

Metal-Asia

TECHNICAL DOCUMENTATION BY UNIT — STRAIGHT-LINE WIRE DRAWING MACHINE LZ6/560

Wire Rod Drawing Line: Input dia. 6 mm → Output dia. 2.5 mm

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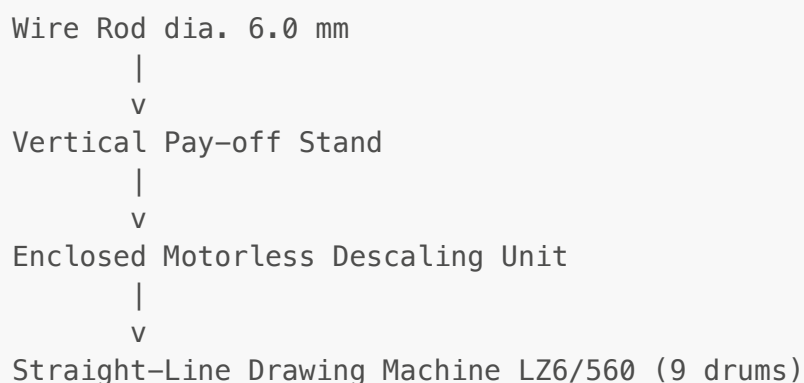
Target Markets: Europe, North America, Middle East, Africa, Southeast Asia, Latin America

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1. GENERAL PROCESS DESCRIPTION

1.1 Process Flow Diagram



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    |
    v
Built-in Tension Device
    |
    v
Coiler with Type 1T Basket
  
```

1.2 Line Technical Specifications

Parameter	Value
Equipment name	Straight-line wire drawing machine
Model	LZ6/560
Input wire diameter	6 mm
Output diameter	2.0–5.7 mm (optimal: 2.5 mm)
Input material tensile strength	≤600 MPa
Average reduction ratio	≤23.04%
Production capacity	1.3 t/hour
Wire feeding direction	Left (customizable)

1.3 Motor Specifications

Unit	Power	Qty
LZ6/560 main drawing drive	22 kW	1
LZ6/560 auxiliary drives	18.5 kW	5
Coiler basket unit	15 kW	1
Total installed power	127 kW	7 motors

1.4 Standard Supply Scope

Item	Description	Qty
1	Vertical pay-off stand + descaling unit	1 set
2	Straight-line drawing machine LZ6/560	1 set
3	Coiler unit with 1T basket	1 pcs
4	Siemens PLC automatic control cabinet	1 set
5	HMI touchscreen control panel	1 set
6	Hardened gear reducers	1 set

2. UNIT 1 — VERTICAL PAY-OFF STAND

2.1 Purpose

The pay-off stand is the first unit in the process line. It is designed to uncoil wire rod from billets and feed it into the descaling unit.

2.2 Technical Specifications

Parameter	Value
Construction type	Vertical pay-off stand
Footprint	Compact design
Safety feature	Emergency shutoff switch for wire tangling

2.3 Description & Features

- **Compact footprint** — occupies minimal floor space on the production floor
- **Easy threading** — design ensures safe and simple wire threading
- **Anti-tangling protection** — special design prevents wire tangling during uncoiling
- **Emergency protection** — equipped with emergency shutoff switch for immediate stop upon wire tangling detection, preventing equipment damage and personnel injury

2.4 Maintenance Requirements

- Inspect emergency switch condition before each shift
- Lubricate moving parts per maintenance schedule
- Monitor wear on guide rollers

3. UNIT 2 — DESCALING MACHINE (SCALE BREAKER)

3.1 Purpose

The descaling machine is designed for mechanical cleaning of wire surface from mill scale (oxide products) prior to drawing. Scale removal is a mandatory operation to ensure finished product quality and extend die service life.

3.2 Technical Specifications

Parameter	Value
Type	Enclosed motorless
Construction	Enclosed type with scale collection container
Container location	Bottom section of machine
Descaling wheels	Fitted with carbide rod inserts

3.3 Construction Description

- **Enclosed housing** — prevents scale dispersal in the work area, ensuring cleanliness and safety
- **Scale collection container** — located in the bottom section for convenient scale collection and removal
- **Working wheels** — fitted with tungsten carbide rod inserts providing:
 - Superior scale removal quality
 - Clean wire surface treatment
 - Extended working element service life

3.4 Advantages

Advantage	Description
Cleaning quality	Carbide inserts ensure high-efficiency scale removal
Cleanliness	Enclosed design prevents environmental contamination
Durability	Carbide inserts offer extended operational life

3.5 Consumables

Item	Purpose
Carbide inserts (rods)	Working elements of descaling wheels
Support roller bearings	Spare parts

4. UNIT 3 — DRAWING DRUMS & COOLING SYSTEM

4.1 Purpose

The drawing drums are the primary working elements of the machine. They are designed to pull wire through dies while simultaneously reducing diameter and increasing length. The cooling system removes heat generated during metal deformation.

4.2 Drum Technical Specifications

Parameter	Value
Model	LZ6/560
Number of drums	9 (No. 1–No. 9)
Drum diameter	560 mm
Operating mode	Individual or synchronized
Flexibility	Selective drum bypass capability

4.3 Drum Surface Specifications

Parameter	Value
Surface treatment technology	Welding overlay + special spray coating
Coating height	120 mm
Wear-resistant layer thickness	≥8 mm
Surface roughness	≤ Ra0.8
Hardness	HRC ≥60
Guaranteed service life	≥22,000 hours / 3 years

4.4 Drum Cooling System

Parameter	Value
Cooling type	Internal high-pressure water cooling
Location	Inside drums
Purpose	Heat removal from drum working surface

4.5 Construction Description

- **Spray-coated working surface** — special welding and spray technology ensures high wear resistance
- **High surface hardness (HRC ≥60)** — ensures extended service life without reprocessing
- **Low surface roughness (Ra ≤0.8)** — guarantees quality drawing without wire surface damage
- **Internal cooling** — high-pressure water circulates inside drums, effectively removing heat from the deformation zone
- **Modular construction** — selective drum bypass capability allows line adaptation for various drawing modes

4.6 Operating Modes

Mode	Description
Individual	Each drum operates autonomously at individual speed
Synchronized	All drums operate synchronously as a single line
Hybrid	Synchronized operation starting from any drum, forward or reverse

4.7 Consumables & Spare Parts

Item	Purpose
Welding overlay material	Working surface restoration
Drum bearings	Spare parts
Cooling system seals	Spare parts

Item	Purpose
Drawing dies	Working tool for wire drawing

5. UNIT 4 – MACHINE FRAME & STRUCTURAL ELEMENTS

5.1 Purpose

The machine frame serves as the supporting structure for the entire drawing machine. It provides a rigid and stable base for mounting drawing drums, die holders, drive system, and other units.

5.2 Technical Specifications

Parameter	Value
Construction type	Welded box-frame
Material	Steel plate, I-beams, angle iron
Allowable corrosion depth of raw materials	≤0.3 mm
Foundation requirement	No special foundation required

5.3 Construction Description

Materials & Processing

Element	Material	Processing
Base	Thick hot-rolled plate	Welding, heat treatment, machining
Working platform	Thick hot-rolled plate	Welding, heat treatment, machining
Vertical panels	Thick hot-rolled plate	Welding, heat treatment, machining
Internal stiffener ribs	Internal	Welding

Manufacturing Process

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Metal surface rust removal
  |
  v
Welding of elements
  |
  v
Heat treatment (stress relief)
  |
  v
Precision machining
  |

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V Finished machine frame

5.4 Construction Features

Feature	Description
High rigidity	Welded box-frame with internal stiffener ribs provides exceptional rigidity
Stability	Post-weld heat treatment eliminates internal stresses, preventing deformation
Vibration-free	Design calculated for high-speed drawing, eliminates vibration at high speed and load
No foundation required	Frame is sufficiently robust and stable — only requires level industrial floor
Clean layout	Angled drums and accessible work area ensure easy maintenance and monitoring

6. UNIT 5 — DIE HOLDER & DIE COOLING

6.1 Purpose

The die holder is designed to secure drawing dies (draw plates) — the working tool through which wire is pulled. The cooling system removes heat from dies and wire in the deformation zone.

6.2 Technical Specifications

Parameter	Value
Construction	Welded
Number of chambers	2
Die cooling type	Direct immersion
Cooling principle	Low pressure, high flow rate
Wire entry temperature	≤65°C
Wire exit temperature	≤160°C

6.3 Construction Description

The die holder consists of two functional chambers:

Chamber	Purpose	Features
Cooling water chamber	Direct cooling of dies and wire	Independent water supply, low pressure, high flow

Chamber	Purpose	Features
Lubricant powder chamber	Lubricant material delivery during drawing	Replaceable with liquid lubrication system upon request

6.4 Cooling System

Parameter	Value
Water supply type	Independent (separate from drum cooling system)
Design principle	Low pressure + high flow rate
Water circulation	Free and stable
Cooling type	Direct immersion
Result	Stable cooling without significant pressure loss

6.5 Process Temperature Parameters

Controlled Parameter	Required Value	Notes
Wire entry temperature	$\leq 65^{\circ}\text{C}$	Prevents overheating of input material
Wire exit temperature	$\leq 160^{\circ}\text{C}$	Prevents overheating of finished product
Cooling water delivery	Normal/rated	Critical for cooling efficiency

6.6 Drawing Dies

Parameter	Value
Die dimensions	Per customer specification
Purpose	Working tool for wire drawing (diameter reduction)
Material	Hard alloy (typically tungsten carbide or diamond)

6.7 Options

Option	Description
Lubricant powder chamber replacement	Upon customer request, lubricant powder chamber can be replaced with liquid lubrication delivery system

6.8 Consumables

Item	Purpose
Drawing dies	Working tool, wear item
Drawing powder	Drawing lubricant

Item	Purpose
Liquid lubricant (option)	Alternative to powder
Chamber seals	Spare parts

7. UNIT 6 — DRIVE SYSTEM

7.1 Purpose

The drive system provides rotational motion to the drawing drums at specified speed and torque. It consists of electric motors, gearboxes, and power transmission system.

7.2 Technical Specifications

Parameter	Value
Gearbox type	Hardened helical gears
Belt type	Narrow V-belts
Noise level	≤82 dB
Bearings	High-quality industrial grade
Efficiency	High

7.3 Motor Specifications

Unit	Power	Qty	Total Power
Main drum drive	22 kW	1	22 kW
Auxiliary drives	18.5 kW	5	92.5 kW
Coiler basket	15 kW	1	15 kW
TOTAL		7 motors	129.5 kW

7.4 System Description

- **Hardened helical gearboxes** — ensure high load capacity, extended service life, and quiet operation
- **Narrow V-belts** — provide smooth power transmission, compensation for installation tolerances, and overload protection
- **High efficiency** — minimal power loss in the drive system
- **Low noise level** — does not exceed 82 dB, complies with workplace safety requirements
- **Quality bearings** — reliability and extended service life

7.5 Consumables & Spare Parts

Item	Purpose
V-belts	Power transmission, wear item
Gearbox bearings	Spare parts
Gearbox oil	Lubrication
Bearing grease	Periodic maintenance

8. UNIT 7 — TENSION DEVICE

8.1 Purpose

The tension device is designed to regulate balance and synchronize speed between drawing and coiling operations. It maintains optimal wire tension between the last drawing drum and the coiler.

8.2 Technical Specifications

Parameter	Value
Type	Built-in
Location	In-line between drawing machine and coiler
Purpose	Balance regulation and speed synchronization

8.3 Functions

- **Maintains optimal tension** — prevents both sagging and excessive wire tension
- **Speed synchronization** — ensures coordinated operation of drawing machine and coiler
- **Balance compensation** — compensates for speed differences between drawing and coiling

9. UNIT 8 — COILER & BASKET

9.1 Purpose

The coiler is designed to wind finished drawn wire onto a basket. It ensures uniform wire lay and accurate length measurement.

9.2 Coiler Technical Specifications

Parameter	Value
Motor power	15 kW
Winding type	Horizontal
Protection	Protective hood
Winding mode option	Fully automatic intelligent system

9.3 Basket Technical Specifications

Parameter	Value
Basket material	Steel Q355 (minimum mechanical properties)
Coil diameter	≥800 mm
Custom manufacturing	Per customer requirements
Load capacity	≥1 t
Clamping	Pneumatic
Length counter accuracy	≤0.1%
Basket type	Type 1T ()

9.4 Advantages

Advantage	Description
High load capacity	Up to 1 ton of wire per basket
High accuracy	Length counting error ≤0.1%
Pneumatic clamp	Fast and reliable fixation
Automatic mode	Fully automatic operation capability
Custom sizing	Baskets manufactured to customer specifications

10. UNIT 9 – ELECTRICAL CONTROL SYSTEM

10.1 Purpose

The control system provides automatic control of the entire drawing line, including speed regulation, unit synchronization, parameter monitoring, and safety functions.

10.2 Technical Specifications

Parameter	Value
Control platform	Siemens PLC
Speed regulation	AC variable frequency drives
Interface	Color HMI touchscreen
Communication	Industrial fieldbus
Control type	Adaptive (ensures process continuity)

10.3 Control System Components

Item	Specification	Qty
1	Siemens PLC controller	1 set
2	Variable frequency drives	6 pcs
3	Main circuit breaker	Industrial grade
4	Low-voltage components	Industrial grade
5	Electric motors	Industrial grade
6	Control cabinet	—
7	Main operator panel	—
8	HMI touchscreen	Color display

10.4 Control Functions

Operating Modes

Mode	Description
Single	Individual selected drum operation
Jog	Step-by-step wire advancement for setup
Synchronized	All drums operate synchronously
Continuous proportional	Specified drum operates with configurable speed coefficient
Ramp-up	Gradual acceleration from low speed to operating speed

Safety Functions

Function	Description
Wire break protection	No wire break occurs on any stop and subsequent restart
Jog mode speed	Equipment operates at low speed only (adjustable)
Electric braking	Used during emergency stop
Pneumatic brake	Used during emergency stop

11. SAFETY SYSTEM

11.1 Safety Equipment

Item	Specification
1	Emergency pull-cord switch
2	Emergency stop button

Item	Specification
3	Electric braking
4	Pneumatic brake
5	Motor protective covers
6	Safety indicator lights

11.2 Safety Operating Modes

Mode	Description
Emergency stop	Electric braking + pneumatic brake, time ≤ 5 sec
Fast stop	Standard braking, time ≤ 10 sec
Jog mode	Operates at low speed only, speed adjustable

12. INSTALLATION & COMMISSIONING

12.1 Customer Responsibilities (Preparation)

Item	Description	Notes
1	Foundation preparation	No special foundation required
2	Drainage system	Mandatory
3	Water connection	For cooling system
4	Compressed air connection	For pneumatic systems
5	Power cable routing	Per supplier electrical schematics
6	Control cable routing	Provided by customer
7	Shielded cable routing	Provided by customer

12.2 Customer-Supplied Materials

Item	Purpose
1	Lubricants
2	Gearbox oil
3	Drawing powder
4	Cooling tower
5	Compressed air source
6	Water pump

Item	Purpose
7	Power cables
8	Control cables
9	Shielded cables

12.3 Supplier Responsibilities

Item	Description
1	Installation guidance
2	Commissioning
3	Personnel training

13. COMPLETE EQUIPMENT LIST

13.1 Main Supply

Item	Description	Model/Type	Qty
1	Vertical pay-off stand	—	1 set
2	Enclosed descaling unit (motorless)	—	1 pcs
3	Straight-line drawing machine	LZ6/560	1 set
4	Drawing drums	560 mm	9 pcs
5	Die holders	Two-chamber	9 sets
6	Drive system	Gearboxes + V-belts	1 set
7	Tension device	Built-in	1 pcs
8	Coiler unit	—	1 pcs
9	Type 1T basket	800 mm, 1 t	1 pcs
10	Control cabinet	Siemens PLC	1 set
11	HMI touchscreen panel	Color	1 set

13.2 Electrical Components

Item	Specification	Brand	Qty
1	Siemens PLC	Siemens	1 set
2	Variable frequency drives	Included	6 pcs
3	22 kW motor	Industrial grade	1 pcs

Item	Specification	Brand	Qty
4	18.5 kW motors	Industrial grade	5 pcs
5	15 kW motor (coiler)	Industrial grade	1 pcs
6	Main circuit breaker	Industrial grade	1 pcs
7	Low-voltage components	Industrial grade	1 set

13.3 Optional Equipment

Item	Purpose
1	Butt welding machine
2	Wire pointing machine

14. CONSUMABLES & SPARE PARTS

14.1 Startup & Operational Consumables

Item	Qty	Notes
1	Gearbox oil	Per gearbox volume
2	Drawing powder	1 bag (included) + replenishment
3	Liquid lubricant (option)	Per consumption rate
4	Lubricants	Per maintenance schedule

14.2 Recommended Minimum Spare Parts Inventory

Item	Purpose	Replacement Interval
1	Drawing dies	Working tool
2	V-belts	Drive transmission
3	Drum bearings	Drum support
4	Gearbox bearings	Gearbox support
5	Cooling system seals	Seal integrity
6	Descaling unit carbide inserts	Working elements
7	Die holder seals	Chamber sealing

14.3 External Resources (Customer-Supplied)

Item	Requirement
1	Electrical power

Item	Requirement
2	Cooling water
3	Compressed air
4	Wire rod dia. 6 mm

APPENDIX: UNIT SPECIFICATION SUMMARY

Unit	Key Parameters	Critical Features
Pay-off stand	Compact, emergency shutoff	Prevents wire tangling
Descaling unit	Enclosed, motorless, carbide inserts	Scale collection container
Drawing drums (x9)	560 mm, HRC \geq 60, 22,000 hrs/3 yrs	High-pressure water cooling
Machine frame	Welded box-frame, no foundation	Post-weld heat treatment
Die holder	Two-chamber, immersion cooling	Entry \leq 65°C, exit \leq 160°C
Drive system	Gearboxes, V-belts, 129.5 kW	Noise \leq 82 dB
Tension device	Built-in	Speed synchronization
Coiler + basket	15 kW, 1 t, 800 mm	Accuracy \leq 0.1%
Electrical control	Siemens PLC, VFD, HMI	Adaptive control



Turnkey supply of straight-line wire drawing machines with global commissioning support

Document prepared based on manufacturer technical specifications. All parameters verified against original documentation. Supplier: [Metal-Asia.pw](https://www.metal-asia.pw), Author: [Milosh Kovachevi](#).