e. 储线器操作在储线器上和主控室操作柜上, 储线量在操作柜上有显示

Operation is performed on the accumulator and operating cabinet in master control room, accumulating value is displayed on the control cabinet.

- f. 储线器电机功率 Motor power 7.5kW (伺服电机 Servo motor)
- g. 储线在空、满时有声光报警、极限位置有急停开关保证设备安全

There is an audible and visual alarm to tell if the accumulator is empty or full, and emergency stop switches of limiting positions can make sure the equipment safe.

- h. 储轮采用加厚铸铝件制造, 强度大, 光洁圆整度好

Accumulating wheel is made of thickened casting aluminum, with good strength and smooth roundness.

结构特点: 为卧式移动型储线器, 由定轮, 动轮, 支架, 限位器, 控制箱等组成。储线架为卧式, 共有两组导轮 4+5 模式, 一组固定, 另一组可移动, 控制采用张力控制。换盘接头时由压紧汽缸夹住从放线上来的缆芯, 储线装置开始吐线, 直到放线换盘结束, 汽缸松开, 活动轮在稀土伺服电机软特性控制下, 反向移动到初始位置。储线在空、满状态时有声、光报警, 极限位置设限位开关, 由计算机操作屏显示。

Characteristic: It is horizontal moving type, consists of fixed wheel, moving wheel, support, position limit, controlling cabinet etc. The accumulating stand is horizontal and has two groups of guide wheels 4+5 mode, one group is fixed, the other is movable, control adopts tension control. The pressing cylinder will clamp the core from the pay off when changing drums. The accumulating device begins to discharge conductor core until drum changing is over. At this time the cylinder is unloosed. The running wheel moves back to the initial position under the control of servo motor with the soft character. The accumulator has audio & visual alarm for full or empty. There is a switch for limiting position, display on PC operating screen.

3. 上牵引机 Metering capstan

- a. 牵引方式 Pulling way: 包带牵引 disk type capstan
- b. 牵引轮直径 Pulling wheel dia.: 2000mm
- c. 调整范围 Adjustable range: 0~30m/min 分四档 with four gear-shifts
- d. 牵引力 Pulling force (max): 30kN
- e. 牵引皮带接触长度 3 米以上 belt touching length is 3m or over 3m

- f. 电缆直径 Cable diameter (max): 100mm
- g. 配有线速表的速度传感器 A speed sensor equipped with a line speed meter
- h. 主驱动采用直流电机, 可 4 象限运行, 功率 11kW
Main drive adopts DC motor, which can run in 4 quadrants with power of 11Kw
- i. 驱动器 Drive: 派克 Parker 590P (原英国欧陆 original Eurotherm)
- j. 牵引轮盘采用整体铸造工艺 Pulling wheel adopts integral whole casting technology.

结构特点: 由牵引轮, 张紧轮, 机架, 底架, 变速箱, 减速机, 气动系统, 电控系统, DC 调速电机等组成。用于将导体线芯从低处向上牵引到一定高度, 同时承担硫化管中的电缆位置。为 CCV LINE 基准线速, 履带牵引机/包带牵引机应与其同步。具有线芯左右上下定位装置, 可保证不同规格线芯从上牵引出口时对准机头中心。传动装置部分底座采用固定式底座, 减速机采用螺旋伞齿减速机, 电机采用直流电机。

Structure features: It consists of puling wheel, tension wheel, frame, under frame, gearbox, reducing gearbox, pneumatic system, electric control system, DC speed adjustable motor etc. It is used for pulling the core from down to a certain level and bearing the cable position in curing tube. It is the basic line speed in CCV LINE, caterpillar/pull out capstan should synchronously run with it. It has core around positioning device which guarantee different size of core from metering capstan outlet to align to the center of crosshead. Transmission device base adopts fixed base, reducer is spiral gear reducer, motor is DC motor.

4. 夹线器 Clamper

- a. 换盘或接头时夹住由放线上来的线芯
To clamp the conductor when change drum & connect the conductor
- b. 可通过最大线芯 Max. core diameter can be through: 100mm
- c. 气动夹紧结构, 橡皮板压紧
Pneumatic clamp structure, rubber plate clamped

5. 放线舞蹈器 Dancer on the pay off:

可通过最大电缆直径 100mm, 调节放线速度, 维持电缆中心不变。

Can be through Max.cable dia. 100mm, adjust pay off speed, keep the cable center unchanged.

注: 我公司操作系统中有两套放线形式, 舞蹈器速度控制和恒张力控制, 可自由选择操作。

Special attention: Operating system has two pay off types, dancer speed control and constant tension control, can choose freely for operation.

6. 65 挤出机 Extruder 65/20D

- a. 机筒 Barrel

材料 Material: 38CrMoA1A

硬度 Hardness: >950HV

最大工作压力 Working pressure: max.70MPa

b. 螺杆 Screw:

材料 Material: 38CrMoA1A

硬度 Hardness: >850HV

直径 Diameter: 65mm

型式 Type: 新 BM 分离型螺杆带中心孔冷却 Newly BM separate type with center hole cooling

转速 Rate of rotation (max): 48rpm

c. 齿轮箱 Gear box

减速比 Reduction gear ratio: 32: 1

润滑方式 Lubricating method: 油泵喷淋 inject oil from oil-pump

推力轴承动态承受力 Dynamic bearing force 788kN

d. 加热和冷却系统 Heating and cooling system

机筒加热方式 Heating way for barrel: 电加热 electric heating

机筒冷却方式 Cooling way for barrel: 独立式分区油冷却 Independent partition with oil cooling

机筒冷却原理 Barrel cooling principle:: 油冷方式 Oil cooling way

(包括全封闭循环油泵、热交换器、阀门和电磁阀组成 Including fully enclosed circulating oil pump, heat exchanger, valves and magnetic valve)

喂料斗冷却 Cooling way for feed hopper: 水冷却 water cooling

机筒加热区段数 Quantity of heating section for barrel: 4 个

每段加热功率 Heating power for each heating section: 2.5kW

(铸铝 cast aluminum)

e. 直流电机 DC motor

型式 Type: Z4 型

功率 Power: 30kW

额定转速 Rated speed: 1450rpm

驱动器 Drive: 派克 Parker 590P (原英国欧陆 original Eurotherm)

f. 上料 Material feeding: 自动真空吸料机 2.2kw、热风式料斗干燥机 100kg (用户自备) automatic vacuum feeding device 2.2kw, hot air hopper dryer 100kg (supplied by customer)

g. 出胶量 Extrusion output: 35kg/h

h. 机筒温度控制 Barrel temperature control

一次仪表 Primary instrument: 热电偶 E 型 Thermocouple E

二次数表 Secondary figure meter: 数字显示 PID 调节, 集中安装于控制柜 digital display, regulated by PID, mounted in control cabinet.

控制精度 Control accuracy: $\pm 2^{\circ}\text{C}$

i. 压力控制, 在机筒末端滤网前安装融熔压力测量传感器, 压力在电气柜有数字显示, 超压时仪表会报警, 立即采取措施保护挤出机。挤出机底部有遥控电动行走小车, 通过遥控方式操作, 电机带动涡轮箱减速行走, 不用人工手遥操作。

Pressure control: by a melt pressure measuring sensor installed before the filter screen at the end of barrel, there is a digital display for pressure on the electric cabinet. When overpressure occurs, there will be an alarm to protect the extruders, there is remote control electrical mobile car on the bottom of extruder in the remote control way. The motor drives the worm-gear box to slowly walk, manual control is not needed.

结构特点: 用于挤出导体屏蔽层。由减速机, 机筒, 螺杆, 底座, 快速夹紧装置, 电加热、冷却系统, DC 电机, 料斗及上料系统组成。机筒双层结构采用内置型环型水道式冷却方式, 机身不缠绕铜管, 控温准确, 机身采用铸铝管状加热器电加热、独立分区全封闭水冷却。冷却水电磁阀根据各区温控要求, 由计算机控制开、断频率, PID 调节控温精度 $\pm 2^{\circ}\text{C}$ 。挤出机与三层共挤机头, 通过导胶管连接。导胶管外有加热器, 温度显示在总操作屏上。

Structure characteristic: It is used for extruding the conductor screen layer. Consist of reducing gearbox, barrel, screw, base, quick clamping device, electric heating & cooling system, DC motor, hopper and loading system. The double-layer structure of the barrel adopts the built-in ring-type channel cooling mode, and no copper pipe wrapped around the extruder body, so the temperature control is accurate Extruder body adopts electric heating by cast aluminum tube type heater, independent partition and fully enclosed water cooling. Control to connect or cut off frequency of cooling water magnetic valve by PC according to temperature control requirement in each area, PID regulating temperature control accuracy $\pm 2^{\circ}\text{C}$. Extruder connect triple crosshead by a model adapter. Heater on adapter, display temperature main operating screen.

7. 90 挤出机 Extruder 90/20D

a. 机筒 Barrel

材料 Material: 38CrMoA1A

硬度 Hardness: $>950\text{HV}$

最大工作压力 Working pressure: max 70MPa

b. 螺杆 Screw

材料 Material: 38CrMoA1A

硬度 Hardness: $>850\text{HV}$

直径 Diameter: 90mm

型式 Type: 新 BM 分离型螺杆带中心孔冷却 Newly BM separate type with center hole cooling

转速 (max) Rate of rotation: max.: 41.5rpm

长径比: 20:1

c. 齿轮箱 Gear box

减速比 Reduction gear ratio: 36: 1

润滑方式 Reduction gear ratio: 油泵喷淋 inject oil from oil-pump

推力轴承动态最大压力 Maximum pressure for thrust bearing: 1040kN

d. 加热和冷却系统 Heating and cooling system

机筒加热方式 Heating way for barrel: 电加热 electric heating

机筒冷却方式 Cooling way for barrel: 独立式分区油冷却 Independent partition with oil cooling

机筒冷却原理 Barrel cooling principle:: 油冷方式 Oil cooling way

(包括全封闭循环油泵、热交换器、阀门和电磁阀组成 Including fully enclosed circulating oil pump, heat exchanger, valves and magnetic valve)

喂料斗冷却 Cooling way for feed hopper: 水冷却 water cooling

机筒加热区段数 Quantity of heating section for barrel: 4 个

每段加热功率 Heating power for each heating section: 4kW

e. 直流电机 D C motor

型号 Type: Z4

功率 Power: 55kW

额定转速 Rated speed: 1450rpm

驱动器 Drive: 派克 Parker 590(原英国欧陆 original Eurotherm)

f. 上料 Material feeding: 自动真空吸料机 2.2kw、热风式料斗干燥机 150kg (用户自备) automatic vacuum feeding device 2.2kw, hot air hopper dryer 150kg (supplied by customer)

g. 出胶量 Extrusion output: 60kg/h

h. 机筒温度控制 Barrel temperature control:

一次仪表 Primary instrument: 热电偶 E 型 Thermocouple E

二次仪表 Secondary figure meter: 数字显示 PID 调节控制柜集中安装

digital display, regulated by PID, mounted in control cabinet

控制精度 Control accuracy: $\pm 2^{\circ}\text{C}$

i. 压力控制: 在机筒末端滤网前安装融熔压力测量传感器, 压力在电控箱上有数字显示, 当超压时仪表会报警, 立即采取措施保护挤出机。挤出机底部有遥控电动行走小车, 通过遥控方式操作, 电机带动涡轮箱减速行走, 不用人工手遥操作。

Pressure control: by a melt pressure measuring sensor installed before the filter screen at the end of barrel, there is a digital display for pressure on the electric cabinet. When overpressure occurs, there will be an alarm to protect the extruders, there is remote control electrical mobile car on the bottom of extruder in the remote control way. The motor drives the worm-gear box to slowly walk, manual control is not needed.

结构特点: 用于挤出导体屏蔽层。由减速箱, 机筒, 螺杆, 底座, 快速夹紧装置, 电

加热、冷却系统，DC 电机，料斗及上料系统组成。机筒双层结构采用内置型环型水道式冷却方式，机身不缠绕铜管，控温准确，机身采用铸铝管状加热器电加热、独立分区全封闭水冷却。冷却水电磁阀根据各区温控要求，由计算机控制开、断频率，PID 调节控温精度 $\pm 2^{\circ}\text{C}$ 。挤出机与三层共挤机头，通过导胶管连接。导胶管外有加热器，温度显示在总操作屏上。

Structure characteristic : It is used for extruding the conductor screen layer. Consist of reducing gearbox, barrel, screw, base, quick clamping device, electric heating & cooling system, DC motor, hopper and loading system. The double-layer structure of the barrel adopts the built-in ring-type channel cooling mode, and no copper pipe wrapped around the extruder body, so the temperature control is accurate Extruder body adopts electric heating by cast aluminum tube type heater, independent partition and fully enclosed water cooling. Control to connect or cut off frequency of cooling water magnetic valve by PC according to temperature control requirement in each area, PID regulating temperature control accuracy $\pm 2^{\circ}\text{C}$. Extruder connect triple crosshead by a model adapter. Heater on adapter, display temperature main operating screen.

8. 150 挤出机 Extruder 150/25D

a. 机筒 Barrel

材料 Material: 38CrMoAlA

硬度 Hardness: $>95\text{HV}$

最大工作压力 Working pressure: max.50MPa

b. 螺杆 Screw

材料 Material: 38CrMoAlA

硬度 Hardness: $>85\text{HV}$

直径 Diameter: 150mm

型式 Type: BM+屏障型新型螺杆带中心孔冷却 BM+barrier type newly screw with center hole cooling

转速 (max) Rate of rotation: Max.40rpm

c. 齿轮箱 Gear box:

减速比 Reduction gear ratio: 37.5: 1

润滑方式 Lubricating method: 油泵喷淋 inject oil from oil-pump

推力轴承动态最大压力 Maximum pressure of thrust bearing 1600kN

d. 加热冷却系统 Heating and cooling system

机筒加热方式 Heating way for barrel: 电加热 electric heating

机筒冷却方式 Cooling way for barrel: 独立式分区油冷却 Independent partition with oil cooling

机筒冷却原理 Barrel cooling principle: 油冷方式 Oil cooling way

(包括全封闭循环油泵、热交换器、阀门和电磁阀组成 Including fully enclosed circulating oil pump, heat exchanger, valves and magnetic valve)

- 喂料斗冷却 Cooling way for feed hopper: 水冷却 water cooling
齿轮箱冷却 Cooling way for gearbox: 水冷却 water cooling
机筒加热区段数 Quantity of heating section for barrel: 7 个
每段加热功率 Heating power for each heating section: 5kW
- e. 直流电机 D C motor
型号 Type: Z4
功率 Power: 132kW
额定转速 Rated speed: 1450rpm
驱动器 Drive: 派克 Parker 590P (原英国欧陆 original Eurotherm)
- f. 上料 Material feeding: 自动真空上料机 4.0kw 不锈钢主料斗 200kg 带辅料斗 15kg (用户自备)
automatic vacuum feeding device 4.0kw,, stainless steel main hopper with auxiliary hopper 15kg (supplied by customer)
- g. 出胶量 Extrusion output: 300kg/h
- h. 机筒温度控制 Temperature control for barrel
一次仪表 Primary instrument: 热电偶 E 型 Thermocouple E
二次仪表 Secondary figure meter: 数字显示 PID 调节, 集中安装于控制柜 digital display, regulated by PID, mounted in control cabinet
温控精度 Control accuracy: $\pm 2^{\circ}\text{C}$
- i. 压力控制 Pressure control

在机筒末端滤网前安装融熔压力测量传感器, 压力在电气柜有数字显示, 当超压时仪表会报警, 立即采取措施保护挤出机。挤出机底部有遥控电动行走小车, 通过遥控方式操作, 电机带动涡轮箱减速行走, 不用人工手遥操作。

Pressure control: by a melt pressure measuring sensor installed before the filter screen at the end of barrel, there is a digital display for pressure on the electric cabinet. When overpressure occurs, there will be an alarm to protect the extruders, there is remote control electrical mobile car on the bottom of extruder in the remote control way. The motor drives the worm-gear box to slowly walk, manual control is not needed.

结构特点: 用于挤出导体屏蔽层。由减速箱, 机筒, 螺杆, 底座, 快速夹紧装置, 电加热、冷却系统, DC 电机, 料斗及上料系统组成。机筒双层结构采用内置型环型水道式冷却方式, 机身不缠绕铜管, 控温准确, 机身采用铸铝管状加热器电加热、独立分区全封闭水冷却。冷却水电磁阀根据各区温控要求, 由计算机控制开、断频率, PID 调节控温精度 $\pm 2^{\circ}\text{C}$ 。挤出机与三层共挤机头, 通过导胶管连接。导胶管外有加热器, 温度显示在总操作屏上。

Structure characteristic : It is used for extruding the conductor screen layer. Consist of reducing gearbox, barrel, screw, base, quick clamping device, electric heating & cooling system, DC motor, hopper and loading system. The double-layer structure of the barrel adopts the built-in ring-type channel cooling mode, and no copper pipe wrapped around the extruder body, so the temperature control is accurate Extruder body adopts electric heating by

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cast aluminum tube type heater, independent partition and fully enclosed water cooling. Control to connect or cut off frequency of cooling water magnetic valve by PC according to temperature control requirement in each area, PID regulating temperature control accuracy $\pm 2^{\circ}\text{C}$. Extruder connect triple crosshead by a model adapter. Heater on adapter, display temperature main operating screen.

9. 三层共挤机头 Triple-layer extrusion crosshead

a. 技术参数 Technical parameters

导体直径范围 Conductor diameter range: 6~34mm

出线直径(max) Outlet wire diameter: max. 70mm

挤出厚度 Extrusion thickness:

第一层 First layer: 0.5~2.0mm

第二层 Second layer: 2.0~12mm

第三层 Third layer: 0.5~2.0mm

加热方式 Heating way: 油加热器 Oil heater, 温控精度 Temp.ctrl.accuracy $\pm 2^{\circ}\text{C}$

b. 机头材料: 38CrMoA1A 经氮化处理加工, 螺纹紧压与挤出机相连接, 本公司专利技术生产, 经多年客户使用无问题, 技术成熟稳定, 氮化强度大多年使用不损坏 Its material is 38CrMoA1A with nitrogen treatment, connects with the extruder by screw pressed. It is produced by our patent technology, and no problem occurred after many years used by our clients. Its technology is mature and stable. No destroyed with good nitride strength after years used.

c. 油加热器采用 3 路加热, 通过手动调节流量控制机头 3 个区温度, 油加热器与机头采用快插接头方式连接。

Oil heater adopts 3-way heating, control 3 zones temperature of crosshead by manual flow regulation. Quick change coupler conneted with crosshead.

结构特点: 在分流体上通过环流道对电缆料进行圆周上的分配, 通过节流环的节流间隙控制并保证电缆料沿机头轴向圆周上各点的流速一致, 从而保证了挤包层在圆周上各点厚度一致。该机头由于采用了环流分配流道和节流环, 与国外三层共挤机头相比, 大大缩短了分流体和机头的长度, 减轻了重量; 清理机头时, 拆卸方便, 易于清理, 生产时调偏容易, 省时省力, 材料 38CrMoA1A. 为油加热自然冷却式, 由机头体, 分胶体, 模芯, 模套, 导胶管, 连接法兰, 不锈钢编织管, 材料 38CrMoA1A 等组成。3 台挤出机分别通过各自的导胶管, 分胶体, 模芯, 模套实行各层的挤出。机头上设置 2 个热电偶测温点。

characteristic: dividing cable material on circle by circular flow channel on divider, regulate restrictor gap of restrictor ring and guarantee not only same velocity of cable material from crosshead axis to each point on circle but also same thickness of extrusion layer on each point of circle. As crosshead adopts circular dividing flow channel and restrictor ring, it shortens the length of divider and crosshead than foreign crosshead and reduce weight. It is

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convenient to clean and disassemble when cleaning crosshead, easy to regulate eccentricity, save time and workforce when producing. Material is 38CrMoAlA.

It adopts oil heating & naturally cooling. It consists of crosshead body, material divider, die mandrel, die, model adapter, connecting flange, stainless steel hose, etc. Extruding each layer via separate model adapter, material divider, die mandrel and die. Set 2 temperature measure points of thermocouple in the crosshead.

10. 上封闭器 Splice box

- a. 材料 Material: 伸缩管为不锈钢 304
Telescopic tube is made of stainless steel 304
- b. 行程 Travel: 1000mm
- c. 动作方式 Action way: 电动与滑轨 motorized and sliding rail
打开时管内压力连锁, 压力回零时才能打开, 以保安全。
As the pressure in the tube is interlink, for security the tube can be opened only when the pressure goes back to zero position.
- d. 与机头连接方法, 聚氟乙烯垫密封, 螺纹连接, 滑道定位。
Connection way with crosshead: sealed with PTFE gasket, screwed connection and slide way positioning.
- e. 可留出外径测偏仪接口(用户提供有关参数)。
If necessary, an interface of a derivometer can be reserved. (customer supplies the related parameters)
- f. 电动控制伸缩管装置 Motorized control device for the telescopic tube.

结构特点: 上封闭器伸缩管材料不锈钢 304, 由内伸缩管、外定位套、墙板、滑轨等组成。在丝杠的作用下, 带动内伸缩管移动, 与机头之间采用四氟环自动密封定位。具有机械连锁, 确保安全。

上封闭器上端与三层共挤机头连接, 下端与管路第一节加热管连接。生产时与三层共挤机头连接在一起; 不生产时前部伸缩管缩回近 1000mm 便于三层共挤机头的清胶与拆卸。

characteristic: splice box material is stainless steel 304, consist of inner telescope tube, outer positioning sleeve, wall plate, slidig rail etc. Under the action of leading screw, make inner expansion tube moving, automatic seal and position by Teflon ring with crosshead. Ensure safety with mechanic interlock.

The top of the splice box is connected with the triple crosshead. The bottom is connected with first heating tube. Connect together with triple crosshead when producing; the telescope tube in front

Will draw back nearly 1000mm when stop producing. It will be convenient to clean material and disassemble triple crosshead.

11. 交联管加热 Heating for cross linking tube

- a. 采用特种干式变压器短路加热，热效率高，加热温度均匀，维护简单。

Special dry transformer is adopted for short-circuit heating, which has the feature of high thermal efficiency, even heating temperature as well as easy to maintain.

- b. 加热管共 6 节，每节长 6m，管径：Φ219×4，材料：不锈钢 304。

There are totally 6 sections in heating tube. Each section is 6m long. Pipe size is φ 219×4. Material is stainless steel 304.

- c. 采用可控硅触发模块无触点开关加热，联锁控制。

Interlink control with silicon controlled trigger module contactless switch, linking control.

- d. 温度表集中安装在控制柜上，温度控制精度±5℃。

Thermometer is mounted on the cabinet, and temperature control accuracy is ±5℃

- e. 加厚铜铝型材，结构稳定不变形，加热时不抖动。

Thickened copper and aluminum, stable structure no deformation, no jitter during heating.

- f. 加热总功率 Total power for heating: 420KW

- g. 交联管采用热弯曲成型，满足压力容器标准，管内压力≤1.6MPa

Heating tube adopts hot bending, meets the standard of pressure vessel, Pressure in tube ≤ 1.6MPa

h. 每段交联管底部含支撑托轮，加热伸长冷却收缩时起到滑动作用，交联管连接采用石棉垫绝缘。The bottom of each section of crosslinking pipe contains supporting roller, which plays a sliding role when extend upon heating shrink upon cooling. Crosslinking pipe connection is insulated by asbestos.

- i. 每节交联管上有 2 套热电偶，一套使用，一套备用。

There are two sets of thermocouples on each crosslinking tube, one is to be used, the other is for standby.

结构特点：加热管管壁最高温度为 450℃，每节管由导电板，铝排，绝缘管，吊架，干式变压器，管路支架组成。正常生产时，每节管的加热温度不一样，管内介质为氮气，压力 1.0-1.6Mpa. 变压器容量：60KVA, 电压：初级 380V, 次级 9-11V, 试验压力：2.0Mpa (常温，水压)

characteristic: max. temperature 450℃ of curing tube wall, consist of conducting plate, aluminium bar, insulation tube, hanging bracket, dry transformer, stand of tube etc. The heating temperature in each tube is different when normally producing, medium in tube is nitrogen, pressure 1.0-1.6Mpa. Transformer capacity: 60KVA, voltage: primary 380V, secondary 9-11V, test pressure: 2.0Mpa (normal temperature, water pressure)

12. 悬垂控制器 Catenary controller

- a. 型式 Type: 非接触式 contactless

- b. 安装位置: 安装在加热段中间，保证在加热段中电缆不擦管。

Mounting position: in the middle of heating section and make sure the cable not

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touch the pipe.

- c. c. 悬垂控制得到电缆位置信号，信号经处理后调整下牵引机转速。

When the catenary controller gets the cable position signal, rotate speed of lower hauling machine will be regulated.

结构特点：悬垂控制器由管体，前法兰，线圈架，支架，后法兰，发射线圈，接收线圈组成。在消化吸收国外最新技术的基础上研发的最新产品。工作原理为非接触式场强控制，抗干扰能力强。电缆在管内的波动范围很小，运行稳定，维护简单。

指示电缆在管内位置，通过本身的电信号调节下牵引机转速与包带牵引机同步，控制电缆悬浮在管路中部，防止电缆在加热段碰管，产生废品。

技术参数：长度：1290mm，管道直径：Φ219×4，管内介质：氮气，工作压力 1.0-1.6Mpa，试验压力：2.0Mpa。

characteristic: Consist of tube body, front flange, coil stand, stand, back flange, sending coil, receiving coil.

Innovate the latest product after absorbing foreign latest technology. Working principle : contactless field strength control, strong antijamming capacity. Small fluctuating range of cable in tube, running stably, easy to maintain.

Indicate cable position in tube, regulate revolution of caterpillar synchronize metering capstan by electric signal, control cable to suspend in middle of tube, prevent cable touch tube in curing tube and produce reject.

parameter: length: 1290mm, tube diameter: Φ219×4, medium in tube: nitrogen, working pressure 1.0-1.6Mpa, test pressure: 2.0Mpa.

13. 预冷段 Precooling section

电缆预冷段位于电缆在热氮区和水冷区之间，使电缆在生产过程中温度有一个渐变过程，减少电缆绝缘的应力提高产品质量。

其中包括 1 节胖管，2 节 Φ219×4 管，工作压力 1.0-1.2Mpa，中间设置定时排氮孔。（带水位感应报警装置）

Precooling section is between nitrogen heating zone and water-cooling zone, which makes the temperature gradually change during the course of cable production. It can minimize cable insulation stress and improve the quality of products. Including 1 section fat tube, 2 sections of Φ219×4 tube, pressure 1.0-1.2Mpa, set timing nitrogen discharging hole in middle.(with water level inductive alarm device)

14. 冷却段 Cooling section

材 料：不锈钢 304，管径：Φ150×4，（第一节冷却管 Φ219×4）

Material: stainless steel 304 pipe size: Φ150×4 (the first section is Φ219×4)

冷却介质：水，通过冷却水库闭路循环，其水位高度通过水汽平衡系统自动控制。最后一节管设置进水口，采用不锈钢管，分段（6025mm/节）热弯曲成形，符合悬链曲线和压力容器标准，管内压力≤2.0Mpa。各段交联管底部配有支撑导轮，当交联管加

热伸长（或冷却收缩）时起滑动作用。各段交联管的连接，内衬 XB450 橡胶石棉板，厚度 4mm。

Cooling medium: water (circulating water from reservoir), water level is automatic control by water and air balance system. At the last section of tube, set water inlet, adopts stainless steel tube, hot bending and forming in sections (6025mm/section), conforms to catenary curve and pressure vessel standard, pressure in pipe ≤ 2.0 MPa. Each section of crosslinking tube bottom equipped with supporting roller, which plays a sliding role when extend upon heating shrink upon cooling. Crosslinking pipe connection is insulated by XB450 rubber asbestos, thickness is 4mm.

15. 下封闭器 End seal

a. 封闭方式：一次封闭，用近似园锥形橡皮密封圈密封。

Seal type: primary seal with rubber seal ring approximately conical shaped.

b. 特点：通过调节螺杆改变对密封圈的压力，可以对电缆出线口径进行微调，控制冷却水渗漏量。Feature: change the pressure to the seal ring by regulating the screw. By making fine adjustments to the cable outlet aperture, control the cooling water leakage

c. 双气缸气动控制，可移动距离 500mm Double cylinders pneumatic control, movable distance is 500mm.

结构特点：下密封装置材料为 304 不锈钢，由内伸缩管、外定位套、气缸、移动水箱等组成采用气压控制伸缩移动。采用近似圆锥形硅橡胶密封圈定位，为了保证电缆表面不擦伤，在密封处控制一定的泄流量。下密封为气动操作方式，机械锁紧装置。下部设置辊轮，可以在轨道上移动，解决管路热胀冷缩的问题。出口处有独立可调节托辊

Characteristic: End seal material is stainless steel 304. It consists of telescope tube, outer position sleeve, cylinder, traveling water tank etc. Adopts pneumatic control telescopic moving. Positioning with approx conical rubber seal ring, control leakage in seal part to guarantee no scratching the surface of cable. It adopts pneumatic operating way and has mechanic lock device. Set roller in bottom, can move on rail, resolve problem of thermal expansion. In outlet, set independent adjustable roller.

16. 电缆吹干机 Blow dryer

技术参数 Technical parameter:

泵功率 pump power: 1.1KW

线外径 wire outer dia.: 25-100 mm

空气流量 Air flow: 130m³/h

17. 下履带牵引机 Lower belt caterpillar

18. a. 牵引电缆直径 Pulling cable dia. (max): 100mm

19. b. 牵引力 Pulling force (max): 30kN

20. c. 直传动 DC drive: 4 象限 quadrants
21. d. 电机型号及功率 Motor type & power: Z4, 11kW
驱动器 Drive: 派克 Parker 590
- e. 线速度 Line speed: 0~30m/min, 分四档, 分档同上牵引
with four gear-shifts the same as metering capstan

18. 机械与感应式计米器 Mechanical and inductive meter counter

带有 5 位计米器, 作为长度测量。(准确长度以操作台计米长度为准)

The meter counter with 5 digits is used for measuring length. (Accurate length is subject to meter-counting length of operation station)

带有感应计米, 计米在主操作屏上有显示。

With inductive meter countering, it will be displayed on the main operating screen.

结构特点: 由夹线轮, 长度显示表, 支架组成。

Structure features: It consists of wire clamping wheel, length indicator and bracket.

19. 收线辅助 Take up helper

- a. 转向架、拖线架 turning rack, wire supporter rack
- b. 根据图纸设计要求提供数量 provide the number according to drawing design requirements.

20. 收排线架 (龙门行走式) Take-up stand (Portal Traveling Type)

- a. 线盘直径 Drum dia: 2000~3150mm, GB4004-83 PN 型
- b. 线盘宽度 Drum width: 1180~2300mm
- c. 最大承重 Maximum bearing capacity: 16t
- d. 直传动, 功率 7.5kW, 可 4 象限运行
DC drive, which can run in 4 quadrants. Power: 7.5kw
- e. 驱动器 Driver: 派克 Parker 590P (原英国欧陆 original Eurotherm)
- f. 收线速度 Take-up speed: 0~30m/min 分二档 two gear-shifts
- g. 有快速移动功能 Has the function of quick travel

结构特点: 机电一体化龙门型结构, 整体移动往返, 维持收卷中心线不变。收线盘安装形式为无轴式, 左右立柱的上下移动、两端顶针按 PN2000-PN3150 标准线盘配顶针, 两端顶针的分开合拢, 由交流电机驱动。主传动为 7.5kW 直流电机, 经齿轮箱减速, 四象限可逆控制。根据电缆直径, 当线盘每转一圈, 控制交流电机点动时间、行走一个节距, 收线速度 0~30m/min, 并具有快速移动功能。

Structure features: mechatronical portal type structure, totally move

to and fro, keep the central line of payoff no changing. The mounting type of the take up is shaftless type, left & right columns move up and down, the pintles in both side equipped pintles as PN2000-PN400 standard drum, the pintles in both side open and close is driven by AC motor. Main drive is DC motor of 11Kw, speed down visa gearbox, and reversible

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controlled in four quarants. Traversing is moving in whole, and driven by AC motor via reducer, and will be ordered to jog and walk for a pitch, when the drum turns a round accor. to the cable diameter. The take-up speed is 0~25m/min, and has quick moving function.

21. 氮气供给和排放 Nitrogen supply and discharge

- a. 供氮源压力不大于 2~2.5MPa, 开车前应有足够储备量
Pressure of nitrogen supply source: not more than 2~2.5MPa, make sure of enough nitrogen storage before set up.
- b. 供氮可手动、自动, 自动状态压力由调节阀自动控制
Nitrogen is supplied automatically or by hand. Under the automatic state, the pressure is controlled automatically by regulating valve.
- c. 上封器处有压力表观察系统压力, 压力超过规定值时会报警或关闭供氮阀
There is a pressure gauge on the splice box to watch system pressure. When the pressure is going beyond the stipulated value, the system will alarm or close the nitrogen supply valve.
- d. 预冷段后有排污氮口
There is a pollutant-emission outlet for nitrogen after precooling section
- e. 污氮排放为 1m³/h 根据情况可增减最大不超过 1.5m³/h
Discharging amount of nitrogen waste is 1m³/h, which can be increased or decreased according to the situation but maximum should not exceed 1.5 m³ /h.
- f. 污氮排放为自动控制, 排放时间可根据工艺要求设定
Nitrogen waste discharge is controlled automatically, and discharging time can be set on technological requirements.
- g. 在加热段后有抽气泵, 当停车时开启, 不让管内气体进入主机房
Suction pump after the heating section will be opened when machine is stopped, which prevents the air in pipes from entering main machine hall.

22. 油、水循环冷却(分三路供水)

Oil and water circulating cooling (3-way water supply)

- a. 三台挤出机机身独立分区油冷却, 油为耐高温导热油。
Bodies of three extruders are independent partition oil cooling. The oil should be high temperature conductive oil.
- b. 挤出机齿轮箱, 料斗座用软化水冷却, 压力范围 0.2~0.4MPa, 水压力用手阀调节, 由机身冷却系统集中供水。
Gearbox of extruders and hopper stand are cooled with softened water. Pressure range should be 0.2~0.4MPa. Water pressure is regulated by hand valve. Centralized water supply will be supplied by extruder body cooling system.
- c. 交联管冷却, 配有二套水泵, 压力为 2.0MPa, 与水库成循环系统
Cooling for cross-linking tubes consists of two water pumps with pressure of

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2.0MPa, which forms a circulating system with reservoir.

- d. 冷却循环区由气动球阀控制，流量由手阀调节，气动球阀和手阀串联
Cooling circle zone is controlled by pneumatic ball valve; flow rate is adjusted by hand valve. Pneumatic ball valve and hand valve are in series.
- e. 管道冷却水由差压变送器和数字调节仪，**电动调节阀手阀控制与磁力翻板液位计和气动球阀手阀 2 路控制。**
Cooling water level in pipe is controlled by differential pressure transmitter and digital controller, motorized regulator manual valve, magnetic turn-over plate level gauge, pneumatic ball manual valve, two way controlled.
- f. 所有工作时与交联管有位移处的接口(包括氮气)均采用不锈钢软管
When working, all interfaces that make displacement with crosslinking pipes (including nitrogen) are stainless steel hose.

23. 水汽平衡系统 (2 路控制方式 1 套使用 1 套备用)

Water-air balance system (2-way control, one set is for use, the other is for standby)

- a. 1 路采用差压变送器和电动调节阀、手阀数字调节仪自动控制
One way adopts pressure differential transmitter and motorized regulator valve, manual valve digital controller automatic control.
- b. 2 路采用不锈钢磁力翻板液位计和气动球阀、手阀自动控制
The second way uses stainless steel magnetic turn-over plate level gauge and pneumatic ball valve, manual valve automatic control.
- c. 转换采用主操作柜上开关控制选择 1 路或 2 路来工作。
Change-over adopts swith on the main control cabinet to control and choose one way or second way. For work.

24. 电气控制 Electrical control

- a. 系统运行时以上牵引为基准，悬垂控制器辅助调节，保证全线同步。
When the system is running, the whole line is based on the metering capstan. Catenary controller is acted as auxiliary adjustment to make sure the whole line run synchronously.
- b. 全部电气传动系统，在电气上可以同步升、降速，也可以各单机独立调节。并有全线倒车功能。
All the electrical drive systems can realize synchronously speed up and down, also can be separately controlled by single machine. It has the function of whole line reversal.
- c. 全线分布有五处急停点，分布于放线、储线、主操作台、牵引机及收线。
In the whole line there are five emergency stops respectively in pay offs, accumulators, main operating station, hauling machine and take-ups.

d. 电控柜显示部分 **Cabinet display**

有表示全线设备布置的工艺流程模拟屏，配有发光二极管，表示设备运行状态。

There is a simulation screen of process flow equipped with LED to display as follows:

直流传动的电流、电压（转速）显示

Whole line layout, running situation, voltage (rotate speed) and current of DC drive

供电电压、电流显示 Supply voltage and current

挤出机、硫化管加热温控系统的每一测温点的温度显示

Temperature at every point for measuring temperature of heating temperature control system for extruders and vulcanizing tube

线速度显示 Line speed

三台挤出机融熔压力显示 Melt pressure of three extruders

电缆位置显示 Cable position

储线量显示 Accumulating quantity

计米显示 Meter counting

水位调节阀启开程度显示 Opening degree of water level regulating valve

氮气储气量（压力）显示 Nitrogen storage amount (pressure) display

e. 声光报警系统 **Acoustic-optical alarm system**

挤出机机筒融熔压力超压报警

Overpressure alarm for melt pressure of barrel on extruder

水位高、低报警、悬垂高低报警

Water level high or low, Catenary controller high or low

氮气超压报警、交联管路超温报警

Alarm of over-pressure for nitrogen, and over-temperature for crosslinking pipe

储线空、满报警 Accumulator empty or full alarm

油泵、水泵停报警 Oil or water pump stop alarm

f. 电控柜操作 **Electrical control cabinet operation**

电源柜电动或手动合闸操作 Switch on by electrical or manual

各单机、传动、温控及水泵等起、停操作

Start-stop operation on transmission, temperature control and water pump for every unit

传动柜单机升、降调节，全线升、降速调节

Single machine of transmission cabinet up and down adjustment, speed control for the whole line

电缆在硫化管中位置的调节（偏上或偏下）

Set cable position in the vulcanizing pipe (upward or downward adjustment)

供氮系统自动或手动操作，污氮排放量调节

Automatic or manual operation for nitrogen supply system, discharge amount adjustment of nitrogen waste

水位控制自动或手动操作

Automatic or manual control for water level

储线器前有夹紧、放松操作

Clamp and loosen operation before the accumulator

加热系统的开启操作温度设定

Start the heating system and setting the temperature

g. 电控柜组成 Electrical control cabinets consist of:

主机房电控柜集中安装包括

Electrical control cabinets in the main unit room consist of:

进线电源柜 Power supply cabinet for in-wire

出线电源柜 Power supply cabinet for out-wire

挤出机传动柜 Drive cabinet for extruders

挤出机温控柜 Temperature control cabinet for extruders

交联管加热温控柜 Temperature control cabinet for crosslinking pipe heating

牵引传动柜 Drive cabinet for haul-off

主控制柜 Main control cabinet

主机房环境温度 Ambient temperature in the main unit room: 0~30°C

25. 电视监视系统 TV Monitor system

四台彩色电视摄像机，分别安装在放线、收线、储线及悬垂窗四个位置，监视器安装在主机房

Four color TV cameras are respectively installed at pay off, take-up, accumulator, catenary controller window.

Monitor is installed in the main machine hall.

26. 工装附件 Tools and accessories

a. 机头拆卸工装一套

Tools for disassembling the crosshead, 1 set

b. 65 挤出机螺杆拆卸工装一套

Tools for disassembling the screw of ϕ 65 extruder, 1 set

c. 90 挤出机螺杆拆卸工装一套

Tools for disassembling the screw of ϕ 90 extruder, 1 set

d. 150 挤出机螺杆拆卸工装一套

Tools for disassembling the screw of ϕ 150 extruder, 1 set

e. 三套试车挤出模具

Extrusion die-tool for test running, 3 sets

f. 工具小车一台 Tool carriage, 1

27. 生产线验收 Inspection and acceptance of production line

生产线调试后通过双方认为条件具备时，进行产品试生产验收，一般为大、中、小三种规格，供方提供模具，具体规格见表，用户也可以根据电缆销售情况改变品种，但模具自备。35kV 电缆验收规格为 95mm² 以上。(双方可另行商定)

After commissioning, when both parties think everything is OK, trial production inspection and acceptance can be conducted. In most cases, there are three specifications of big, medium and small size. Supplier offers Die-tools. Specific specification can be seen in the following table. Customer can change the cable variety according to the sales status, but the die-tool is ready by customer. 35kV cable specification for check and accept is over 95 mm². (Both sides can make other consultation)

序号 No.	规格 Specification	电压 Voltage	数量 Quantity
1	35 mm ²	6KV	3000m
2	120 mm ²	10KV	3000m
3	300 mm ²	35KV	1000m

生产线生产的交联电缆应符合 GB/T 12706 -2002 标准中有关结构条款的要求。生产线生产三种规格的电缆达到标准后，即作为本生产线验收。

The cross linking cable from the production line should meet requirements of the configuration clause in GB/T 12706 -2002 standard.

It will be regarded as the inspection and acceptance of production line after the three specifications of cable from trial production line reach the standard.

附件 2 Appendix 2:

主要设备明细

Main Equipments List

序号 Item	设备名称 Name of equipment	规格 Specification	数量 Quantity
1	主动式龙门放线架 Motorized Portal Pay-off stand 1. 放线形式舞蹈器速度放线 Dancer speed pay off 2. 恒张力方式 Constant tension pay off	Φ2500 mm (龙门行走式 portal travelling type) 含电控在内 Electric control is included	2 台 2 Pcs.
2	放线舞蹈器 Pay off Dancer	调节放线速度, 维持电缆中心位置不变 Adjust pay off speed, keep the center position unchanged	1 台 1 Piece
3	转向轮、拖线轮尼龙材料 Steering wheel, holding wire wheel are made of nylon.	根据整线布局确定角度及数量 define angle and quantity acc.to whole line layout	1 台 1 Piece
4	气动式夹线器 Pneumatic Wire clamber	气动操作 Pneumatic operation	1 台 1 Piece
5	卧式储线器 Horizontal Accumulator (伺服电机 Servo motor)	储线长度 Accumulating length: 120m 西门子 PLC+西门子文本显示器+派克 590P 驱动器控制 Siemens PLC+Siemens text display+ Parker 590P Drive control	1 台 1 Piece
6	上包带牵引机 (垂直度及齿轮间隙控制精准, 斜齿传动 Upper disk type capstan	牵引力 Pulling force: 30KN (2 米直径轮盘整体铸造加工) Wheel of 2m in dia. is integrally casting processed.	1 台 1 Piece

	(Accurate verticality and gear clearance, helical gear transmission)		
7	机头(三层共挤) Head (Triple extrusion crosshead)	导胶管、机头支架、油加热器快插接头, 耐油不锈钢金属软管 Guiding pipe, stand of crosshead, quick connectors for oil heater, oil resistant stainless steel metal hose	1 台 1 Piece
	全套模具 Full set of dies 10kv/35kv (35-630)	氮化加工 Nitridized process	2 套 2 Sets
8	65 挤出机 Φ 65 extruder (独立式机身油冷) Independent extruder body oil cooling	长径比: 1: 20 机身温控密闭式流道结构, 不缠绕铜管控温准 L:D 1:20, closed runner structure for the body temperature control, no wrapping copper tube, accurate temperature control.	1 台 1 Piece
	65 挤出机行走小车 Φ 65 extruder mobile carriage	遥控电机涡轮箱减速行走方式, 坦克链包裹各类安装电缆美观 Remote motor worm gear box slow walking way, tank chain covered kinds of installation cable for well appearance.	1 台 1 Piece
9	150 挤出机 Φ 150 extruder (独立式机身油冷) Independent extruder body oil cooling	长径比: 1: 25 机身温控密闭式流道结构, 不缠绕铜管控温准 L:D 1:25 closed runner structure for the body temperature control, no wrapping copper tube, accurate temperature control.	1 台 1 Piece
	150 挤出机行走小车 Φ 150 extruder mobile carriage	遥控电机涡轮箱减速行走方式, 坦克链包裹各类安装电缆美观 Remote motor worm gear box slow walking way, tank chain covered kinds of installation cable for well appearance.	1 台 1 Piece
10	90 挤出机 Φ 90 extruder (独立式机身油冷) Independent extruder body oil cooling	长径比: 1: 20 机身温控密闭式流道结构, 不缠绕铜管控温准 L:D 1:20 closed runner structure for the body temperature control, no wrapping copper tube, accurate temperature control.	1 台 1 Piece
	90 挤出机行走小车	遥控电机涡轮箱减速行走方式, 坦克链包	1 台

	φ 90 extruder mobile carriage	裹各类安装电缆美观 Remote motor worm gear box slow walking way, tank chain covered kinds of installation cable for well appearance.	1 Piece
11	上封闭器 Splice box	电动与滑轨 motorized & sliding rail	1 台 1 Piece
12	交联加热管 (36 米) Cross linking heating tube (36m)	Φ219×4 不锈钢 304 6 段 φ 219×4 stainless steel 304, 6 sections	1 套 1 Set
13	悬垂控制器 Catenary controller (送悬垂玻璃 1 块) A piece of glass free of charge	非接触式场强接收 Contactless and field strength receipt	1 台 1 Piece
14	丁字罐 T-tank (水汽平衡用 used for water-air balance)	不锈钢 304 Stainless Steel 304	1 台 1 Piece
15	水汽平衡系统 Water-air balance system (2 种控制方式) (2 kinds of control ways)	1. 差压变送器、电动调节阀、手阀数字调节仪 Pressure differential transmitter, electrical control valve, manual digital controller 2. 不锈钢磁力翻板液位计、气动球阀、手阀 Stainless steel magnetic turn-over plate level gauge, pneumatic ball valve, and manual valve	1 套 1 Set
16	预冷管段 (12m) Pre-cooling tube section	Φ219×4 不锈钢 304 2 段 Φ219×4 stainless steel 304, 2 sections	1 套 1 Set
17	冷却管段 (54m) Cooling tube section	Φ 150×4 不锈钢 304 (第一节 Φ219×4) 9 段 φ 150×4 stainless steel 304 (φ 219×4 for the first section) 9 sections	1 套 1 Set
18	氮气压力控制系统 Control system for nitrogen pressure	自动及手动控制阀组 Automatic and manual control valve group	1 套 1 Set
19	氮气排放系统 Nitrogen drain system	风机及自动球阀等 Air blower and automatic ball valve	1 套 1 Set
20	气路控制系统 Air pipe control system	气动球阀等 Pneumatic ball valve etc.	1 套 1 Set

21	水控制系统 Water control system	多级立式水泵 2 台、自动手动调阀 2 sets of vertical water pumps with multi-level, automatic and manual control valve	1 套 1 Set
22	管路电加热变压器 Pipe electrical heating transformer	加热变压器（干式） Heating transformer(drying type)	6 台 6 Pieces
23	管路底部托轮 Pipe bottom supporting wheel	加热段、预冷段、冷却段 Heating section, pre-cooling section, cooling section	1 套 1 set
24	加热用铜铝排 6 段 Copper & aluminum bar for heating 6 sections	铜排厚 12mm、铝排厚 16mm Copper bar thickness 12mm, aluminum bar thickness 16mm	1 套 1 Set
25	下封闭器 End seal	软性封闭、气动控制 不锈钢 304, 可调 电缆中心控制泄水量装置 Soft seal, pneumatic control, stainless steel 304 adjustable water discharge control device for cable center	1 台 1 Piece
26	5 位计米器 Meter counter with 5 digits.	机械及感应一体式 Mechanical and inductive integrated type	1 台 1 Piece
27	下履带牵引机 Lower belt caterpillar	牵引力 30kN Pulling force: 30kN	1 台 1 Piece
28	电缆吹干机 Cable Dryer	1.1kw 电机及软管 1.1kw motor and hose	1 台 1 Piece
29	收线辅助 Take up helper	转向轮、托架根据整线布局确定角度及数量 Steering wheel and support will be defined angle and quantity according to the whole line layout.	1 台 1 Piece
30	龙门式主动收线架 Portal active Take-up stand (含电控在内) Electric control is included	Φ3150mm (龙门行走式 portal mobile type)	2 台 2 Pcs.
31	收放线架底部轻轨 Bottom light rails for	双收双放 double take up and pay off	56m

	take up and pay off stand		
32	<p>整套线操作电控柜 (全线七个控制柜) Complete set of operating electrical control cabinet (Totally 7 control cabinets for the whole line)</p>	<p>1. 主电源柜 (主电源开关及各主机开关接线铜排) Main power cabinet (Main power switch and every main machine switch wiring copper bar) 2. 主操作柜 (西门子 S7-200PLC 加 12 寸彩色液晶触控屏+融压及温度各类操作仪表等) Main operating cabinet (Siemens S7-200PLC+12"colorful LCD touch screen+ various of operating instruments such as melt pressure and temperature etc.) 3. 三台主机机身加热柜 (RKC 温控表控制+电流显示仪表) Heating cabinet for 3 extruders body (RKC temperature controller+current display meter) 4. 管路加热控制柜 (可控硅触发模块加热+电流显示仪表) Pipe heating control cabinet (SCR Trigger module heating+current display instrument) 5. 3 台主机驱动柜 (派克 590P, 原英国欧陆) 3 extruders driving cabinet (Parker 590Poriginal Eurotherm) 6. 上下牵引驱动柜 (派克 590P) Drive cabinet for upper and lower capstan (Parker 590Poriginal Eurotherm) 7.储线器驱动柜 (西门子 PLC+西门子文本显示器+派克 590P, 原英国欧陆) Drive cabinet for accumulator(Siemens PLC+ Siemens text display+ Parker 590P, original Eruothum)</p>	<p>1 套 1 Set</p>
33	<p>高清工业摄像机 High definition</p>	<p>彩色 Colorful</p>	<p>4 台 4 Pcs.</p>

	industrial camera		
34	电视监控器 TV monitor	液晶 32 寸, 分割四画面显示 32" LCD, split four pictures display	1 台 1 Piece
35	65 挤出机螺杆拆卸工装 Disassembling tool for φ 65 extruder screw		1 套 1 Set
36	90 挤出机螺杆拆卸工装 Disassembling tool for φ 90 extruder screw		1 套 1 Set
37	150 挤出机螺杆拆卸工装 Disassembling tool for φ 150 extruder screw		1 套 1 Set
38	工具小车 Tool carriage		1 台 1 Piece
39	下封闭胶垫 Rubber cushion for end seal	软性硅胶 soft silicone	30 个 30 Pcs.
40	机头油热器 9kW Crosshead oil heater 9kW		3 台 3 Pcs.
41	自动上料系统 65、90、 150 各一套 Automatic material feeding system for Extruder 65,90 &150		三台挤 出机各 一套 1 Set for each extruder
42	液压接头机 Hydraulic splicer		1 套 1 set
43	手动压线钳 Manual wire crimper		1 台 1 set
44	出厂随机文件 Documents with the line	模具图纸、布置图、地基图、电器原理图、 电器接线图、水气管线图、使用说明书、 技术说明书、驱动器说明书、所有自制件 图 Die drawing, layout, foundation drawing, electric diagram, ,electric wiring	1 套 1 lot

		diagram, water-air pipe line drawing, operating instructions, technical instructions, drive manuals, drawings of all the part made by customer.	
合计/Total Ex-Works in China USD 389,706.00			

报价有效期为 1 个月

Quotation validity: 1 month.

白城天奇装备机械有限公司

Baicheng Miracle Equipment Machinery Co., Ltd.

16-Sep-22

附件 3、需方自制、自购、自备生产线辅助设备部分

Attachment 3: Auxiliary equipment part that buyer shall prepare and provide

序号 No.	名称及规格 Description & Specification	数量 Qty.	备注 Remark
1	气水路连接管 Connecting tube of gas and water pipe	1 套 1 set	用户自备 To be supplied by the customer 供方提供图纸 Supplier to provide drawings
2	安装连接电缆 Connecting cable for installation	1 套 1 set	用户自备 To be supplied by the customer 供方清单 See suppliers' list
3	铜接头 Copper connectors	1 套 1 set	用户自备 To be supplied by the customer 供方清单 See suppliers' list
4	表面喷塑电缆桥架 Plastic-sprayed cable tray	1 套 1 set	用户自备 To be supplied by the customer
5	上牵引机台架 Metering capstan support	1 套 1 set	供方提供图纸 Drawing is to be supplied by the Supplier
6	交联管支承立柱 (滑点以下)	1 套	供方提供图纸

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		Supporting column for crosslinking tube (Below the sliding point)	1 set	Drawing is to be supplied by the Supplier
7		悬垂控制器平台 Catenary controller platform	1 套 1 set	供方提供图纸 Drawing is to be supplied by the Supplier
8		管路加热变压器平台 Pipe heating transformer platform	7 个 7 Pcs.	供方提供图纸 Drawing is to be supplied by the Supplier
9		电控柜底部平台 Electrical cabinet bottom platform	1 套 1 set	用户自备 To be supplied by the customer 供方提供图纸 Supplier to provide drawings
10	N G S 制 氮 机 系 统	空压机 Air compression machine 11kW	1	螺杆式 screw type
		耐高温冷干机 Thermal resistant cold dryer	1	UT-10GF
		空气、氮气缓冲罐 Air and nitrogen buffer tank	2	0.3 m ³
		吸附式制氮机 Adsorption nitrogen generator	1	20 m ³ /h
		全无油氮气增压机 Oil free nitrogen booster	2	VW-20/25
		高压储氮罐 Hight pressure nitrogen storage tank	1	2.5MPa 、5m ³
11		60 m ³ 户外循环冷却水池(一条线) 60 m ³ Circulating cooling water pool outside for 1 line	1 个 1 Pc.	(两条线共用 100 m ³)用户自行设计 Totally 100m ³ for two lines and self design by customer
12		管路保温硅酸铝保温棉, 铝板外皮 Pipe insulated with aluminum silicate, covered with aluminum sheet	6 套 6 sets	供方提供图纸 Drawing is to be supplied by the Supplier
13		安装调整用垫板 Mounting adjustment pad	1 套 1 set	供方提供图纸 Drawing is to be supplied by the Supplier
14		安装用各类膨胀螺栓 Various of expansion bolts for	1 套 1 set	供方提供图纸 Drawing is to be supplied by the

	Mounting		Supplier
15	西克拉测偏仪 Sikora X-ray device		用户自备 To be supplied by the customer

白城天奇装备机械有限公司

Baicheng Miracle Equipment Machinery Co., Ltd.

16-Sep-22

附件 4： 电器元件厂家

Attachment 4: Electrical Components Manufacturer

电器元件 Electrical components	厂家 Manufacture
直流驱动器 590 DC Drive 590	派克 Parker (原欧陆 Original Eurothurm)
12 吋触屏 12" Touch Screen	西门子 Siemens
台式电脑主机箱 Desk op computer case	联想 Lenovo
自动空气开关 Automatic air switch	施耐德 Schneider
小型断路器 miniature circuit breaker	施耐德 Schneider
接触器, 继电器 Contactor, relay	施耐德 Schneider
小型继电器 Miniature relay	欧姆龙 Omron
控制变压器 Control transformer	上海琨玛 Shanghai Kunma
干式变压器 Dry transformer	上海琨玛 Shanghai Kunma

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地址: 吉林省白城市工业园区淮河路 1299 号 邮编 Zip: 137000

Add: No.1299 Huaihe Road, Industrial Park, Baicheng City, Jilin Province, China

[Http://www.bctqzb.com](http://www.bctqzb.com)

传真 Fax: 0086-0436-3221798

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电源柜主断路器 1000A Main circuit breaker of power cabinet 1000A	正泰 Chint
配电断路器 Distributor breaker	施耐德 Schneider
熔压传感器，熔压表 Melt pressure sensor, melt pressure meter	孝感 Xiaogan

The Seller:

Baicheng Miracle Equipment Machinery Co., Ltd.

卖方：白城天奇装备机械有限公司

Authorised signatory:

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