

SPECIFICATIONS

PET FDY (ATi615R/12) SPINNING & TAKE-UP MACHINE Project No.

**Line FDY No.1 and 2 (Machine Type E and F)
Machine type E-1~3, F-1~2: 5 Machines for regular denier
Machine type F-3: 1 Machine for coarse denier**

DATE: November 05, 2009

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1. Main Specification

- 1.1 Products : Polyester FDY
- On bobbin titer:
- Machine type E-1~3,F-1~2:
55~110dtex (50~100de)/24~72fil.
- Machine type F-3:
167~330dtex (150~300de)/34~72fil.
- dpf range :
1.0~3.0 de/fil. for Machine type E-1~3,F-1~2
3.3~4.6 de/fil. for Machine type F-3
- 1.2 Number of Position and Line : 3pos./ SB x 12SB / Line = 36pos./ Line
36pos./ Line x 2Lines = 72pos. in total
- 12pos./Machine x 5 Machines
= 60 pos. for Machine type E-1~3,F-1~2
- 12pos./Machine x 1 Machine
= 12 pos. for Machine type F-3
- 1.3 Number of End / Position : 12
- 1.4 Position Gauge : Machine type E-1~3,F-1~2: 1500mm
Machine type F-3: 1650mm
- 1.5 Spin Finish System : Nozzle Oiling System on Spinning part
Roll Oiling System on Take-Up part
- 1.6 Take-Up System
- 1.6.1 Take-Up Speed : 2500 ~ 6000m/min
(Mechanical)
- 1.6.2 Take-Up Frame : With Hot Godet Rolls
- 1.6.3 Take-Up Winder : Spindle Drive Auto Winder : ATi615R/12
- Package size: ϕ 440 x 95L (13.1dm³)
Tube size: I.D.120 x O.D.134 x 125L

2. Utility

2.1 Electricity

- | | | |
|----------|---|---|
| 1) Power | : | AC 440V±10%, 60Hz±1Hz 3 phases, 3W+PE+TE |
| | : | AC 110V±10%, 60Hz±1Hz 1 phase UPS |

2.2 For Spinning

- | | | |
|--|---|---------------------------------|
| 1) Compressed air (General air) | | For Freezing Valve |
| Pressure | : | 0.6 MPa (Inlet of machine) |
| Dew point | : | Less than -17 deg.C without oil |
| 2) Industrial water for Local Head Tank | | |
| Pressure | : | 0.3 MPa (Inlet of machine) |
| Temperature | : | Less than 20 deg.C |
| Turbidity | : | Less than 1° |
| Hardness | | Less than 7 ppm |
| CL- | : | Less than 10 ppm |
| 3) Industrial water for Extruder (applicable for Extruder spinning only) | | |
| Pressure | : | 0.3 MPa (Inlet of machine) |
| Temperature | : | 25~30 deg.C |
| Turbidity | : | Less than 1° |
| Hardness | | Less than 7 ppm |
| CL- | : | Less than 10 ppm |
| 4) N2 gas for Extruder (applicable for Extruder spinning only) | | |
| Pressure | : | 50 kPa |
| Purity | : | 99.999% |

2.3 For Take-Up

- | | |
|---------------------------------------|--|
| 1) Compressed air (General air) | For Aspirator |
| Pressure | : 0.6 MPa (Inlet of machine) |
| Dew point | : Less than -17 deg.C without oil |
| Max. residual dust content | : Particle size : Less than 5µm Particle density : Less than 5mg/m ³ |
| 2) Compressed air (High general air) | For Suction Gun |
| Pressure | : 0.9 MPa (Inlet of Suction Gun) |
| Dew point | : Less than -17 deg.C without oil |
| Max. residual dust content | : Particle size : Less than 5µm Particle density : Less than 5mg/m ³ |
| 3) Compressed air (Instrumental air) | For Migration Nozzle, Interlacing Nozzle, Winder |
| Pressure | : 0.7 MPa (Inlet of machine) |
| Dew point | : Less than -30 deg.C without oil |
| Max. residual dust content | : Particle size : Less than 5µm Particle density : Less than 5mg/m ³ |
| 4) Industrial water for Finish Oiling | |
| Pressure | : 0.3 MPa (Inlet of machine) |
| Temperature | : Less than 20 deg.C |
| Turbidity | : Less than 1° |
| Hardness | : Less than 7 ppm |
| CL- | : Less than 10 ppm |

Rev.8

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|---------------------------|--|
| 5) Take-up room condition | : Recommended room temperture : Less than 26 deg.C. Moisture: RH 60~75 % |
|---------------------------|--|

3. Standards and Regulations

The machinery shall be produced in accordance with a combination of following standards which are suitable.

| | |
|---------------------------|--|
| JIS | Japanese Industrial Standards |
| JEM | Japan Electrical Manufactures Standard |
| JEC | Japan Electro Technical Committee |
| Others standards or codes | such as National standards of P.R.China for steel pressire vessels GB-150, etc.. |
| The producer's practices | Unless otherwise specified, all selle's supply equipment mentioned in the equipment list should be designed and manufactured in accordance with the Seller's standard. |

3.1 Painting

According to TMT machinery standards

4. Documents

- 1) Specifications
- 2) Machine Layout
- 3) Drawing for Piping Connections
- 4) Instrumentation Diagram
- 5) Installation Manual
- 6) Operation Manual
- 7) Maintenance Manual
- 8) Wiring Diagram
- 9) Parts List

All the documents listed above are to be written in English and six copies each are to be furnished to the buyer.

5. Excluded Items(Not supplied by seller)

The following items are not supplied
by the Seller :

- 1) Any other items and equipment not stated in this specification.
- 2) Wiring design, work and its materials out of the machine.
- 3) Piping design, work and its materials out of the machine.
- 4) Each connecting design, work and its materials between each machine.
- 5) Installation, insulation and adjusting work at the Buyer's site.
- 6) General tools for installation and maintenance.(Hoist, Lifter etc.)
- 7) Construction and foundation work at the Buyer's site.
- 8) "Ba", "Bb" and "Bc" in the list of equipment.
- 9) Air conditioning system and utility equipment.
- 10) All other items except "S" marks in this equipment list.

6. Item Numbers List

| Item Numbers | Equipment Name |
|--------------|-----------------------------------|
| 1000 | Spinning Machine |
| 1100 | Mechanical Equipment |
| 1200 | Piping |
| 1300 | Pick Up Sensor |
| 2000 | Take-Up Machine |
| 2100 | Take-Up Frame and Accessories |
| 2200 | Roller |
| 2300 | Piping |
| 2400 | Air Control Unit |
| 2500 | Winder |
| 3000 | Auxiliary Equipment |
| 4000 | Electric Equipment |
| 5000 | Consumable |
| 6000 | Testing and Inspection Facilities |
| 7000 | Tools |
| 7100 | Tools for Spinning |
| 7200 | Tools for Take-Up frame |
| 7250 | Tools for Take-Up Winder |
| 7400 | Tools for Electrical Equipment |
| 8000 | Stand by |
| 8500 | Mterials for performance test |
| 9000 | Spare Parts |

7. Supply scope

| | |
|----------|---|
| S | The Seller's supply equipment |
| Ba to Bc | The Buyer's supply equipment The Buyer's supply equipment should be designed and manufactured according to |
| Ba | The Seller's reference drawings |
| Bb | The Seller's reference documents (catalogs, schematic drawings, diagrams, standards, etc.) |
| Bc | The Buyer's own design |
| C | The equipment which would be commonness use to the same items of another proposed line |
| Option | The Seller's supply equipment under another contract between the Buyer and the Seller |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---|----------|---|--------------|
| 1000 | Spinning Machine | | | |
| 1100 | Mechanical Equipment | | | |
| 1101 | Nil | | | |
| 1102 | Nil | | | |
| 1103 | Polymer pipe (PP) | | | |
| 1103-1 | Polymer pipe (Upstream side of Tie-in point) | 2 sets | a. 1 set for 1 line (3 machines) | Bc |
| | | | | |
| | | | b. Design basis Temp. : 320 deg.C Press. : 0.25 Mpa 24.5 Mpa for Process c. Type : Jacket type d. Heating : HTM vapor and/or liquid | |
| 1103-2 | Polymer Pipe (from Tie-in point to Spinning beam) | 24 sets | a. Type : Jacket type b. Design basis Temp. : 320 deg.C Press. : 0.250 Mpa 24.5 Mpa for Process c. to be assembled and welded at the plant site | S |
| 1103-3 | Insulation Cover | 2 sets | a. Material : Calcium silicate b. for the Item No. 1103-1, -2 | Bb |
| 1103-4 | Static mixer | 24 sets | a. Type : Kenics type (6 elements) b. to be installed in the Item No. 1103-2 by welding c. for Machine E: 25A08S x (12sets) 32A16S x (4sets) 32A08S x (4sets) for Machine F: 40A08S x (4sets) | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--|----------|--|--------------|
| 1104E | Spinning Beam (SB) for Machine type E-1~3,F-1~2 Rev.11 | | | |
| 1104E-1 | Spinning Beam (For ϕ 85mm spinnerert) | 20 sets | a. Type : Single side operation b. Design basis Temp. : 320 deg.C Vessel press. :0.250 MPa Poly. pass(before GP) : 24.5 MPa Poly. pass(after GP) : 34.5 MPa c. No. of pos. / SB : 3pos. / SB d. No. of end / pos. : 12end / pos. e. Heating : HTM vapor f. Poly. valve : Air freezing (2pc / pos.) g. Pack loading : Bottom side h. Pack fixation : Quick fitting by special bayonet (90deg. turn) | S |
| 1104E-2 | Insulation Cover | 20 sets | a. Material : Glass wool b. Finish : Carbon steel sheet with silver paint | S |
| 1104E-3 | Joint for Pack | 720 pcs | | S |
| 1104F | Spinning Beam (SB) for Machine type F-3 Rev.11 | | | |
| 1104F-1 | Spinning Beam (For ϕ 100mm spinnerert) | 4 sets | a. Type : Single side operation b. Design basis Temp. : 320 deg.C Vessel press. : 0.250MPa Poly. pass(before GP) : 24.5 MPa Poly. pass(after GP) : 34.5 MPa c. No. of pos. / SB : 3pos. / SB d. No. of end / pos. : 12end / pos. e. Heating : HTM vapor f. Poly. valve : Air freezing (2pc / pos.) g. Pack loading : Bottom side h. Pack fixation : Quick fitting by special bayonet (90deg. turn) | S |
| 1104F-2 | Insulation Cover | 4 sets | a. Material : Glass wool b. Finish : Carbon steel sheet with silver paint | S |
| 1104F-3 | Joint for Pack | 144 pcs | | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--------------------------|----------|---|--------------|
| 1105E | Gear Pump Driving System | | | |
| 1105E-1 | Spinning Gear Pump (GP) | 96 sets | For Line E-1~-3, F-1 a. Type : Single stage planetary b. Displacement : 1.8 cc / rev. c. No. of inlet : 1 d. No. of outlet : 6 | S |
| | | 24 sets | For Line F-2 a. Type : Single stage planetary b. Displacement : 3.0 cc / rev. c. No. of inlet : 1 d. No. of outlet : 6 | |
| 1105E-2 | GP Driving Motor | 96 sets | For Line E-1~-3, F-1 a. Kind of type : Synchronous motor b. Power and capacity : 440V / 500W c. Reduction gear ratio : 1 / 71 | S |
| | | 24 sets | For Line F-2 a. Kind of type : Synchronous motor with cyclo reduction gear b. Power and capacity : 440V / 750W c. Reduction gear ratio : 1 / 71 | S |
| 1105E-3 | GP Driving Unit | 120 sets | a. Type : Vertical type b. Revolution : 6.3~25.3 rpm c. Accessory : Drive Shaft, Flex. Joint Shear Pin, etc | S |
| 1105F | Gear Pump Driving System | | | |
| 1105F-1 | Spinning Gear Pump (GP) | 24 sets | a. Type : Single stage planetary b. Displacement : 6.0cc / rev. c. No. of inlet : 1 d. No. of outlet : 6 | S |
| 1105F-2 | GP Driving Motor | 24 sets | a. Kind of type : Synchronous motor with cyclo reduction gear b. Power and capacity : 440V / 1600W c. Reduction gear ratio : 1 / 71 | S |
| 1105F-3 | GP Driving Unit | 24 sets | a. Type : Vertical type b. Revolution : 6.3~25.3 rpm c. Accessory : Drive Shaft, Flex. Joint Shear Pin, etc | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---|----------|--|--------------|
| 1106E | Spinning Pack (for Machine type E-1~3,F-1~2) | 720 sets | a. Type : Round body, Forced seal b. No. of spinneret / Pack : 1 c. Excluding Spinneret d. Consumable parts : Mentioned on 5000 Item | S |
| 1106F | Spinning Pack (for Machine type F-3) | 144 sets | a. Type : Round body, Forced seal b. No. of spinneret / Pack : 1 c. Excluding Spinneret d. Consumable parts : Mentioned on 5000 Item | S |
| 1107E-1 | Spinneret | 720 pcs | a. Type : Round type b. Diameter : ϕ 85 c. Hole shape : Round d. Hole No.:24f | Ba |
| 1107E-2 | Spinneret | 720 pcs | a. Type : Round type b. Diameter : ϕ 85 c. Hole shape : Round d. Hole No.:72f | Ba |
| 1107F-1 | Spinneret | 144 pcs | a. Type : Round type b. Diameter : ϕ 100 c. Hole shape : Round d. Hole No.:36f | Ba |
| 1107F-2 | Spinneret | 144 pcs | a. Type : Round type b. Diameter : ϕ 100 c. Hole shape : Round d. Hole No.:72f | Ba |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---------------------------|----------|--|--------------|
| 1108 | HTM boiler re-boiler (HB) | | | Rev.8 |
| 1108-1 | HTM re-boiler | 6 sets | a. Installation : On the spinning floor b. Design basis Temp. : 320 deg.C Vessel press. : 0.250 MPa c. Heating : Heating medium liquid d. Heating capacity : (90)KW e. Accessory : ①Rapture Disk, Safety Valve Compound Gauge, etc ②Sight Glass, f. 3 sets / line | S Bb S |
| 1108-2 | Insulation Cover | 6 sets | a. Material : Calcium silicate | Bb |
| 1108-3 | Control valve | 6 sets | a. | S |
| 1109E | Hot-Zone (HZ) | 60 sets | a. Adjustment : 2-steps b. Accessory : Heat insulation plate, Shutter | S |
| 1109E-1 | Quench Stage heater | 36 sets | a. 1set / pos. b. applicable for Machine type E-1, E-2, E-3 only | S |
| 1109F | Hot-Zone (HZ) | 12 sets | a. Adjustment : 2-steps b. Accessory : Heat insulation plate, Shutter | S |
| 1109F-1 | Quench Stage heater | Nil | a. 1set / pos. | |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--|----------|---|--------------|
| 1110E | Quenching Stack (QS) for Line type E-1~3,F-1~2 | | | |
| 1110E-1 | Quenching Stack | 60 sets | a. Type : Cross flow b. Blowing area : Width : (1400)mm Length : 1200mm c. Major material : Carbon steel d. Front door : Detachable type, swing open door | S |
| 1110E-2 | Interfloor Tube | 60 sets | a. Major material : AL b. Shutter : Slide open type | Ba |
| 1110E-3 | Flow Control Valve | 60 sets | a. Manual operation b. 1set/pos. | S |
| 1110E-4 | Bellows | 60 sets | a. 1set/pos. | S |
| 1110F | Quenching Stack (QS) for Line type F-3 | | | |
| 1110F-1 | Quenching Stack | 12 sets | a. Type : Cross flow b. Blowing area : Width : (1550)mm Length : 1200mm c. Major material : Carbon steel d. Front door : Detachable type, swing open door | S |
| 1110F-2 | Interfloor Tube | 12 sets | a. Major material : AL b. Shutter : Slide open type | Ba |
| 1110F-3 | Flow Control Valve | 12 sets | a. Manual operation b. 1set/pos. | S |
| 1110F-4 | Bellows | 12 sets | a. 1set/pos. | S |
| 1111 | Branch Air Duct | 72 sets | a. Type : Rectangle b. Material : Galvanized steel sheet c. 1set/pos. | Ba |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|------------------------------------|----------|--|--------------|
| 1112 | Spin Finish System | | | |
| 1112-1 | Nozzle Oiling Unit | 72 sets | a. Location : Inside of QS b. No. of nozzles : 12 Nozzles / set c. Adjustable range : 700 ~ 1400mm from Spinneret surface d. Piping : NO-GP~Oiling Nozzle~ Drain tube (Soft nylon tube) e. Accessory : Bracket, Tray, Cover | S |
| 1112-2E | Nozzle Oiling Gear Pump (NO-GP) | 36 sets | For Line E-1,-2,-3 a. Displacement : 0.08cc / rev. b. No. of inlet : 1 c. No. of outlet : 12 d. Revolution : up to 40rpm | S |
| | | 12 sets | For Line F-1 a. Displacement : 0.12cc / rev. b. No. of inlet : 1 c. No. of outlet : 12 d. Revolution : up to 40rpm | |
| | | 12 sets | For Line F-2 a. Displacement : 0.16cc / rev. b. No. of inlet : 1 c. No. of outlet : 12 d. Revolution : up to 40rpm | |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---------------------------------|----------|--|--------------|
| 1112-2F | Nozzle Oiling Gear Pump (NO-GP) | 12 sets | For Line F-3 a. Displacement : 0.3 cc / rev. b. No. of inlet : 1 c. No. of outlet : 12 d. Revolution : up to 40rpm | S |
| 1112-3 | NO-GP Driving Unit | 72 sets | a. Kind of type : Geared induction motor b. Power and capacity : 440V / 100W c. Reduction gear ratio : 1 / 30 d. Accessory : Coupling, Base Plate and Pump Holder | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--|----------|--|--------------|
| 1113 | Vent Box | 6 sets | | Bb |
| 1114 | Local Head Tank (HT) | 6 sets | a. Cooling : Coil of cooling water | Bb |
| 1115 | Spinning Machine Frame | | | |
| 1115-1 | SB Supporting Frame | 2 sets | a. Major material : Carbon steel | Ba |
| 1115-2 | GP Driving Unit Supporting Frame | 2 sets | a. Major material : Carbon steel | Ba |
| 1115-3 | Spinning Floor Opening Frame and Plate | 2 sets | a. Major material : Carbon steel | Ba |
| 1115-4 | Nil | | | |
| 1115-5 | Nil | | | |
| 1200 | Piping | | | |
| 1201 | Piping for Outside Machine | | | |
| 1201-1 | Utility Piping | 2 lots | a. For Water, Compressed air | Bb |
| 1201-2 | HTM Vapor Piping | 6 lots | a. For HTM supply, Drain, Venting | Bb |
| 1201-3 | Special Parts for HTM Piping | 6 lots | a. Valves, Compound gauge, Joint, expansion | Bb |
| 1201-4 | Spin Finish Oil Piping | 6 lots | a. Oil preparation facilities ~ Local Head Tank | Bc |
| | | | b. Local Head Tank outlet ~ NO-GP inlet and Oil cock for GP Material : SUS and Nylon tube | Bb |
| | | | c. Drain piping | Bc |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--|----------|--|--------------|
| 1300 | Pick Up Sensor | | | |
| 1301 | Nil | | | |
| 1302 | For SB and Polymer Pipe | | | |
| 1302-1 | Temp. Sensor for Polymer | 6 sets | a. For monitoring, Pt100Ω Double Element (after GP) | S |
| 1302-2 | Temp. Sensor for HTM Vapor of SB | 24 sets | a. For monitoring, Pt100Ω Single Element | S |
| 1302-3 | Temp. Sensor for Quench Stage Heater | 36 sets | a. For control Pt100Ω Double Element | S |
| 1302-4 | Pressure Transmitter for polymer | 2 sets | a. For monitoring b. 1set for 1line c. to be installed on the Polymer pipe Item No. 1103-1. | Bb |
| 1302-5 | Pressure Transmitter for Polymer | 6 sets | a. For monitoring (after GP) | S |
| 1302-6 | Temp. Sensor for Vent box | 6 sets | | Bb |
| 1302-7 | Pressure Transmitter for Polymer | 6 sets | a. For monitoring (Before GP) | S |
| 1303 | Nil | | | |
| 1340 | Temp. and Pressure sensors for HTM Re-boiler | | | |
| 1341 | Temp. sensor for HTM vapor | 6 pcs | a. for control, Pt100Ω double elements | S |
| 1342 | Nil | | | |
| 1343 | Nil | | | |
| 1344 | Compound gauge | 6 sets | a. for monitoring and alarming b. with pressure switch, (H) | Bb |
| 1345 | Compound gauge | 6 sets | a. for monitoring of RD condition | Bb |
| 1346 | Level transmitter | 6 sets | a. for monitoring and alarming | S |
| 1347 | Nil | | | |
| 1348 | Nil | | | |
| 1400 | Terminal box | 1 lot | | Bb |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-------------------------------|----------|--|--------------|
| 2000 | Take-Up Machine | | | |
| 2100 | Take-Up Frame and Accessories | | | |
| 2101 | Take-Up Frame | | | |
| 2101-1 | Frame | 12 sets | a. 1sets/6pos., 12ends/pos. | S |
| 2101-2 | Safety Guard on Platform | 12 sets | a. 1sets/6pos. | S |
| 2101-3 | Ladder (or Stairs) | 1 lot | a. 2sets/1line | S |
| 2102 | Yarn Guide Set | | | |
| 2102-1 | Yarn Guide Bracket | 72 sets | a. For 12 thread lines/pos. without Yarn Guide | S |
| 2102-2 | Yarn Guide | 72 sets | a. 12 guides/set b. 1set/pos. | S |
| 2103 | Spin Finish System | | | |
| 2103-1 | Roll Oiling (RO) | 72 sets | a. Oiling Roller ϕ 150×260L b. Bracket & Trough | S S |
| 2103-2 | RO Driving Device | 72 sets | a. Motor & Reducer b. 1set/1pos | S |
| 2103-3 | Finish Oiling Tank | 3 sets | a. For RO b. With pump & motor c. 1set for Machine No. E-1~E-3 1set for Machine No. F-1 and F-2 1set for Machine No. F-3 | S |
| 2104 | Aspirator and Cutter | 72 sets | a. With gathering guides for threads | S |
| 2105 | Migration Nozzle | | | |
| 2105-1 | Casing and Bracket | 72 sets | a. Location: Up side of GR1 b. With drain port and fume port | S |
| 2105-2 | Nozzle | 72 sets | a. 12 nozzles/set b. Nozzle model : Japanese Maker Line-E,F1-2: ϕ 1.4×1 Hole Line-F3: ϕ 1.8×1 Hole | S |
| 2105-3 | Guide | 72 sets | a. 24 pcs/set b. Dog tail guide | S |
| 2105-4 | Regulator | 12 sets | a. For Migration Nozzle b. 1 set for 6pos | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|----------------------------------|----------|---|--------------|
| 2105-5 | Solenoid Valve | 72 sets | | S |
| 2106 | Interlacing Nozzle | | | |
| 2106-1 | Casing and Bracket | 72 sets | a. Location : Downstream side of GR2 b. With drain port | S |
| 2106-2 | Nozzle | 72 sets | a. 12 nozzles/set b. Nozzle model : Japanese Maker Line-E,F1-2: $\phi 1.2 \times 2$ Hole Line-F3: $\phi 1.3 \times 2$ Hole | S S |
| 2106-3 | Guide | 72 sets | a. 24 pcs/set b. Dog tail guide | S |
| 2106-4 | Solenoid Valve | 72 sets | | S |
| 2106-5 | Regulator | 12 sets | a. For Interlacing Nozzle b. For 6 pos | S |
| 2107 | GR1 Box (Insulation Box for GR1) | 72 sets | a. Type : Swing open front door type b. With drain port c. Without window | S |
| 2108 | GR2 Box (Insulation Box for GR2) | 72 sets | a. Type : Swing open front door type b. With drain port and fume port c. Without window | S |
| 2109 | Windbreak Plate for GR1 | 72 sets | | S |
| 2110 | Windbreak Plate for GR2 | 72 sets | | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-----------------|----------|---|--------------|
| 2111 | Main Switch | | | |
| 2111-1 | Casing | 72 sets | a. Installed on the front end of the winder | S |
| 2111-2 | Switches | 72 sets | Operation switches for · GR drives · OR drives · Doffing time indicator · ASP & cutter · Spinning room call | S |
| 2112 | Sub Switch | | | |
| 2112-1 | Casing | 72 sets | a. Installed on the front panel of upper frame, below GR2 | S |
| 2112-2 | Switches | 72 sets | a. Operation switches for · GR drives · OR drives · ASP & cutter ASP · Spinning room call · Position stop · Full Package Lamp | S |
| 2113 | Terminal | | | |
| 2113-1 | Terminal Box | 72 sets | a. 1set/ 1pos b. For wiring Take-Up Frame | S |
| 2113-2 | Cable duct | 72 sets | | Bb |
| 2114 | Foundation | | | |
| 2114-1 | Foundation Rail | 12 sets | a. 1set/6pos. | Ba |
| 2114-2 | Base Plate | 12 sets | a. 1set/6pos. | Ba |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-------------------------|----------|--|--------------|
| 2201 | Godet Roll-1 (GR-1) | 144 sets | <ul style="list-style-type: none"> a. Duo roll arrangement b. Heated roll c. Model : THR42240 d. Drive : Induction motor (2.0 kW) with revolution pick up e. Heater : Induction heater (8.0 kW) f. Temperature : 50~150°C, $R \leq 4^\circ\text{C}$ g. Feeding speed : 1000~4000m/min. h. Roll dimension : $\phi 220 \times 400\text{L}$ Effective length : 330 mm i. Surface : HCr plating mirror finish j. Bearing lubrication : Oil mist | S |
| 2202 | Nil | | | |
| 2203 | Godet roll-2 (GR-2) | 72 sets | <ul style="list-style-type: none"> a. Single roll arrangement b. Heated roll with heat pipes c. Model : THR62235 d. Drive : Induction motor (3.0 kW) with revolution pick up e. Heater : Induction heater(11.0 kW) f. Temperature : 50~200°C, $R \leq 3^\circ\text{C}$ g. Feeding speed : 1000~6000m/min. h. Roll dimension : $\phi 220 \times 350\text{L}$ Effective length : 280 mm i. Surface : Ceramic coating j. Bearing lubrication : Oil mist | S |
| 2204 | Separator roll-2 (SR-2) | 72 sets | <ul style="list-style-type: none"> a. Motor driven type b. Model : TGR61135 c. Drive : Induction motor (1.0 kW) d. Feeding speed : 2000~6000m/min. e. Roll dimension : $\phi 110 \times 350\text{L}$ f. Surface : Ceramic coating g. Bearing lubrication : Oil mist | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|----------------------------|----------|---|---------------|
| 2301 | Piping for Inside Machine | | | |
| 2301-1 | Compressed Air Piping | 2 sets | a. 1set/ 1line For · Migration Nozzle · Interlacing Nozzle · Aspirator · Winder actuation · Hot roll air purge | S |
| 2301-2 | Oil Mist Piping | 2 sets | a. 1set/1line For GR and SR lubrication, consists of header pipe and tube for each roll Rev.8 | S |
| 2301-3 | Finish Oil Piping | 3 sets | a. 1set/36pos. x 1 1set/24pos. x 1 1set/12pos. x 1 for Roll Oiling System | S |
| 2301-4 | Nil | | | |
| 2301-5 | Fume Exhaust Hose | 1 lots | a. Between fume port of MN case and main fume duct (including hose clamp, excluding main fume duct) b. Between fume port of GR2 box and main fume duct (including hose clamp, excluding main fume duct) c. Between fume port of IL case and main fume duct (including hose clamp, excluding main fume duct) | Bb S Bb |
| 2302 | Piping for Outside Machine | | | |
| 2302-1 | Utility Piping | 1 lot | a. For outside machine b. For water and compressed air such as piping materials including supports, fittings, valves, accessories, insulation, etc. | Bc |
| 2302-2 | Fume Exhaust Duct | 1 lot | a. For outside machine | Bc |
| 2301-3 | Exhaust Header and Branch | 1 lot | a. Behind the Take-Up Frame | Bb |
| 2302-4 | Compressed Air Piping | 1 lot | a. Between Air Control Unit and each compressed air headers of the Take-Up Frame b. Nil | Bb |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---------------------------------------|----------|---|--------------|
| 2302-5 | Oil Mist Piping | 1 lot | <ul style="list-style-type: none"> a. Between Mist Generator / Suction Unit and each headers of the Take-Up Frame b. Between Mist Separator Stand and each headers of the Take-Up Frame | Bb |
| 2302-6 | Waste Yarn Pipe | 1 lot | <ul style="list-style-type: none"> a. Stainless pipe (4m) 2pcs/pos. | Bb |
| 2401 | Air Control Unit | 2 sets | <ul style="list-style-type: none"> a. 1set/1line b. Compressed air distribution function for Winders c. With pressure gauges, air filters and air regulators for distribution line d. Regulators and air filters for IL and MN are mounted on the back side of the take-up machine e. Regulator and air filter for Aspirator are mounted on the back side of each line | S |
| 2402 | Mist Generator | 2 sets | <ul style="list-style-type: none"> a. 1set/1line b. Included in Item No. 2401-1 Air Control Unit c. Consists of Oil Mist Generator for GR, SR | S |
| 2403 | Mist Separator Unit and Suction stand | 2 sets | <ul style="list-style-type: none"> a. 1set/1line b. Oil Mist Separator c. Blower d. Installation location : Outside of the building should be recommended | S |

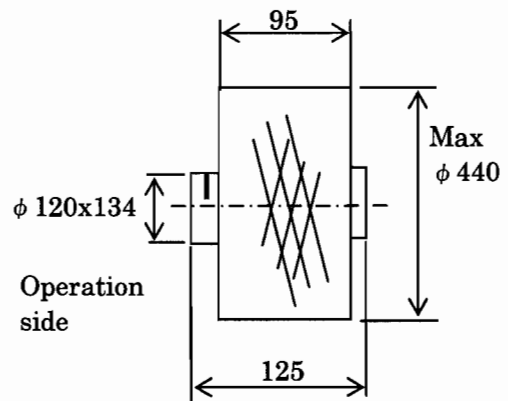
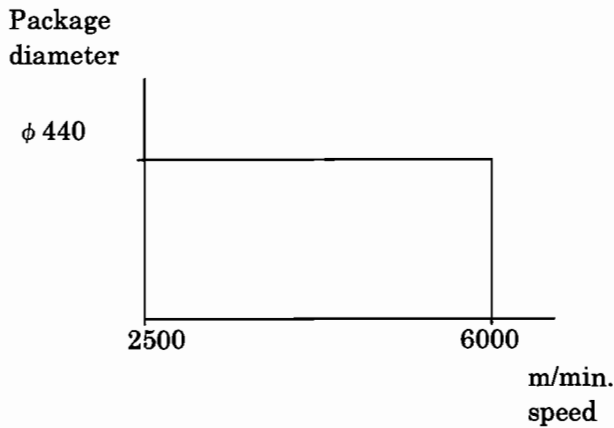
| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-----------|----------|----------------|--------------|
|----------|-----------|----------|----------------|--------------|

2501 Winder 72 sets a. Type : ATi615R/12 S

b. Speed range : 2500-6000m/min

c. Winding method
 : Spindle drive
 : Speed control
 : Traverse control
 : Contact roll drive

d. Package size
 : O.D.440mm, 95mm stroke
 : 12 cops, 13.1dm³/cop



The above figure represents theoretical and ideal shape. The shape and dimensions of the package including winding width may rather vary depending on the winding conditions.

e. Tube size
 : I.D. 120mm, 125mm length

f. Traverse system
 : Rotary traverse system

g. Lubrication for bearings
 Bobbin holder : Grease
 Contact roll : Grease
 Traverse : Grease

h. Accessories
 : Threading up device
 : Pushing off device for packages
 : Wrap detector for contact roll
 : Pivot guides for yarn traverse
 : Yarn break sensors
 (Optical, Non contact type)

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--------------------------------|----------|---|--------------|
| 3000 | Auxiliary Equipment | | | |
| 3101 | Air Conditioner for QS | 1 set | a. Capacity : ***Nm ³ / min | Bc |
| 3102 | Main Air Duct for QS | 2 set | | Bc |
| 3201 | Suction Gun Unit | | | |
| 3201-1 | Suction Gun | 12 sets | a. Consists of Model: Heberlein Lufan HS/7-2 Air supply hose: 10m Waste yarn hose: 10m | S |
| 3201-2 | Air Coupler Unit | 12 sets | a. Coupler and Valve | S |
| 3201-3 | Waste Yarn Box for Suction Gun | 12 sets | a. Installation location : Front of the Take-Up Frame | Bc |
| 3202 | Waste Yarn Box for Aspirator | 12 sets | a. 1set/6pos. b. Installation location : Behind the Take-Up Frame | Bc |
| 3203 | Fume Extraction Blower | 1 lot | | Bb |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-------------------------------------|------------------------------|---|--------------|
| 4000 | Electric Component | | | |
| 4100 | Spinning(Elec. & Instrument) | | | |
| 4101 | Nil Instrument Cabinet | 2 sets | a. Type:Self-standing | S |
| 4101-1 | Nil PLC (CPU,COM,AI/AO,DI/DO) | 2 sets | a. Function :SB temperature monitor :Vent box temperature alarm :GP polymer pressure monitor | |
| 4102 | Nil | | | |
| 4103A | Nil Remote IO Box | 4 sets | a. Type:Wall mount b. Input sensor :Temperature sensor from —SB,Vent, QS, etc. :Pressure sensor from GP, etc. | S |
| 4104A | Heater Control Cabinet | 1 set | a. Type:Self-standing b. Heater power control device : For Quench stage heater | S |
| 4104B | Nil Heater Control Cabinet | Rev.8 2 1 sets | a. Type:Self-standing b. Heater power control device : For HTM reboiler Rev.8 c. 1 controller / 1 reboiler d. 6 reboiler controll / set | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--|----------|--|--------------|
| 4105 | Nil Setting & Monitoring Unit for Spinning | 1 sets | a. Type: Desk-top b. Function - Parameter setting & monitoring - Process value monitoring - Trend graph - Historical alarm monitoring | |
| 4105-1 | Nil Personal Computer | 1 sets | a. Hardware b. License Software | S |
| 4105-2 | Nil LCD Display Rev.10 | 1 sets | | S |
| 4105-3 | Nil Printer Rev.10 | 1 sets | | Bb |
| 4105-4 | Nil Desk Rev.10 | 1 sets | | Be |
| 4106 | Nil Rev.10 Inverter Cabinet for GP & NO | Nil | | |
| 4106-1 | Nil Cabinet Rev.10 | Nil | | |
| 4106-2 | Nil Inverter for GP Rev.10 | Nil | | |
| 4106-3 | Nil Inverter for NO Rev.10 | Nil | | |
| 4107 | Nil | | | |
| 4108 | Switch Box for Spinning | 72 sets | a. Type: Wall mount b. Spinning GP on/off switch & lamp Nozzle Oiling on/off switch & lamp Take-Up room call switch & lamp | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-----------------------------|----------|---|--------------|
| 4109 | Wiring and Wiring Materials | 1 lot | a. Wiring from power station to each cabinets b. Wiring from control cabinet to each equipment c. Wiring and wiring materials except 4110 | Bb |
| 4110 | Special Wiring Materials | 1 lot | a. Communication cable b. Material supply only, wire cutting and assembling work should be required at site | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|-----------------|--|----------|--|--------------|
| 4200 | Take-Up & Winder(Elec. & Instrument) | | | |
| 4201 | Nil | | | |
| 4202 | Nil | | | |
| 4203 | Winder Control Box (mount) | 72 sets | a. Type:Winder mount b. Function:Winder control | S |
| 4203-1 | Inverter for Winder | 72 sets | | |
| 4203-2 | Servo Driver for Winder | 72 sets | | |
| 4204 | Take-Up Control Cabinet | 36 sets | a. Type:Self-standing b. 2pos/set c. Function : Spinning GP & NO speed control : GR speed & temperature control : RO speed control Rev.8 Auto doffer interface d. Clean air for Cabinet purge required | S |
| 4204-1 | Inverter for GP, NO | 144 sets | | S |
| 4204-2 | Inverter for GR | 216 sets | | S |
| 4204-3 | Power Control Device for HR | 72 sets | a. 3Heater/set | S |
| 4204-4 | Inverter for RO | 72 sets | | S |
| 4204-5 | Nil | | | |
| 4204-6 | Nil | | | |
| Rev.8 4204-7 | Remote IO for Auto doffer interface | 72 sets | 1set for 1pos | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---------------------------------------|----------|--|--------------|
| 4205 | Setting & Monitoring Unit for Take-Up | 2 sets | a. Type:Self-standing 1set for 36pos. b. Function : Parameter setting and monitoring : Alarm monitoring & printing : Event data logging : Trend recording : Short production data reporting | S |
| 4205-1 | Personal Computer with LCD | 2 sets | a. For Main SMU | S |
| 4205-2 | Nil | | | |
| 4205-3 | Printer | 2 sets | | Bb |
| 4205-4 | Cabinet | 2 sets | | S |
| 4206 | Auxiliary Cabinet | 2 sets | a. Type:Self-standing b. 1set/line(36pos.) c. Function : Roll oiling motor control : Air pressure alarm : Oil mist alarm : Fume Blower switching : Oil mist absorber switching | S S |
| 4206-1 | Nil | | | |
| 4206-2 | Communication HUB | 1 lot | | S |
| 4207 | Nil | | | |
| 4208 | Distribution Cabinet | 1 lot | Distribution for 4203,4204,4206 | Bb |
| 4209 | Nil | | | |
| 4210 | UPS for SMU | 1 lot | | Bb |
| 4211 | Nil | | | |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|------------------------------------|----------|--|--------------|
| 4212 | Wiring and Wiring Materials | 1 lot | a. Wiring from each control cabinet to machine b. Wiring from control cabinet to each equipment c. Wiring and wiring materials except 4213 | Bb |
| 4213 | Special Wiring Materials | 1 lot | a. Special wire supply only, wire cutting and assembling work should be required at site | S |
| 4213-1 | Communication Cable | 1 lot | a. Wiring from 4206 to 4203 and to 4205 | S |
| | | 1 lot | b. Wiring from 4204 to Frame terminal box | |
| 4213-2 | Special Cables for Pulse Signal | 1 lot | a. Wiring from 4204 to Frame terminal box b. Less than 30m/pos. | S |
| 4213-3 | Wiring for Winder | 1 lot | a. Wiring from Frame terminal box to Winder | S |
| 4214 | Signalization for Take-up room | | | |
| 4214-1 | Siren with light for communication | 2 sets | a. 2sound and 2color system b. 1set for 1line | S |
| 4215 | Emergency stop switch | 4 sets | a. 2set for 1line | S |
| 4216 | Gate way for Auto doffer interface | 2 sets | 1set for 36pos | S |
| 4217 | Doffer Switch | | | |
| 4217-1 | Casing | 72 sets | a. | Bb |
| 4217-2 | Switches | 72 sets | a. | Bb |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|------------------------------------|-----------------|---|--------------|
| 5000 | Consumable | | | |
| 5101 | Heat Medium Liquid | 1 lot | | Bc |
| 5102 | Consumable Parts for Spinning Pack | 1 lot | a. Filters, Sand and Gaskets for 5200Spinnerets | S |
| 5201 | Lubricant Oil | 1 lot | a. For Spinning and Take-Up Machine | Bb |
| 5202 | Paper Tube | 1 lot | | Ba |
| 5203 | Finish Oil | 1 lot | | Bc |
| 5204 | Nil | | | |
| 6000 | Testing and Inspection Facilities | | | |
| 6101 | Surface Thermometer | | | |
| 6101-1 | Digital Surface Thermometer | Rev.8 2 sets | MODEL: HA-200E | S |
| 6101-2 | U type Sensor | Rev.8 2 sets | MODEL: U-217E-00-D2 for Godet Roll surface | S |
| 6101-3 | N type Sensor | Rev.8 2 sets | MODEL: N-231E-00 for Spinneret surface | S |
| 6102 | Anemometer | 1 set | MODEL: 6004 | S |
| 6201 | Tension Meter | 1 set | MODEL: ETPB-200 | S |
| 6202 | Digital Stroboscope | 1 set | MODEL: DT-311N | S |
| 6203 | Vibration Meter | 1 set | MODEL: 1332 | S |
| 6501 | Nil | | | |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--------------------------------|----------|--|--------------|
| 7000 | Tools | | | |
| 7001 | General Tools | 1 set | | Bc |
| 7100 | Tools for Spinning Machine | | | |
| 7101 | Special Tools for Installation | 1 set | | S |
| 7102 | Special Tools for Maintenance | 1 set | | S |
| 7103 | Pack Mounting Tool | 4 sets | a. Manual operation | S |
| 7104 | Pack Assembling Device | 2 sets | a. Hydraulic pressure cylinder b. 1set each for 85mm spinneret pack and 100mm spinneret pack | Ba |
| 7105 | Pack Disassembling Device | 2 sets | a. Manual operation assistance table for pack disassembling b. 1set each for 85mm spinneret pack and 100mm spinneret pack | Ba |
| 7106 | Pack transporting cart | 1 set | a. with electric heater type | Bb |
| 7200 | Tools for Take-Up Frame | | | |
| 7201 | Special Tools for Installation | 1 set | | S |
| 7202 | Special Tools for Maintenance | 1 set | | S |
| 7203 | Balancing Machine | 1 set | a. Manufactured by Schenck (Type: HS 3 B/Tex) | Bb |
| 7204 | Godet Roll Test Stand | | | |
| 7204-1 | Base Plate and Terminal Box | 1 set | | Ba |
| 7204-2 | Concrete Base Block for GR | 1 set | | Bb |
| 7204-3 | Oil Mist Lubricator | 1 set | | S |
| 7205 | Yarn Threading Cart | 1 lot | | Bc |
| 7206 | Bearing Heater | 1 set | | Bb |
| 7207 | GR mounting device | 1 set | | Bb |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|--------------------------------|----------|---|-----------------|
| 7250 | Tools for Take-Up Winder | | | |
| 7251 | Special Tools for Installation | 1 set | | S |
| 7252 | Special Tools for Maintenance | 1 set | a. With balance jig | S |
| 7253 | Nil | | | |
| 7254 | Transporter for Winder | 1 set | | S |
| 7255 | Hand Press | 1 set | | Bc |
| 7256 | Bobbin Holder Heater | 1 set | a. Band heater and switch box | S |
| 7257 | Nil | | | |
| 7258 | Bearing Press | 1 set | a. Oil press device | S |
| 7259 | Bobbin Holder Working Stand | 1 set | a. Working Stand b. Pressure intensifier | Rev.8 S S |
| 7260 | Apparatus for CR Mounting | 1 set | | S |
| 7261 | Doffing Cart | 1 lot | a. Manual type | Bc |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|---|----------|---|--------------|
| 7400 | Tools for Electrical Equipment | | | |
| 7401 | Maintenance Cabinet for Winder and GR | 1 set | | S |
| 7401-1 | Cabinet | 1 set | a. Type:Self-standing b. Function: Power supply for Winder GR motor drive | S |
| 7401-2 | Maintenance Cable for Winder | 1 set | | S |
| 7402 | Setting & Monitoring Unit for Maintenance Cabinet | 1 set | a. Type:Desk-top b. for Take-up | S |
| 7402-1 | Personal Computer | 1 set | | S |
| 7402-2 | LCD Display | 1 set | | S |
| 7402-3 | PC Desk | 1 set | | Bc |
| 7403 | Operation Terminal for Inverter | 1 set | | S |
| 7404 | Nil Programing tool for PLC | 1 set | | S |
| 7405 | Special Tool for Wiring | 1 set | | S |
| 7405-1 | For Communication Line | 1 set | a. Modular connector | S |
| 7405-2 | For Winder Internal Wiring | 1 set | | S |
| 7405-3 | For Winder Cable | 1 set | | S |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|-------------------------------|----------|---|--------------|
| 8000 | Stand by | | | |
| 8100 | Stand by for Spinning Machine | | | |
| 8101E | Spinning Pack | 864 sets | a. Same Item No.1106E | S |
| 8101F | Spinning Pack | 176 sets | a. Same Item No.1106F | S |
| 8102E-1 | Spinneret | 864 pcs | a. Same Item No.1107E-1 | Ba |
| 8102E-2 | Spinneret | 864 pcs | a. Same Item No.1107E-2 | Ba |
| 8102F-1 | Spinneret | 176 pcs | a. Same Item No.1107F-1 | Ba |
| 8102F-2 | Spinneret | 176 pcs | a. Same Item No.1108F-2 | Ba |
| 8104 | Gear Pump Driving system | | | |
| 8104E-1 | Spinning Gear Pump | 4 sets | a. Same Item No.1105E-1 1.8cc:3un 3.0cc:1un | S |
| 8104F-1 | Spinning Gear Pump | 1 set | a. Same Item No.1105F-1 | S |
| 8104E-2 | GP Driving Motor | 2 set | a. Same Item No.1105E-2 500W:1un 750W:1un | S |
| 8104F-2 | GP Driving Motor | 1 set | a. Same Item No.1105F-2 | S |
| 8104E-3 | GP Driving Unit | 1 set | a. Same Item No.1105E-3 | S |
| 8104F-3 | GP Driving Unit | 1 set | a. Same Item No.1105F-3 | S |
| 8105 | Spin Finish System | | | |
| 8104-1 | Spin finish guide | 48 pcs | a. Only oiling guide | S |
| 8104-2E | Nozzle Oiling Gear Pump | 3 set | a. Same Item No.1112-2E 0.08cc:1un 0.12cc:1un 0.16cc:1un | S |
| 8104-2F | Nozzle Oiling Gear Pump | 1 set | a. Same Item No.1112-2F | S |
| 8104-3 | NO-GP Driving Unit | 2 sets | a. Same Item No.1112-3 | S |
| 8106 | Nil | | | |

| Item No. | Equipment | Quantity | Specifications | Supply scope |
|----------|----------------------------------|----------|--|--------------|
| 8107 | Pick Up Sensor | | | |
| 8107-1 | Temp. Sensor for Polymer | 2 sets | Same Item No.1302-1 | S |
| 8107-2 | Pressure Transmitter for Polymer | 2 sets | Same Item No.1302-5 | S |
| 8200 | Stand by for Take-Up Machine | | | S |
| 8201 | GR1 | 4 sets | a. Same Item No.2201 | S |
| 8202 | Nil | | | |
| 8203 | GR2 | 2 sets | a. Same Item No.2203 | S |
| 8204 | SR2 | 2 sets | a. Same Item No.2204 | S |
| 8250 | Winder Unit | 2 sets | a. Type : ATi615R/12 | S |
| Rev.8 | | | | |
| 8500 | Materials for performance test | | | |
| 8501 | Spinneret | 1 lot | | S |
| 8502 | Paper tube | 1 lot | | S |
| 8503 | Spin finish oil | 1 lot | | S |
| 9000 | Spare parts | | | |
| 9000 | Spare parts | | 3% of contract price of Spinning and Take-Up | |
| 9100 | Spare parts | 1 lot | a. For Spinning Machine | S |
| 9200 | Spare parts | 1 lot | a. For Take-Up Machine | S |
| 9300 | Spare parts | 1 lot | a. For Take-Up Winder | S |
| 9400 | Spare parts | 1 lot | a. For Electrical Equipment | S |