



张家港市张运机械制造有限公司
Zhangjiagang City Zhangyun Machinery Manufacturing Co.,Ltd.

PROPOSAL SPECIFICATION

OF

HF63AL Type ERW **AL-TUBE** MILL LINE
Ø12.7~Ø63.5 x 1.0 ~ 3.0mm x 4~7m x 30~120 m/min

Zhangjiagang City Zhangyun Machinery
Manufacturing Co.,Ltd.

VZH-63AL Type ERW Tube & Pipe Welding Mill

-----Production Introduction and Parameters



A. SUMMARY

HF63AL Type high-frequency straight seam welding mill line is specialized equipment to produce high frequency straight seam welded **aluminum or aluminum alloy pipe** for auto condenser pipe or structural pipe or industrial pipe with $\Phi 12.7 \sim \Phi 63.5\text{mm}$ and wall thickness of $\delta 1.0 \sim 3.0\text{mm}$. Through optimization design, best materials choice, and accurately fabrication and rolls, the whole line can be reached high precision and high speed. Within suitable range of pipe diameter and wall thickness, pipe production speed can be adjusted.

The accurately sized strips, precut from high quality **aluminum or aluminum alloy** coil strips in slitting machine, are fed into the tube mill, gradually formed to a round profile

with open seam along its length in the forming mill.

A high-frequency induction welding technique is adopted to seam edge heat and longitudinal seam weld, form a strong continuous seam joint.

The strip is continuously seam welded while round in shape. The welded pipe passes through and external bead scarfing and cooling, further sizing to round with specified tolerance in the sizing mill.

After that, the endless welded pipe will be on-stream cut to desired and measured lengths.

Finished tubes may be of round, square or rectangular shape.



B. SCOPE of LINE

B.1、 GENERAL PROCESSING

{Aluminum strips} →→Double-head un-coiler →→Strip-head Shearer & Butt welder station
→→**Horizontal spiral accumulate group** →→Forming M/C (Main driving unit +Flattening
Entry unit + Breakdown zone + Fin pass zone + Seam guide unit + High frequency induction

welding system + Squeeze welding roller unit + Outside scarfing unit + Horizontal ironing stand)
 →→Emulsion water Cooling section →→ Sizing M/C (Main driving unit +Sizing zone + Speed
 testing unit + Straightener + Vertical pull-out stand) →→ NC **cold** flying saw under computer
 control →→ Run out table →→ { Stacking & packing section }

B.2、 LINE COMPOSITION

1. Double-head un-coiler -----1 set
2. Strip-head Shearer & Butt welder station -----1 set
3. Horizontal spiral accumulator group -----1 set
4. Forming section -----1 set
 - 4-1. Main driving unit ① with **1set AC inverter motor**
 - 4-2. Gear Decelerators
 - 4-3. Secondary gear boxes & universal joints
 - 4-4. Forming section base
 - 4-5. Washing and cleaning unit**
 - 4-6. Feeding entry & flattening unit
 - 4-6. Break down zone
 - 4-7. Side cluster
 - 4-8. Fin-pass zone
5. Welding section -----1 set
 - 5-1. Disk type Seam guider
 - 5-2. Squeeze roll stand (**2-Rollers type**)
 - 5-3. Solid state High frequency welding system (HF-200kw)
 - 5-4. Pure water cooling pool with tower & water supply-return system for plate-exchanger and HF-welder (Ready and erect by customer)**
 - 5-5. Outside bead scarfing uintr
 - 5-6. Inside bead scarfing system**
 - 5-7. Ironing horizontal roll stand
 - 5-8. Fumes exhaust system for welding zone (Ready and erect by customer)**
6. Emulsion water cooling system -----1 set
 - 6-1. Emulsion water cooling box

6-2. Emulsion water cooling pools with tower & water supply-return system (Ready and erect by customer)

6-3. Cooling system for impeder bar (Customer ready)

7. Sizing section -----1 set
 - 7-1. Main driving unit ②with **1set AC inverter motor**
 - 7-2. Gear Decelerators
 - 7-3. Secondary gear boxes & universal joints
 - 7-4. Sizing zone
 - 7-5. Measuring roll unit
 - 7-6. Turk's heads
 - 7-6. Pull out roll stand
9. NC cold flying saw -----1 set
10. Run-out table -----1 set
- 11. Stacking & Packing section -----Customer Ready**
12. Electric system -----1 set
13. Roller
14. Bearing
- 15. Pneumatic supply system -----Customer Ready**
16. Others

C. Technical specification

C.1、INCOMING RAW MATERIAL

- ◇ Raw material: **Aluminum & Aluminum alloy strip coil**
- ◇ Tensile Strength: $\sigma_b \leq 600\text{Mpa}$
- ◇ Yield Strength: **$\sigma_s \leq 300\text{Mpa}$**
- ◇ Strip width: **35~200mm**
- ◇ O.D of coil: Max. **$\Phi 1600\text{mm}$**
- ◇ I.D of coil: **$\Phi 400\text{mm}$ or $\Phi 508\text{mm}$ (? As customer's decision later)**
- ◇ Weight of coil: Max. 2.0 ton/coil
- ◇ Wall thickness: 1.0~ **3.0mm**

- ◇ Strip condition: Slitting edge
- ◇ Strip thickness tolerance: Max. ±5%
- ◇ Strip width tolerance: ±0.1mm
- ◇ Strip camber: Max. 2mm/10m
- ◇ Burr height: ≤ (0.03 x T) mm (T: strip thickness, mm)

C.2、 MACHINE CAPACITY

- ◇ Type: **VZH-63AL Type** ERW Tube Mill
- ◇ Operation direction: **? As customer's decision later**

- ◇ Pipe size:
 - Round pipe: Φ12.7 ~ Φ63.5mm *1.0 ~ **3.0mm**
 - Square: 10*10 ~ 50*50mm *1.0 ~ **2.5mm**
 - Rectangle: 20*10 ~ 60*40mm *1.0 ~ **2.5mm** (a*b≤2:1)
- ◇ Cutting length: 4 ~ **7m? As customer's decision later**
- ◇ Length tolerance: **Cold** saw ±1.5mm
- ◇ Design speed:
 - Motor speed 1500rpm: Max. 80 m/min
 - Motor speed 2300rpm: Max. 120m/min (Flux-weakening control)
 - Mill welding speed: 30~120m/min
- ◇ Strip storage: Horizontal spiral accumulator cage
- ◇ Roller change: Changing roller from the side
- ◇ Main mill driver motor: **Double drivers, AC75Kw/1500rpm*2sets**
- ◇ Solid state high frequency: **XGGP-200-0.35-HC** (REDSTAR from CHINA)
 - Special type for non-ferrous metals**
 - Normal output power: **200Kw**
 - DC voltage: 235V
 - DC current: 1000A
 - Efficiency: ≥90%
 - Ripple coefficient: 0.50%
 - Module quantity: MOSFET 50Kw*4sets (American IR)
 - Frequency : 350~450 KHz
- ◇ **Squeeze roll stand Type: 2pcs rolls type**
- ◇ Roller material:
 - Forming & sizing roller material: Cr12MoV (**Carbonitriding**, 60 HRC ±2)

(ASTM-D2, JIS-SKD11)

- Welding roller material: **Creamic.**
- ✧ Flying saw: **Cold** saw by AC servo control
 - ✧ Bearing:
 - Bearing for Horizontal stands: “NTN” or “NSK” or “SKF” or “FAG”
 - Bearing for secondary gear box: “NTN” or “NSK” or “SKF” or “FAG”
 - Others: Chinese “HRB” or “ZWZ” or “LYC” or “TMB”
 - ✧ Conveyor table with **double side** dumping by kicker: **10m?** (table length depends on pipe length=7m? As customer’s decision later)

C.3、 UTILITY

- ✧ Electric Power Source: Main AC **380V** ±10% x **50Hz** ±5% x 3PH
Control AC **220V** ±10% x **50HZ** ±5% x 1PH
Solenoid valve DC 24V
- ✧ Compressed Air Pressure: 5Bar ~ 8 Bar
- ✧ Raw Water Pressure: 1Bar ~ 3Bar
- ✧ Water or Emulsion Temperature: 30 °C below
- ✧ **Cooler for HF Welder: Water-water plate-exchanger**
- ✧ Pure cooling water Pools Volume for Plate-exchange r: ≥ 20m³
- ✧ Pure cooling water Flow into Plate-exchanger: ≥ 25m³/Hr
- ✧ Pure cooling water Lift for Plate-exchanger: ≥ 30m (Pump power ≥ AC4.0Kw)
- ✧ Inner exhaust axial fan for welded steam: ≥ AC0.55Kw
- ✧ Outer exhaust axial fan for welded steam: ≥ AC4.0Kw
- ✧ Emulsion cooling Pools Volume: ≥ 20m³ x 2sets
- ✧ Emulsion cooling water Flow: ≥ 20m³/Hr (Pump power ≥ AC4.0Kw*2sets)
- ✧ Emulsion cooling water Lift: ≥ 30m
- ✧ Inner exhaust axial fan for welded steam: ≥ AC0.55Kw
- ✧ Outer exhaust axial fan for welded steam: ≥ AC4.0Kw

D. SCOPE of SUPPLIES

E. 1、 Double-heads Un-coiler



1.1 Type: Double-heads & **Auto** rotary type, **mandrel expansion by pneumatic**

1.2 With pneumatic disk brake

1.3 Parameters:

- Coil ID: **Φ400mm or Φ508mm (? As customer's decision later)**
- Coil OD: **Max. Ø1600mm? As customer's decision later**
- Coil width: Max. 200mm
- Coil weight: Max. 2.0tone/coil

1.4 **Mandrel expansion by pneumatic:**

- Main rotation mandrels Dia.: Φ120mm
- Expansion stroke: **Φ320 – Φ420mm or Φ420 - Φ520mm (? Chosen by customer later)**
- Compressed Air Pressure: 5Bar ~ 8 Bar
- **Pneumatic supply system: Customer Ready**

1.5 Double mandrel' s position **auto** rotation by 0.55Kw AC inverter motor

2、Shearer & **Auto AL** Butt welding station (DJJ-260B)



2.1 Pneumatic shear:

- Type: Crocodile shear by air cylinder
- Compressed Air Pressure: 5Bar ~ 8 Bar
- **Pneumatic supply system: Customer Ready**
- No. of Blade: 1 couples
- Blade material: Cr12 (surface quench HRC58~62)
- Strip Width: Max.260mm
- Strip Thickness: 0.6 ~ **3.0mm**

2.2 **Auto TIG AL Butt welder by PLC control**

- **Type: AL welding, TIG welding gun auto-running by PLC-control & inverter speed adjuster**
- Welder: **WSE-315 AC phase AL welder**
- Welding current: 10~315A
- Inlet protection gas: **Argon** gas more than 99.99%
- Welding torch: 1set

- Strip clamp: By air cylinder
 - Welding speed: 75~350mm/min
 - Welding time: 3~5min per cycle
- 2.3 Overall: 1100 x 750 x 1580 mm

3、Horizontal spiral accumulate group



- 3.1 Low bracket : 1 set
- 3.2 Revolver : 1 set
- 3.3 Flattening unit: 1 set
- No. of flatten rolls: 7pcs
 - Flatten roll diameter: Ø 100mm
 - Width of leveler rolls : 260mm
 - Material of pinch rolls: 45# (Surface quench HRC45~48, chrome-faced)
- 3.4 Entry unit : 1 set
- Drive method: Motor → Triangular belt pulley → Angle gearbox → universal joints → Pinch rolls
 - Pinch roll motor : AC 11Kw, By AC inverter speed regulating system
 - Strip feeding speed: Max.280m/min
 - Pneumatic brake: 1set

- Push & Release for the Pinch roll: By air cylinder
 - No. of Pinch roll: 1 Couples 2Pcs 1 对 2 辊
 - Pinch roll diameter: Ø 200mm
 - Material of rolls: 45# (Surface quench HRC45~48, chrome-faced)
- 3.5 Accumulator : 1 set
- Drive method: Motor → Universal joints → **Carbide-faced cylindrical gear decelerator, With lubricant oil pump** → Open gear → basket
 - Driver motor: **AC 15Kw**, By **AC inverter speed regulating system**
 - Basket OD.: **Ø4000mm**
 - Basket ID.: **Ø1220mm**
 - Spiral drum OD.: **Ø400mm**
 - **Devices for prevent the narrow strip turn-over: 3sets, 120 °equispaced**
 - Material of rolls: 45# (Surface quench HRC45~48, chrome-faced)
 - Run out speed: **Max.220** m/min
 - Storing capacity: Appr.350~800m
- 3.6 High bracket: 1 set

4、 Forming section

4.1 Main Driver unit ① for forming mill

- Main AC motor①: **1set, SIEMENS AC 75Kw /1500rpm**
- Main gear decelerators①: 1set, **ZLY type**-Carbide-faced cylindrical gear decelerator
- With 1set **AC driver control** box①

4.2 Forming section consists of :

- Forming section base: 1set
- Secondary gear box : 7sets, **2pcs output axis type**,
With spiral bevel gear & Helical-spur gear
- Material of spiral bevel gear: 20CrMnTi
- Material of helical-spur gear: 45#
- Material of gear box: 35#, welded Plate
- Universal joint for heavy load truck: **7sets (14pcs)** 7 套 (14 支)
- **Washing and cleaning unit: 1set**
- New type feeding entry & Flattening unit: 1set (with 2H+2V+7R+2H+2V =**15pcs** rollers)
- **Stand Arrangement: BD1+BDS1 / BD2+BDS2 / BD3+BDS3 / BD4 / +SC1+SC2 / FP1+FPS1 / FP2+FPS2 / FP3+FPS3**



Here, BD: Breakdown roll stand (Driven)
 BDS: Breakdown Side roll stand (Idle)
 SC: Side Cluster roll stand (Idle)
 FP: Fin pass roll stand (Driven)
 FPS: Fin pass Side roll stand (Idle)

- Driven stand: 7 sets (Horizontal)
- Driven stand shaft: **Φ60mm**
- Material of shaft: **42CrMo** (Surface quench, grinding, 53 HRC ±2)
- Roll height adjustment: **Together move by manual operated worm screw jack
With Height rulers & Position display**
- Side roll stand: 10sets (Vertical, include 2sets of feeding entry)
- Side roll stand shaft: **Φ45mm**
- Material of shaft: **42CrMo** (Surface quench, grinding, 53 HRC ±2)
- Roll space distance adjustment: Manually operated screw shaft

5、 WELDING ZONE

5.1 Welding section consists of:

- Stand Arrangement: **SG + SQ + BS + IR**

Here, SG: Seam guide roll stand (Idle)

SQ: Squeeze roll stand (Idle)

BS: Bead scarfing unit

IR: Ironing roll stand

5.2 Seam guide roll stand:

- Type : **Disk type**
- Seam guide roll shaft: $\varnothing 40\text{mm}$
- Material of horizontal roll shaft: 42CrMo (Surface quench, grinding, 60 HRC ± 2)

5.3 Squeeze roll stand

- Type: **2pcs rolls**
- Side squeeze roll shaft: $\varnothing 40\text{mm}$
- Material of squeeze roll shaft: 42CrMo (Surface quench, grinding, 60 HRC ± 2)
- Roll space distance adjustment: Manually operated screw

5.4 Outside bead scarfing unit

- Type : 2sets of cutting tool unit
- Cutter up/down: By air cylinder
- Cutter fine adjustment: Manually operated screw

5.5 Mechanical type inside bead scarfing unit -----Customer Ready

- **Range :** **Tube ID $\geq \varnothing 15\text{mm}$**

5.6 Ironing horizontal roll stand

- Horizontal roll shaft: $\varnothing 50\text{mm}$
- Material of horizontal roll shaft: 42CrMo, Harden surface

6、 SOLID STATE HIGH FREQUENCY WELDER

6.1 Character of **solid state** system:

- a) Type 型式: **Special type for non-ferrous metals**
XGGP-200-0.4 type high frequency induction welding (RedStar, China)
- b) Normal output power: **200Kw**
- c) DC voltage: 235V
- d) DC current: 1000A
- e) Efficiency: $\geq 90\%$

- f) Ripple coefficient: 0.50%
- g) Module quantity: MOSFET 50Kw*4sets (American IR)
- h) Frequency range: 350-450KHZ.
- i) "DELTA" PLC & "EVIEW" LCD operation pane
- j) With plate exchanger for welder
- k) With air conditioner for inverter output cabinet

6.2 Ambient condition

- Installed indoors, grounding well, keep the color of grounding line distinctive from other lines, the cross section of line should be $>4\text{mm}^2$, grounding resistance should not be over 4Ω .
- Altitude should not be over 1000m, or the rating should be lowered
Ambient temperature: $-5\sim 40^\circ\text{C}$
- Relative humidity: less than 85%
- No intense vibration, no corrosive gas and explosive gas
- Installation gradient: less than 5°
- Good ventilation

6.3 **PURE Cooling water supply system for HF-welder: (Ready and erect by customer)**

- Customer in charge of valves、pipes、joints of clean cooling water circulation system, and installation from pure water pool to water-water plate-exchanger、tank of plate-exchanger to HF-welder
- Cooler for HF Welder: Water-water plate-exchanger
- Cooling Water for plate-exchanger: Customer had plenty of supply clean soft water from pool to the plate-exchanger by themselves
- Clean soft water pools: $\geq 20\text{m}^3$ *1set
- Clean soft water Temperature: $5\sim 30^\circ\text{C}$
- Clean soft water Lift pumps: $\geq 4.0\text{Kw}$
- Clean soft water Lift: $\geq 30\text{m}$
- Clean soft Water Flow: $\geq 25\text{m}^3/\text{Hr}$
- Cooling Water for welder: Pure and soft water filled to tank of plate-exchanger

6.4 **Fumes exhaust system for welding zone : (Ready and erect by customer)**



- Customer in charge of fumes exhaust system and installation
- Inner exhaust axial fan for welded steam: \geq AC0.55Kw
- Outer exhaust axial fan for welded steam: \geq AC4.0Kw

7、EMULSION WATER COOLING BOX

7.1 Emulsion water cooling box

- Cooling method: Emulsion water Shower & Bath
- Cooling box length: 2500 mm

7.2 Emulsion water supply system : (Ready and erect by customer)

- The factory will dig the water supply ditch & return water ditch, and ready foundation concrete engineering by themselves
- Customer in charge of valves、pipes、joints of Emulsion cooling water circulation system, and installation from Emulsion water pools to mill line
- Emulsion water pools: $\geq 20\text{m}^3*2\text{sets}$
- The best way is to install 1set Glass fiber reinforced plastic cooling tower: $\geq 30 \text{ m}^3/\text{Hr}$
- Emulsion water Temperature: 5~30°C
- Emulsion water Lift pumps: $\geq 4.0\text{Kw}*2\text{sets}$
- Emulsion water Lift: $\geq 30\text{m}$

- Emulsion water Flow: $\geq 20\text{m}^3/\text{Hr}$

8、SIZING SECTION

8.1 Main driving unit② for sizing section

- Main AC motor: **1set, SIEMENS AC 75Kw /1500rpm**
- Main gear decelerator②: 1set, ZLY type carbide-faced cylindrical gear decelerator
- With 1set AC driver control box②

8.2 Sizing section consists of :

- Sizing section base: 1set
- Secondary gear box: **5sets**, 2pcs output axis type
With spiral bevel gear and Helical-spur gear
- Material of spiral bevel gear: 20CrMnTi
- Material of helical-spur gear: 45#
- Universal joint for heavy load truck: **5sets (10pcs)** 5套 (10支)
- **Stand Arrangement: TW +SF1SV1 +SF2SV2 +SF3SV3 +SF4SV4 +SF5 + MR + TH1TH2TH3 +PV**

Here, TW: Twisting roll stand (Idle)

SF: Sizing 2-rolls stands (Driven)

SV: Sizing side roll stand (Idle)

MR: Measuring roll stand (Idle)

TH: Turks head stand (Idle)

PV: Pull out side roll stand (Idle)

- Driven stand: **5sets** (Horizontal)
- Driven stand shaft : **Ø60mm**
- Material of shaft : **42CrMo** (Surface quench, grinding, 53 HRC ± 2)
- Roll height adjustment: **Together move by manual operated worm screw jack**
With Height rulers & Position display
- Twisting & side roll & PV stand: **6 sets** (Vertical)
- Side roll stand shaft: Ø45mm
- Material of shaft: **42CrMo** (Surface quench, grinding, 53 HRC ± 2)
- Roll space distance adjustment: Manually operated screw shaft

8.3 Measuring roll for Speed tester of NC hot flying saw

- Type: Double rolls, Touching pressure by air cylinder

- Quantity: 1 set
- Material of roller: Cr12 (SKD1/D3, Surface quench, grinding, 53 HRC ±2)
- Roller dia: Φ111.4mm
- Pulse per revolution : 2000 pulse

8.4 Turk's head with single side rollers.

- Type: **With Single side rolls**, **Three-dimension**(Up/Down, Forward/Backward, Rotate) adjustment by manually operated worm and screw
- No. of Turks head : 3sets
- Roller shaft dia. : Φ35mm
- Material of roller shaft: **42CrMo** (Surface quench, grinding, 53 HRC ±2)

8.5 Pull out side roll stand

- Quantity: 1 set (Same as vertical stand)

9、NC **Cold Flying Saw** under computer control



- Type : **Cold flying saw**

For pipe end, they haven't burr, so no need second cutting, it's best cutting method for square and rectangle pipe.

- Cutting Pipe Size:
 - Round pipe: $\Phi 12.7 \sim \Phi 63.5\text{mm} * 0.8 \sim 3.0\text{mm}$
 - Square: $15*15 \sim 50*50\text{mm} * 0.8 \sim 2.5\text{mm}$
 - Rectangle: $20*10 \sim 60*40\text{mm} * 0.8 \sim 2.5\text{mm}$ (a*b \leq 2:1)
- Cutting Length : $4.0\text{m} \sim 7\text{m? As customer's decision later}$
- Length Tolerance: $\pm 1.5\text{mm}$
- Base length : L=5150mm
- Cutting method: **Servo motor control push cutting**
(Five step for feed-in and rotation speed)
- **Servo control system: "YASKAWA", DDS AC servo control and motion controller**
- Servo motor for travel: **"YASKAWA" servo motor, SV- 11Kw**
- Saw carriage travel: Rack and pinion with gear lath
Rack import from Germany
- Motor for cutting: **"SIEMENS" AC motor, AC- 11Kw**
- Servo motor for push : **"YASKAWA" servo motor, SV- 1.8Kw**
- Saw disk: HSS OD400mm \times ID50mm \times T2.5mm (2pcs for testing)
(Italyimported with original packaging)
- Pipe clamp: Double side clamping by air cylinder
- No. of clamp : 2 couples
- **Material of clamp : Bronze**

10. CONVEYOR TABLE WITH **DOUBLE SIDE TUMBLING BY KICKER**

- Type: V-Roller chain conveyor table
- Conveyor structure: Welding frame - Length of conveyor: **10meter (table length depends on 6m pipe length)**
- Conveyor speed: Max.140m/min
- Conveyor motor: **AC3.0Kw**
- Speed adjuster: **By AC Inverter Adjuster**

- Tumbling motor: **22N*m** step motor
- Tumbling method: Double side tumbling by the kicker step revolve



- The kicker structure: Kicker with 180 °equispaced triangle star forks
- Double side tilted checking platform: 4pcs for each side

11. STACKING & PACKING section

----- Customer ready

12. MILL ELECTRIC

12.1 Customer will in charge of all cables and wires、 cable bridge and erect projects for ERW mill line

12.2 Un-coiler

- AC inverter driver

12.3 Strip-head Shearer & **Auto** TIG butt welder station

- AC inverter driver、 PLC control

12.4 Horizontal accumulate group

- AC **inverter control system**

12.5 AC drive and control for main mill

- “SIEMENS” G120 AC inverter drive

12.3 NC Cold Flying saw control system

- Cutting method: **Servo motor control push cutting**
- **Servo control system: “YASKAWA”, DDS AC servo control and CT-03motion controller**
- Servo motor for travel: **“YASKAWA” AC servo motor, SV- 15Kw**
- AC cutting motor control system: **“YASKAWA” AC inverter**
- Motor for cutting: **“SIEMENS” AC motor, AC- 11Kw**
- Servo motor for push : **“YASKAWA” AC servo motor, SV-2.9Kw**
- “HITECH” **10 inch LCD** operation panel (length and batch setting)
- “ELCO” Encoder, 1pcs
- “AUTONCIS” or ”ELCO” approach switch, 4pcs

12.4 Conveyor

- Roll conveyor speed adjust: By AC **3.7Kw** inverter
- Brush type approach switch: 1pcs

12.5 Others

- “Schneider”

13. AIR PARTS

13.1 Pneumatic components: Taiwan “AirTAC”

13.2 Factory had plenty of supply compressed air to the mill line by themselves. The installation work and materials (pipelines, joints, valves, tools, etc.) are all responsible by the customer between of compressed air supply point to the ERW mill line

14. Rollers

14.1 Forming and sizing Rollers material

- Material: Cr12MoV (JIS-SKD11, ASTM-D2)
- Hardness: **Carbonitriding**, 60 HRC +/-2

14.2 Welding rollers material

- Material: **Creamic**.

14.3 All rolls are marked with serial code & pipe size

14.4 Each roller will afford stencil-plate

14.5 Each size fin-pass roller and seam guider disk have one set of (4pcs) spare parts in free charge

14.6 Each size welding push roller have 2pcs spare parts in free charge.

14.7 Include roller's spacers, and these spacers are for free charge

14.8 Include same size **bronze** clamps for flying saw

15. BEARING

- Bearing for Horizontal stands: "NTN" or "NSK" or "SKF" or "FAG"
- Bearing for secondary gear box: "NTN" or "NSK" or "SKF" or "FAG"
- Others: Chinese "LYC" or "ZWZ" or "QC" or "TMB"

E、Advised buyer's necessary establishments (only for reference):

- (1) Mechanical equipment site: 50m × 6m (length × width)
- (2) Electrical equipment site: 6m × 3m (length × width)
- (3) Machine unit foundation base、 foundation concrete engineering & the water supply ditch & return water ditch (See supplier's checked base drawing, they are provided within 3 weeks after contract become effective)
- (4) 2 sets of ≥ 5 Ton overhead crane、 Lifts、 carrying equipment & tools、 etc.
- (5) Lifts、 tools、 anchor bolts、 expand bolts、 embedded and fixing materials for installing machine.
- (6) Power supply:

a. **Solid state high-frequency welder : GGP-200 Kw**

b. **Power of supply:** Main AC **380V** $\pm 10\%$ * **50Hz** $\pm 5\%$ * 3Phase * 4Wires

Control AC **220V** $\pm 10\%$ x **50Hz** $\pm 5\%$ x 1PH

Solenoid valve DC 24V

c. **Equipment Motor list:** (11+15) Kw + (75*2)Kw + (11+11+1.8)Kw +3Kw ≥ 205 Kw

- (7) Machine unit electric circuit. Before assembling, circuit must reach the electric cabinet of high-frequency room. Electric connection from high-frequency room to overall control table and button station (Whole of the cables and wires will be decided size and quantity when installation on site, Purchase from market by buyer).
- (8) Two sets of emulsion water pools, Volume $\geq 20 \text{ m}^3$ 2sets, One of pool with ≥ 30 Ton/hour glass fiber cooling tower for forming-welding-sizing mill, with 2sets of pumps (AC ≥ 4.0 Kw, Flux $\geq 20 \text{ m}^3/\text{hour}$, Lift $\geq 30\text{m}$), water pipe, joints, water pressure meters, valves and tools (Whole of the parts of cooling water system will be decided size and quantity when installation on site, Purchased from market by buyer).
- (9) One set of cleaning cooling water pool for plate-exchanger of HF welder system, volume $\geq 20 \text{ m}^3$ 1set, with 1set of pump (AC ≥ 4.0 Kw, Flux $\geq 25 \text{ m}^3/\text{hour}$, Lift $\geq 30\text{m}$), water pipe, joints, water pressure meters, valves and tools (Whole of the parts of cooling water system will be decided size and quantity when installation on site, Purchased from market by buyer).
- (10) Adopting ground or attic frame and room of high-frequency welder for machine unit, collect case for welded pipe, making with customer's layout by buyer.
- (11) One set of Flux $\geq 1 \text{ m}^3/\text{min}$ air compressor and one set $\geq 0.5 \text{ m}^3$ air tank, pressure 0.5~0.8Mpa compressed air feed into ERW mill line, The installation work and materials (pipelines、 joints、 valves、 tools、 etc.) are all responsible by the customer.
- (12) Magnetic bar (Impeder core) 、 protective sleeve、 copper tube and PTFE tube for induction coil are consumable in production, customer will purchase as per pipe welding size by themselves.
- (13) Saw disk for flying saw is consumable in production, purchase from market by buyer.
- (14) Lubricating oil & grease for moving parts and Emulsion oil for forming & welding & sizing zone, purchased from market by buyer.