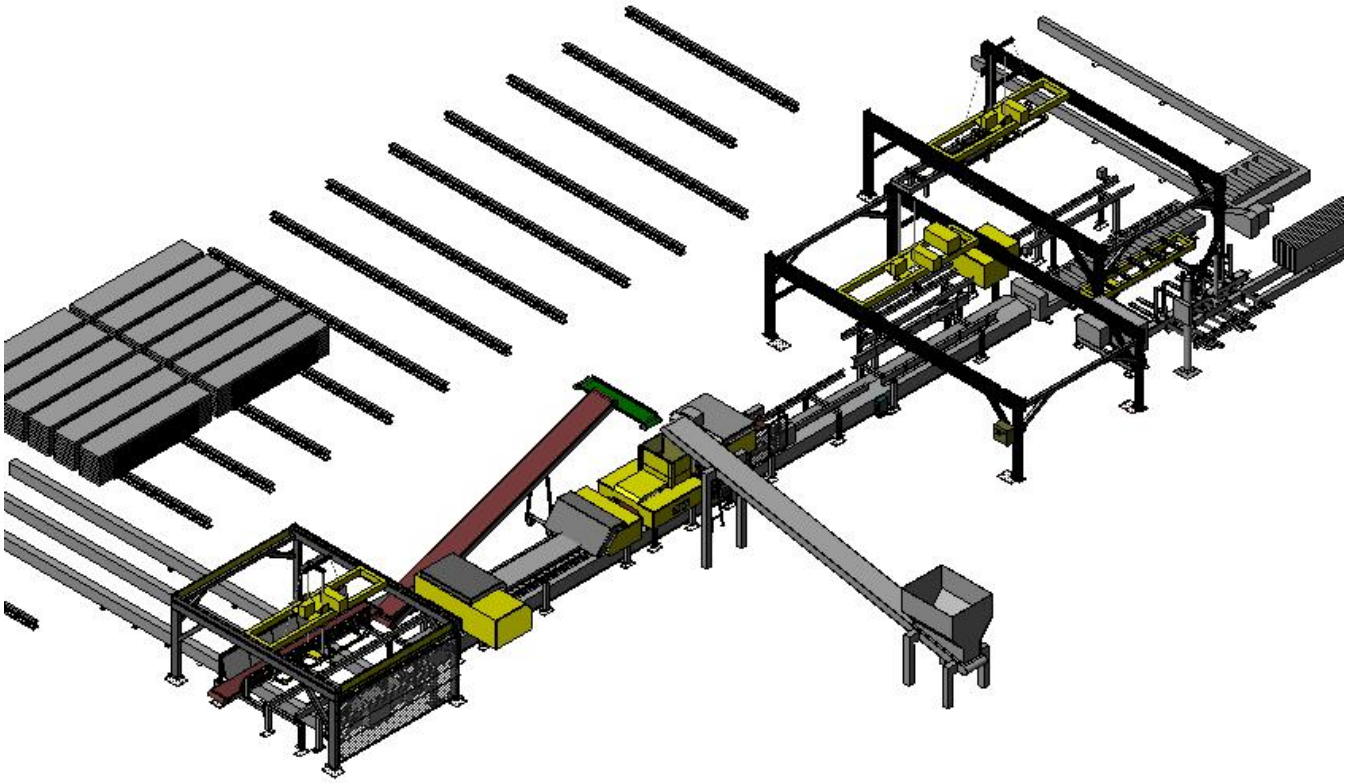
ELEMATIC PRIMO WALL PRODUCTION LINE Item 851 0000



DESCRIPTION

- Lightweight non-bearing ACOTEC-wall panels without reinforcements can be produced of concrete on the Primo-production line.
- At least one Primo thickness-set option must be chosen for the delivery.
- The line has automatic operation.
- Example layout P67223.

TECHNICAL DETAILS

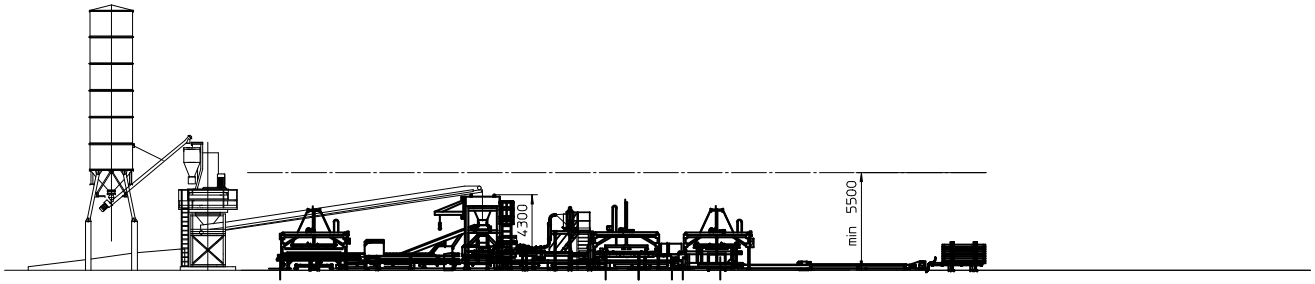
Space needed for the production line 24 x 42 m²

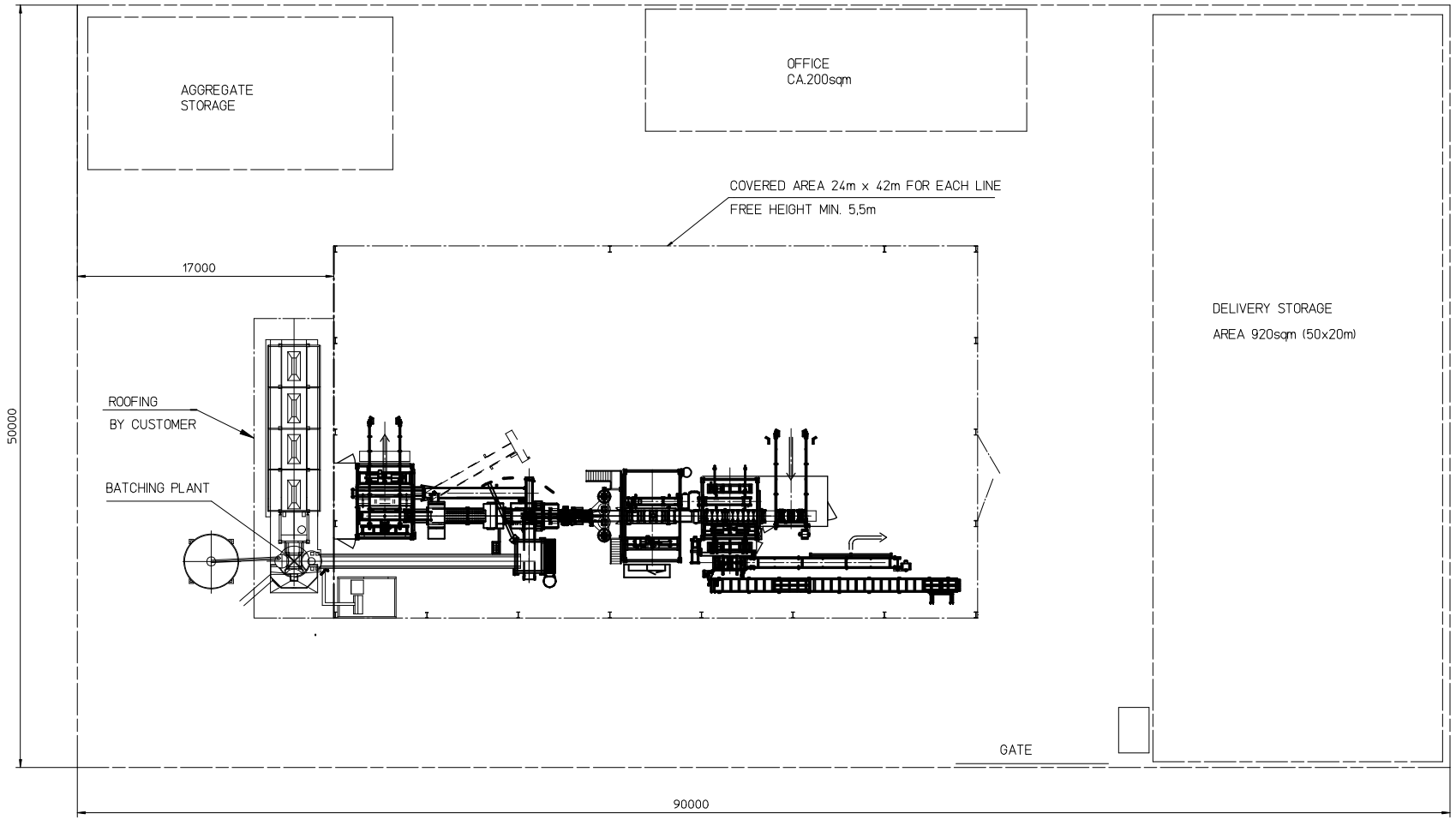
Free height of the hall	min 5,5 m
Product width	600 mm
Product length	900 – 3300 mm
Product thicknesses	68, 75, 92, 100,120
Production speed	approx. 80 m² / h
Mould plates 1000 pcs (3000 m / 2.4 – 3.3 m)	
Steel pallets	5 pc(s)
Connected power	50 kW
Compressed air free air	6 bar 0.3 m^3 / min

OPTIONAL

Primo- thickness set	68, 75, 92, 100, 120
Primo-splitting set	2 x 300 / 68, 75, 92, 100,120

Safety wire equipment, ITEM 853 3000
Extra mould plates (delivery includes 1000 pcs)
Extra steel pallets (delivery includes 5 pcs)
Handling equipment for delivery pallets
Batching and mixing plant and concrete transport system, ITEM 853 1000
Pre-curing storage
Safety fences

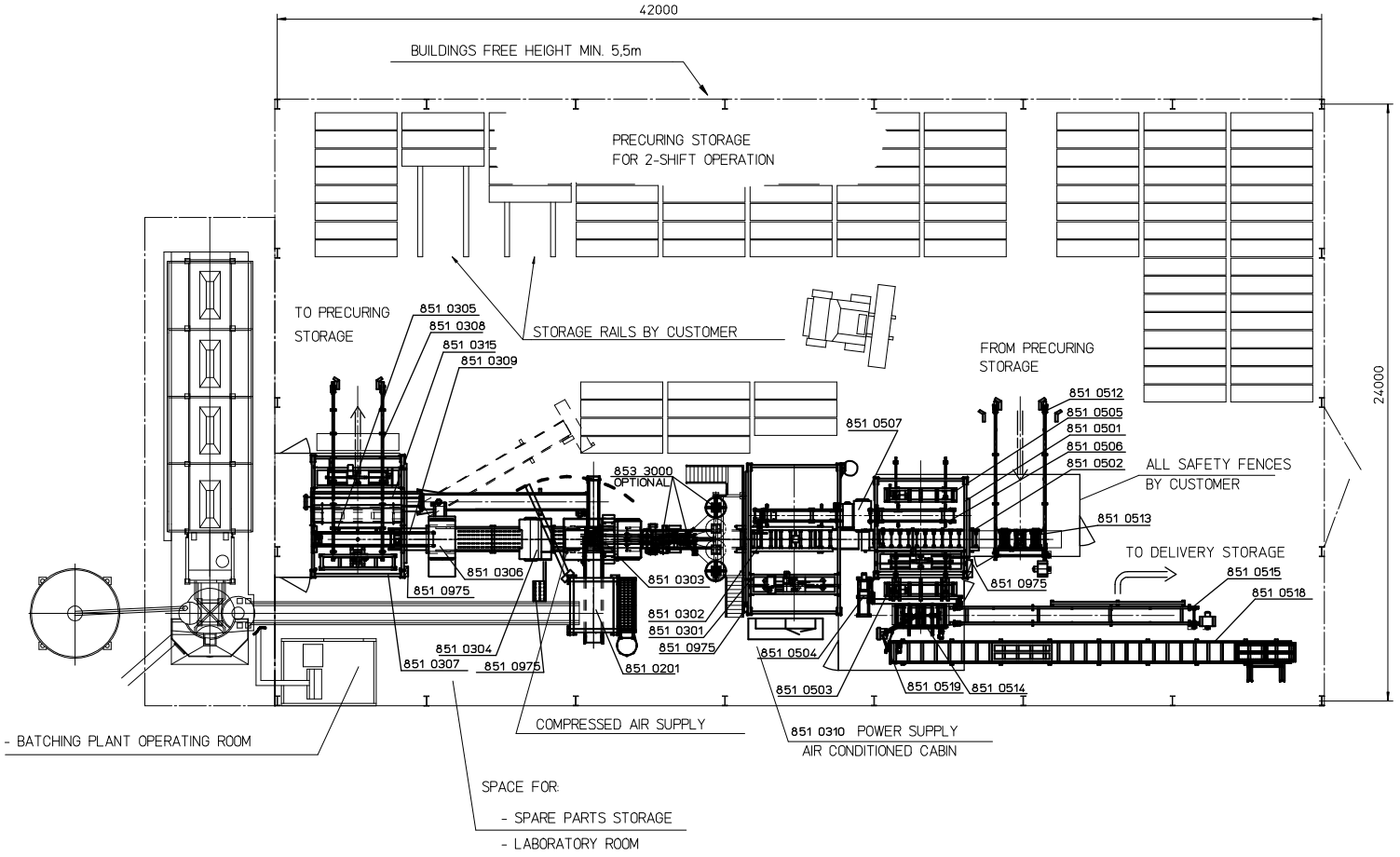




SITE LAY-OUT FOR DELIVERY STORAGE AREA AND FACTORY BUILDING DESINGNED FOR 2-SHIFT OPERATION.

LEAF 2/2 P67224

Scale 1:150	Dwg type		Total weight kg				
	Dwg size A1L		Material weight kg	Rev	Times	Change	Date Name
Measures mm	Surface texture Ra/ Vum	General tolerance ISO 2768-	Drawn VHA 0104.2004				
			Check. YLI 0104.2004	ELEMATIC OY AB FIN-37800 TOUALA FINLAND			Dwg No. P67223
			Appr.				LEAF 1/2
Belongs to		Part	pcs	Job No.	Description ELEMATIC-PRIMO PRODUCTION LINE		



ELEMATIC-PRIMO MACHINERY LIST

POS.	MACHINE	
	CONCRETE SUPPLY	
851 0201	Concrete buffer	
	PRODUCT FORMING	
851 0301	Plate feeder	
851 0302	Plate feeder conveyor	
851 0303	Extruder	
851 0304	Cutter	
851 0304	Pallet conveyor	
851 0306	Trimmer	
851 0307	Stacker	
851 0308	Stack conveyor	
851 0309	Belt conveyor	
851 0310	Electrification	
851 0975	Field devices and cabling	
851 0315	Tipper and recycling	
	RESTACKING STATION	
851 0501	Restacker	
851 0502	Roller conveyor	
851 0503	Grade A transfer plate	
851 0504	Turning device	
851 0505	Grade B transfer plate	
851 0506	Plate conveyor	
851 0507	Cleaning /Oiling	
851 0512	Stack conveyor	
851 0513	Crossing station	
851 0514	Receiving conveyor	
851 0515	Chain conveyor	
851 0518	Delivery pallet roller	OPTION
851 0519	Swing lifter	OPTION
853 3000	SAFERY WIRE EQUIPMENT	OPTION

NOTE ! All free standing safety fences by customer.

LEAF 1/2 P67223

Scale 1:100	Dwg type		Total weight kg				
	Dwg size A1L		Material weight kg	Rev	Times	Change	Date Name
Measures mm	Surface texture Ra/ µm	General tolerance ISO 2768-	Drawn VHA 0104.2004	ELEMATIC	ELEMATIC OY AB FIN-37800 TOUALA FINLAND		Dwg No. P67224
			Check. YLI 0104.2004				LEAF 2/2
			Appr.				
Belongs to		Part	pcs	Job No.	Description ELEMATIC-PRIMO PRODUCTION LINE		

MACHINERY ACCORDING TO LAY-OUT DRAWINGS NO P67223 and P67224

Line length	**ca 40 m**
Required building area	**ca 800 m^2**
Connection power	**50 kVA**
Capacity/shift	**150 000 m^2/year/300 workdays**
Nominal capacity	**80 m^2/h**
Workers/1 shift	**2 – 4**
Thicknesses	**68 mm, hollow 38 mm** **Up to 140 mm, hollow 90 mm**
Product width	**600 mm**
Product length	**2100 – 3300 mm**

Options in the quotation may include **See appendix 4.**

- additional base molds
- additional thicknesses
- wearing parts
- 300 mm width splitting set
- delivery pallet handling
- safety wire equipment
- concrete batching and mixing plant

In Appendix 5: "Buyer's supply", there is a list and specifications for items not included into this quotation.

The quotation does not include factory facilities and installation of the machinery.

PROCESS DESCRIPTION
ELEMATIC Wall PRODUCTION LINE ITEM 851 0000

CONCRETE MIXING

The needed concrete is batched and mixed at an automatic batching and mixing station, which has to be purchased separately. The relatively dry aggregates are automatically batched into the mixer. Then also cement and water are added into the mixture. Moisture content of the mixed concrete must be automatically controlled and adjusted. After mixing, the concrete batch is fed to the conveying system, which brings fresh concrete to the hopper of the **ELEMATIC Wall - line**.

EXTRUSION

The ELEMATIC-Wall elements are formed in a continuously operating extruder. The concrete is compacted onto thin base molds, which support the products during the precuring time. Base molds are automatically fed to the extruder as a continuous ribbon. The base mold length determines standard lengths of the products. There can simultaneously be maximum five plate lengths in the system. The extruder compacts the concrete with extrusion screws against the packing bar and side walls. Top surface of the product is vibrated by a vibrating plate.

CUTTING

After extruding the products are cut according to the base mold length. A circular saw cuts the fresh concrete on each base mold seam. Then the cut product together with the supporting plate is pulled to the stacker.

TRIMMING

When necessary, the fresh product is stopped at a specified point, where the manually adjusted circular saw cuts off the wanted trimming piece. Trimming length is max. 20 cm. The trimmed-off concrete is recycled back to the extruder.

STACKING

Cut, fresh products are stacked into precuring stacks. Depending on the product thickness and weight each stack contains 4 to 10 products and base molds. Stacks are supported by steel pallets, which are automatically fed underneath each stack.

PRECURING

The stacks must stay 15 to 24 hours in the precuring storage. The storage is an area where natural curing (temp. should be above +10^{o}C) occurs. Product stacks are moved into and out from the stock area by a forklift, crane or automatic conveyor lines.

RESTACKING

After precuring the products are strong enough to stand automatic handling. Products are separated from the base molds. Base molds are returned back to circulation trough a cleaning and oiling unit. The products are restacked to form delivery stacks with 4 – 10 products on top of each other. The stack is pushed against a wooden delivery pallet and turned on its side. Delivery stacks are strapped and preferably also wrapped before transportation to delivery storage. Stacks must stay in the delivery storage at least 14 days before transporting to a construction site.

CONCRETE FEEDING

851 0201 Concrete buffer

Concrete from the automatic batching and mixing plant (buyer's delivery) is brought into the buffer hopper for the extruder.

- Equipped with a hoist (lifting capacity 1000 kg) for lifting the extruder upper part.
- Hopper size 2.5 m^3, water volume.

EXTRUDING, CUTTING AND PLATE FEEDING

851 0301 Plate Feeder

- Feeds automatically the backing base molds to the extruder.
- Works as storage for clean base molds.
- 5 storage places max plate length 3300 mm. Max. 300 plates in each place.
- Equipped with automatic vacuum gripper for horizontal and vertical transfer of base molds.
- Automatic mold straightness detection.
- The plate feeder station is shielded with wire mesh fences.

851 0302 Plate feeder conveyor

- Conveys base molds from the plate feeder to the extruder.

851 0303 Extruder

- Stationary extruder for producing hollow core wall elements from 2000 to 3300 mm of length.
- Earth dry, zero slump concrete with maximum aggregate size of 8 mm is extruded onto base molds.
- At least one standard thickness set must be chosen. Additional thickness sets between 68 – 140 mm can separately be purchased.
- Product width 600 mm.
- Equipped with special tongue-and-groove side forming set.
- Automatic operation.
- Depending on product thickness, equipped with 5 – 8 extrusion screws of special material.
- Equipped with compression and leveling equipment.
- Low noise (< 85 dB), emission free extruder.
- Capacity ca 80 m^2/h.
- Screw drive units, 8 gear motors each, driven by 8 frequency converters.
- Extruder equipped with 3 vibrators.

851 0304 Cutter

- Formed of a moving circular saw installed onto a roller conveyor.
- The saw grips to the base mold coming out of the extruder and moves automatically along with the product while sawing.
- Cutting takes place from the seams of the base molds.
- Cutting length is selected from the control board and detected by limit switches.
- Cutting speed 10 m/min, diamond blade ∅ 450 mm.

851 0310 Electrification, basic line

PLC, motor control center
ELEMATIC Wall - line is automated by one Programmable Logic Controller (Omron PLC). System is divided into individual control areas enabling each area to be operated also manually for service purposes.

851 0975 Field devices and cabling
control boards

TRIMMER

851 0306 Trimmer

The trimmer cutter is installed after the first cutter. The trimmer enables adjusting the product length for special needs not meeting the existing base mold lengths. 1 – 20 cm can be trimmed off, and the concrete is moved back to the extruder. Trimming length is set manually.

TIPPING AND RECYCLING

851 0309 Belt conveyor
851 0315 Tipper and recycling

The tipper shifts non-acceptable product, e.g. when starting and finishing the production, off the line to the recycling system. The tipped off concrete is automatically transferred back to the extruder, and the base mold to plate feeder.

- Tipping pneumatically.
- Automatic operation, possibility for manual operation.
- Also possibility for transferring the rejected concrete totally off the process.

STACKING

851 0305 Pallet conveyor
851 0307 Stacker
851 0308 Stack conveyor

The stacking system stacks the extruded products and their backing plates into 4 – 10 piece stacks on steel pallets for transferring to precuring.

- The chain driven pallet conveyor is shielded with steel covers.
- Stacking capacity max. 500 kg/min.
- Automatic operation, possibility for manual operation.
- Electric drives for lifting and horizontal movements.
- Catching pneumatically.
- Base mold handling with a vacuum gripper.
- Equipped with stack height control
- Chain driven stack conveyor.

RESTACKING

851 0512 Stack conveyor
851 0513 Crossing station
851 0501 Restacker
851 0502 Roller conveyor
851 0503 Grade A transfer table
851 0504 Turning device
851 0505 Grade B transfer table

The precured stacks are brought (e.g. by a forklift) to the conveying system that transports the stacks to the restacker. At the restacking station the precured products are separated from the base molds. After visual quality control A-grade products are stacked into 4 – 10 pc delivery stacks. The stacks are turned to their edge for delivery. B-grade products can be removed.

- All operations automatic, possibility for manual operation.
- Restacker equipped with a dual operation catcher (product + base mold), and a vacuum gripper for base mold handling. Catching pneumatically.
- Restacker equipped with a transfer wagon vertical and horizontal movement by gear motor.
- Roller conveyor equipped with nylon brush for steel pallet cleaning.

CLEANING AND OILING

851 0506 Plate conveyor
851 0507 Cleaning and oiling

At the cleaning and oiling station the backing base molds are cleaned from concrete residues and oiled before transferring back to process.

- Chain conveyor followed by a cleaning /oiling equipment.
- Equipped with adjustable rolling steel brushes.
- Mould oil spraying and spreading equipment.
- Waste and drip oil collectors.
- Automatic operation.

DELIVERY

851 0514 Receiving conveyor
851 0515 Chain conveyor

The delivery stack is moved for further transferring to the long term outside storage. If needed delivery stack can easily be wrapped in plastic and tied on this conveyor system.

- Receiving conveyor equipped with a tilting shield

OTHER

851 0150 Emergency spare part set
851 0160 Base molds 1000 pc(s), length between 2400-3300 mm

Minimum need 400 pc(s)/shift/line. Most often our clients have 3 or 4 different length sets of plates. The production can be started with just one length. Element length is according to base mold length. With the trimmer cutter 1-20 cm of each element can be cut off.

We offer base molds for 1 line 1-shift production, specification enclosed

- 200 pc(s) 3.3 meter
- 300 pc(s) 3.0 meter
- 300 pc(s) 2.7 meter
- 200 pc(s) 2.4 meter

This is just a recommendation, the actual lengths and amounts must be determined by the Buyer in relation to the production

With this selection it is possible to produce any element length from 2100mm to 3300 mm

Above mentioned amount of base molds need four (4) additional 20' containers.

851 0800 Pallets 5 pc(s)
851 0900 Test building package

- Raw material and marketing consulting

DOCUMENTS

All documentation in English:

- Lay-out drawing
- Foundation drawing
- Drawings for base molds and steel pallets
- Process and product information
- Electrification and automation documents
- Operation and maintenance guides

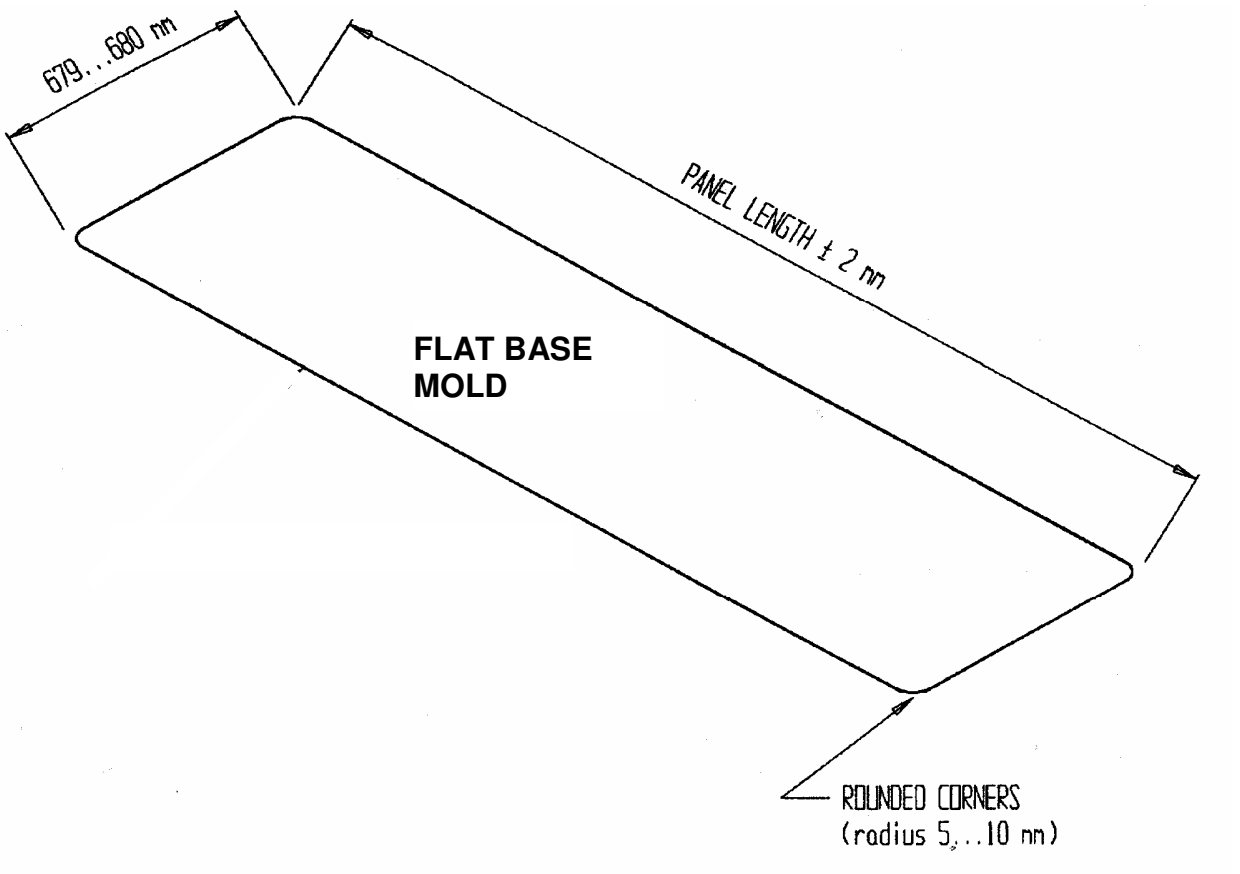
BASE MOLDS FOR ELEMATIC Wall PRODUCTION LINE

specification

- base mold supplied by ELEMATIC are RAEX MULTISTEEL (RAEX 37-52)
- base mold is 5 mm thick. Other dimensions are shown in the sketch below.
- the sharp sides and corners must be ground by the Buyer before putting them into the process

MECHANICAL PROPERTIES OF RAEX MULTISTEEL

Yield point (R_{eH} N/mm²)	Tensile strength (R_m N/mm²)	Elongation A_5 % transverse specimen
355	490-630	20



Base mold is considered flat if no part of it raises more than 2 mm when put on a flat surface

RAEX MULTISTEEL equivalent grades in standard EN 10 025	Fe 510 D1 Fe 510 DD1 Fe 510 D2 Fe 510 DD2
Other equivalent standard steels	DIN ST 52-3N BS 50D A 572 Grade 50 JIS G 410G SM53C

General requirements for the plates and their storing:

- The ends of the base molds must not be rounded in order to avoid their overlapping in the process. The corners then must be rounded.
- The storing places of the base molds must be level and smooth.
- Never lift molds or mold stacks so that they twist.

The molds must be leveled by a suitable machine after they are cut out of a big plate. This way planar quality and straightness will be checked already when purchasing.

SUPERVISION OF INSTALLATION AND TRAINING

This service package includes altogether eighteen (18) man-weeks containing:

Supervision of installation
Factory management training
Elematic wall installation training

Buyer arranges and pays transportation Finland – project site – Finland, accommodation and local transportation for **ELEMATIC** engineers during the installation and start-up, commissioning and training time. Accommodation means single rooms in a good hotel or equivalent including breakfast. Transportation to and from project site during installation is by car, which is given to the **ELEMATIC** engineers to use for the whole project time

Above service must be ordered and carried out within 18 months from signing of the contract.

Supervision of installation

Starts after **all** needed machinery has arrived to the factory site (both ELEMATIC delivery and Buyer's supply), and raw materials have been checked in Finland by ELEMATIC.
For keeping the machinery installation and start-up time as short as possible and the costs minimized, **ELEMATIC** engineers (Technical Advisor and Electrical Engineer) work as supervisors and the Buyer provides all installation labor.

Installation, start-up, electrification and commissioning takes 10 (ten) calendar weeks (6 working days/week) (Electrical Engineer for 4 weeks during above mentioned 10 weeks time)

Basic operation and management training takes place during machinery installation and start-up.

Installation arrangement

- A crane (10 t) and a forklift (3 t) must be available.
- The factory floor must be of concrete, at least 10 cm thick and leveled
- ±15 mm with loading capacity of 20 kN/m^2, for the Plate feeder (Pos. 3.01) area loading capacity of 75 kN/m^2 is required.
- Foundations for machines, concrete feeding and roofing must be ready before **ELEMATIC** personnel arrive.
- Machinery installation must be made possible during normal working hours (between 7.00 – 17.00).
- **ELEMATIC** personnel must have the right to use free of charge telephone and telefax at the project site for contacting **ELEMATIC**/Finland.
- Compressed air, water, and electric supplies must be available.
- Electricity, compressed air, raw materials for testing, mechanical/electrical labor for installation as well as all welding etc equipment must be available free of charge.
- At least one Buyer's installation supervisor/foreman must have technical education and speak English fluently.
- There must be locker rooms for changing clothes and washing up, lockable tool storage available at the project site.

- The project site must have temperature between +10°C and +35 ºC and have adequate lighting.

Factory management training

Factory management training including detailed overall operational training takes place only after the personnel have learned the basic operations. This Factory management training takes place earliest one month, latest four months after commissioning of the plant.

Services of the Technical Advisor is for 2 weeks, and can contain basics in e.g.

- Securing of raw material deliveries
  - right quality
  - cost control
  - changing raw material base
- Additional items available and functioning
  - batching plant
  - additional recipe designing
  - base molds (quality &quantity)
  - packing materials and delivery of elements
- Production planning
  - element dimensions to be produced
  - stock control
  - quality control
  - selection of production personnel
- Maintenance and spare parts
  - periodical maintenance
  - spare part and wearing part stock
- Production costs control and follow-up

Elematic wall installation training

Takes place before commissioning of the plant. Wall installation training is carried our by a Technical Advisor, who is a construction specialist. This training is to teach the customer to use proper methods and materials when installing ELEMATIC walls.

Services of the Technical Advisor is for 2 weeks, and gives basic knowledge to:

- Installation tools, installation materials and accessories
  - Find out proper tools for installation
  - Teaching how to use installation tools
  - Select right materials and accessories from the local market
- Preparation of installation and installing in practice
  - ELEMATIC-Primo wall installation in detail
  - Different kinds of joints (top, bottom, vertical, corner, expansion joint, etc.)
  - Cutting the element at building site
  - Installation of door and window top pieces
  - Electric wire and water pipe installation

- Element handling at the building site
  - Teach correct methods
  - Handling tools
- Fixing into ELEMATIC-Primo wall
  - Various fixing accessories
- Finishing an ELEMATIC -Primo wall
  - Teach the different wall finishing possibilities
- Cost control in ELEMATIC-Primo wall installation

OPTIONS

MACHINES AND EQUIPMENT

851 0xxx Primo THICKNESS SET

Any standard thickness set between 68 - 140 mm, when purchased together with the main delivery costs.:

ITEM	ACO-PANEL PRIMO
851 0068	h = 68 mm
851 0075	h = 75 mm
851 0092	h = 92 mm
851 0100	h = 100 mm
851 0120	h = 120 mm
851 0140	h = 140 mm

851 3000 298 mm WIDTH SPLITTING THICKNESS SET FOR Primo production

When purchased together with the main 600 mm machinery.

851 3xxx Primo SPLITTING THICKNESS SET

Any splitting thickness set between 68 - 140 mm, when purchased together with the main delivery costs:

ITEM	ACO-PANEL PRIMO
851 3068	2 x 298 mm h = 68 mm
851 3075	2 x 298 mm h = 75 mm
851 3092	2 x 298 mm h = 92 mm
851 3100	2 x 298 mm h = 100 mm
851 3120	2 x 298 mm h = 120 mm
851 3140	2 x 298 mm h = 140 mm

DELIVERY PALLET HANDLING

Works as a buffer for wooden delivery pallets and feeds them automatically to the turning device.

ITEM	
851 0518	Delivery pallet roller conveyor
851 0519	Swing lifter

853 3000 SAFETY WIRE EQUIPMENT

For feeding the safety wire (max. 4 wires) into Primo-panels during extrusion.

ITEM	
853 3010	Uncoiling and guiding of safety wire
853 3015	Wire butt-welding machine
853 3020	Safety wire feeding equipment
853 3030	Cutter modification for safety wire feeding

BATCHING AND MIXING PLANT

According to enclosed technical specification, an automatic batching and mixing plant for production of concrete, type Marcantonini Mixobeton M/4-0.75- Compumat with one Pan mixer type MAV 0.75, is quoted optionally as follows. **See appendix 4.1**.

In Appendix 5, “Buyer’s supply”, there is a specification for B&M plant for ELEMATIC wall production line, if customer decides to get his B&M plant by himself.

BUYER´S SUPPLY

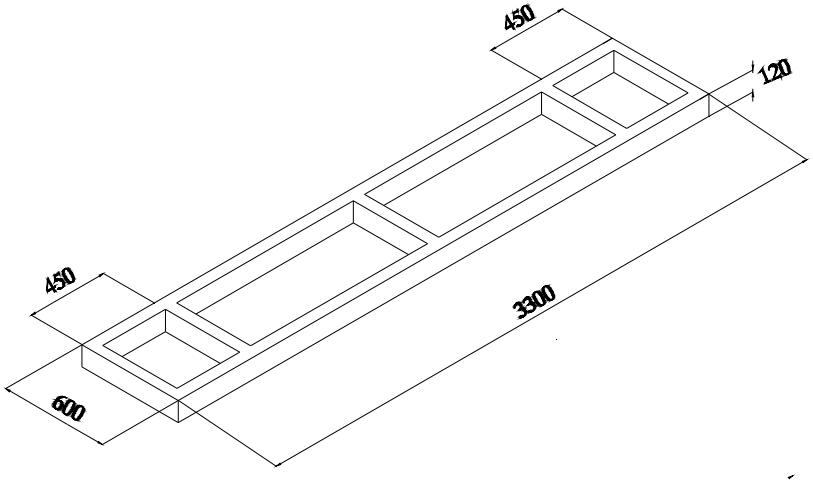
All machines, equipment and materials according to this Buyer's supply must be purchased and ready BEFORE the Elematic-machinery installation starts.

ADDITIONAL EQUIPMENT, MACHINERY, FACILITIES

- STEEL PALLETS
- WOODEN PALLETS
- FACTORY UTILITIES
- INSTALLATION TOOLS
- RAW MATERIALS
- FORKLIFT TRUCKS
- FRONT-END LOADER
- CONCRETE BATCHING AND MIXING PLANT

STEEL PALLETS FOR ELEMATIC Primo PRODUCTION LINE

Dimensions	width	600 mm
	length	3300 mm
	height	120 mm
Material	for instance rectangular tube 120 x 60 x 5, Fe 52 D or I-beam 120 x 58, mild steel	
Needed pallet amount	50 pallets/shift/line	
Straightness	The pallets must be straight and level	
Tolerances	Level ± 1 mm	

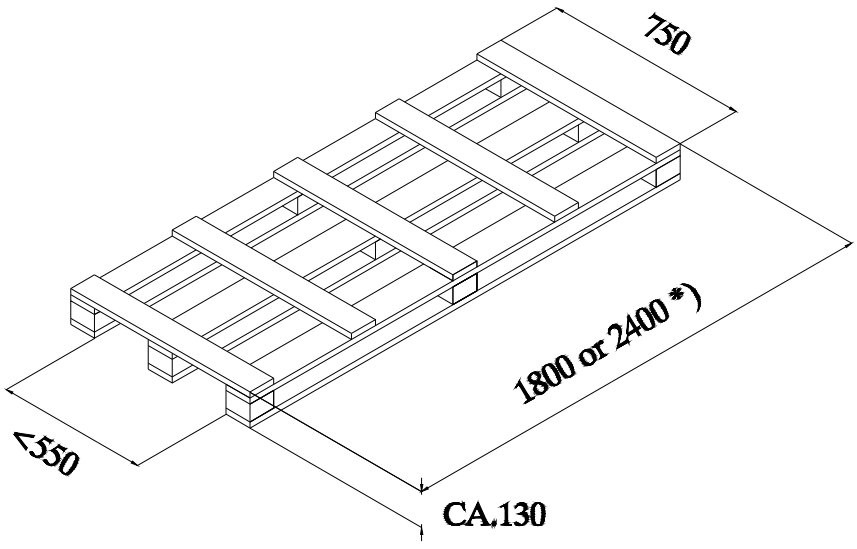


WOODEN PALLETS

Amount depends on two things.

- Are the pallets circulated?
- How many elements are piled on each wooden pallet?

Some of our clients have 5 some even 12 elements on each pallet – amount depending on weight of the elements, transportation means, loading capacity of trucks, lifts at construction site etc.



*) 1800 mm for ELEMATIC-Elements L < 2800 mm
2400 mm for ELEMATIC-Elements L > 2800 mm

FACTORY UTILITIES REQUIREMENTS

- The total power supply for one ELEMATIC line is 50 kVA , to one supply point
- Compressed air, 6 bar (0.3 m^3/min free air) to one supply point for each line.
- Concrete production needs also process water (Not salty) to the concrete batching and mixing plant about 1.5 m^3/hour /line
- Factory building must at all times have temperature between +10 ºC and +35 ºC
- Separate air conditioned cabin for MCC (electric cabins)
- Total land area need for one line in two-shift operation is 4800 m^2 (For two lines in two shifts 8500 m^2).
- Paved site area.
- Covered area should be at least 900 m^2 for one line in two shifts
- Factory building must have flat floor
- Free inside height should be at least 5,5 m.
- The power supply for batching plant is informed by manufacturer of batching plant (Marcantonini 100 kVA)

INSTALLATION TOOLS

For ELEMATIC machinery

- welding set with 20 m cables
- gas cutter set
- grinding machine with 8 inches blade
- Hilti concrete drill
- surveyor´s level
- water level
- 2 electric drills for boring up to Ø13 mm holes in steel
- 2 ring spanner sets 6-24 mm
- socket spanner set 6-24 mm
- steel saw
- hammers
- crow bars
- 4 measuring tapes 5 m
- measuring tape 30 m
- screw driwers 4 different sizes
- hand tools for electrical installation
- marker pens
- pencils
- chalk line

RAW MATERIALS

Generally, in ELEMATIC-Primo production, the same raw materials can be used as in normal concrete production. Only particle size must be smaller than 8 mm. All aggregates and cement materials must be kept unfrozen.

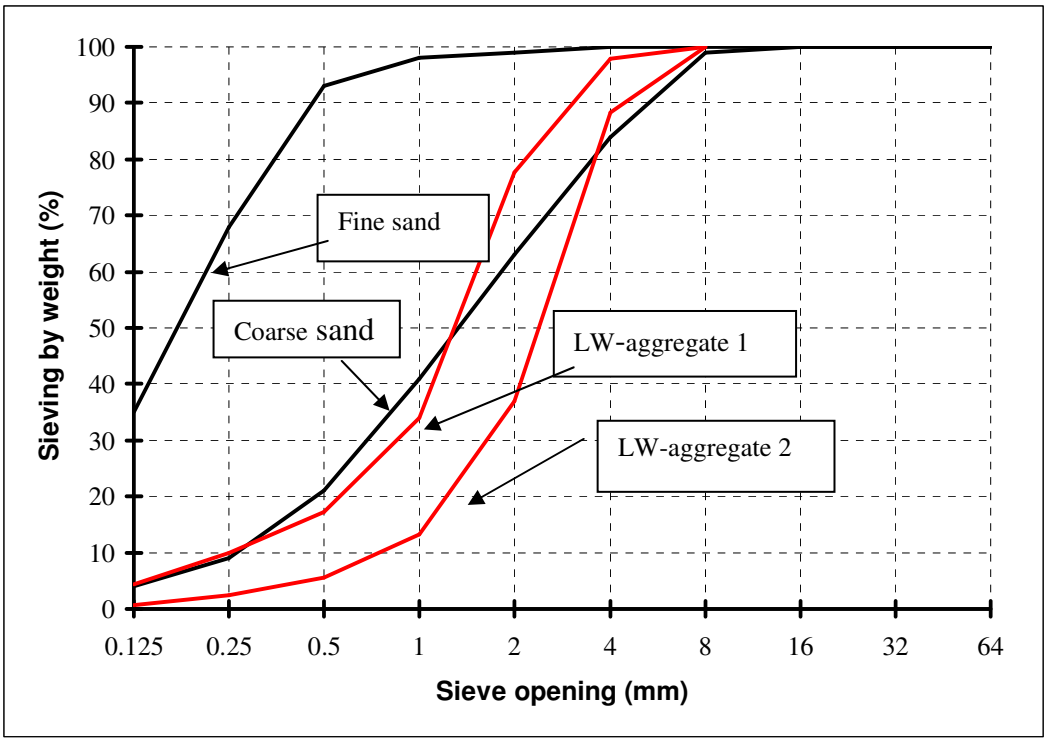
Cement

Normal Portland cement 40 MPa / 28 d

Aggregates

Fine sand
Coarse sand
Lightweight aggregate 1
Lightweight aggregate 2

Particle size distribution



Sand

No organic materials
No silt or clay
Water suction < 2,5 % (weight)
Chlorides < 0,1 % (fine sand)
Chlorides < 0,05 % (coarse sand)
Sulphate < 0,4 %
Alkali reactivity should be checked ASTM C 227

Lightweight aggregate

Lightweight expanded clay (LECA)

Water

Potable water is best, but process water is ok!
No salt water
No swamp water
No drain or waste water
No sugar, oil or fat

Generally water is NOT good when

- pH < 4...5
- Sulphate > 0,5%
- Chlorides > 0,6%
- Salts of magnesium >0,7 %
- Metallic salts together > 3,5%
- Potassium permanganate usage >100...150 mg/l

RECIPES

Sample recipes – Only for evaluations!

	kg	kg	kg	kg
Cement	250	330	360	350
Sand	325	1078	689	725
Fine sand	250	470		
LW aggregate	112		133	265
Fine LW aggregate	250		308	70
Water	75	100	194	80
Density (kg/m^3)	1250	2000	1500	1500

Final recipe shall be defined during start-up and test running.

FORKLIFT TRUCKS

- At least 3 pcs are needed.
- Lifting capacity 3 t each.

FRONT-END LOADER

- For batching plant operations

BATCHING AND MIXING PLANT SPECIFICATION for ELEMATIC Wall production line

GENERAL DESCRIPTION

The batching plant must be designed for continuous 1 or 2-shift operation. The plant will supply lightweight concrete to a continuously working production line (extruder) or lines.

Needed concrete is relatively dry (earth dry, zero-slump content)

Capacity shall be continuously minimum 10 m^3 per hour per line.

It is extremely important that the concrete's viscosity (water / cement ratio) is very exact and reproducible. This means practically that the batching plant must be equipped with automatic moisture sensoring and batching.

STANDARD MIXTURE

For batching plant dimensioning following mixture is applicable:

- cement	300 kg / m^3
(- substitute	100 kg = e.g. fly ash) if used
- aggregate 1	300 kg
- aggregate 2	150 kg
- lightweight aggregate	600 kg
- water	100 kg

PLANT BUILD-UP

The batching plant must include following main items:

Given sizes are minimum requirements and the vendor may quote larger sizes if advantageous. Storage:

Cement silo	min. 80 tons
Substitute silo, if used	min. 80 tons

Silos must be pneumatically loadable and include all aeration and filter systems.
In case the silos would be local supply all workshop drawings and feeders from silo to weighing system must be included.

Four (4) aggregate bins as follows:

- Aggregate 1 bin	min. 10 m^3
- Aggregate 2 bin	min. 10 m^3
- Light weight aggregate 1	min. 15 m^3
- Light weight aggregate 2	min. 15 m^3

Bins will be loaded by truck or front-end loader. Bins must include cover to protect the material from rain.

Weighing system

The weighing system shall be made according to manufacturer's standards, but it must fulfill the following specifications. Vendor may use belt scales and/or weighing hoppers.

Water must be weighed with a separate system and it is NOT allowed to use the same hopper with solid materials.

The final water content in the mixture must be automatically controlled and adjusted.

	Recommended Capacity	Required Accuracy
Cement	500 kg	+/- 2%
(Substitute	300 kg	+/- 2%) if used
Aggregates	800 kg	+/- 2%
Lightweight aggr.	800 kg	+/- 2%
Water	200 kg	+/- 1%

Conveyors

Conveyors must be made according to manufacturer's standards and the dimensioning must be suitable for the required capacities.

Mixer

Mixer must be pan-type with agitators (activators).
Mixer charging size (dry fill capacity) must be 1 to 1.5 m^3.
Required ready-mix capacity continuously is 10 m^3/hour per production line.

Belt or bucket conveyor (in case of more than one line a distributing system is required):

After the mixer there must be a conveying system feeding a buffer hopper, which is dimensioned for two batches. The length of the conveyor must be determined according to the final layout, but it is normally approx. 18 m.

The height of the hopper supply point is approx. 5 m.