德 恩 全 球 金 屬 有 限 公 司
DOYEN GLOBAL METAL CO., LIMITED

Louis
General manager machinery and equipment deparment.
HEAD-QUARTER: CHINA MINMETALS CORP. BEIJING OFFICE: BEIJING ZHUANGYU METAL CO., LTD.
HK OFFICE: DOYEN GLOBAL METAL CO., LTDTEL: (+)86-10-64442176 DIAL 858
FAX: (+)86-10-64413738 MOBILE: (+)86 18020000708Wechat/Whatsapp
WEBSITE: http://www.zhyumetal.com.cn/ www.minmetals.com.cn

1250 彩 涂 生 产 线

技术方案

1250mm Color coating line

Technical Specification

(100,000T/A)

目录 CATALOG

1. 机组选型 11

1. PROCESS METHOD 11

2. 机组主要技术参数 11

2. MAIN PERFORMANCE PARAMETER OF THE LINE 11

2.1. 原料 11

2.1. Raw material 11

2.2 能源介质： 11

2.2.Energy sources： 11

2.3 原材料： 12

2.3 Raw material: 12

2.3.1 钢板厚度： 12

2.3.1.Strip thickness: 12

2.3.2 钢板宽度： 12

2.3.2 Strip width 12

2.3.3 最大卷重： 12

2.3.3.Weight 12

2.3.4 卷内径： 12

2.3.4.Inside diameter 12

2.3.5 卷外径： 12

2.3.5.Outside diameter 12

2.4 彩涂板成品 12

2.4.Finished product 12

2.4.1 产品种类： 12

2.4.1.product range 12

2.4.2 产品执行标准： 13

2.4.2 Execute criterion of product quality： 13

2.4.3 成品 13

2.4.3.Finished product: 13

2.4.4 卷内径： 13

2.4.4.Inside diameter 13

2.4.5 卷外径： 13

2.4.5. Outside diameter 13

2.4.6 涂层厚度： 13

2.4.6. Coating thickness 13

2.5 机组速度: 13

2.5.line speed 13

2.5.1 入口段： 13

2.5.1.Entrance velocity 13

2.5.2 工艺段： 13

2.5.2 Process velocity 13

2.5.3 出口段: 14

2.5.3. Outlet velocity 14

2.5.4 穿　带： 14

2.5.4.Threading velocity 14

2.6. 机组和厂房及平面布置要求 14

2.6. CCL and plant and layout requirements 14

2.7 机组工艺参数: 14

2.7.CCL process parameters: 14

2.7.1 机组产能： 14

2.7.1.Unit capacity: 14

2.7.2 工艺段参数： 15

2.7.2.Process parameters: 15

2.8.排放标准： 15
2.8.Emission standards: 16
2.9.加热介质： 16
2.9.Heating medium: 16
2.10.工艺流程 16
2.10.Technological process 16
2.10.1 入口段操作 16
2.10.1 Entry section operation 16
2.10.2. 清洗段 18
2.10.2.cleaning section 18
2.10.3 化学预处理 19
2.10.3.chemically pretreated 19
2.10.4 涂层 19
2.10.4 coating 19
2.10.5 涂层固化 20
2.10.5 Coating curing 20
2.10.6 出口段操作 21
2.10.6 Export segment operation 21
3、设备概述 22
3. OVERVIEW OF EQUIPMENT 22
3.1. 设备总表 22
3.1. Equipment table 22
3.2. 设备概述 25
3.2. Equipment Overview 25
3.2.1. No.1 上卷小车 25

3.2.1. No.1 Coil car 25
3.2.2. No.1 开卷机 26
3.2.2. No.1 pay-off reel 26
3.2.3. 1#夹送辊 27
3.2.3. 1# pinch roll 27
3.2.4. No.2 上卷小车 27
3.2.4. No.2 Coil car 27
3.2.5. No.2 开卷机 28
3.2.5. No.2 pay-off reel 28
3.2.6. 入口分断剪 29
3.2.6.Entry Shear 29
3.2.7. 缝合机 29
3.2.7.strip suture machine 29
3.2.8. 压毛刺机 29
3.2.8. Burr press 29
3.2.9. 1# 张力辊 30
3.2.9. 1# Bridle roll 30
3.2.10. 入口立式活套 30
3.2.10.entry looped 30
3.2.11. 2#力紧辊 31
3.2.11. 2# Bridle roll 31
3.2.12. 碱液浸泡 31
3.2.12.Alkaline solution 31
3.2.13. 刷洗装置 31
3.2.13. Alkaline brushing 31

3.2.14. 热水刷洗装置 32
3.2.14.Hot water washing device 32
3.2.15. 漂洗装置 32
3.2.15. Rinsing device 32
3.2.16. 1#干燥装置 33
3.2.16.1# drying device 33
3.2.17. 化学涂层机 33
3.2.17. Coating machine 33
3.2.18. 2#干燥装置 34
3.2.18. 2# drying device 34
3.2.19. 1#纠偏装置 34
3.2.19. 1# deviation correcting machine 34
3.2.20. 3#张力辊 34
3.2.20. 3# Bridle roll 34
3.2.21. 初涂机 34
3.2.21.Primary coating device 34
3.2.22. 初涂固化炉 35
3.2.22.Primary coating curing furnace 35
3.2.23. 冷却装置 35
3.2.23.Cooling after solidification 35
3.2.24. 2#纠偏装置 35
3.2.24. 2# deviation correcting machine 35
3.2.25、3#纠偏装置 35
3.2.25. 3# deviation correcting machine 35
3.2.26. 4#张力辊 36

3.2.26. 4# Bridle roll 36
3.2.27.面涂机 36
3.2.27.Surface coating machine 36
3.2.28.精涂固化炉 37
3.2.28.Fine coating curing furnace 37
3.2.29.冷却装置 37
3.2.29. Cooling after solidification 37
3.2.30. 4#纠偏装置 37
3.2.30. 4# deviation correcting machine 37
3.2.31. 5#张力辊 37
3.2.31. 5# Bridle roll 37
3.2.32. 出口立式活套 38
3.2.32. Export looper 38
3.2.33. 6#张力辊 38
3.2.33. 6# Bridle roll 38
3.2.34. 出口分断剪 39
3.2.34. Export shear 39
3.2.35. 卷取机 39
3.2.35. Recoiler 39
3.2.36.卸卷小车 40
3.2.36.Coil car 40
4. 热工设备 41
4. THERMAL EQUIPMENT 41
4.1. 初涂固化炉 41
4.1. Primary coating curing furnace 41

4.1.1. 技术参数 41
4.1.1.technical parameter 41
4.1.2. 方案说明： 41
4.1.2. Scheme description: 41
4.2. 精涂固化炉 44
4.2. Fine coating curing furnace 44
4.2.1. 技术参数 44
4.2.1. technical parameter 44
4.2.2. 方案说明： 44
4.2.2. Scheme description: 44
4.3.焚烧炉 44
4.3.Incinerator system 44
4.3.1 处理净化废气的原理： 45
4.3.1.The principle of purifying waste gas is: 45
4.3.2 废气处理工艺概述 45
4.3.2. Overview of waste gas treatment process 45
5. 电气传动系统 46
5. ELECTRIC CONTROL SYSTEM 46
5.1 概述 46
5.1.Summary 46
5.1.1 设计原则 46
5.1.1.Design principle 46
5.1.2 标准规范 47
5.1.2.standard specification 47
5.1.3 电压等级 47

5.1.3.Voltage level 47
5.1.4 电气接口信号 48
5.1.4.Electrical interface signal 48
5.2 控制系统方案 48
5.2.Control system scheme 48
5.2.1.交流工频传动 48
5.2.1.AC power transmission 48
5.2.2 交流变频传动 48
5.2.2.AC variable frequency drive 48
5.2.3 自动化控制方案 50
5.2.3. Automation control scheme 50
5.2.4 机组控制功能 56
5.2.4. Unit control function 56
5.2.5 电缆工程及其他 57
5.2.5. Cable and other engineering 57
5.2.5.1 电缆工程 57
5.2.5.1. Cable engineering 57
6、消防 58
6、FIRE CONTROL 58
7. 公辅介质 59
7. PUBLIC AUXILIARY MEDIUM 59
7.1. 净化水 59
7.1. Purification of water 59
7.2. 循环水 59

7.2. circulating water 59

7.3. 压缩空气 59

7.3. compressed air 59

7.4. 供电 59

7.4. power supply 59

8. 人员配置 60

8. STAFFING 60

9.技术培训及售后服务： 60

9.TECHNICAL TRAINING AND AFTER SALES SERVICE: 60

附件一　双方人员派遣 62

ANNEX I　PERSONNEL DISPATCH FROM BOTH SIDES 62

附件二：双方的责任 65

ANNEX 2　RESPONSIBILITY OF BOTH PARTIES 65

Louis
General manager machinery and equipment deparment.
HEAD-QUARTER: CHINA MINMETALS CORP. BEIJING OFFICE: BEIJING ZHUANGYU METAL CO., LTD.
HK OFFICE: DOYEN GLOBAL METAL CO., LTDTEL: (+)86-10-64442176 DIAL 858
FAX: (+)86-10-64413738 MOBILE: (+)86 18020000708Wechat/Whatsapp
WEBSITE: http://www.zhyumetal.com.cn/ www.minmetals.com.cn

1250 彩涂生产线技术方案

(10万吨/年)

1250mm Color coating line

Technical Specification

(100,000T/A)

1. 机组选型

1. Process method

本彩涂机组采用两涂两烘机型、天然气热风加热工艺。

The CCL adopts two coating two baking,natural gas heating and hot air circulation heating technology.

2. 机组主要技术参数

2. Main performance parameter of the line

2.1. 原料

2.1. Raw material

原料镀锌板。

Raw material: galvanized sheet

2.2 能源介质：

水、天然气、电

2.2.Energy sources：

water, electricity, Nature gas

2.3 原材料：

2.3 Raw material:

2.3.1 钢板厚度：

0.2-1.0mm

2.3.1.Strip thickness:

0.2-1.0mm

2.3.2 钢板宽度：

≤1250mm

2.3.2 Strip width

1250mm （max）

2.3.3 最大卷重：

15t

2.3.3.Weight

Max15000Kg/coil（max）

2.3.4 卷内径：

Φ508mm/Φ610mm

2.3.4.Inside diameter

Φ508mm/Φ610mm

2.3.5 卷外径：

Φ1600mm

2.3.5.Outside diameter

Φ1600mm（max）

2.4 彩涂板成品

2.4.Finished product

2.4.1 产品种类：

2.4.1.product range

1）聚酯涂层板（Polyester coated board）

2）丙烯涂层板（Acrylic coated board）

3）环氧树脂涂层板（Epoxy resin coated sheet）

4）聚乙烯涂层板（PE coated board）

5）氟碳涂料涂层板（Fluorocarbon coating board）

6）硅钙涂层彩涂板（Calcium silicon coating board）

2.4.2 产品执行标准：

GB/T12754-2006

2.4.2 Execute criterion of product quality：

GB/T12754-2006

2.4.3 成品

卷重：≤10t

2.4.3.Finished product:

Weight: 10000Kg/coil（max）

2.4.4 卷内径：

Φ508mm

2.4.4.Inside diameter

Φ508mm

2.4.5 卷外径：

≤Φ1500mm

2.4.5. Outside diameter

Φ1500mm（max）

2.4.6 涂层厚度：

10-40μm

2.4.6. Coating thickness

10-40um

2.5 机组速度:

2.5.line speed

2.5.1 入口段：

100m/min（Max.）

2.5.1.Entrance velocity

100m/min（Max.）

2.5.2 工艺段：

80m/min（Max.）

2.5.2 Process velocity

80m/min（Max.）

2.5.3 出口段:

100m/min（Max.）

2.5.3. Outlet velocity

100m/min（Max.）

2.5.4 穿　带:

15m/min

2.5.4.Threading velocity

15m/min

2.6. 机组和厂房及平面布置要求

2.6. CCL and plant and layout requirements

根据生产工艺和现场条件确定

According to the production process and site conditions to determine

2.7 机组工艺参数:

2.7.CCL process parameters:

2.7.1 机组产能:

2.7.1.Unit capacity:

年产量:　　～10.0 万吨

Annual output: ～100,000 Mtons

最大小时产量：15.07 吨/小时(0.40mm×1000w×80mpm×60min=15.07 吨)

Maximum hourly production: 15.07 mt/h

基准板：（厚×宽×速度） 0.40mm×1000mm×80m/min。固化炉加热能力、冷却能力以此为依据。

Design reference board:（Thickness x width x speed）0.40mm×1000mm×80m/min.The heating capacity and cooling capacity of the curing furnace are taken as the basis.

工作制度及有效作业时间

Working system and effective working time

年日历时间 8760h

Annual time: 8760h

年维护:65 天×24 小时/天= 1560 小时(包括节假日)

Annual maintenance: 65 days ×24 h/day =1560 hours (holidays included)

净可用时间:300 天×24 小时/天= 7200 小时

Net available hours: 300 days ×24 h/day =7200 hours

工作效率:0.95

Working factor: 0.95

每年的生产时间:6840h

Production hours available per year: 7200×0.95 =6840 hours

2.7.2 工艺段参数:

2.7.2.Process parameters:

化涂层:

Chemical coating:

名 称 Name	正 面 Face	背 面 back	铬酸盐 chromate
化 涂 Chemical coating	3-5 g/m2	3-5 g/m2	水 剂 water aqua

油漆涂层:

Paint coating:

涂层 coating	正面（干膜） Face	背面（干膜） Back	总涂层厚度 （干膜）
油漆 paint	环氧树脂、聚氨酯、聚酯、聚丙烯、聚偏氟乙烯	聚丙烯、聚酯、硅改性聚酯	
初涂 Bottom coating	5-10μm	3-5μm	8-15μm
精涂 Surface coating	10-20μm	3-5μm	13-20μm
总涂层 Total coating	15-30μm	6-10μm	18-40μm

2.8.排放标准:

符合国家标准 GB28665-2012

2.8.Emission standards:

GB28665-2012

2.9.加热介质：

天然气及涂料溶剂挥发气

2.9.Heating medium:

Natural gas and volatile gas of paint solvent

2.10.工艺流程

2.10.Technological process

开卷机→夹送辊→缝合机→压毛刺→1#张力辊→入口活套→2#张力辊→脱脂清洗→1#烘干→钝化→2#烘干→1#纠偏机→3#张力辊→底涂辊涂机→底涂固化炉→冷却→2#纠偏机→3#纠偏机→4#张力辊→面涂辊涂机→面涂固化炉→4#纠偏机→面涂冷却→5#张力辊→出口活套→6#张力辊→剪切机→收卷机

Payoff Reel→pinch roll→sewing machine→ pressure→1# Bridle roll→entry looped→degreasing cleaning→2# Bridle roll→1# drying→chemical coating→2# drying→1# deviation correcting machine→3# Bridle roll→bottom coating machine→primary coating curing furnace→cooling→2# deviation correcting machine→3# deviation correcting machine→4# Bridle roll→Surface coating machine→Fine coating curing furnace→4# deviation correcting machine →cooling→ 5# Bridle roll→export looper→6# Bridle roll→export shear→ Recoiler

2.10.1 入口段操作

2.10.1 Entry section operation

原料卷在上料前首先由人工拆去外包装，再用吊车放在 No.1 或 No.2 上卷小车上。

The raw material is first removed manually before the feeding, and then placed on the No.1 or the crane No.2 on the coil car.

人工切断钢卷的捆带，启动上卷小车将钢卷送到开卷机卷筒前，对中后再送入开卷机的卷筒。开卷机卷筒由液压涨开，将钢卷涨紧在卷筒上。同时上卷小车下降并返回至待料位置，准备接运下一个钢卷。

The manual shut-off coil strapping, coil car coil will start to payoff

reel to reel in front, and then to the payoff reel. Payoff reel by hydraulic expansion, the coil tension on the drum. At the same time decrease coil car and return to the waiting position, ready to pick up a steel coil.

钢卷的头部借助于开卷机穿带台和人工辅助，喂入夹送辊，由夹送辊将带钢送到缝合机前等待缝合。

The head of the steel coil is fed into the pinch roll with the aid of the payoff reel and the manual belt, and the strip is sent to the sewing machine before the sewing machine is waiting to be sutured.

当前一个钢卷的尾部达到一定长度时，机组入口段减速运行。当钢卷的尾部进入缝合机时，入口段停车，将前后两卷带钢的头、尾进入缝合机后，启动缝合机将前后两卷带钢联接起来。

When the tail of a steel coil reaches a certain length, the inlet section of the unit will decelerate. When the tail coil into the sewing machine, the entrance parking, the volume of strip head and tail into the sewing machine, sewing machine will start before and after the coil is connected.

缝合后的带钢经去毛刺辊碾压焊缝后，先后进入 1#张紧辊后进入入口活套。

The rolled strip is rolled into the 1# bridle roll and then enters the looper.

机组头部设有二台开卷机，当一台开卷机处于正常运行状态时，另一台开卷机已将下一个钢卷的头部拆开,做好缝合前的准备以缩短换卷时间。带钢经以高于机组工艺段的速度进入入口活套。

The head of the unit is equipped with two payoff reel. When an payoff reel is in normal operation, another payoff reel has dismantled the head of the next steel coil, and made a good preparation before stitching to shorten the roll changing time. The steel strip enters the entrance looper by the speed higher than the unit process section.

入口活套为立式结构。在机组换卷操作时，入口活套将放出贮存的带钢以维持机组工艺段的恒速运行。

The entrance looper is vertical structure. In the process of changing the

operation of the unit, the live sleeve will release the stored steel strip to maintain the constant speed operation of the unit process section.

2.10.2. 清洗段

2.10.2.cleaning section

带钢离开 1#张力辊和入口活套后，进入清洗段。清洗喷淋通道为全不锈钢封闭结构，包括化学脱脂、辊刷脱脂、水洗等工序；各工序间配置挤干辊，确保槽液的相对稳定和板面的挤干效果，增强稳定性。各工序储液槽为碳钢焊接结构，利用焚烧余热加热槽液。

The strip enters the cleaning section after leaving the 1# Bridle roll and the inlet sleeve. The cleaning section includes chemical degreasing, roller brushing degreasing, washing and other processes; each process is equipped with a squeezing roller to ensure the relative stability of the tank fluid and the squeezing effect of the plate surface; the stability is enhanced, and the waste heat is used to heat the bath liquid.

第一段为喷淋化学脱脂槽，用由焚烧炉余热加热碱性脱脂清洗液，喷洗带材两面，主要为皂化反应脱脂除油。

The first section is soaking chemical degreasing tank, heating the alkaline degreasing cleaning liquid with the waste heat of the incinerator, cleaning the two sides of the strip, mainly degreasing and degreasing by saponification reaction.

第二段为辊刷脱脂槽，用浓度更高更清洁的脱脂剂喷淋刷洗带材两面，去除钢板表面的杂物，在脱脂段内配备辊刷机组，对钢板上下表面进行刷洗，将带材表面的主要杂物清洗干净，为机械和化学双重脱脂功能。

The second section is the roller brush brush strip with two degreasing tank, higher concentration of cleaning degreasing agent, the removal of surface debris, in the degreasing stage equipped with roller brush unit, steel plate on the upper surface and the lower surface of the strip surface cleaning, mainly for sundries cleaning, mechanical and chemical double degreasing function.

第三段为循环水洗槽，用热水冲洗，洗去脱脂剂等表面残留化学品及表面杂物。

The third section is the circulating water scrubbing tank, rinse with hot water, wash away the degreasing agent surface residual chemicals and surface debris.

第四段为热水循环冲洗槽，进一步净化带材表面等。

The fourth section is a hot water circulation washing tank to further purify the strip surface.

在各循环槽每段的出口处都装有一对或两对挤干辊，用于隔离前喷淋段与后段之间的工艺介质，防止带入下一段，造成串液，挤干辊由气缸调节挤压力。

In the circular slot exit of each section are equipped with one or two pairs of squeezing rollers, used to process medium isolation between the spray section and the rear section of the front, to prevent the next section, cause the string liquid squeezing roll by adjusting the cylinder pressure.

2.10.3 化学预处理

2.10.3.chemically pretreated

清洁干燥的带钢经过热风干燥器后进入化涂。带钢将在化涂机上进行化学预处理，以增强涂料与基板之间的附着力和抗腐蚀能力。带钢离开化学预处理段后经过纠偏辊和 3#张力辊进入涂层工艺段。

Strip clean and dry after the hot air dryer backward into a coating. The strip will be chemically pretreated on the coating machine to enhance adhesion and corrosion resistance between the coating and the substrate. The strip enters the coating process section after deviation from the chemical pretreatment section through the deviation correction roller and the 2# Bridle roll.

2.10.4 涂层

2.10.4 coating

带钢经过“初涂、初涂固化、冷却、精涂、面漆固化、冷却”完成整个涂层加工。

The strip is finished by ″ primer, primer coating curing, cooling, fine coating, fine curing and cooling″.

涂机上、下涂头均为两辊式，由沾料辊和涂敷辊组成。涂料用气动泵由漆桶压入涂机的漆盘，经沾料辊、涂敷辊涂敷到带钢表面。

Roll coater, coating head are composed with two roller, the feeding roller and roller coating. Batea coating for pneumatic pump by the paint bucket pressed into the coating machine, the dipping roller, coating roll coating to the steel strip surface

涂敷时，应根据成品要求的涂层厚度确定涂敷方式、各辊子的速度及辊缝。当涂层厚度变化时，人工通过手轮对辊缝进行微调。

When coating, the coating method, the speed of each roller and the roll gap should be determined according to the coating thickness required by the finished product. When the coating thickness changes, manual manual adjustment of the roll gap.

2.10.5 涂层固化

2.10.5 Coating curing

带钢涂敷涂料后即进入固化炉加热固化。带钢进入炉内后温度持续上升。在溶剂挥发段，带钢温度缓慢上升，当涂料开始聚合时，带钢温度迅速上升至聚合温度，从而完成整个固化过程。

After coating the steel strip, it enters the curing furnace to be heated and solidified. The temperature continues to rise after the strip enters the furnace. In the solvent, the strip temperature rise slowly, when started to paint during polymerization, the strip temperature quickly rose to the polymerization temperature, thus completing the whole curing process.

两座固化炉均为悬垂式。初涂炉和精涂炉沿其长度分设不同的温度控制段，采用加热热风循环方式。

The two seat suspension are curing furnace. At the beginning of coating furnace and fine coating furnace along its length is divided into different temperature control, the use of natural gas heating hot cycle.

带钢在炉内的固化时间是根据带钢厚度、涂料种类、涂层厚度以及固化温度等参数确定。改变机组的速度可获得不同的固化时间。炉内温度通常在250~400℃范围，炉温不同所得到的金属（带钢）表面最高温度（PMT）值也不同，炉温及其分布是根据带钢厚度、涂料种类、涂层厚度以及机组的速度等参数决定的。

The curing time of strip steel in the furnace is determined according to

the parameters such as strip thickness, coating type, coating thickness and curing temperature. Different curing time can be obtained by changing the speed of the unit. The furnace temperature is usually in the range of 250~400℃, and the maximum temperature of the strip surface is different when the furnace temperature is different. The furnace temperature and its distribution are determined by the parameters such as strip thickness, coating type, coating thickness and the speed of the unit.

涂层后处理

Coating post treatment

带材出固化炉后，先进行空气强制冷却和水喷淋冷却。

The steel strip is forced to cool after cold water out of the curing furnace.

2.10.6 出口段操作

2.10.6 Export segment operation

出口活套在机组正常工作时不贮存带钢，当出口段分断剪切、取样及卸卷等操作时，出口活套充套，以维持机组工艺段的恒速运行。

When the export looper is in normal operation, the strip is not stored. When the outlet section is cut, sheared, sampled and unloaded, the outlet sleeve is filled to maintain the constant speed operation of the unit process section.

分断剪设在6#张力辊后，带钢通过分断剪切除接头、取样和分卷，最后进入卷取机卷取。

Shears in 6# Bridle roll, strip breaking through shear connectors, sampling and resection of segments, and finally into the coiler.

带钢的头部以穿带速度卷到卷筒上，在卷取张力建立后，带钢即以高于机组工艺段的速度运行，将出口活套中的带钢放空，为下一个钢卷的卷取操作做好准备。

The head of the strip is rolled to the reel at the speed of threading. After the coiling tension is set up, the strip is running at the speed higher than the process section of the machine, and the strip in the export looper is vented to prepare for the coiling operation of the next steel coil.

卷好的钢卷利用出口卸卷小车从卷取机卷筒上卸下，人工用胶带粘贴住带头后运往成品包装区。

The rolled coil is removed from the coiler drum by using the export stripper car, and the adhesive tape is used to hold the head and then to the finished packing area.

带钢在成品包装区利用吊车辅助作业，进行称重和人工包装。包装好的成品卷用吊车或叉车运至成品堆放区存放，等待发货。

The strip by crane auxiliary operation in the finished packing area, weighing and packing manual. Packed finished rolls with a crane or forklift transported to the finished product storage area store, waiting for delivery.

3、设备概述

3. Overview of equipment

3.1. 设备总表

3.1. Equipment table

序号 Serial number	名　　称 Name	数量 quantity	备 注 Remarks
1	上卷小车 Coil car	2	
2	开卷机 Payoff Reel	2	
3	夹送辊 pinch roll	1	
4	入口剪 Entry shear	1	
5	缝合机 strip suture machine	1	
6	压毛刺机 Burr press	2	

序号 Serial number	名　　称 Name	数量 quantity	备 注 Remarks
7	1#张力辊 1# Bridle roll	1	
8	入口活套 entry looped	1	
9	2#张力辊 2# Bridle roll	1	
10	脱脂清洗段 Degreasing cleaning device	1	
11	1#烘干装置 1# drying device	1	
12	化涂机 Coating machine	1	
13	2#烘干装置 2# drying device	1	
14	1#纠偏机 1# deviation correcting machine	1	
15	3#张力辊 3# Bridle roll	1	
16	初涂机 Primary coating machine	1	
17	初涂固化炉 Primary coating curing furnace	1	
18	初涂冷却 Cooling after solidification	1	
19	2#纠偏机 2# deviation correcting machine	1	

序号 Serial number	名　　称 Name	数量 quantity	备 注 Remarks
20	3#纠偏机 3# deviation correcting machine	1	
21	4#张力辊 4# Bridle roll	1	
22	精涂机 Fine coating machine	2	
23	精涂固化炉 Fine coating curing furnace	1	
24	精涂冷却 Cooling after solidification	1	
25	4#纠偏机 4# deviation correcting machine	1	
26	5#张力辊 5# Bridle roll	1	
27	出口立式活套 Export looper	1	
28	6#张力辊 5# Bridle roll	1	
29	出口剪 Export shear	1	
30	夹送辊 pinch roll	1	
32	卷取机 Recoiler	1	
33	卸卷小车 Coil car	1	

序号 Serial number	名　　称 Name	数量 quantity	备 注 Remarks
34	钢结构平台 Steel structure platform	1	
35	焚烧系统 Incinerator system	1	
36	液压系统 Hydraulic system	1	
37	电气控制系统 electric control system	1	
38	纯净水及循环水系统 Pure water and circulating water	1	
39	污水处理系统 Wastewater treatment system	1	
40	空压机站 Compressed Air System	1	
41	天然气站 Natural gas station	1	
42	变压器及高低压配电 Transformer and high and low voltage distribution	1	

3.2. 设备概述

3.2. Equipment Overview

3.2.1. No.1 上卷小车

3.2.1. No.1　Coil car

功 能: 上卷小车，位于开卷机卷筒的下面，用于运输钢卷到开卷机卷筒上。

Function: coil car, located below the pay-off reel, for transporting steel coils to pay-off reel.

结 构: 上卷小车由车体、液压升降鞍座、驱动行走装置、轨道组成。

Structure: the coil car comprises a car body, a hydraulic lifting device, saddle, driving and walking tracks

技术参数：

Technical parameters:

承载能力　15t

carrying capacity 15t

带卷外径：　Ø1600mm

Outside diameter：Φ1600mm

带卷宽度：1250mm

Strip width　1250mm

运输钢卷数量：　1 个

quantity of steel coils transported:　1

3.2.2. No.1 开卷机

3.2.2. No.1 pay-off reel

功 能：具备悬臂卷筒涨缩功能，钢卷正反转功能，变频调速功能，制动停车功能。

Features: with a cantilever steel coil reel expanding function, positive function, frequency control function, parking brake function.

开卷机接收钢卷车上的钢卷，并将其头部送入生产线，其由芯轴、减速机、电机、芯轴胀缩液压缸等。卷筒由液压缸控制涨缩，芯轴的驱动由电机变频调速完成。

The pay-off reel receives the steel coil on the steel coil car, and sends its head into the production line.　It is expanded and shrunk by the core shaft, reducer, motor, mandrel, etc.. Drum is controlled by the hydraulic cylinder expansion, drive shaft by the motor to complete.

结构：由焊接机架、悬臂式卷筒、变频调速传动、液压涨缩、电机减速机传动系统组成。

The structure is composed of welding rack, cantilever drum, variable speed drive, hydraulic drive system, motor reducer.

主要技术参数

technical parameters：

型　　式： 固定式开卷

Type: fixed open coil

最大卷径：　Φ1600mm

Maximum diameter: Φ1600mm

最大载荷：　15 吨

Maximum carrying capacity 15t

穿带速度：　15m/min

Threading speed: 15m/min

最大速度：　100m/min

Maximum speed: 100m/min

正常直径：　Φ508mm/Φ610mm

Normal diameter: Φ508mm/Φ610mm

电机：变频调速电机

Motor: variable frequency speed regulating motor

3.2.3. 1#夹送辊

3.2.3. 1# pinch roll

型 式： 上辊气动打开/压下，液压马达传动，下辊固定，不传动

Type: upper roller pneumatic open / down, hydraulic motor drive, lower roller fixed, not drive

辊子尺寸： 上辊Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，下辊Φ320×1500 mm，辊面镀铬

Roller size: upper roller Φ200 x 1500 mm, roller liner NBR, adhesive thickness 15mm,The lower roller is Φ320 x 1500 mm, and the roll surface is chromium plated.

3.2.4. No.2 上卷小车

3.2.4. No.2 Coil car

功 能: 上卷小车，位于开卷机卷筒的下面，用于运输钢卷到开卷机卷筒上。

Function: coil car, located below the pay-off reel, for transporting steel coils to pay-off reel.

结 构: 上卷小车由车体、液压升降鞍座、驱动行走装置、轨道组成。

Structure: the coil car comprises a car body, a hydraulic lifting device, saddle, driving and walking tracks

技术参数：

Technical parameters:

承载能力　15t

carrying capacity 15t

带卷外径：　Ø1600mm

Outside diameter：　Φ1600mm

带卷宽度：1250mm

Strip width　1250mm

运输钢卷数量：　1 个

quantity of steel coils transported:　1

3.2.5. No.2 开卷机

3.2.5. No.2　pay-off reel

功 能：具备悬臂卷筒涨缩功能，钢卷正反转功能，变频调速功能，制动停车功能。

Features: with a cantilever steel coil reel expanding function, positive function, frequency control function, parking brake function.

开卷机接收钢卷车上的钢卷，并将其头部送入生产线，其由芯轴、减速机、电机、芯轴胀缩液压缸等。卷筒由液压缸控制涨缩，芯轴的驱动由电机变频调速完成。

The pay-off reel receives the steel coil on the steel coil car, and sends its head into the production line.　It is expanded and shrunk by the core shaft, reducer, motor, mandrel, etc.. Drum is controlled by the hydraulic cylinder expansion, drive shaft by the motor to complete.

结构：由焊接机架、悬臂式卷筒、变频调速传动、液压涨缩、电机减速机传动系统组成。

The structure is composed of welding rack, cantilever drum, variable speed drive, hydraulic drive system, motor reducer.

主要技术参数

technical parameters：

型　　式： 固定式开卷

Type: fixed open coil

最大卷径：　Φ1600mm

Maximum diameter: Φ1600mm

最大载荷：　15 吨

Maximum carrying capacity 15t

穿带速度：　15m/min

Threading speed: 15m/min

最大速度：　100m/min

Maximum speed: 100m/min

正常直径：　Φ508mm/Φ610mm

Normal diameter: Φ508mm/Φ610mm

电机：变频调速电机

Motor: variable frequency speed regulating motor

3.2.6. 入口分断剪

3.2.6.Entry Shear

型 式： 液压剪

Type: hydraulic shearing machine

3.2.7. 缝合机

3.2.7.strip suture machine

缝合材料： 低碳钢镀锌钢板,双排冲压

Stitching material: low carbon steel galvanized steel sheet, double stamping

结构形式：整体框架式，双液压缸

Structural form: overall frame type, double hydraulic cylinder

3.2.8. 压毛刺机

3.2.8. Burr press

型式： 钢辊式，上辊气动打开/压下，不传动，下辊固定，不传动。辊子尺寸：Φ200×1500 mm，辊面淬火

Type: steel roller type, upper roller pneumatic open / down, no

transmission, lower roller fixed, not drive.Roller size: Φ200 x 1500 mm, quenching and chromium plating of roll surface

3.2.9. 1# 张力辊

3.2.9. 1# Bridle roll

形式：两辊张力辊

Type: two roller type

张力辊： Φ650×1500 mm，辊面聚氨酯橡胶，胶层厚度 15mm，压紧辊： Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，气动打开/压下，不传动

Bridle roll: Φ 650 × 1500 mm,polyurethane rubber for roll surface, thickness of adhesive layer 15mm，Compacting roller: Φ200 x 1500 mm, roller surface lining NBR, adhesive thickness 15mm, pneumatic open / down, not drive

张力辊传动： AC 变频调速电机，硬齿面减速机。

Bridle roll drive: AC frequency conversion motor, hardened gear reducer.

3.2.10. 入口立式活套

3.2.10.entry looped

功 能：用于贮存带钢，以保证机组入口段在带钢停止并进行缝接工作时，工艺段带钢仍能连续稳定运行。

Function: it is used to store strip steel to ensure the continuous and stable operation of the strip steel in the process section when the strip is stopped and stitched.

结 构：该机组为立式活套，由塔顶传动装置、移动小车、固定辊组、钢结构等部分组成。在开卷机进行换卷作业时，入口段停止供料，改由入口活套将储存的带钢继续向工艺段输送，确保生产的连续进行。

Structure: the unit is a vertical looper, which consists of top drive device, moving car, fixed roller group, steel structure and other parts. For the papers in pay-off reel, stop feeding by the entrance, entrance loop can be stored and transported to the strip continue to process, to ensure continuous production.

活套移动小车由电机、减速机、卷扬机、链条、链轮同步传动。活套内设有减速

点、同步点、停止点检测。

The movable mobile car is driven by motors, reducers, winches, chains and sprockets synchronously. A deceleration point, a synchronous point and a stop point are detected in the looper.

转向辊： Ø420×1500mm，辊面镀铬。活套卷扬机为交流变频电机驱动

turn roller: Φ420 x 1500mm, roll surface chromium plating. The movable windlass is driven by an AC variable frequency motor

3.2.11. 2#力紧辊

3.2.11. 2# Bridle roll

Type: two roller type

张力辊： Φ650×1500 mm，辊面聚氨酯橡胶，胶层厚度 15mm，压紧辊： Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，气动打开/压下，不传动

Bridle roll: Φ 650 × 1500 mm,polyurethane rubber for roll surface, thickness of adhesive layer 15mm，Compacting roller: Φ200 x 1500 mm, roller surface lining NBR, adhesive thickness 15mm, pneumatic open / down, not drive

张力辊传动： AC 变频调速电机，硬齿面减速机。

Bridle roll drive: AC frequency conversion motor, hardened gear reducer.

3.2.12. 碱液浸泡

3.2.12.Alkaline solution

溶液型式： 热碱液

Type: hot alkali solution

槽体材质 ：不锈钢

Tank material: stainless steel

挤干辊：Φ200X1500mm，辊面衬丁腈橡胶，胶层厚度 15mm

Squeeze roll:Φ200 x 1500 mm, roller surface lining NBR

3.2.13. 刷洗装置

3.2.13. Alkaline brushing

型式： 带热碱液喷淋的两级刷洗

Type: two scrub with hot alkali spraying.

刷辊： 4 根，尼龙刷毛刷辊，压下量手动调节

Brush roller: 4 pcs, nylon brush roller, press down manual adjustment

尺寸：Φ250×1500 mm

Size: Φ250 x 1500 mm

传动：普通交流电机

Drive: ordinary AC motor

溶液型式： 热碱液

Type: hot alkali solution

槽体材质：不锈钢

Tank material: stainless steel

挤干辊：Φ200X1500mm，辊面衬丁腈橡胶，胶层单边厚度 15mm

Squeeze roll:Φ200 x 1500 mm, roller surface lining NBR

3.2.14. 热水刷洗装置

3.2.14.Hot water washing device

型式： 热水刷洗

Type: hot water scrubbing

溶液型式： 热水

Type: hot water solution

槽体材质： 不锈钢

Tank material: stainless steel

刷辊： 4 根，尼龙刷毛刷辊

Brush roller: 4 pcs, nylon brush roller, press down manual adjustment

尺寸：Φ250×1500 mm

Size: Φ250 x 1500 mm

传动：普通交流电机

Drive: ordinary AC motor

挤干辊：Φ200X1500mm，辊面衬丁腈橡胶，胶层厚度 15mm

Squeeze roll:Φ200 x 1500 mm, roller surface lining NBR

3.2.15. 漂洗装置

3.2.15. Rinsing device

挤干辊：Φ200X1500mm，辊面衬丁腈橡胶，胶层厚度 15mm

Squeeze roll:Φ200 x 1500 mm, roller surface lining NBR

槽体材质： 不锈钢

Tank material: stainless steel

3.2.16. 1#干燥装置

3.2.16.1# drying device

功能：通过向带钢表面喷吹高速热风，来吹干脱脂留在带钢表面上的水分。

Function: blow the high speed hot air on the strip surface to dry the moisture on the surface of the strip.

结构：本装置由喷箱、风机、及管网系统组成。起到吹干和带走带钢表面水分的作用。风机采用交流电机传动。

Structure: the device is composed of a spray box, fan, and pipe system. To dry and moisture away strip surface effect. The wind machine adopts AC motor drive.

3.2.17. 化学涂层机

3.2.17. Coating machine

功 能：在钢带表面涂覆一层化涂液，增加油漆涂层与钢板之间的附着力。

Function: coating a layer of coating liquid on the surface of the steel strip to increase the adhesion between the paint coat and the steel plate.

涂 头： 两辊式，辊缝采用手轮调节

Coated head: two roller type, roll gap adjusted by hand wheel

涂敷辊：Φ260 辊面衬聚氨脂橡胶，AC 电机传动，硬齿面齿轮减速机

Coating roller: Φ260 roller surface lining polyurethane rubber, AC motor drive, hard tooth surface gear reducer

粘料辊：Φ260 碳钢镀铬辊，AC 电机传动，硬齿面齿轮减速机

Sticky roller: Φ260 carbon steel chrome plated rollers, AC drive motor, gear reducer

涂头打开：涂头气动快速后移

Paint head open: pneumatic head fast move back

3.2.18. 2#干燥装置

3.2.18. 2# drying device

功能：通过向带钢表面喷吹高速热风，来吹干带钢表面的化涂液。

Function: high speed by blowing hot air to the strip surface spraying, surface dry strip coating liquid.

结构：本装置由喷箱、风机、及管网系统组成。风机采用交流电机传动。

Structure: the device is composed of a spray box, fan, and pipe system. The wind machine adopts AC motor drive.

3.2.19. 1#纠偏装置

3.2.19. 1# deviation correcting machine

纠偏辊：Φ520x1500

Rectifying roller: Φ520x1500

驱动方式：液压驱动

Drive mode: hydraulic drive

3.2.20. 3#张力辊

3.2.20. 3# Bridle roll

型式： 二辊式

Type: two roller type

张力辊： Φ650×1500 mm，辊面聚氨酯橡胶，胶层厚度 15mm，

Bridle roll: Φ 650 × 1500 mm,polyurethane rubber for roll surface, thickness of adhesive layer 15mm

压紧辊： Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，气动打开/压下，不传动

Compacting roller: Φ200 x 1500 mm, roller surface lining NBR, adhesive thickness 15mm, pneumatic open / down, not drive

张力辊传动： AC 变频调速电机，硬齿面减速机。

Bridle roll drive: AC frequency conversion motor, hardened gear reducer.

3.2.21. 初涂机

3.2.21.Primary coating device

涂 头： 两辊式，辊缝采用手轮调节

Coated head: two roller type, roll gap adjusted by hand wheel

涂敷辊：Φ260 辊面衬聚氨脂橡胶，AC 电机传动，硬齿面齿轮减速机

Coating roller: Φ260 roller surface lining polyurethane rubber, AC motor drive, hard tooth surface gear reducer

粘料辊：Φ260 碳钢镀铬辊，AC 电机传动，硬齿面齿轮减速机

Sticky roller: Φ260 carbon steel chrome plated rollers, AC drive motor, gear reducer

涂头打开：涂头气动快速后移

Paint head open: pneumatic head fast move back

支撑靠辊：Φ700 碳钢镀铬辊

Supporting roller: Φ700 carbon steel chromium plated roller

3.2.22. 初涂固化炉

3.2.22.Primary coating curing furnace

见热工部分

See thermal engineering section

3.2.23. 冷却装置

3.2.23.Cooling after solidification

型式： 风冷+水冷

Type: air cooling + water cooling

槽体材质 ：不锈钢

Tank material: stainless steel

挤干辊：Φ200X1500mm，辊面衬丁腈橡胶

Dry roller: 200X1500mm, roll surface lining NBR

3.2.24. 2#纠偏装置

3.2.24. 2# deviation correcting machine

纠偏辊：Φ420x1500

Rectifying roller: Φ420x1500

驱动方式：液压驱动

Drive mode: hydraulic drive

3.2.25、3#纠偏装置

3.2.25. 3# deviation correcting machine

纠偏辊：Φ520x1500

Rectifying roller: Φ520x1500

驱动方式：液压驱动

Drive mode: hydraulic drive

3.2.26. 4#张力辊

3.2.26. 4# Bridle roll

型式： 二辊式

Type: two roller type

张力辊： Φ650×1500 mm，辊面聚氨酯橡胶，胶层厚度 15mm，

Bridle roll: Φ 650 × 1500 mm,polyurethane rubber for roll surface, thickness of adhesive layer 15mm

压紧辊： Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，气动打开/压下，不传动

Compacting roller: Φ200 x 1500 mm, roller surface lining NBR, adhesive thickness 15mm, pneumatic open / down, not drive

张力辊传动： AC 变频调速电机，硬齿面减速机。

Bridle roll drive: AC frequency conversion motor, hardened gear reducer.

3.2.27.面涂机

3.2.27.Surface coating machine

涂 头： 两辊式，辊缝采用手轮调节

Coated head: two roller type, roll gap adjusted by hand wheel

涂敷辊：Φ260 辊面衬聚氨脂橡胶，AC 电机传动，硬齿面齿轮减速机

Coating roller: Φ260 roller surface lining polyurethane rubber, AC motor drive, hard tooth surface gear reducer

粘料辊：Φ260 碳钢镀铬辊，AC 电机传动，硬齿面齿轮减速机

Sticky roller: Φ260 carbon steel chrome plated rollers, AC drive motor, gear reducer

涂头打开：涂头气动快速后移

Paint head open: pneumatic head fast move back

支撑靠辊：Φ700 碳钢镀铬辊

Supporting roller: Φ700 carbon steel chromium plated roller

3.2.28.精涂固化炉

3.2.28.Fine coating curing furnace

见热工部分

See thermal engineering section

3.2.29.冷却装置

3.2.29. Cooling after solidification

型式： 风冷+水冷

Type: air cooling + water cooling

槽体材质 ：不锈钢

Tank material: stainless steel

挤干辊：Φ200X1500mm，辊面衬丁腈橡胶

Dry roller: 200X1500mm, roll surface lining NBR

3.2.30. 4#纠偏装置

3.2.30. 4# deviation correcting machine

纠偏辊：Φ520x1500

Rectifying roller: Φ520x1500

驱动方式：液压驱动

Drive mode: hydraulic drive

3.2.31. 5#张力辊

3.2.31. 5# Bridle roll

张力辊： Φ650×1500 mm，辊面聚氨酯橡胶，胶层厚度 15mm，

Bridle roll: Φ 650 × 1500 mm,polyurethane rubber for roll surface, thickness of adhesive layer 15mm

压紧辊： Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，气动打开/压下，不传动

Compacting roller: Φ200 x 1500 mm, roller surface lining NBR, adhesive thickness 15mm, pneumatic open / down, not drive

张力辊传动： AC 变频调速电机，硬齿面减速机。

Bridle roll drive: AC frequency conversion motor, hardened gear reducer.

3.2.32. 出口立式活套

3.2.32. Export looper

功　能：用于贮存带钢，以保证机组出口段在带钢停止并进行卸卷工作时，工艺段带钢仍能连续稳定运行。

Function: used to store the strip, to ensure the unit outlet section and stop in the strip to discharge the volume of work, the process can still strip continuous and stable operation.

结　构：该机组为立式活套，由塔顶传动装置、移动小车、固定辊组、钢结构等部分组成。该活套在正常状态下，移动小车位于活套底部，在卷取机进行斜卷作业时，出口段停止供料，改由出口活套储存的带钢，确保生产的连续进行。

Structure: the unit is a vertical looper, which consists of top drive device, moving car, fixed roller group, steel structure and other parts. Oblique roll operation in the Recoiler, stop feeding by the exit section, exit looper storage strip, to ensure continuous production.

活套移动小车由电机、减速机、卷扬机、链条、链轮同步传动。活套内设有减速点、同步点、停止点检测。

The movable mobile car is driven by motors, reducers, winches, chains and sprockets synchronously. A deceleration point, a synchronous point and a stop point are detected in the looper.

转向辊：　Ø420×1500mm，辊面镀铬。活套卷扬机为交流变频电机驱动

turn roller: Φ420 x 1500mm, roll surface chromium plating. The movable windlass is driven by an AC variable frequency motor

3.2.33. 6#张力辊

3.2.33. 6# Bridle roll

张力辊：　Φ650×1500 mm，辊面聚氨酯橡胶，胶层厚度 15mm，

Bridle roll: Φ 650 × 1500 mm,polyurethane rubber for roll surface, thickness of adhesive layer 15mm

压紧辊：　Φ200×1500 mm，辊面衬丁腈橡胶，胶层厚度 15mm，气动打开/压下，不传动

Compacting roller: Φ200 x 1500 mm, roller surface lining NBR, adhesive

thickness 15mm, pneumatic open / down, not drive

张力辊传动： AC 变频调速电机，硬齿面减速机。

Bridle roll drive: AC frequency conversion motor, hardened gear reducer.

3.2.34. 出口分断剪

3.2.34. Export shear

型式： 液压剪

Type: hydraulic shearing machine

3.2.35. 卷取机

3.2.35. Recoiler

卷取机为悬臂式结构，在一定的张力下与 EPC 装置配合完成对卷取的卷取。

Recoiler for the cantilever structure, in some tension with the EPC device with the completion of coiling coiling.

结构: 卷取机由悬臂卷筒、传动系统、横移油缸、滑动底座等部分组成。

Structure: recoiler consists of cantilever drum, transmission system, traverse cylinder, sliding base and other parts.

卷筒：卷筒在胀缩液压缸作用下，实现胀缩，在卷取时卷筒胀开，在卸卷时卷筒收缩。

Drum:drum in the expansion and contraction of the hydraulic cylinder under the action of expansion and contraction, in the reel, the drum bulge, in the unwinding of the drum shrinkage.

传动系统：传动装置由一台交流变频调速电机、联轴器、制动器和齿轮箱组成。齿轮箱为全封闭式焊接钢结构。

Transmission system: the transmission device consists of an AC variable frequency speed regulating motor, coupling, brake and gear box. The gear box is a totally enclosed welded steel structure.

横移油缸：由 EPC 装置的伺服阀控制，实现齐边卷取。

Horizontal cylinders: controlled by servo valve EPC device, realize edge coiling

滑动底座：支撑整个卷取机，在滑动轨道上滑行。

Slide base: support the Recoiler, slide on the slide rail.

技术参数：

Technical parameter:

卷取机型式： 悬臂卷筒式

Coiling type cantilever drum

卷取方式： 上卷取

Coiling way: take up

钢卷最大重量: 10t

Maximum weight of steel coil: 10t

钢卷外径: Ø1500mm

Diameter of steel coil: Φ1500mm

卷筒直径: Ø508mm

Drum diameter: 508mm

横移行程： ±100mm

Traverse stroke: ±100mm

3.2.36.卸卷小车

3.2.36.Coil car

功 能: 卸卷小车，位于卷取机卷筒的下面，用于将卷取机卷筒上的钢卷卸下。

Function: the unloading trolley is located below the coiler drum, which is used to unload the coil on the coiler reel.

结 构: 上卷小车主要由车体、液压升降鞍座、驱动行走装置、轨道组成。

Structure: the coil car comprises a car body, a hydraulic lifting device, saddle, driving and walking tracks

技术参数：

Technical parameters:

承载能力 10t

carrying capacity 10t

带卷外径： Ø1500mm

Outside diameter： Φ1500mm

运输钢卷数量： 1 个

quantity of steel coils transported: 1

4. 热工设备

4. Thermal equipment

4.1. 初涂固化炉

4.1. Primary coating curing furnace

4.1.1. 技术参数

4.1.1.technical parameter

炉型：天然气加热及溶剂挥发气焚烧热风气体循环式，水平布置

Type: natural gas heating furnace and gas burning hot gas solvent circulation type, horizontal arrangement

炉长：42m

Furnace length: 42m

炉内最高温度：400℃

The highest temperature in the furnace is 400 centigrade

炉内气氛温度控制精度：±10℃

Furnace atmosphere temperature control accuracy:±10℃

带钢温度（PMT）：220℃

Strip temperature：220℃

4.1.2. 方案说明：

4.1.2. Scheme description:

炉墙的内衬为1.2mm厚不锈钢结构，在炉子内外墙板间衬有保温材料。固化炉的各加热区均采用对流方式加热，加热气流在循环风机的作用下，从钢带上下方喷向钢带表面，加速了溶剂的蒸发和涂层的固化过程。各加热区的供热均由天然气加热及焚烧系统产生的高温热风实现，温度控制由热风自动调节阀实现。喷流箱、循环风道均采用不锈钢制作。根据溶剂在炉子不同部位的蒸发量的大小，合理布置废气的排出口。炉外的循环风机、循环风道和排烟道均设有保温措施，以减少热损失。为了便于固化炉的维修和定期做卫生，在炉体一侧墙上留有若干炉门，在该侧的炉膛内留有人行走道。固化炉入口和出口处设置隔离腔和单独的排烟管道。

The lining of the furnace wall is 1.2mm thick stainless steel structure, and the insulation material is lined between the inner and outer walls of the furnace. The heating zone of the curing furnace is heated by convection. The

heated air flow is sprayed to the steel strip surface from the upper and the lower of the steel belt under the action of the circulating fan, which accelerates the evaporation of the solvent and the curing process of the coating. The heating in each heating area is realized by the high temperature hot air produced by the natural gas heating and burning system, and the temperature control is realized by the hot blast automatic regulating valve.

The jet box and the circulating air duct are made of stainless steel. According to the evaporation amount of the solvent in different parts of the furnace, the exhaust port of the waste gas is arranged reasonably. Heat preservation measures are adopted in the circulating fan, circulating air duct and smoke exhaust path outside the furnace to reduce heat loss. In order to facilitate the maintenance and regular sanitation of the curing furnace, a plurality of furnace doors are left on the side wall of the furnace body, and a walkway is left in the hearth of the furnace side. Isolation chamber and separate smoke pipe are set at the inlet and outlet of the curing furnace.

循环风管、混合箱采用 1.2mm 不锈钢材料制造，一端接固化炉本体，另一端与固化炉内风道相连接；焚烧炉送来的热空气，进入混合箱进行混合，通过循环风机送入内风道，热空气送入量根据炉内工作温度情况，由 PID 调节阀自动调节，固化炉循环风量不变，混合箱为整体框架结构，外用硅酸铝保温棉做隔热处理，外包 1.5mm 冷扎板。炉温分段控制，依段递增到所要求的固化温度。各段炉温的选择既可保证溶剂的充分挥发又不影响涂层的“烘烤”质量。带钢在炉内的固化时间可根据涂料种类、涂层厚度以及固化温度等参数综合后确定，通过改变机组速度，可以得到不同的固化时间。

The mixing box manufactured using 1.2mm stainless steel material circulation duct, and one end is connected with the curing furnace body, and the other end of the air duct is connected in curing furnace; burning hot air stove sent, mixed into the mixing tank, through the circulation fan into the duct, hot air feeding according to the working temperature inside the furnace, automatic regulation by PID regulating valve, constant circulating air curing

furnace, mixing box for the whole frame structure with aluminum silicate cotton insulation insulation treatment, the outsourcing of 1.5mm cold rolled plate. The temperature control of the furnace section increases according to the required curing temperature. The selection of furnace temperature in each section can ensure the sufficient volatilization of the solvent and not affect the baking quality of the coating. The curing time of strip steel in the furnace can be determined according to the type of coating, coating thickness and curing temperature and other parameters. Different curing time can be obtained by changing the speed of the unit.

电控系统：

Electronic control system:

固化炉的电控系统分电气系统和仪表控制系统：

Electric control system of curing furnace and the composition of the instrument control system of electrical system:

电控系统主要包括各区循环风机的供电和控制。

The electric control system mainly includes the power supply and control of the circulating fan in each district.

仪表控制系统包括以下内容：

Instrument control system includes the following contents:

固化炉内压力显示。

Pressure display in curing furnace.

气流温度控制系统：该系统热电偶、温控仪、调节阀组成，通过调节冷热风流量实现气流温度的自动控制。炉子各区均设有两个测温点，一个测量循环热气流的温度，另一个测量炉膛温度，前者用于控温后者用于显示炉温。

Air flow temperature control system: the system consists of thermocouple, temperature controller and control valve. The automatic control of airflow temperature is realized by adjusting the flow rate of cold and hot air. The district has two points, one measuring cycle hot air temperature, another measurement of the temperature of the furnace, the latter is used to display

the temperature for temperature control.

4.2. 精涂固化炉

4.2. Fine coating curing furnace

4.2.1. 技术参数

4.2.1. technical parameter

炉型：天然气加热及溶剂挥发气焚烧热风气体循环式，水平布置

Type: natural gas heating furnace and gas burning hot gas solvent circulation type, horizontal arrangement

炉长：45m

Furnace length: 45m

炉内最高温度：400℃

The highest temperature in the furnace is 400 centigrade

炉内气氛温度控制精度：±10℃

Furnace atmosphere temperature control accuracy:±10℃

带钢温度（PMT）：220℃

Strip temperature：220℃

4.2.2. 方案说明：

4.2.2. Scheme description:

精涂固化炉的炉体与初涂固化炉的炉体具体结构相同。

The furnace body of the fine coating solidified furnace is the same as the structure of the initial coating and curing furnace.

电控系统：精涂固化炉的电控系统与初涂固化炉的电控系统功能和特点相同。

Electronic control system: the electronic control system of the fine coating and curing furnace is the same as the electric control system of the initial coating and curing furnace.

4.3.焚烧炉

4.3.Incinerator system

焚烧炉布置在生产线传动侧的附跨，采用催化燃烧法。

The incinerator is arranged on the transmission side of the production line, by catalytic combustion method

4.3.1 处理净化废气的原理：

4.3.1.The principle of purifying waste gas is:

有机废气在较低的催化起燃温度 250－350℃的前提下，依靠催化剂中的活性成分的催化转化作用，使废气中的有机物转化氧化为无害的水和二氧化碳达到净化废气的目的。废气在合适的温度情况下，在较低浓度时依靠外界天然气加热补充热量达到催化起燃温度；在合适的浓度条件下，系统完全依靠废气反应放热维持所需的热平衡；达到最佳的无功运行状态，系统运行能耗较低。当烘箱系统运行稳定时，废气净化效果稳定。

On the premise of low catalytic combustion temperature of 250-350 C, the organic waste gas can convert the organic matter in the waste gas into harmless water and carbon dioxide to purify the waste gas by the catalytic conversion of the active component in the catalyst.

At the appropriate temperature, the exhaust gas will rely on the external natural gas to replenish the heat at the lower concentration to achieve the catalytic ignition temperature. Under the appropriate concentration conditions, the system relies entirely on the heat balance of the exhaust reaction and exothermic heat to maintain the required heat balance; the optimal operation state is achieved, and the energy consumption of the system is low.When the oven system is stable, the exhaust gas purification effect is stable.

4.3.2 废气处理工艺概述

4.3.2. Overview of waste gas treatment process

废气经过预热交换器加热后进入燃烧预热室，在预热室内被加热到催化起燃温度后进入催化床，在催化床内的催化剂的作用下，废气被分解为无毒无害的二氧化碳和少量的水蒸气并放出大量的热量。这些热量经过高温引风机送入烘箱对烘箱供热或保温,多余高温气体经过预热交换器对废气预热后,再经过换热器对脱脂槽内的脱脂液进行加热，以进一步降低生产过程中的能源消耗。

The exhaust gas is heated through the preheat exchanger and enters the combustion preheating chamber, which is heated to the catalytic combustion temperature in the preheating chamber and enters the catalytic bed. Under the

action of the catalyst in the catalytic bed, the exhaust gas is decomposed into innoxious and harmless carbon dioxide and a small amount of water vapor, and a large amount of heat is released.

The heat is fed into the oven by high temperature air blower to heat or heat the oven. After the heat exchanger is preheated through the preheat exchanger, the heat exchanger is heated to heat the degreasing liquid in the degreasing tank to further reduce the energy consumption in the production process.

5. 电气传动系统

5. electric control system

5.1 概述

5.1.Summary

5.1.1 设计原则

5.1.1.Design principle

机组的自动控制系统采用电仪一体化的控制系统。设备选择以先进、经济、实用、可靠为原则，选用质量可靠、性能价格比好和技术先进的设备及元件，以满足工艺运行操作的要求，确保生产的产品质量好、技术经济指标先进。

The automatic control system of unit control system using the instrument integration. The selection of equipment is advanced, economical, practical and reliable. The equipment and components with reliable quality, good price performance and advanced technology are selected to meet the requirements of the operation of the process, and ensure the quality of the product is good, and the technical and economic indexes are advanced.

对于电控设备元器件选型原则,要求遵循:一般的电气元件、检测和控制装置可采用国产可靠性强的设备厂商，关键的电气元件、检测元件、控制装置或目前国内尚无可靠产品的控制元件，均采用引进国外技术生产的设备或者国外进口设备。

For the electrical equipment components selection principle, follow the requirements: electrical components, detection and control device can be made of high reliability of the equipment manufacturers, electrical components,

detection device, control device or currently there is no reliable product key control element, adopts the introduction of foreign technology production equipment or equipment imported from abroad.

对于以可编程控制器（PLC）为核心的自动化控制系统，采用操作站进行显示和操作的控制方案，并有多幅模拟画面显示整个机组的生产状态和设备运行情况。

The programmable controller (PLC) automatic control system as the core, the operating station control scheme for display and operation, and has multiple simulation screen display the entire unit production status and equipment operation.

5.1.2 标准规范

5.1.2.standard specification

如果没有单独另行规定，我们的供货和服务符合相应适用的规定，或符合同等的安全要求。

If there is no separate provision, our supply and service meet the relevant requirements, or the safety requirements of the contract.

ISO（国际标准化组织）

IEC（国际电工学会）

GB（中华人民共和国国标）

5.1.3 电压等级

5.1.3.Voltage level

供电中压　　交流三相 10KV/6KV　±10%

Power supply medium voltage AC three phase 10KV/6KV 10%

供电低压　　交流三相 400V/230V　±10%

Power supply low voltage AC three phase 400V/230V 10%

控制电压　　交流单相 230V

Control voltage AC single phase 230V

交流频率　　50Hz　±1%

AC frequency 50Hz 1%

5.1.4 电气接口信号

5.1.4.Electrical interface signal

数字量输入(Digital input)　DC24V

数字量输出(Digital output)　DC24V

模拟量输入(Analog input)　4-20mA/±20mA

模拟量输出(Analog output)　4-20mA/±20mA

脉冲输入(Pulse input)　“0”signal　0-4V

“1”signal　20-30V

5.2 控制系统方案

5.2.Control system scheme

5.2.1.交流工频传动

5.2.1.AC power transmission

生产线机组辅传动电机均为工频工作方式,根据功率大小选择直接或间接启动方式。

The production line for auxiliary drive motor power frequency mode, based on the size of the power to choose directly start.

5.2.2 交流变频传动

5.2.2.AC variable frequency drive

考虑到机组的工艺特点，全线主传动拟采用交流变频的公共母线+制动单元的控制方案。全数字交流调速控制系统具有性能好、可靠性高等特点，可以满足各种不同的控制要求，系统具有最佳自优化功能，并提供完备的监控保护和自诊断功能，同时还具有方便快捷的网络通讯功能，自动化系统可以通过网络对传动系统进行参数设定，并进行信息交换。

Considering the process features of the unit, the control scheme of main drive across the board intends to common bus braking unit + AC inverter. Full digital AC speed control system has the characteristics of good performance, high reliability, can satisfy various control requirements, the system has the best optimization function, and provide complete protection monitoring and self diagnosis function, but also has a convenient network communication function, the automation system can drive system parameters through the network settings, and the exchange of information.

交流调速选用公共直流母线方案,通过配置主线路开关、主线路接触器、熔断器、三相电抗器、整流单元、自振荡二极管、逆变器、输出电抗器等控制元件,完成将固定频率和电压的三相进线电源转换成可变频率和电压的三相交流电输出，满足机组变频调速要求。变频调速装置可完成包括矢量控制控制功能和闭环控制功能，如转速、转矩、频率，或 V/f 性能控制。

Selection of common DC bus AC speed regulation scheme, through the configuration of main circuit switch, main circuit contactor, fuse, three-phase reactor and rectifier unit, inverter, diode, self oscillation output reactor control components, complete the three-phase fixed frequency and voltage in the power source line into three-phase AC output variable frequency and voltage, meet the unit frequency control requirements. Variable frequency speed regulating device can complete vector control, control function and closed loop control function, such as speed, torque, frequency, or V/f performance control.

张力辊根据工艺要求,在正常生产时为速度控制系统或张力控制系统，穿带时均为速度控制，张力辊组正常生产时两辊间具有自动负荷平衡功能，以达到无扰动的平滑过渡。

Bridle roll according to the process requirements, in the normal production or tension control system for speed control system, threading are speed control, Bridle roll group of normal production of automatic load balancing with two rollers, in order to achieve a smooth transition without disturbance.

出入口活套正常生产时为张力控制系统，活套充套时为电动工作状态，放套时为发电工作状态，为防止充放套时活套引起的张力冲击，需考虑活套动态时的摩擦补偿和惯量补偿，以达到无扰动的平滑过渡。

The entrance of normal production for looper tension control system, charging for electric looper set working condition, a set of power for the working state of looper tension caused by the impact to prevent the charge and discharge set, considering friction compensation and inertia compensation

loop dynamics, in order to achieve a smooth transition without disturbance.

开卷、卷取机控制系统在穿带时为速度系统，正常工作时为张力系统。开卷机和卷取机均可选择为直接或间接张力控制方式，具有卷径计算、动态补偿、摩擦补偿、断带保护等功能。

The control system of uncoiling and Recoiler is a speed system when threading, and it is a tension system when working normally. Both coiler and coiler can be chosen as direct or indirect tension control. They have the functions of winding diameter calculation, dynamic compensation, friction compensation and belt breakage protection.

全数字变频调速装置是以带协处理器的微处理器为基础的全数字控制系统，其基本结构是电流内环，速度外环的双闭环调速系统，还有自优化和自诊断功能，从而大大减轻调试和现场维护人员的工作强度。

Full digital converter is a full digital control system with coprocessor microprocessor as the foundation, the basic structure of current loop, speed loop double loop speed control system, and the function of self optimization and self diagnosis, thus greatly reduce the debugging and on-site maintenance personnel work intensity.

2) 直流公共母线方案

DC common bus scheme

直流母线主要用于多电机交流电机变频调速系统，使电机在制动时的能量能迅速被吸收，满足变频系统快速正反向起/制动要求。

The DC bus is mainly used for multi motor AC motor speed control system, the motor in braking energy can be absorbed quickly, meet the frequency conversion system of fast forward and reverse / braking requirements.

5.2.3 自动化控制方案

5.2.3. Automation control scheme

根据彩涂生产线设备构成及工艺要求，本方案的控制系统总体构成原则描述如下：

According to the requirements of color coating production line equipment and technology, the control system of the overall plan principle is described

as follows:

A）整个控制系统分为两级：传动控制级和基础自动化级（包括人机界面 HMI）。传动控制级包括全线所有交直流调速电机和交流工频电机的传动系统。基础自动化级包括各区控制系统、检测仪表系统、监控系统。

A) the whole control system is divided into two levels: the drive control level and the basic automation level (including man-machine interface HMI). The drive control stage includes all the AC and DC motor and AC power frequency motor drive system. The basic automation level includes the district control system, detection instrument system and monitoring system.

B）、在基础自动化级中,基础自动化和人机界面 HMI 之间采用交换机作为网络交换设备，基础自动化的控制系统与传动系统、检测系统的信息交换采用现场总线和点对点等方式。

B), the basic automation level, between basic automation and man-machine interface using HMI switch as the network switching equipment, basic automation control system and transmission system, detection system of information exchange with field bus and point-to-point etc..

2) 网络的连接和走向 The connection and trend of network

网络与现场设备的连接随现场设备的不同而变化，只有根据现场设备实际位置连接成的网络，才会使网络短小精悍，得到最快的传输速度，本公司根据现场实际情况制定自动化控制方案。

The connection with the field equipment network with field equipment varies according to the actual position, only field devices connected to the network, the network will be small, transmission speed is the fastest, the company developed automation control program according to the actual situation.

3) PLC 选型原则 PLC selection principle

基础自动化系统的控制任务分为两类，第一类是反馈控制，例如生产线张力控制、活套位置控制等。控制系统一方面要同时完成多个控制任务，另一方面还要满足系统响应的快速性，因此该类控制器需要选用多处理器并行工作方式的系统进行控制，各

部分功能分配在不同的处理器，各自完成独立的控制任务。

The control tasks of the basic automation system are divided into two categories, the first is feedback control, such as the tension control of the production line, looper position control, etc.. The control system on the one hand to complete multiple control tasks at the same time, on the other hand, but also to meet the system's response speed, so the controller needs system adopts multi processor parallel working mode control, the function of each part in the distribution of different processors to complete their task independent control.

生产线的另一类控制任务是设备动作的逻辑控制、设备的顺序控制等，完成这些任务的控制系统多采用 PLC。本方案中，选用一块独立 CPU 完成此类任务，这样即可以充分发挥系统的控制能力，又可以统一控制程序软件版本和控制器硬件，在相同的系统控制能力下，降低系统的复杂性和软硬件投资成本。

Another control task of the production line is the logical control of the equipment action and the sequential control of the equipment. The control system of these tasks is mostly PLC. In the scheme, selection of an independent CPU to fulfill the task, which can give full play to the control ability of the system, and control procedures can be unified version of the software and hardware controller, in the same capacity control system, reduce the complexity of hardware and software investment cost.

4) 远程终端 Remote terminal

远程终端是集散控制系统分散控制集中管理的现代控制思想的最佳体现，作为 PROFIBUS-DP 网的一部分，远程终端就近采集现场信号，并通过网络与 CPU 交换数据。

Remote terminal is the best embodiment of modern control idea of centralized control of distributed control system. As part of PROFIBUS-DP network, remote terminal collects the field signal nearby and exchanges data with CPU through network.

根据现场要求，现场远程初步配置如下具体数量如下：

According to the requirements, the specific number of remote site

preliminary configuration is as follows:

开卷操作主台　　1台

Uncoiling operation master station

工艺操作箱　　多台

Process operating box

卷取操作台　　1台

Coiler operating table

急停按钮设置：开、收卷控制台，辊涂机控制台

Emergency stop button setting: console, roll console, roll coater console

5) HMI（人机接口）配置

HMI与基础自动化相联的服务器和客户机为基础,画面以图形标准接口为基础。每个服务器复盖一个专门的机组区段或者一个专门的功能。这些服务器管理着过程通讯、数据存贮以及与客户的通讯。各个客户用作操作站，它们显示从服务器发出的数据，接受操作员输入，并将它传送至相应的服务器。

The server and client HMI and basic automation connected based picture based on graphics standard interface. Each server covering a dedicated unit section or a special function. The server manages the process of communication, data storage and communication with customers. Each customer as an operation station, they display data sent from the server, accept operator input and sends it to the server.

HMI 方案的优点如下：

The advantages of the HMI scheme are as follows:

—服务器和客户采用标准操作系统

Server and client adopt standard operating system

—基础自动化和过程计算机系统采用统一的操作和直观显示

The basic automation and process computer system adopts unified operation and visual display

—口令保护功能，便于安全的机组操作

Password protection function, easy and safe operation of the unit

—直观显示与基础自动化间采用优化后的接口，从而降低总线负荷

The optimized interface is used between the visual display and the basic automation to reduce the bus load

—面向对象的数据处理

Object oriented data processing

●系统总画面 System total picture

该页显示了系统主要设备状态、主要工艺参数，点击不同的设备则分别调出不同的控制画面，同时页面上还设有快捷键，点击则能马上切换到相应显示画面。

This page shows the main equipment status and main process parameters of the system. Different control devices are brought out by clicking on different devices. At the same time, there are shortcut keys on the page, which can be switched to the corresponding display screen immediately.

●入口操作画面 Entrance operation picture

该页显示了系统入口段所有设备的详细工作状态，工艺参数和电气参数，和相应设备的起/停操作按钮，同时页面上还设有快捷键，点击则能马上切换到相应显示画面。

The page shows the detailed working status, process parameters and electrical parameters of the equipment at the entrance section of the system, and the start / stop operation buttons of the corresponding equipment. At the same time, the page also has a shortcut key, and the click can immediately switch to the corresponding display screen.

●工艺操作画面 Process operation picture

该页显示了所有工艺设备的详细工作状态，工艺参数和电气参数，和相应设备的起/停操作按钮，同时页面上还设有快捷键，点击则能马上切换到相应显示画面。

The page shows the detailed working state, process parameters and electrical parameters of all the process equipment, and the start / stop operation buttons of the corresponding equipment. At the same time, the page also has shortcut keys, and then click to the corresponding display screen immediately.

●出口操作画面 Export operation picture

该页显示了系统出口段所有设备的详细工作状态，工艺参数和电气参数，和相应设备的起/停操作按钮，同时页面上还设有快捷键，点击则能马上切换到相应显示画面。

The page shows the detailed working state, process parameters and electrical parameters of the equipment at the exit section of the system, and the start / stop operation buttons of the corresponding equipment. At the same time, the page also has a shortcut key, and the click can immediately switch to the corresponding display screen.

●系统报警画面 System alarm screen

该页显示和记录在生产过程中发生的报警和故障，并附有简要说明，通过颜色的不同来区分报警的危险性。在事故分析时还可把报警记录打印出来。

The page is displayed and recorded in the production process of alarm and fault, and a brief description of the risk by different colors to distinguish the alarm. In the accident analysis can also print out the alarm record.

●参数显示画面 Display parameters

该页集中显示机组在生产过程中所有相关的电气参数、仪表参数、工艺参数和产品规格等。同时页面上还设有快捷键，点击则能马上切换到相应显示画面。

The page display unit in the production process of all electrical parameters, the instrument parameters, process parameters and product specifications. At the same time the page is also arranged on the shortcut key, click can immediately switch to the corresponding display screen.

●合闸操作画面 Closing operation picture

该功能分主传动和辅传动两个操作画面，并显示设备合闸的所有必要条件和跳闸首故障，操作人员可单独成组或全部合上或断开相应控制设备。同时页面上还设有快捷键，点击则能马上切换到相应显示画面.

The function of the main drive and auxiliary transmission two operation picture, and display all the necessary conditions and equipment on the first trip fault, the operator can separate groups or closed or open the corresponding control equipment. At the same time, the page also has shortcut

keys, click can immediately switch to the corresponding display screen.

●系统单线图 System diagram

仿真显示入口段、工艺段、出口段设备主回路状态，供操作人员监控

The simulation shows the main loop state of the equipment in the entrance section, process section and exit section for the operator to monitor

5.2.4 机组控制功能

5.2.4. Unit control function

—单机操作 Single machine operation

手动独立操作相应控制设备,如电机、液压阀和气阀、纠偏、张力辊、化涂机、初涂机、精涂机、缝合机等。

Manually operate corresponding control equipment, such as motor, hydraulic valve and air valve, deviation correction, Bridle roll, coating machine, primary coating machine, finishing machine,strip suture machine, etc..

—局部单机操作 Local single machine operation

手动同时操作两个以上的控制设备

Manual operation of more than two control devices at the same time

—区段操作 Operation section

同时按一定逻辑关系操作相应区段内的所有控制设备,如入口段、工艺段、出口段

At the same time, according to a certain logical relationship between the corresponding operation section within all control devices, such as the entrance section, process section and exit section

—全线操作 Whole line operation

同时按一定逻辑关系操作全线所有控制设备,包括入口段、工艺段、出口段和其他设备

At the same time, according to a certain logic operation across the board for all control equipment, including entrance section, process section, exit section and other equipment

—全线速度控制 Full line speed control

包括：单机点动速度、区段点动速度、全线运行速度、局部联合点动速度

Including: single point moving speed, moving speed, section point of operation in the whole speed, combined with local move speed

—全线张力控制 Tension control

包括：开卷、卷取、活套和张力辊张力控制

Including: uncoiling, coiling, looper and Bridle roll tension control

—全线顺序控制 Whole line sequence control

包括：全线交流电机、抱闸电机、接近开关、行程开关、电磁阀、气阀等,交流电机参与全线连锁

Including: line of AC motor, brake motor, proximity switch, limit switch, solenoid valve, air valve, AC motor in line chain

—活套位置控制 Looper position control

活套在稳态工作时套量恒定，并根据套量变化自动调节入口段、 工艺段和出口段速度

When the looper is in steady state, the sleeve quantity is constant, and the inlet section, process section and outlet section speed are adjusted automatically according to the change of the sleeve quantity

—开卷卷取机卷径计算

Calculation of coiling diameter of uncoiling coiler

5.2.5 电缆工程及其他

5.2.5. Cable and other engineering

5.2.5.1 电缆工程

5.2.5.1. Cable engineering

所有电缆均采用铜芯电缆，控制电缆采用软铜芯电缆。一般仪表信号均选用控制屏蔽电缆；热电偶信号选用相应分度号的对屏或总屏补偿电缆。仪表电源电缆选用控制电缆。对于环境温度较高区域的电缆选用耐高温型电缆。

All cables are made of copper core cable, control cable with soft copper core cable. General instrument signal are used for control of shielded cable; screen or screen cable compensation thermocouple signal selects the corresponding semaphore. Instrument power cable selection control cable. In the environment of high temperature region of the cable made of high

temperature resistant cable.

电缆敷设采用以电缆隧道为主的敷设方式，在电气室的地下室、电缆隧道、电缆沟和其它构筑物内主要采用阻燃电缆桥架或支架敷设，从电缆隧道和电缆沟至设备的电缆采用穿管敷设。根据中国有关规程规范，电缆在不同场所的敷设采取必要的耐火阻燃与防火措施。

The cable laying is mainly laid by the cable tunnel. The flame retardant cable bridge or bracket is mainly used in the basement, cable tunnel, cable trench and other structures of the electrical room, and the cable is laid through the cable tunnel and the cable trench to the equipment cable. According to the relevant codes and regulations in China, the cable laying in different places to take the necessary fire retardant and fire prevention measures.

仪表用弱电电缆的敷设根据现场电缆分布情况和现场环境采用穿管敷设或走电缆桥架,原则是在电缆集中的区域设电缆桥架，在电缆分散的区域采用穿管敷设。电缆穿管敷设采用明敷或暗敷，视情况设拉线箱或接线箱。

The laying of weak cable for instrument is based on the distribution of cable in site and the field environment. The cable laying frame is adopted in the area where the cable is concentrated, and the cable laying is adopted in the area where the cable is dispersed. The laying of the cable through the pipe should be laid on the ground or concealed, and the cable box or the junction box shall be set as the case is concerned.

6、消防

6、Fire control

消防系统包括火灾报警和灭火两部分内容。

Fire alarm and fire extinguishing fire system consists of two parts.

涂机室、主控室、主操作室配备灭火器材：灭火器、消防桶…等。

The painting machine room, the main control room and the main operating room are equipped with fire extinguishing equipment: fire extinguishers and fire barrels... etc.

涂机室、主控室、主操作室设置火灾自动报警系统。

Automatic alarm system for coating machine room, main control room, the main operating room setting fire.

消防由买方统一考虑。

Fire fighting shall be taken into consideration by buyers.

7. 公辅介质

7. Public auxiliary medium

7.1. 净化水

7.1. Purification of water

电导率（conductivity）：≤10μs/cm;

PH 值：6.5—7;

流量（flow）： 3t/h

7.2. 循环水

7.2. circulating water

总硬度 Total hardness（Ca+Mg） ：≤16dh;

PH 值：6～8.7;

悬浮物 Suspended solids（最大）20mg/l;

温度 temperature：最大 33℃。

流量 flow 80t/h

7.3. 压缩空气

7.3. compressed air

压力 pressure：0.4～0.6MPa

环境温度 ambient temperature(max.40℃)

质量：无油、无水、无固体杂质的仪表用气

Quality: instrument gas with no oil, no water and no solid impurities

流量 flow：最大 3.5 Nm3/min

7.4. 供电

7.4. power supply

电压：高压：10KV/6KV，3 相。

低压：380V，交流±10%，3 相。

辅助：220V，交流±10%，单相。

Voltage: high voltage: 10KV/6KV, 3 phase.

Low pressure: 380V, AC + 10%, 3 phase.

Auxiliary: 220V, AC + 10%, single phase.

8. 人员配置

8. Staffing

生产车间为三班制生产，管理部门为一班制，每班工作时间 8 小时,24 小时不间断运行。

序号	项 目 名 称	每班人数			合计	备注
		1	2	3		
1	车间主任	1			1	
2	操作工	10	10	10	30	
3	机修、电工	4			4	
4	化验、质检	2	2	2	6	
5	其它人员	5	5	5	15	
	合计				56	

9.技术培训及售后服务：

9.Technical training and after sales service:

技术培训内容：张力控制、变频调速、入口段控制、工艺段控制、出口段控制、化涂炉控制、固化炉控制、PLC 口令密码等移交买方。

Technical training content: tension control, variable frequency speed control, entrance control, process control, export control, coating furnace control, curing furnace control, PLC password password transfer to the buyer.

售后服务：After-sale service：

（1）生产线运转 1 年质保期内设备出现质量事故时，卖方免费修理、更换零部件（易损件除外）。

When the quality of the equipment runs within 1 years, the seller will

repair and replace the parts (except vulnerable parts) free of charge.

（2）超出 1 年时间，卖方负责提供零部件图纸并提供现场指导服务；（费用由买方负责）

Over 1 years, the seller is responsible for providing spare parts drawings and on-site guidance services; (the cost is responsible for the buyer)

（3）出现运转不良现象，卖方负责帮助买方分析原因并协助提出改进办法。

Running a bad phenomenon, the seller is responsible for helping the buyer to analyze the reasons and put forward the improvement measures of assistance.

附件一　双方人员派遣

Annex I　Personnel dispatch from both sides

1. 乙方人员的派遣

Dispatch of Party B personnel

1.1　乙方人员的派遣

Dispatch of Party B personnel

为实现合同的顺利履行，乙方将派遣有技能的、健康的和合格的技术人员到甲方合同工厂进行工程项目管理和技术服务。

In order to achieve the successful performance of the contract, Party B will send skilled, healthy and qualified technicians to the contract factory of Party A for project management and technical services.

1.2　乙方技术人员的任务和义务

The task and duty of the technical personnel of Party B

1.2.1 乙方将指定一名技术人员为现场总代表，即项目经理。项目经理将提供合同范围内的总的工程项目管理和技术服务，并与甲方现场总代表进行通力合作及协商解决有关合同中的技术和工作问题。

Party B will appoint a technician to be the general representative of the site, that is, the project manager. The project manager will provide the total project management and technical services in the contract scope, and cooperate with the general representative of Party A to solve the technical and work problems related to the contract.

1.2.2 乙方项目经理应代表乙方组织有关人员提供技术服务并进行合同范围内应由乙方完成的有关安装、设备考核、调试、操作、生产方法、维护和培训等的任务和义务。

Party B's project manager shall provide technical services to Party members on behalf of Party B, and carry out tasks and obligations related to installation, equipment assessment, commissioning, operation, production methods, maintenance and training, etc., which shall be completed by Party

B within the scope of contract.

1.2.3 乙方的技术人员应详细解释技术文件、图纸、工艺流程图、操作手册、设备性能、分析方法和有关的预防措施以及回答和解决由甲方提出的合同范围内的技术问题。

The technical personnel of Party B shall explain in detail the technical documents, drawings, process flow charts, operation manuals, equipment performance, analysis methods and related preventive measures, and answer and solve the technical problems within the scope of the contract put forward by Party A.

1.3 工作联系和工作制度

Working contact and working system

根据工程进度情况，乙方项目经理将组织有关设计人员、设备制造厂人员及由乙方承担的施工安装人员进驻现场。

According to the progress of the project, the project manager of the second party will organize the designers, equipment manufacturers, and the construction and installation personnel to be stationed at the scene.

1.4 在安装、冷试车、热试车期间，甲方将向乙方现场人员提供以下内容：

During the installation, cold test and hot test, Party A will provide the following contents to Party B's site personnel:

买方负责卖方安装调试人员的签证、往返交通费用及在国外期间的食宿等费用。国外安装调试期间所需的工具、耗材、辅材均由买方负责并提供。

Buyer is responsible for Seller installation of the visas of the debugger, the cost of round-trip traffic and the cost of accommodation during the period of the foreign period. Foreign required during installation and debugging tools, supplies, auxiliary by the Buyer responsible for.

2、甲方人员的派遣

Dispatch of party a personnel

2.1 甲方技术人员的派遣

The dispatch of technical personnel of Buyer

甲方将委派有技能的、健康的和合格的技术人员担任甲方的现场总代表，即甲方

项目经理。

Buyer will appoint skilled, healthy and qualified technicians to be the general representative of Buyer's site, that is, the project manager of Buyer.

2.2　甲方技术人员的任务和义务

The task and duty of the technical personnel of Buyer

2.2.1 甲方项目经理代表甲方行使工程总指挥的权利，并与乙方现场总代表（项目经理）进行通力合作，协商解决有关合同中的技术和工作问题，共同进行工程项目的管理

Buyer's project manager represents Buyer's right to work as chief engineer, and works with Seller chief representative (Project Manager) to negotiate and solve technical and work related problems in contract, and jointly manage project management.

2.2.2 负责协调甲、乙双方及由甲方负责施工安装人员之间的关系，以利工程顺利进行。

It is responsible for coordinating the relationship between Buyer and Seller and by Buyer in charge of the construction and installation personnel, so that the project will be carried out smoothly.

2.2.3 根据工程进度情况，甲方项目经理将组织有关工程技术人员进驻现场。

In accordance with the progress of the project, the project manager of Buyer will organize the technical personnel of the project to the site.

附件二：双方的责任

Annex 2　Responsibility of both parties

1 买方的责任

Responsibility of Buyer

1.1　买方负责对工厂设计、土建设计及施工的正确性、完整性负责；对水、电、风、气、油等能源介质的质量负责。卖方对土建设计任务书的正确性负责。

Buyer is responsible for the correctness and integrity of factory design, civil design and construction, and is responsible for the quality of water, electricity, wind, gas, oil and other energy media. Seller is responsible for the correctness of the civil design task book

1.2　买方对设备在买方工厂的安装阶段的组织、协调、人员配备和设备的安装质量负责检查监督。

Buyer shall be responsible for inspection and supervision of the organization, coordination, staffing and installation quality of the equipment at the stage of installation of the factory of Buyer.

1.3　买方有责任不将卖方提供的图纸、资料向第三方扩散。

Buyer is responsible for not spreading the drawings and information provided by the seller to the third party.

1.4　买方应回答卖方在详细设计期间所提出的问题。

Buyer shall answer the questions raised by Seller during the period of detailed design.

1.5　买方应向卖方出具设备出库接收单、调试报告、验收报告、应收账款结算确认函、往来询证函等文件。

Buyer shall provide Seller with documents such as receipt of receipt, commissioning report, acceptance report, confirmation letter of accounts receivable settlement, contact letter and so on.

1.6　甲方应对因甲方图纸修改而造成的项目工期重大延误负责。

Buyer shall be responsible for the significant delay in the project due to the revision of Buyer's drawings.

1.7 甲方有责任不将乙方提供的图纸、资料向第三方扩散。

Buyer is responsible for not spreading the drawings and information provided by Seller to the third party.

2 乙方的责任

The responsibility of Seller

2.1 乙方应根据合同要求，准备基础数据、基本设计、详细设计及工艺资料。

Seller shall prepare basic data, basic design, detailed design and process data in accordance with the requirements of the contract.

2.2 乙方对合同范围内设备的正确性、完整性和先进性、适用性负责，并对设备中间管线和设备基础条件的设计(供给甲方的车间各操作室、电气室等土建资料，供给买方的车间内厂房、水、电等所有公辅设施的设计要求和基本数据)的正确性、完整性负责。

Seller is responsible for the equipment within the scope of the contract is correct, complete and advanced, applicability, and equipment between pipelines and equipment foundation design (supply Buyer workshop operation room, electrical room and other construction materials, provide the buyer, workshop workshop, water and electricity, the auxiliary facilities design the basic requirements and data) is responsible for the correctness and integrity.

2.3 乙方应在负荷试车时提供典型产品的生产工艺，负责安装施工的技术指导和服务，负责调试工作。

Seller shall provide the production process of the typical product in the load test, and be responsible for the installation of technical guidance and service, and responsible for the commissioning.

2.4 在设备质保期间内（进入试生产后 1 年内），如设备本身出现故障，乙方有责任赶到现场，予以处理，如由于买方使用不当引起的设备故障，也有责任及时协助处理（费用由甲方负责）。

During the period of equipment warranty (after entering the trial production within 1 years), if the equipment itself fails, Seller has the responsibility to rush to the scene and deal with it. If the equipment fault is caused by improper use of the buyer, it is also responsible for timely

assistance.

2.5 乙方必须按照规定交货期交完本合同要求的和分交表中所列的乙方合同供货范围内的全部设备；并对供货设备的交货周期负责。

Seller must complete all the equipment within the scope of the supply of the Seller's contract as stipulated in the contract and deliver the contract according to the prescribed delivery date, and is responsible for the delivery period of the supply equipment.