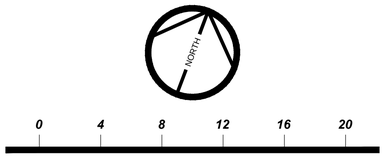
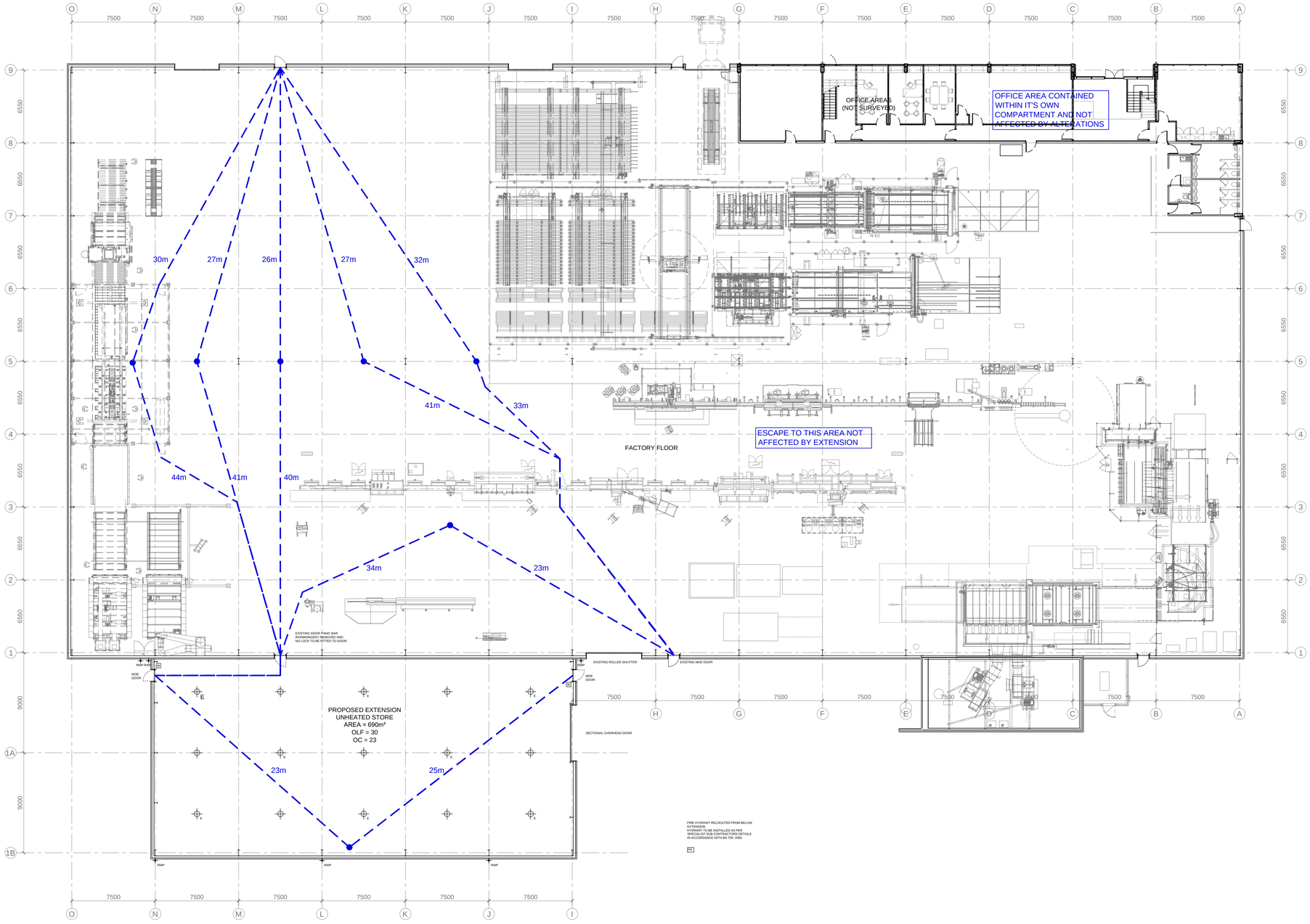


SCALE 1:200 (A1) LENGTHS SHOWN IN METRES

All dimensions and levels to be checked on site prior to the commencement of work. Architect to be informed of any discrepancies prior to the commencement of work. Unspecified dimensions are not to be scaled off this drawing. All dimensions are in millimetres unless stated otherwise. If any dimensions or details conflict please notify the Architect immediately. This drawing is to be used for **STATUTORY** purposes only. This is not a **CONSTRUCTION** drawing.



GROUND FLOOR PLAN

NOTES

GENERAL

ALL NEW WORKS TO BE CARRIED OUT IN ACCORDANCE WITH BUILDING (SCOTLAND) REGULATIONS 2019 AND ALL CURRENT AMENDMENTS.

ALL NEW WORKS, PRODUCTS AND PROCESSES ARE TO BE IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS AND MANUFACTURERS' GUIDANCE.

EXTENSION TO BE UNHEATED NON-DOMESTIC BUILDING

FOR THE PURPOSES OF SATISFYING THE SCOTTISH TECHNICAL STANDARDS STORAGE AREA TO HAVE A TRAVEL DISTANCE OF 18M IN ONE DIRECTION AND 45M IN MORE THAN ONE DIRECTION.

REGULATION 1.2.2
RISK GROUP 3 (FACTORY CLASS 1)

REGULATION 2.1.1
MAXIMUM AREA OF COMPARTMENT 33,000m².

FOUNDATIONS
FOUNDATIONS AND SUB-STRUCTURE IS TO BE CONSTRUCTED IN ACCORDANCE WITH STRUCTURAL ENGINEER'S DETAILS AND SPECIFICATION.

STEEL FRAME
STEEL FRAME IS TO BE CONSTRUCTED IN ACCORDANCE WITH STRUCTURAL ENGINEER'S DETAILS AND SPECIFICATION.

FLOOR
INSITU REINFORCED CONCRETE FLOOR SLAB TO STRUCTURAL ENGINEERS SPECIFICATION WITH VISQUEEN HIGH PERFORMANCE DAMP PROOF MEMBRANE (OR E&A) ON SAND BINDING ON HARDCORE TO S.E. SPECIFICATION

FLOOR SURFACES
FLOOR SURFACES TO CORRIDORS AND CIRCULATION AREAS TO BE UNIFORM, PERMIT EASE IN MANOEUVRING AND BE OF A MATERIAL AND FINISH THAT, WHEN CLEAN AND DRY, PROVIDES A LEVEL OF TRACTION THAT WILL MINIMISE THE POSSIBILITY OF SLIPPING.

EXTERNAL WALL CONSTRUCTION
71mm THK. (40mm CORE) KINGSPAN KS1000 RW TRAPEZOIDAL COMPOSITE CLADDING PANEL (OR E&A) FIXED TO STEEL CLADDING RAILS ON STRUCTURAL STEELWORK. PANELS & ASSOCIATED FLASHINGS TO BE FITTED TO MANUFACTURERS RECOMMENDATIONS.

PANEL COLOUR TO MATCH EXISTING CLADDING

EXTERNAL AND INTERNAL FACES OF PANEL TO BE CLASS 0 IN ACCORDANCE WITH BUILDING REGULATIONS WHEN TESTED TO BS 476:PART 6:2009 AND PART 7:1997

A SANDWICH PANEL USED FOR INTERNAL WALLS OR LININGS IN A NON-RESIDENTIAL BUILDING TO BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE 'DESIGN, CONSTRUCTION, SPECIFICATION AND FIRE MANAGEMENT OF INSULATED ENVELOPES FOR TEMPERATURE CONTROLLED ENVIRONMENTS', INTERNATIONAL ASSOCIATION OF COLD STORAGE CONTRACTORS (EUROPEAN DIVISION), 2008.

ROOF CONSTRUCTION
71mm THK. (40mm CORE) KINGSPAN KS1000 RW TRAPEZOIDAL COMPOSITE CLADDING PANEL (OR E&A) FIXED TO STEEL PURLIN ON STRUCTURAL STEELWORK. PANELS & ASSOCIATED FLASHINGS TO BE FITTED TO MANUFACTURERS RECOMMENDATIONS

DOORS
STEEL DOORSET COLOUR TO MATCH ADJACENT CLADDING PANELTO PROVIDE MINIMUM CLEAR WIDTH OF1050mm

AS BUILDING IS NOT OPEN TO PUBLIC ALL EXIT DOORS ARE FITTED WITH EMERGENCY EXIT DEVICE (LEVER HANDLE/PUSH BAR/PAD) TO BS EN: 179:2008 INTERNALLY. (I.E. NO LOCKS ON SIDE OF DOOR APPROACHED BY OCCUPANTS MAKING AN ESCAPE)

MOE NOTES
AS BUILDING IS NOT OPEN TO PUBLIC ALL EXIT DOORS ARE FITTED WITH EMERGENCY EXIT DEVICE (LEVER HANDLE/PUSH BAR/PAD) TO BS EN: 179:2008
EXTERNAL GROUND LEVELS TO BE GRADED TO FINISH LEVEL WITH INTERNAL FINISHED FLOOR LEVEL. IE. NO STEPS. MINIMUM
FINAL EXITS TO BE PROVIDED WITH A LEVEL PLATT EXCEPT FOR ANY NOMINAL SLOPE FOR DRAINAGE HAVING AN AREA OF AT LEAST 1.2m x 1.2m, AND A THRESHOLD THAT DOES NOT FORM A TRIP HAZARD AND WILL PERMIT UNASSISTED EGRESS TO OCCUPANTS IN A WHEELCHAIR

SECTIONAL OVERHEAD SHUTTER
4.5m HIGH GALVANISED STEEL SECTIONAL OVERHEAD SHUTTER INSTALLED TO MANUFACTURERS SPECIFICATION. SUPPORT STEEL TO S.E. SPECIFICATION
COLOUR TO MATCH ADJACENT WALL CLADDING PANELS
EMERGENCY MANUAL OVER-RIDE TO BE PROVIDED IN CASE OF POWER FAILURE

VENTILATION
NATURAL VENTILATION PROVIDED BY WAY OF SECTIONAL OVER HEAD SHUTTER.
CLEAR AREA PROVIDED = 24.75m²
1/30th FLOOR AREA = 690m² ÷ 30 = 23m²

TRICKLE VENTILATION WITH AN OPENING AREA OF 400mm² FOR EACH SQUARE METRE OF ROOM AREA TO BE PROVIDED

SURFACE WATER DRAINAGE
SURFACE WATER DRAINAGE SYSTEM TO BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS IN BS EN 12056- 3:2000,
FOR BELOW GROUND DRAINAGE PLEASE REFER TO STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS

ELECTRICAL INFORMATION
ALL ELECTRICAL WORK WILL BE CARRIED OUT BY A COMPETENT ELECTRICAL CONTRACTOR. THE INSTALLATION i.e. THE DESIGN CONSTRUCTION, INSPECTION AND TESTING WILL BE COMPLETED IN STRICT ACCORDANCE WITH BS.7671:2008 INCORPORATING ANY AMENDMENTS (EE WIRING REGULATIONS 17TH EDITION) AND IN COMPLIANCE WITH OTHER BUILDING REGULATIONS, IN PARTICULAR, WILL NOT COMPROMISE FIRE STOPPING, STRUCTURAL INTEGRITY, SOUND INSULATION, THERMAL INSULATION AND OTHER RELATED MATTERS. THE CONTRACTOR WILL PROVIDE THE RELEVANT CERTIFICATION AT THE COMPLETION OF HIS PART OF THE WORK.

OUTLETS AND CONTROLS OF ELECTRICAL FIXTURES AND SYSTEMS SHOULD BE POSITIONED AT LEAST 350MM FROM ANY INTERNAL CORNER, PROJECTING WALL OR SIMILAR OBSTRUCTION AND, UNLESS THE NEED FOR A HIGHER LOCATION CAN BE DEMONSTRATED, NOT MORE THAN 1.2M ABOVE FLOOR LEVEL. THIS WOULD INCLUDE FIXTURES SUCH AS SOCKETS, SWITCHES, FIRE ALARM CALL POINTS AND TIMER CONTROLS OR PROGRAMMERS. WITHIN THIS HEIGHT RANGE:

• LIGHT SWITCHES SHOULD BE POSITIONED AT A HEIGHT OF BETWEEN 930MM AND 1.1M ABOVE FLOOR LEVEL
• STANDARD SWITCHED OR UNSWITCHED SOCKET OUTLETS AND OUTLETS FOR OTHER SERVICES SUCH AS TELEPHONE OR TELEVISION SHOULD BE POSITIONED AT LEAST 400MM ABOVE FLOOR LEVEL. ABOVE AN OBSTRUCTION, SUCH AS A WORKTOP. FIXTURES SHOULD BE AT LEAST 150MM ABOVE THE PROJECTING SURFACE
• WHERE SOCKETS ARE CONCEALED, SUCH AS TO THE REAR OF BUILT-IN APPLIANCES, OR OBSTRUCTED BY BUILT-IN FURNITURE, SEPARATE SWITCHING SHOULD BE PROVIDED IN AN ACCESSIBLE POSITION, TO ALLOW APPLIANCES TO BE ISOLATED.

LIGHTING TO BE DESIGNED AND CONSTRUCTED IN SUCH A WAY THAT THE
ARTIFICIAL OR DISPLAY LIGHTING INSTALLED IS ENERGY EFFICIENT AND IS CAPABLE OF BEING CONTROLLED TO ACHIEVE OPTIMUM ENERGY EFFICIENCY LIGHTING TO BE INSTALLED IN LINE WITH THE GUIDANCE ON THE EFFICIENCY OF FIXED INTERNAL AND EXTERNAL LIGHTING GIVEN IN THE NON-DOMESTIC BUILDING SERVICES COMPLIANCE GUIDE FOR SCOTLAND .

LIGHTING
LIGHTING TO MEET THE RECOMMENDED MINIMUM STANDARDS FOR:

A. EFFICACY (AVERAGED OVER THE WHOLE AREA OF THE APPLICABLE TYPE OF SPACE IN THE BUILDING) AND CONTROLS IN TABLE 42 THE NON-DOMESTIC BUILDING SERVICES COMPLIANCE GUIDE FOR SCOTLAND
OR
B. THE LENI IN TABLE 44 OF THE NON-DOMESTIC BUILDING SERVICES COMPLIANCE GUIDE FOR SCOTLAND . THE LENI SHOULD BE CALCULATED USING THE PROCEDURE DESCRIBED IN SECTION 12.5 OF THE NON-DOMESTIC BUILDING SERVICES COMPLIANCE GUIDE FOR SCOTLAND

THE LIGHTING SHOULD BE METERED TO RECORD ITS ENERGY CONSUMPTION IN ACCORDANCE WITH THE MINIMUM STANDARDS IN TABLE 43 OF THE NONDOMESTIC BUILDING SERVICES COMPLIANCE GUIDE FOR SCOTLAND .

LIGHTING CONTROLS IN NEW AND EXISTING BUILDINGS SHOULD FOLLOW THE GUIDANCE IN BRE DIGEST 498 – 'SELECTING LIGHTING CONTROLS'. DISPLAY LIGHTING, WHERE PROVIDED, SHOULD BE CONTROLLED ON DEDICATED CIRCUITS THAT CAN BE SWITCHED OFF AT TIMES WHEN PEOPLE WILL NOT BE INSPECTING EXHIBITS OR MERCHANDISE, OR BEING ENTERTAINED.

EMERGENCY LIGHTING
EMERGENCY LIGHTING TO BS 5266 PART 1: 2016, REGULATORY REFORM (FIRE SAFETY) ORDER (PRO) 2005, BS EN 1838:2013 AND SBSA TECHNICAL HANDBOOK (NON-DOMESTIC) 2019.

FIRE DETECTION AND ALARM
CATEGORY M FIRE ALARM SYSTEM TO BE INSTALLED TO EXTENSION AS A MINIMUM IN LINE WITH CLAUSE 2.11.11 OF THE TECHNICAL HANDBOOK: NON-DOMESTIC
MANUAL CALL POINTS AS SPECIFIED IN BS EN 54: PART 11: 2001 (TYPE A) SHOULD BE INSTALLED AND SITED IN ACCORDANCE WITH BS 5839: PART 1: 2002.

CLIENT TO CONFIRM IF ANY ENHANCEMENT TO FIRE ALARM SYSTEM IS REQUIRED TO SATISFY THIER SPECIFIC NEEDS AND TIE IN WITH EXISTING SYSTEM.

Revisions :
A RC 16.09.2020
UPATED IN LINE WITH BUILDING CONTROL REQUIREMENTS.

Project: Proposed Extension	JON FRULLANI ARCHITECT
Client: Ravensby Glass	
Address: 8 Tom Johnston Road, West Pitkerro Industrial Estate, Dundee. DD4 8XD	Drawing Title: Proposed Floor Plan
	Issue Status: Building Warrant
	Drawing No.: 6319_BW_406
Designer: RC	Date: Aug 2020
	Scale: 1:200@A1
	Revision: B

WORK IN PROGRESS

t: 01382 224828 m: 07808 726306
e: info@jfarchitect.co.uk w: jfarchitect.co.uk f: facebook.com/jfarchitect
a: unit 5, district 10, greenmarket, dundee, dd1 4qb

PUJOL-100 SYSTEM QUOTE

"COMPLETE LINE FOR PRODUCTION OF LAMINATED GLASS WITH PVB & EVA WITH A PUJOL-100 SYSTEM OVEN"

RAVENSBY GLASS CO LTD	
To the attention of:	**Mr. Nicholas G Cunningham**
UK	
Email : ngc@moco1847.co.uk	**Telephone:**

Quotation Number:	**O6524 + O6525**
Your Ref.	**Date: 18/02/2015**
Our Ref.	**Our Letter:**
Section:	

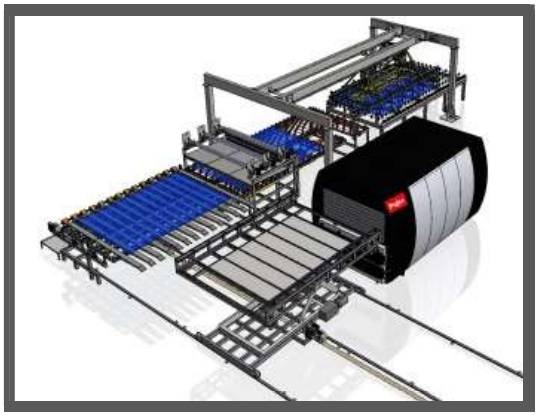
Dear Sirs,

Hornos Pujol S.A is nowadays present in more than 54 countries. After more than a century we have complied with the aim of providing a total service: furnaces, consumables, training and technical assistance.

In response to your request we are pleased to send you the following document for your consideration.

Pujol 100 Explanation Video

To watch the video just click the image of Pujol 100 or enter the link into your browser



http://youtu.be/pOo3isVr_aM

TABLE OF CONTENTS

1. - OVEN TYPE

1.1 General Technical Data

Batch type of	Close vacuum chamber
Heating media	Electrical
Models	2-C (Chambres) 4-C (Chambres).
Moving platforms / cars	Over metallic heat bearings
Working Temperature	PVB Process: 130 ÷ 145 ºC EVALAM Process: 80÷135 ºC
Maximum Temperature	150 ºC
Total Power Installed x Model	52 Kw. 40x24 /2C 63 Kw. 40x28 /2C 72 Kw. 50x28 /2C 105 Kw. 40x24 /4C 118 Kw. 40x28 /4C 130 Kw. 50x28 /4C
Electrical Tension	380-410 v. III + N.- + E.-
Type of Heating Source	Black radiation plates of Low Radiation wave
Number of Heating Plates	180 Elements /2C 360 Elements /4C
Type of atmosphere required	Double Vacuum Process.

1.2 Production Rates Performance

PRODUCTIVITY STUDY RAPPORT 2C

Production Rate

Glass size	M Large	M Width	mm Thickness	M2 Surface	Model
	4,6	2,6	4	11,96	**50x28**
	3,6	2,5	4	9	**40x28**

Random Occupancy: 100%

Total loadding thick: 40 mm

Production rate: 4 Cycles/24 hours Cycle time: 5 Hours

Production x Batch:

50 x 28 **2C** 119,6 M2 / Batch 2,4 Tn. /Batch

40 x 28 **2C** 90 M2 / Batch 1,8 Tn. /Batch

Production per day:

50 x 28 **2C** 478,4 M2 / Day 9,6 Tn. / Day

40 x 28 **2C** 360 M2 / Day 7,2 Tn. / Day

PRODUCTIVITY STUDY RAPPORT 4C

Production Rate

Glass size	M Large	M Width	mm Thickness	M2 Surface	Model
	4,6	2,6	4	11,96	**50x28**
	3,6	2,5	4	9	**40x28**

Random Occupancy: 100%

Total loadding thick: 40 mm

Production rate: 4 Cycles/24 hours Cycle time: 5 Hours

Production x Batch:

50 x 28 **2C** 239,2 M2 / Batch 4,8 Tn. /Batch

40 x 28 **2C** 180 M2 / Batch 3,6 Tn. /Batch

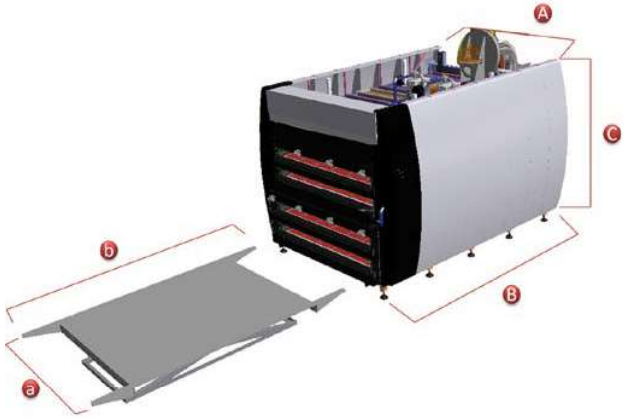
Production per day:

50 x 28 **2C** 956,8 M2 / Day 19,1 Tn. / Day

40 x 28 **2C** 720 M2 / Day 14,4 Tn. / Day

***** Production rates are considering 100% of occupancy and are related to float glass. Other calculation available on request.-**

1.3 General dimensions of the installation



	Medidas exteriores/exterior size						
	ancho/width	largo/lenght	alto/high	Bandeja/tray			
MODELO / MODEL	A	B	C	a	b	Vidrio/ glass	kw
40x24-2C	3450	5800	3750	4000	2400	3.6x2.1	58
40x24-4C	3450	5800	3300	4000	2400	3.6x2.1	107
40x28-2C	3850	5800	3750	4000	2800	3.6x2.5	68
40x28-4C	3850	5800	3300	4000	2800	3.6x2.5	127
50x28-2C	3850	6800	3750	5000	2800	4.5x2.5	72
50x28-4C	3850	6800	3300	5000	2800	4.5x2.5	134

2. SYSTEM DESCRIPTION AND PERFORMANCES

The **PUJOL-100 SYSTEM** has been developed & designed to perform customer to work basically PVB films without need to install and keep on running additional costs of a climate control room, calandre installations or accessories climate BOX of humidity and temperature control.

Thanks to our double vacuum and High Uniformity temperature distribution System, we are the only Process in the market which can warranty a 100% of traceability and repeatability of each working process in Autoclave free systems and as additional performance without need of climate the PVB films during stockage or during processing.

2.1 Highlights of the System

1 **No need** of climate control of humidity & temperature in stockage &/or processing.

2 **No pre-pressing unit required** (so no calandre and no pre-heating infrared tunnel required).

3 **No need** or requirement of BIG Compressor.

4 **No hazardous** ambient or risk of explosion like exist in Autoclave.

5 **Reduction costs** for energy efficiency UP TO 70% compared with Autoclave system of Total cost per unit produced.

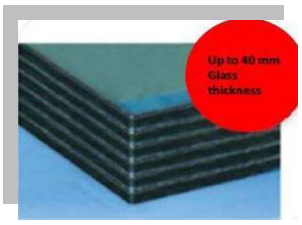
No additional Energy cost for:

- Compressor.
- Pre-Pressing Lines (Heating tunnel & Calandre)
- Cost of Climate Chambre & Assembly Room.
- Cost of Heating High Volume and Inertia space of Autoclave.

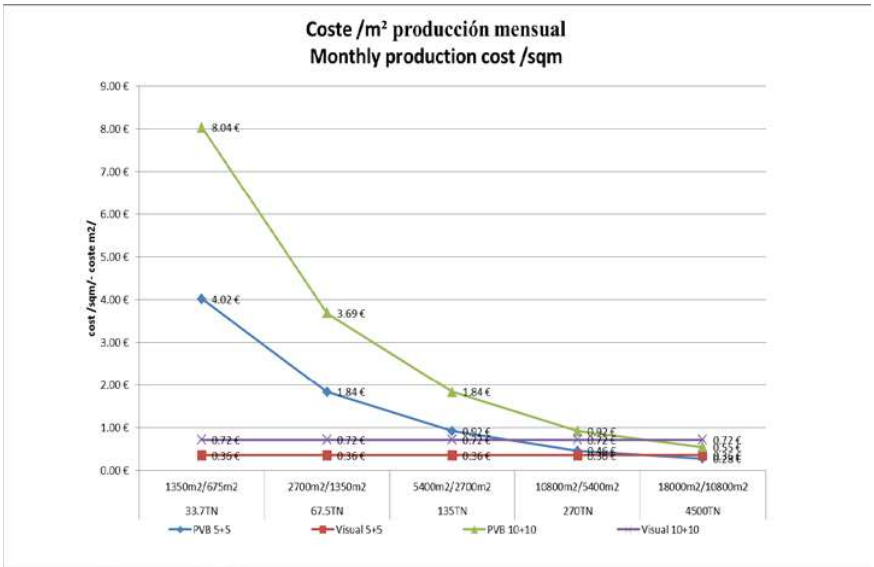
6 **Up to 40 mm. Glass thickness** processing in 1 piece or Multi-pieces independent compositions, depending on glass size.

7 **High temperature uniformity process** by using 96 Heating Plates radiating over up & down Surface of glass.

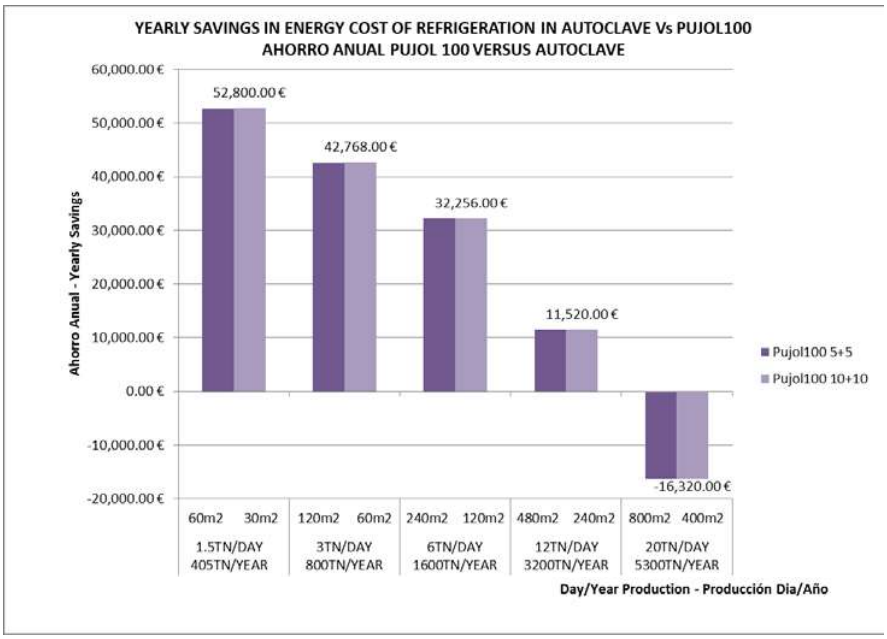
8 **Parking station & double platforms unit** allows optimize the process cycle times, during half are processing in oven, other half are unloading and loading for next batch, reducing to 10 minutes process of introduction & extraction and re-start LAM process in the oven.



3. - HIGH LEVEL PERFORMANCE OF PUJOL100 MODEL



It doesn't matter the production level, the new PUJOL 100 always keep the same energy consumption cost vs. Autoclave Systems.



High performance of PUJOL 100 even for just 500m2 per day

4. - SUPPLY, DELIVERY AND DESCRIPTION OF THE INSTALLATION.

4.1 Metallic structure

Built from our own original standardised designs but completely developed and adapted to the specific location needs of your factory.

The kiln module comprises a robust metal framework with braced steel of laminated profiles that lend greater soundness and strength allowing the structure to be self-supporting. Thus, the entire gas exhaust installation and heating device (with their electrical units) are anchored to it.

The exterior surface is steel and attached to it are the insulating refractory materials, resulting in a unit, which is very solid with a balanced design, and has an aesthetically pleasing outer appearance.

Due to the dimension of the kiln, it is delivered complete, with its own integrated bracing, reinforced vacuum beams & pipes, cooling registers, nozzle frames for the vacuum bags and corresponding parts for connecting to the exhaust pipes and special modules such as entrance and incorporated door mechanisms.

Once the entire structure has been assembled, a coat of anionic degreasing is applied to the sheet metal and a coat of anti-rust primer to both the inside and outside of the kiln.

The metallic sheets used in the internal face of the furnace are Fe+Zn++ fire protection coating. After this, or after completing the refractory assembly, we apply 2 coats of Gradur2-C industrial anti-corrosive paint for the external protection.

Door

Upper swindle Pneumatic hermetic Type.

Double way movement, with a high turning point at the final adjustment for an efficient heat-sealing,

Loading vacuum platforms:

The furnace is supplied with 4 re-enforced loading process platforms base over metallic wheels, ready to work up to 150 ºC without deformation and blocking the bearings and the rolling elements.

Hydraulic elevator Platform:

A special reinforced elevator to adjust different levels of working chambers of oven and parking of the Oven will be supply.

Elevator suitable to move elevation weight up to **2.300 Kg**.

Parking Station:

Pujol-100 System has been developed & studied thinking in optimize the needed personnel required in the Line operation and for optimize and reduce the death times need to load & unload the platforms, which usually are large.

As well, the System includes a **smart vacuum bag sealing** and open/close system, which:

1 Reduce the time to open & close the bags.
2 Minimize the risk of breakage and leakage of the big dimension bags.
3 Optimize the needed space in factory to storage the bags.

4.2 Insulation

General description

TRANS type by low thermal inertia. The metallic structure has an inner lining using"SUPER-LIGHT" refractory material is specially designed for high temperatures. These materials have high refractory properties, which absorb less heat than normal (dense) materials, and in turn act as good insulation given their low level density.

The inner walls of the treatment chamber are lined with different layers of ceramic fibres with a thickness of 50 + 10 mm that allows for a reducing the temperature gradient and minimising power consumption.

4.3 Heating System

The system consists of a Kanthal electrical wire LOW IR plates special designed to work in vacuum atmosphere an in the Black spectre of radiation at low temperatures.

Note: More Technical specifications in paragraph 1,1 Technical Data.

4.4 Equipment to regulate and control automatic Firing

General Description

All the equipment necessary for regulating and controlling is delivered completely wired and assembled in 1 sealed electrical cabinet (depending on the model). These are located and attached to one side of the kiln (following EC electromagnetic standards). Each cabinet measurement is: 800 x 600 x 500.

The following regulating and control automatism can be found inside and on the front:

- Master Switch with a safety device for disconnecting power.
- Start up and stop buttons for vacuum Pump.

- Automatic Electronic Control by Control Zone by means of Temperature Regulators, Emergency Disconnection Master Switch with visual and sound alarm.
- 1 Overheating Regulators independent from those that regulate the main process which control the temperature by means of 2 thermocouples, independent from those that regulate the main Zone control and cut off the mains supply to the control panel.
- double pyrometer tube (temperature probes) "K" type scale 20-1,500 º C. (for regulating the temperature of the process and as a safety measure against maximum overheating and for visualizing the final cooling curve)
- Electrical protection devices (transformer with galvanic insulation, magnetothermic and fuses).
- Relays and switches both for the power circuit and the start up control.

Visual and sound warning for the following failures:

- Excess or faulty temperature due to temperature change in the Process temperature that is in operation (4 independent alarms - 1 per Regulating Zone).
- Failure in the Vacuum pressure.
- Failure in the convection fan.
- Deviation or Excess Tº of the firing curve Programme & Deviation or Excess Pressure of the vacuum.

Visual signals for the process indicating the following:

- On tension.
- Bag Vacuum done.
- Chamber Vacuum done.
- Electrical Heating on working.
- Automatic/Manual mode.
- Automatic Cycle in operation.
- Cooling Cycle in operation.
- End of programme.
- All the electrical control and safety devices are manufactured in strict compliance with EC standards
- Control panel technical documentation and electrical installation (drawings and diagrams).
- Configurable electronic temperature MAIN Visual panel regulators, with microprocessor control.
- Configuration of the modulating elements regulation, P.I.D. parameters, Death band, etc.
- Visual and sound signals for end of process.

Pyrometric and Control devices

The processing variables: *"Temperature-time"* is governed by an Electronic Controller format from a SIEMENS – PLC control with a front interface monochrome "Touch screen of 10".

This controller allows the user to create up to 20 programmes from 200 free segments, to be divided in each free firing configuration as the user needs and creating 200 controlling points in only 1 program or 20 programs with up to 10 segments in each one.

• An extra *"watch dog"* controller works as a follower of the main controller to ensure if any temperature sensor fails or falls below the set parameter or an incorrect reading of temperature of the controller happens then it stops the machine immediately and returns the installation to the Zero point to ensure the correct function of the machine and to save it from destroying the product from over temperature.

• 16 **sensors Type "k**" thermocouples with a metallic Pythagoras cover, located along the kiln, to ensure daily uniformity control **+** additional thermocouple in the heating elements for Safety life according to CE standards

3.5 Assembly

The kiln leaves our factory workshops completely assembled (Structure and Refractory) and pre-wired. All that remains is a final *in-situ* coupling, electrical connection, assembly of the modules and definitive emplacement in the area where it will be used.

3.6 Commissioning

Our engineers will undertake the set up, commissioning and training.

Conditions of acceptance of the machine will be under Pujol Standard Protocol.

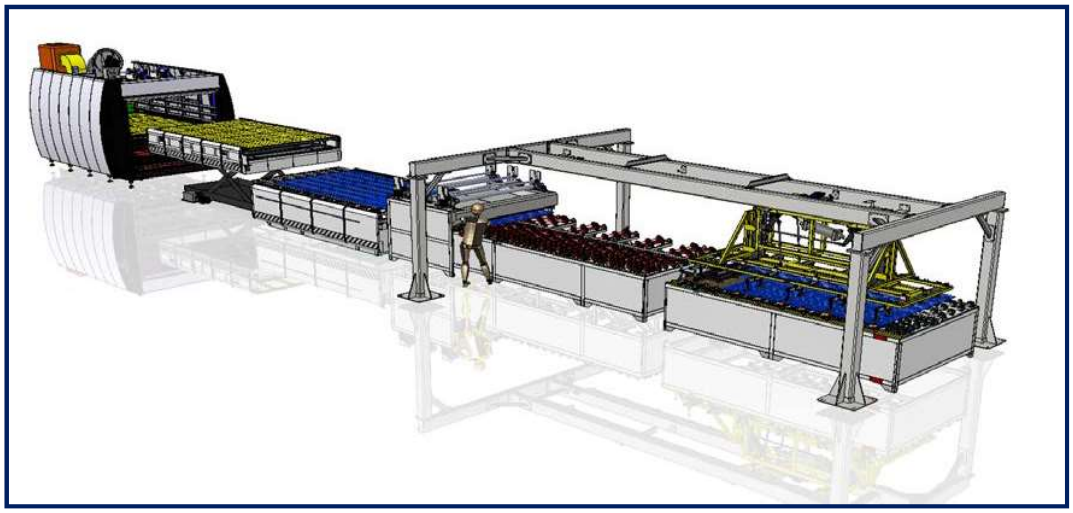
Firings as calibration test indicates (Full load & 10% load at 4+4 & 8+8) will be executed.

Is responsibility of customer to have the glass ready for full load calibration, in case that glass is not ready, machine will be understood accepted or customer will carry out all charges for additional travel of engineers for test full load acceptance.

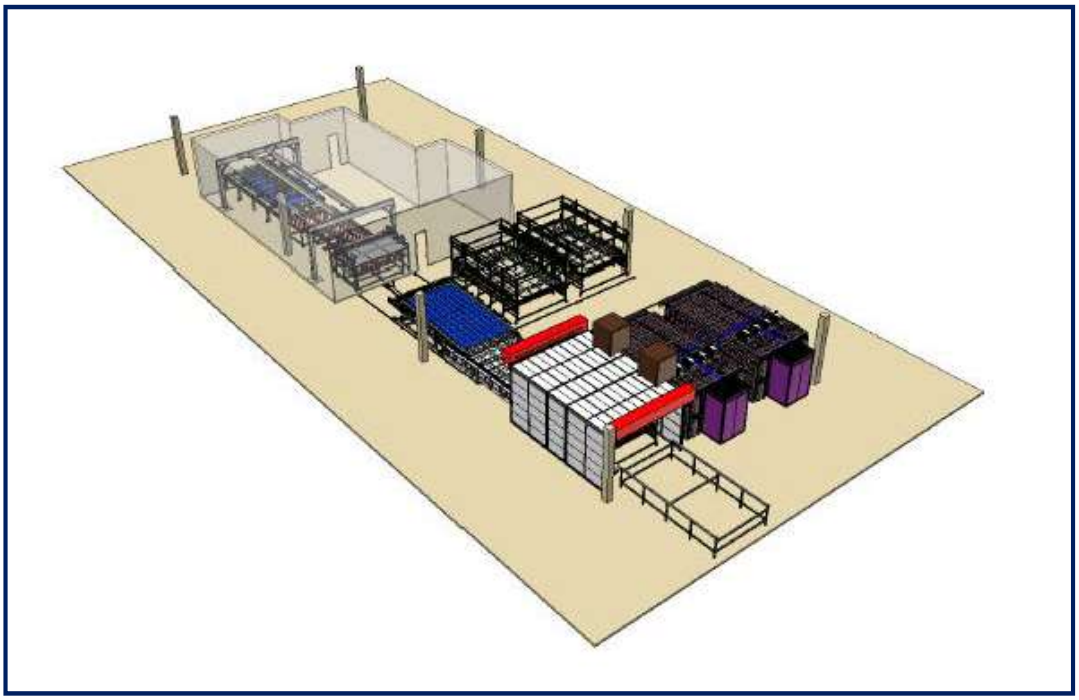
5. - ASSEMBLY FULL AUTOMATIC LINE

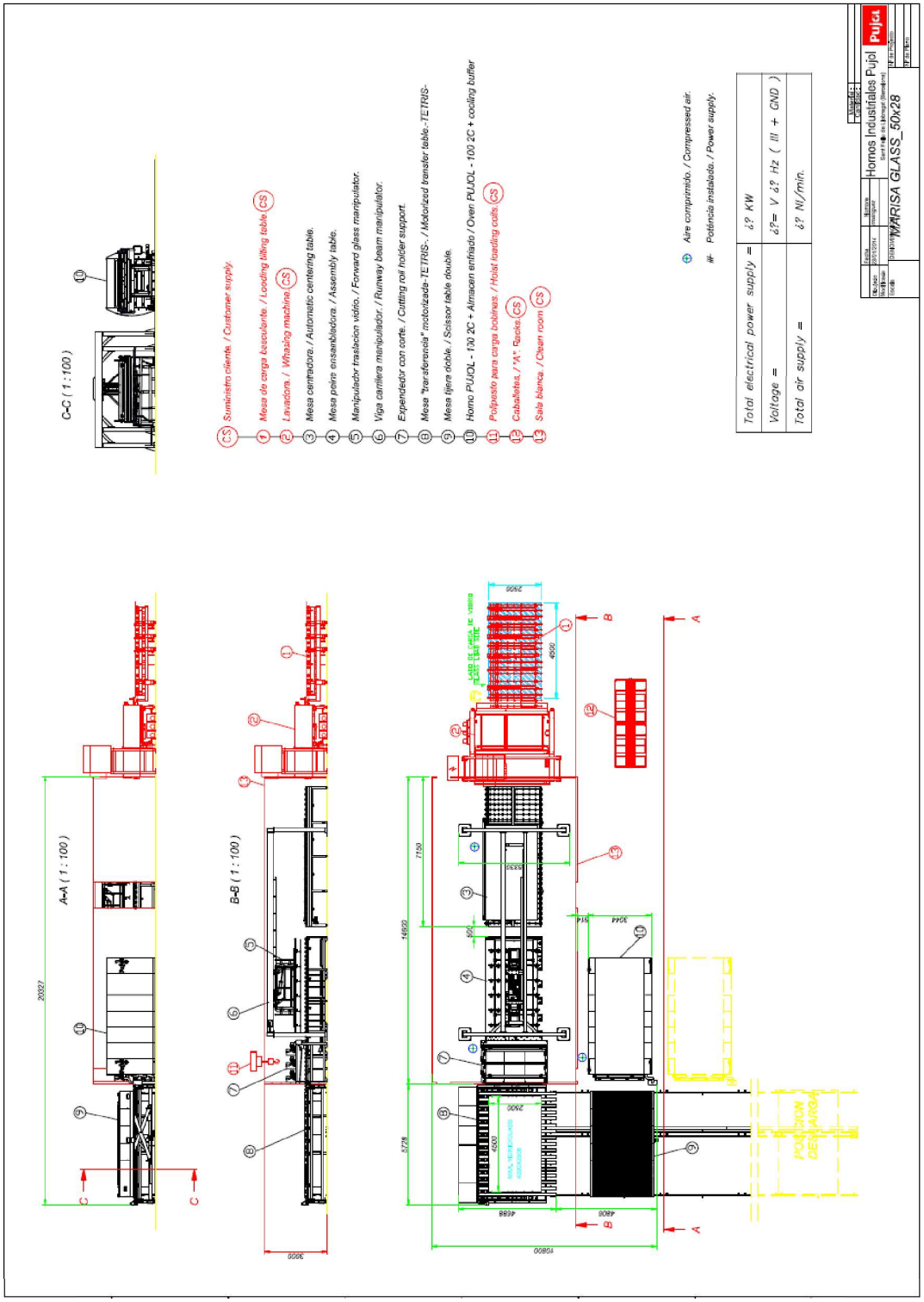
4.1 Parts & elements of the assembly line description

Type -2C

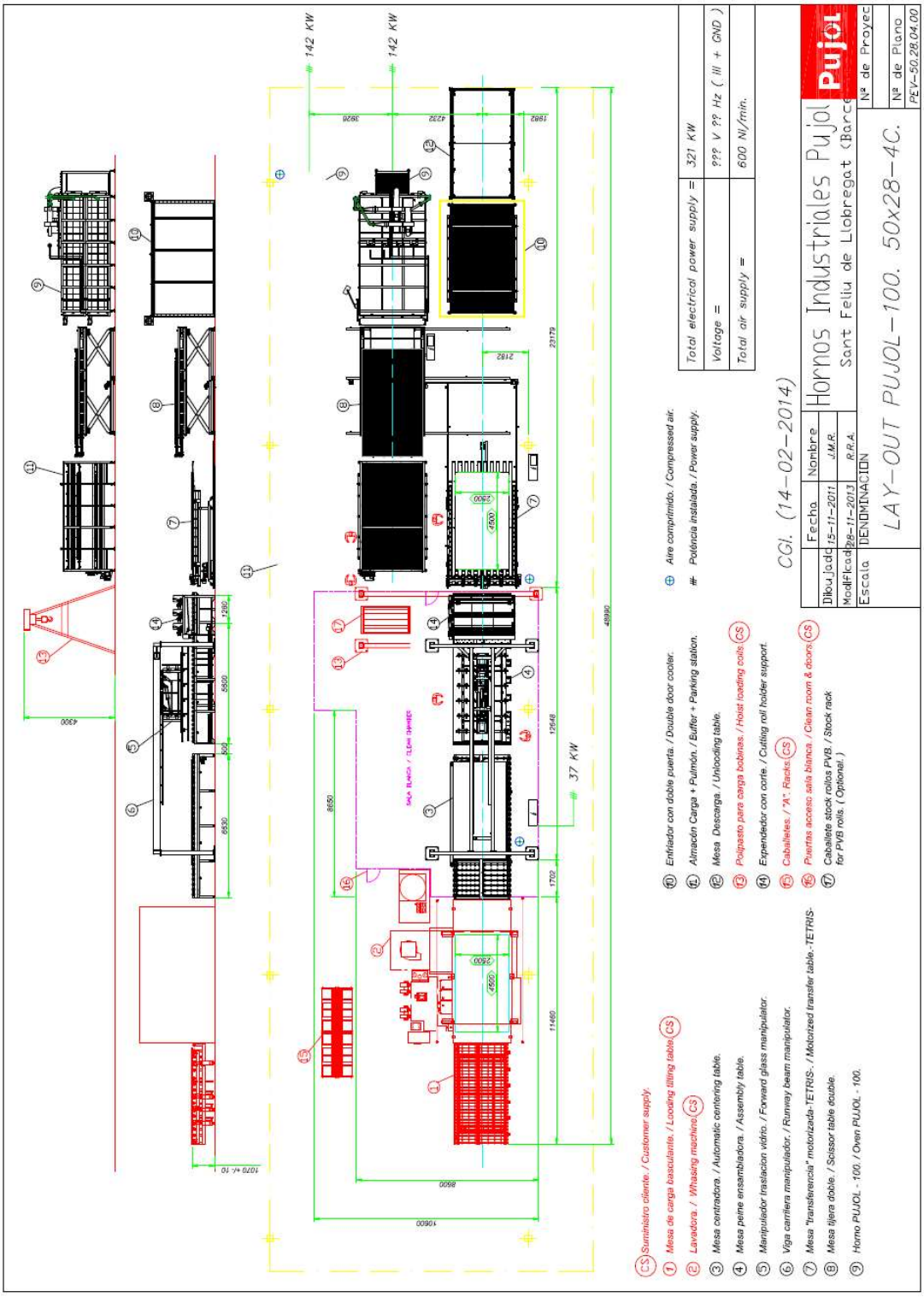


Type-4C:





Lay out PJ100- 5028.00.00/2C –U



Lay out PJ100 5028.00.00 /4C

4.2 Description of machinery and parts that composes the laminated assembly plan supplied by Pujol

Under Lay-out PEV-4024.02.00

Technical data schedule

Glass thickness	**2-19mm. Capacity of transport and assembly of laminated sheets of 19+19mm of maximum dimension.**
Maximum dimensions of the glass by model	**2100 x 3600 mm** **2500 x 3600 mm** **2500 x 4500 mm**
Minimum dimensions in automatic with adjustable suction cups	**800 x 250 mm**
Minimum dimensions in automatic	**800 x 800 mm**
Maximum thickness of the set of laminated pieces	**40 mm**
Production cadence	**0.2 m/min to 2 m/min**.
Installed power	**8 - 12 kW**
Voltage	**400 V III + T + N**
Required air consumption	**Compressor de 5 kW.**
Height of the work surface	**900 mm +- 20 mm**

Delivery items included according to Lay-outs:

Pos. 3 AUTOMATIC FEEDING TABLE:

It is composed by 2 rolling sections tables to be able to make the transfer glass from the reception station from washing machine to the assembly and inspection table.

First section is the accelerating variable speed section located just after the washing machine, is just a transfer table. Made of Polyamide wheels with a coating of transparent Polyurethane rubber. This material prevent from any spot of glass to scratch glass surface.

Second section is in fact the centring table by oblique transport in the way of movement. The table has an Automatic cell, stoppers and devices which autoamatically positions and centres the glass with a tolerance deviation of ± 0,3 mm.

Pos. 4:

Second table located after the first table is the final assembly and Inspection table.

Basically is the working table and Station, where full assembly, trimming and visual inspection is done. Is and adjustable wide table, to be able to work 2 persons at 2 sides of the glass and adjusting the size for an smart trimming job of the operators.

Pos. 5 & 6 VACUUM SUCKER SPIDER CRANE TRANSFER SYSTEM :

Double rail AUTOMATIC crane supply with vacuum suckers for loading big glass sizes from the reception table after washing machine up to the assembly & Inspection table.

The up & down movement is done by a Pneumatic – pump-jack which allows a soft and exact movement.

Sliding movement from table to table COPY is done fully Automatic.

Pos. 7 LOADING TRANFER TABLE –TETRIS:

Automatic Transfer table with lift open wheels to position glass over tilt table and transfer manually to the right/left position over the vacuum bag wants to be positioned.

The table rolls by motor-gear over floor rails from his loading reception position to his unloading position flying over the vacuum bag and the hydraulic lift position of the PUJOL-100System.

The transfer table is supplied with a pneumatic tilting system to tilt the glass and adjusted on his position over the vacuum bag before sliding powered by motorized rolls the glass and pull over the table to unload any size or thickness glass over vacuum bag.

Transference sequence

YOUTUBE VIDEO: http://youtu.be/pOo3isVr_aM

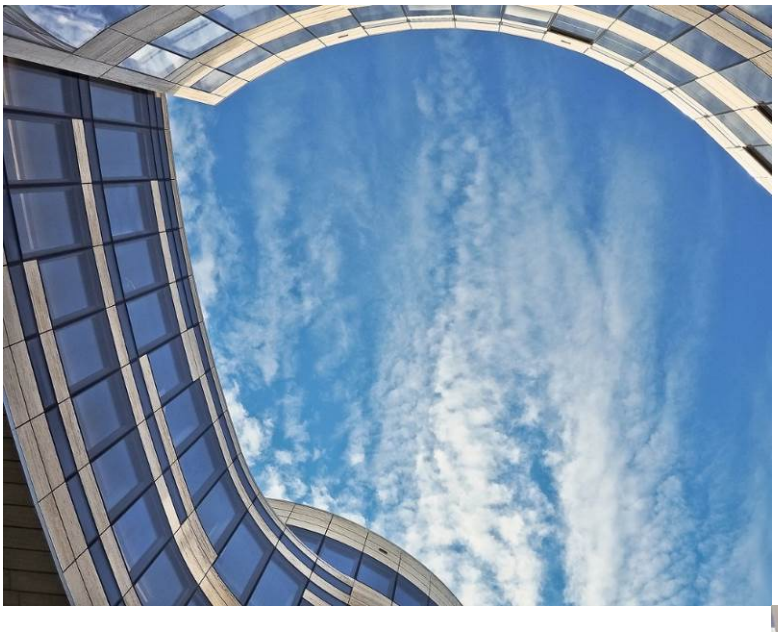
Pos. 8 WAGON – TRANSFER LOADING LIFT

Pos. 13 (optional) ELECTRIC ELEVATOR FOR LIFTING PVB ROLLS ON HIS WORKING POSITION

Pos. 14 CUTTING ROLL HOLDER SUPPORT

Cutting Roll-holder Support Table even for PVB or EVA. 3 POSTIONS / 3 independent rolls.

Available width of roller: 2.100 mm and max admissible length: 100 m. (other Major dimensions are under request) with motors for unrolling film (PVB or EVALAM) and roller winder of insertion. Blade for automatic EVA cutting.



PUJOL-100 PVB+ & FAST CURING SYSTEM

QUOTE

"OVEN & LINE FOR THE PRODUCTION OF LAMINATED GLASS"

Offer number	**O12981**		
Ref.	**409.10**	**Date:**	**17/ 06 / 2.019**
Our. Ref.	**PJL UK**	**Our Note:**	@/05/19

RAVENSBY

To the attention of **Hamish Ogilvie**

Address: **FLOWER ROAD WEST PITKERRO INDUSTRIAL ESTATE, DD5 3RU DUNDEE (UNITED KINGDOM)**

AUTOMATIC ASSEMBLY LINE OF LAMINATED EVA GLASS QUOTE

BY PUJOL-100 PVB+ & FAST CURING SYSTEM

"OVEN & LINE FOR THE PRODUCTION OF EVA LAMINATED GLASS"

Dear Sirs,

In response to your request, we are pleased to attach you the detail of our commercial offer of the **OVEN FOR PRODUCTION OF LAMINATED GLASS PUJOL-100 PVB+ & FAST CURING SYSTEM** for your consideration.

On behalf of the entire team of Hornos Pujol, we would like to express our sincere gratitude for the interest shown, as well as the confidence placed in our brand.

TABLE OF CONTENTS

1. WHO WE ARE

Hornos Pujol, is a fourth-generation company founded in 1911, consolidated worldwide in more than 90 countries as a company specialized in the sector of laminated glass and offering a complete 360º service based of ovens and complete laminating solutions, consumables, training, and Technical Assistance Service, covering all needs of our customers.

We have 2 own factories; First unit dedicated for Machinery and Complete Equipment for Laminate (Plant in Barcelona) and a 2nd one for EVA Film extrusion (Plant in A Coruña), we also have own Service & Commercial Office in Russia and Uruguay. The human team at PUJOL Group is made up of more than 70 highly qualified professionals who are dedicated to attending customers needs.

Our best guarantee and our greatest pride are the more than 3.000 satisfied customers who, in the last 15 years, have experienced our quality solutions and accompanied us in our growth and international expansion until reaching a turnover of over 16,000,000 euros and, at last, to achieve our motto**: "SINCE 1911 NO LIMITS IN GLASS CREATION"**

Jorge Pujol
CEO Hornos Pujol

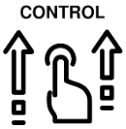
Laminate Machinery and Equipment Plant. (Barcelona)

EVA film extrusion plant. (A Coruña)

2.BASIC BENEFITS OF THE PRODUCT

Independent isolated work chambers, Maximum heat distribution and energy efficiency, resulting in ultra-fast work cycles and a very low specific energy cost per m2 of laminated glass.

Automatic rapid cooling system, thanks to a rapid distribution of cold air from the outside of the oven through a different series of high pressure fans located on the ovens back, in both Heating chamber & cooling Buffer.



UNIQUE Software control system which allows controlling all the segments of the process through monitoring complete cycle variables such as: Temperature / time / Vacuum ON-OFF / Vacuum Pressure / Cooling; segment by segment.

Distributed double-layer radiation system that is reinforced with an air homogenization convection equipment by impulse fans **"Pujol Impeler Convection System®",** this translates into a homogenization of the heat in the chamber of +/- 3 º C

Vacuum bag with fast closing vacuum bag of 2mm of easy and fast closing, avoids strong pressures in the edge that cause poor aeration defects plus optical distorsion but at the same time is durable due to its characteristics of resistance to elongation.

Repetitiveness of the process, thanks to the LCEVA System® which is a complete, sophisticated and precise automatic device that guarantees the different and demanding states of pressure inside the bag, in order to reach in the "ON" mode the perfect de aeration, as well as the best adhesion. In the "OFF" mode it is possible to avoid both the annoying optical distortions and the excesses of EVA at the edges.

Ergonomics designed for an optimal work of the operator in the factory thanks to the hydraulic platform

Energy savings thanks to faster cycles and software control that allows the oven to be automatically switched on at the desired time. Normally the delay Swicth ON control is used to start the cycle automatically without the presence of an operator at night or early morning with best electric rates or better loading optimization.

More information:
http://youtu.be/o6VVQVeteW4

3. DESCRIPTION AND CHARACTERISTICS OF THE INSTALLATION

- The **PUJOL-100 PVB + SYSTEM** has been developed and designed to help the client to work basically with layers of PVB without the need to install a heated room and have additional fixed operating costs, expensive NIPPER roll processes and inefficient air conditioning accessories for humidity control and temperature.

- When using **EVA** film, it works as a high-uniform convection oven for glass lamination according to the PUJOL-EVALAM FAST CURING System, all integrated in the assembly line for glass production. This makes it possible to reduce the cost of manufacturing and increase the quality of the laminate, allowing it to keep pace with the short cycle times of the Fast Curing System of Pujol.

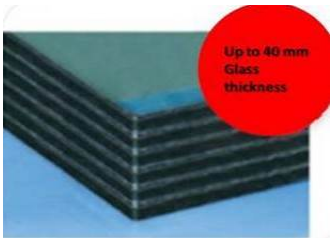
- Due to its high production and flexibility, it is possible, for example, to produce as much as 450 m2 of EVA Laminate glass per day(24H/ 3shifts) in a 50x28 oven; and more in the larger ovens. Therefore, it is possible to offer a rapid response to important and urgent orders, as well as small ones, improving the service and the final customer service.

System Overview

1 **Possibility of laminating with PVB / EVA**
2 System based on **double vacuum**, first and **only** in the market.
3 **Humidity and temperature control is not required** in both storage and / or treatment.
4 **Does not require** pre-laminated line: therefore, it is not necessary to pre-oven and calender system.
5 **Does not require** a large consumption compressor.
6 **There is no risk of explosion**, as there is with an autoclave.
7 **Reduction of costs** for energy efficiency, up to a reduction of 70% compared to traditional autoclave systems.

There is no additional energy cost for:

- High Power Transformer,
- Compressor.
- Pre-Laminate Lines (Heating Oven and Calender)
- Climate Control Assembly Room
- High volume heating and space by inertia of the Autoclave.



8 **Up to 40 mm. of thickness** in a piece or of several pieces of independent compositions, to full tray and up to 60mm in smaller glasses.
9 **High temperature uniformity system** using 96/150 (s / model) heating plates that radiate above and below the surface of the glass.
10 **Minor Area required in the factory**. The lines without calender are shorter than the autoclave systems and less space for loading / unloading the autoclave cars.
11 **The standby position and the double platform units optimize the process cycle time**. While half is processed in the kiln, the other half is discharged and loaded for the next cycle, reducing the introduction and extraction process and the LAM resumption process in the kiln to a few minutes.
12 **The costs of Lamination do not depend on the volume of production**, even if production decreases, the energy cost remains constant and linked only to what is produced.
13 **High production volumes with minimum personnel.**

4. OVEN

4.1 Metallic structure

- Completely finished and ready for easy location in the plant once the oven has been completed in our workshops. The oven is built on the basis of our own original designs that comply with current building standards, but also developed and adapted to the needs of plant location.
- The structure consists of sheet steel and is reinforced with profiles that provide a high level of strength and resistance. The outer casing is equipped with steel plates to support the anchoring of the refractory insulating elements, support materials, as well as the heating equipment. Resulting in a solid unit with a balanced design and pleasant appearance.

Finishing treatment:

- Once the entire structure has been assembled, an anionic degreaser layer is applied to the metal sheet and a layer of antioxidant primer both inside and outside the oven.
- After this, or after completing the refractory assembly, we apply 2 coats of industrial anticorrosive paint Gradur2-C for external protection.

Door

- Hermetic type with oscillating pneumatic closing movement.
- Double form of movement, with a high inflection point in the final adjustment for an efficient heat-sealing,

Loading vacuum platforms

- The furnace consists of 4 bases reinforced load platforms on metal bearings, designed to operate up to 150 ºC without deforming and without gripping the rolling elements.

4.2 Insulation

- The outer panels of the oven are covered with a very low density mineral fiber insulation, which can comfortably cope with the maximum working temperature. This provides a very low heat transfer coefficient, allowing for rapid heating times.

4.3 Fans

Heating areas

- 8 Units (4 + 4) ((50x28) depending on the model. High Volume Axial fans installed in the roof of each oven chamber to achieve a perfect temperature distribution and homogeneity.
- Thanks to the high volume and speed of the air flow through the heating chamber, a Jet-Stream effect is created that provides a high temperature uniformity in all glass pieces, which results in fast cycle times and high quality.
- A special design of blades located in the propeller, helps to obtain a high uniformity in the whole machine.

Cooling

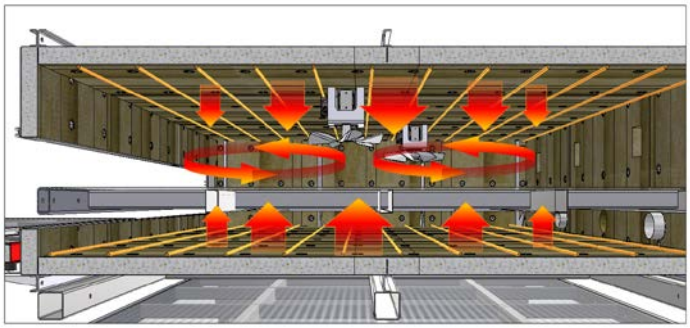
- 1 high pressure Centrifugal system and cooling flow to guarantee ultrashort oven cooling cycles.

4.4 Heating equipment

RADIATION + CONVECTION SYSTEM = FAST + LOW CONSUMPTION + EFFICIENCY.

Thanks to a studied system of Engineering; PUJOL offers its heating system DOUBLE DECK an exclusive and unique system in the lamination market that allows to have work chambers tray by tray.

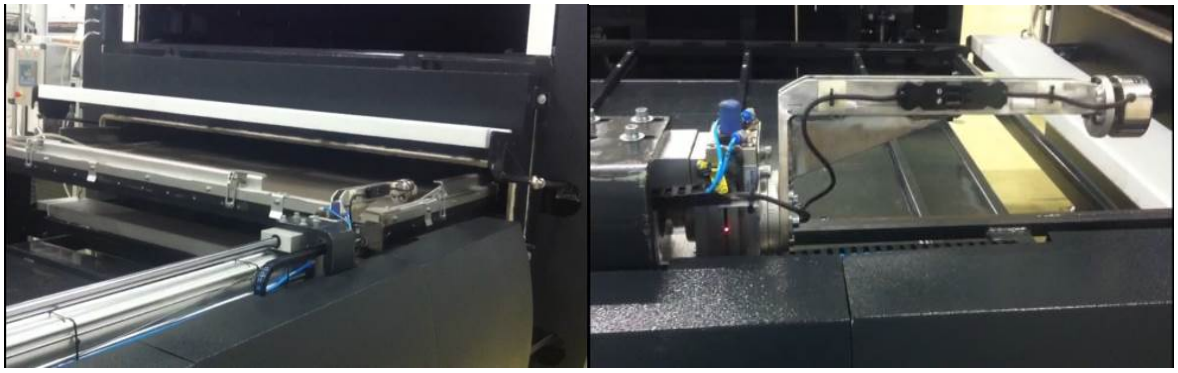
The oven is divided into independent chambers thermally isolated one by one, placing in the upper and lower layers of the tray and glass 2 + 2 independent groups of resistances according to "Kanthal" specifications located both above and below the vacuum bag and the glass, in a double uniform system of radiation. This offers to the users of PUJOL-100 PVB + system: ultra-short, Energy efficient and Low Consumption lamination cycles.



It is supplied conveniently assembled and prepared in the oven for easy connection between it and the control panel.

The double layer of uniform heating by radiation is reinforced by a convection homogenization system with high-flow upper agitation turbines, which allow to work up to 150ºC, uniformizing the temperature on the surface of the glass along its entire diagonal of the tray with ± 3ºC maximum or thermal dispersion, resulting in greater heat transmission to the load with shorter cycles and lower energy consumption per m2 produced

4.5. Automatic Movement Trays & Automatic Plug-in Vacuum System (OPTIONAL)



More information:
https://www.youtube.com/watch?v=3uQwJJ77Sk0

- In order to work in FAST CURING mode, the PUJOL-100 line ovens can be supplied with an automatic tray handling system and vacuum connection in each slot of the process. Thanks to this, a correct, fast and effective without risk of burns for the Operators is achieved.

- Supply includes:
  - Pneumatic arms pushers with rotating push heads and magnetic extruders on the frame of the trays.
  - Complete and adequate reinforcements of the Hydraulic Platform of the oven.
  - New Fairings Complete Protection Platform.
  - Encoder coupled in Platform for exact positioning of the height of the Platform.
  - Automatic vacuum suction cups placed in each work tray, as well as machined aluminium plates for coupling the vacuum cups and all the control equipment by electro-valves in each working slot of each tray. All electrical elements of wiring the System.

4.6. Automatic heating control and regulation equipment

- All the necessary equipment for regulation and control, is provided completely connected and mounted in a closed electrical cabinet. This is attached to the side of the oven (following CE electromagnetic standards).
- The following automatic regulation and control can be found inside and on the front:
  - Master switch with a safety mechanism to disconnect the power.
  - Buttons to start and stop the vacuum pump.
  - Automatic electronic control by zone control through temperature controllers and master switch-off of emergency with visual and audible alarm.
  - Overheating regulators independent of those that regulate the main system, controlling the temperature by means of double, independent thermocouples that regulate the control of the main areas.
  - 12 pyrometric rods (temperature probes) type PT100 scale 0-450º C. (to regulate the system temperature and as a safety measure for maximum superheat and to visualize the final cooling curve).
  - Electrical protection mechanisms (transformer with galvanic isolation, thermal magnet and fuses)
  - Relays and switches for the power circuit and start control.

Visual and sound warning for the following failures:

- Excessive or erroneous temperature due to the temperature change in the temperature of the system that is in operation (12 independent alarms - 1 per regulation zone).
- Failure in convection fans.
- Deviation or excess of temperature of the heating curve program.
- Deviation or lack of vacuum value.

Visual signals for the system that indicate:

- Connected voltage.
- Vacuum bag made.
- Camera vacuum made.
- Electric heating in operation.
- Automatic / manual mode.
- Automatic cycle in operation.
- Operating cooling cycle.
- End of the program.
- Configuration of the regulation of modular elements, parameters P.I.D, dead zone, etc.
- Visual and sound signals for the end of the process.

Pyrometric and control devices

- The system variables "Temperature-time vacuum-cooling events" are governed by an SIEMENS-PLC electronic controller format with 5.7 "color touch screen on the front interface.
- This controller allows the user to create up to 20 programs x 10 segments each to divide them into each automatic heating configuration as the user requires.
- An extra "Safety" controller works by following the main controller to ensure that no temperature sensor fails or the Power equipment does not break down by uncontrolled heating, stopping the machine immediately and returning the system to zero point to ensure correct function of the machine and to avoid possible deterioration of the product and the oven due to an excess of temperature.
- 12 thermocouple type PT100 sensors with a special vacuum cover, located in the whole oven, to ensure a uniform daily control, 4 additional thermocouple in the heat resistors for more safety, in accordance with the CE norms.

All electrical safety and control devices are manufactured in full compliance with CE standards.

4.7 Motorized Hydraulic Lift to lift the load

- Adjustable elevator, specially reinforced, to equalize the different levels of the furnace chambers, those of the parking rack of pre-vacuum cooling.
- The hydraulic lift is designed to lift 2.300 Kg. depending on model size & configuration.

4.8 Buffer racks of loading-unloading section, pre-vacuum and cooling period

- The system consists of two independent racks of Pre-Vacuum and Cooling, which have been designed to optimize the personnel required in the line, reducing the need for downtime for unloading, loading and cooling the trays and the licked glass.
- If the optional system is chosen, it also includes a AUTO PLUG IN vacuum auto-connector, and a pneumatic tray opening / closing system that:
- Reduces the time of opening and closing bags.
- Minimizes the risk of breakage and leakage of large dimensions bags.
- Optimizes the space required for storing bags at the factory.

4.9. Vacuum edge leakage control:

L.C.EVA System.

- A complete, sophisticated and precise automatic system that guarantees the different and demanding states of pressure inside the bag, in order to reach in the "ON" mode the perfect deaeration, as well as the best adhesion. In the "OFF" mode it is possible to avoid both the annoying optical distortions and the excesses of EVA at the edges.

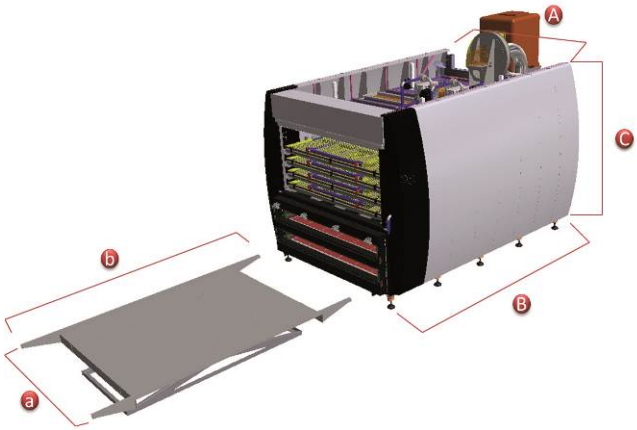
* Edge Leakage appearance at a 0,38 & 0,76 mm EVA thickness

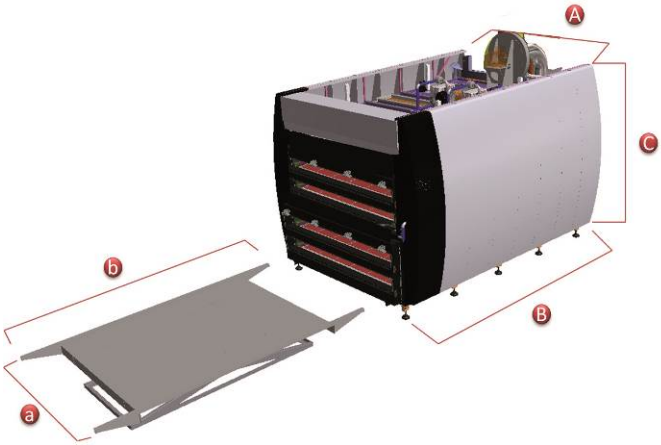
6. OVEN TYPE

6.1 General Technical Data

Batch type of	Close vacuum chamber
Heating media	Electrical
Models	2-C (Chambers)
Moving platforms / cars	On metal wheels
Working Temperature	PVB Process: 130 ÷ 145 ºC EVALAM Process: 80÷145 ºC
Maximum Temperature	150 ºC
Total Power Installed x Model	100 Kw. 50x28 /2C
Electrical Tension	380-410 v.III + N.- + E.-
Type of Heating Source	Black radiation plates of Low Radiation wave
Number of Heating Plates	240c Elements /2C
Type of atmosphere required	Double Vacuum Process

6.2 General dimensions of the installation





MODEL	A	B	C	a	b	Glass	kw
40x24-2C	3450	5800	3750	2400	4000	**3.6 x 2.1**	58
40x28-2C	3850	5800	3750	2800	4000	**3.6 x 2.5**	68
50x28-2C	3850	6800	3750	2800	5000	**4.5 x 2.5**	72

6.3 Production Rates Performance

MODEL 50x28

PVB TYPE CYCLE

Maximum dimension of glass: 4.5x2.5 m stackable up to 40mm.

		Type 2 + 2		Type 4 + 4	
	Cycle (min)	LOAD	PRODUCTION /24 Hrs	LOAD	PRODUCTION /24 Hrs
Mass		2.250 Kg	9,0 Tn.	4.500 Kg	18,0 Tn.
Glass 5+5	300	90 m^2	360 m^2	180 m^2	720 m^2
Glass 10+10	300	45 m^2	180 m^2	90 m^2	360 m^2

FAST CURING TYPE CYCLE

Maximum dimension of glass: 4.5x2.5 m without stacking.

		Type 2 + 2		Type 4 + 4	
	CICLO (min.)	LOAD	PRODUCTION /24 Hrs	LOAD	PRODUCCTION /24 Hrs
Glass 5+5	45 min.	22,5 m^2	650 m^2	45 m^2	1.300 m^2
Glass 10+10	90 min.	22,5 m^2	360 m^2	45 m^2	720 m^2

Production Datas are Bases in FULL CAPACITY of the Loading Tray working on 24 H/3shifts. A correction factor of 65-75% of Load Charge should be considered.

6. ASSEMBLY AND COMMISSIONING

6.1 Assembly

- The kiln leaves our factory workshops completely assembled (Structure and Refractory) and pre-wired. All that remains is a final *in-situ* coupling, electrical connection, assembly of the modules and definitive emplacement in the area where it will be used.

6.2 Commissioning

- Our engineers will undertake the set up, commissioning and training.
- Conditions of acceptance of the machine will be under Pujol Standard Protocol.
- Commissioning consists of: Full load & 10% load at 4+4 & 8+8.
- Is responsibility of customer to have the glass ready for commissioning firings, in case that glass is not ready, machine will be understood accepted, or customer will carry out all charges of additional travel of engineers to perform remaining tests.